

3 4982 00021129 1

US FISH & WILDLIFE SERVICE--ALASKA

ANNUAL NARRATIVE REPORT

Calendar Year 1991

IZEMBEK NATIONAL WILDLIFE REFUGE

Including Izembek, Unimak and Pavlof Units

SPEC
COLL

NARR
IZNWR
1991

IZEMBEK NATIONAL WILDLIFE REFUGE

Including
Izembek, Unimak and Pavlof Units

Cold Bay, Alaska 99571

ANNUAL NARRATIVE REPORT

Calendar Year 1991

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

Library
U.S. Fish & Wildlife Service
1011 E. Tudor Road
Anchorage, Alaska 99503

REVIEW AND APPROVALS

IZEMBEK NATIONAL WILDLIFE REFUGE

Cold Bay, Alaska

ANNUAL NARRATIVE REPORT

Calendar Year 1991

C. Fred Zeillemaker
Refuge Manager

4/10/92
Date

George M. Oosterbaan
Associate Manager

12/17/92
Date

Rouven W. Gould
Regional Office Approval

3/23/93
Date




INTRODUCTION

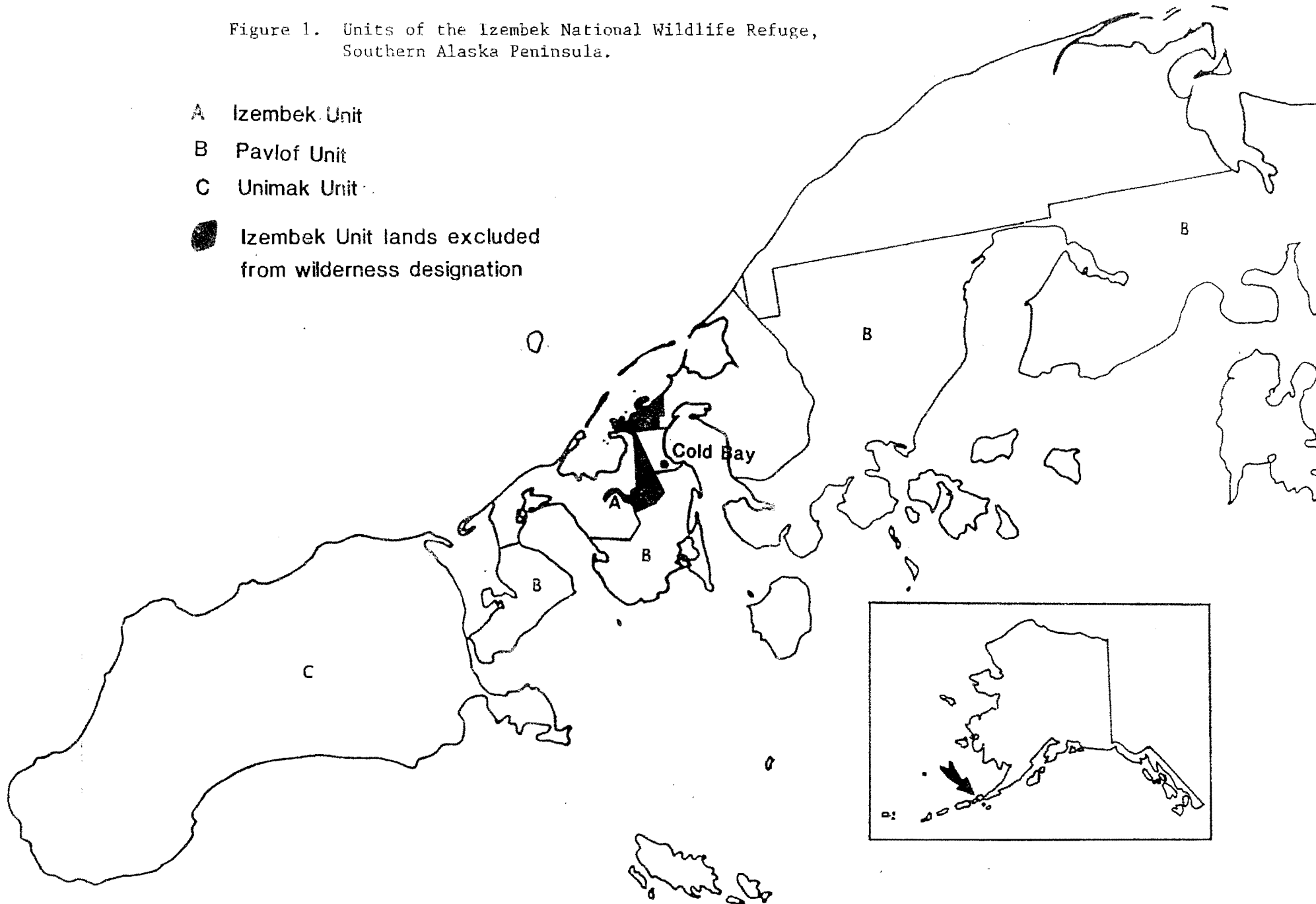
The Izembek National Wildlife Refuge, located near the tip of the Alaska Peninsula (Fig. 1), was originally established as the Izembek National Wildlife Range on December 6, 1960, by Public Land Order 2216. The Range contained 415,300 acres encompassing Izembek Lagoon and its entire watershed. With the 1980 passage of the Alaska National Interest Lands Conservation Act (ANILCA, Public Law 96-487), Izembek was redesignated a National Wildlife Refuge containing the 315,000 acre watershed surrounding Izembek Lagoon. Refuge purposes were redefined, and a 300,000 acre wilderness was designated. Through the 1988 Alaska Submerged Lands Act (Public Law 100-395), about 95,300 acres of the original refuge area were determined to be owned by the State of Alaska. The State had designated Izembek Lagoon as the Izembek State Game Refuge in 1972. Due to resource ties and logistical reasons, 989,000 acre Unimak Island, a component of the Alaska Maritime National Wildlife Refuge, and the 1.5 million acre Pavlof Unit, a component of the Alaska Peninsula National Wildlife Refuge, have been managed from the Izembek Refuge headquarters at Cold Bay since the early 1980's.

Although relatively small by Alaska standards, the Izembek Unit and Izembek Lagoon are critically important to wildlife. In 1986 the federal and state refuges were both designated a "Wetland of International Importance" by the Convention on Wetlands of International Importance Especially as Waterfowl Habitat. Though the designation in itself does not affect management or afford additional protection, it does document the United States' and the world's recognition that Izembek Lagoon and associated habitats are special habitats that we are committed to maintaining. Izembek Unit habitat is mainly ericaceous tundra interspersed with numerous lakes, ponds and streams. Dominant plants include crowberry (*Empetrum nigrum*), mountain cranberry (*Vaccinium vitis-idaea*), bluejoint grass (*Calamagrostis canadensis*), white cottongrass (*Eriophorum scheuchzeri*), reindeer moss (*Cladonia* spp.) sitka alder (*Alnus crispa*) and arctic willow (*Salix arctica*). Eelgrass (*Zostera marina*) dominates lagoon habitats and is critical to staging waterfowl. Unit elevations range from sea level to the 6,600 foot summit of Frosty Peak.

The habitat and physiography of the Unimak Island Unit is similar to that of the lower Peninsula, though somewhat impoverished. Several volcanos, some active, dominate the island's landscape with elevations in the unit ranging from sea level to the 9,372 foot summit of active Shishaldin Volcano. Extensive fairly recent lava flows dominate portions of the island. Shishaldin itself is a designated National Historic Landmark, as its easily recognized nearly perfect cone has guided seamen since the days of the Russian explorers and

Figure 1. Units of the Izembek National Wildlife Refuge,
Southern Alaska Peninsula.

- A Izembek Unit
- B Pavlof Unit
- C Unimak Unit
-  Izembek Unit lands excluded from wilderness designation



undoubtedly the Aleuts before them. False Pass, a fishing village of about 50 people at the eastern end of the island, is the only settlement within the unit. Two small military installations on the island's west end were abandoned prior to 1980. ANILCA established a 910,000 acre wilderness on Unimak Island.

The Alaska Peninsula National Wildlife Refuge was created by ANILCA. The exterior boundary of the Pavlof Unit encompasses about 1.5 million acres on the south side of the Alaska Peninsula from Port Moller to the tip of the Peninsula. Some of the unit's boundary is contiguous with the Izembek Unit boundary. Terrain of the unit is dominated by volcanic peaks and other mountains that form the "backbone" of the Alaska Peninsula. The Pavlof Unit has been extensively impacted by regional and village native corporation land selections under the 1971 Alaska Native Claims Settlement Act (ANCSA). Well over half the area has been conveyed to, or selected by, entitled native corporations and the State of Alaska. King Cove, with a population of about 650, is the only community within the Pavlof Unit. The village economy is based on commercial salmon, cod, halibut and crab fishing and related canning industry.

Interest to officially incorporate the Unimak Island and Pavlof units into Izembek Refuge resurfaced in 1991. The resulting action would involve a name change only and should not affect current refuge programs or operations. This change was originally proposed to be accomplished through the Alaska Omnibus Act, but it appeared late in the year that the effort would become a rider in other legislation.

Refuge headquarters are located at Cold Bay, a small community (156 people in 1990 census) adjacent to the refuge and inhabited largely by transient federal and state government employees and their families. The community is rather unique among villages of the lower Peninsula in that it lacks a fishing industry presence. Cold Bay was first settled in recent times by the U.S. Military during World War II. In excess of 20,000 troops were stationed at what was then called Fort Randall. Evidence of that presence is still apparent across the landscape. Cold Bay is served daily, except Sunday, by two regional airlines and serves as the transportation hub for three villages in the local area.

INTRODUCTION	Page
TABLE OF CONTENTS	i

A. <u>HIGHLIGHTS</u>	1
----------------------	---

B. <u>CLIMATIC CONDITIONS</u>	2
-------------------------------	---

C. LAND ACQUISITION

1. Fee Title.....	5
2. Easements.....	NTR
3. Other.....	NTR

D. PLANNING

1. Master Plan.....	5
2. Management Plan.....	5
3. Public Participation.....	NTR
4. Compliance with Environmental and Cultural Resource Mandates.....	NTR
5. Research and Investigations.....	6
6. Other.....	9

E. ADMINISTRATION

1. Personnel.....	10
2. Youth Programs.....	15
3. Other Manpower Programs.....	NTR
4. Volunteer Program.....	16
5. Funding.....	17
6. Safety.....	17
7. Technical Assistance.....	NTR
8. Other.....	19

F. HABITAT MANAGEMENT

1. General.....	20
2. Wetlands.....	21
3. Forests.....	NTR
4. Croplands.....	NTR
5. Grasslands.....	NTR
6. Other Habitats.....	22
7. Grazing.....	NTR
8. Haying.....	NTR
9. Fire Management.....	NTR

F. HABITAT MANAGEMENT (Cont.)

	<u>Page</u>
10. Pest Control.....	NTR
11. Water Rights.....	22
12. Wilderness and Special Areas.....	23
13. WPA Easement Monitoring.....	NTR

G. WILDLIFE

1. Wildlife Diversity.....	24
2. Endangered and/or Threatened Species.....	24
3. Waterfowl.....	24
4. Marsh and Water Birds.....	67
5. Shorebirds, Gulls, Terns and Allied Species.....	69
6. Raptors.....	69
7. Other Migratory Birds.....	70
8. Game Mammals.....	70
9. Marine Mammals.....	81
10. Other Resident Wildlife.....	82
11. Fisheries Resources.....	82
12. Wildlife Propagation and Stocking.....	NTR
13. Surplus Animal Disposal.....	NTR
14. Scientific Collections.....	83
15. Animal Control.....	NTR
16. Marking and Banding.....	83
17. Disease Prevention and Control.....	85

H. PUBLIC USE

1. General.....	86
2. Outdoor Classrooms - Students.....	NTR
3. Outdoor Classrooms - Teachers.....	NTR
4. Interpretive Foot Trails.....	NTR
5. Interpretive Tour Routes.....	88
6. Interpretive Exhibits/Demonstrations.....	88
7. Other Interpretive Programs.....	89
8. Hunting.....	89
9. Fishing.....	94
10. Trapping.....	95
11. Wildlife Observation.....	96
12. Other Wildlife Oriented Recreation.....	96
13. Camping.....	NTR
14. Picnicking.....	NTR
15. Off-Road Vehicling.....	97
16. Other Non-Wildlife Oriented Recreation.....	97
17. Law Enforcement.....	99
18. Cooperating Associations.....	NTR
19. Concessions.....	NTR

I. EQUIPMENT AND FACILITIES

	<u>Page</u>
1. New Construction.....	NTR
2. Rehabilitation.....	100
3. Major Maintenance.....	100
4. Equipment Utilization and Replacement.....	101
5. Communications Systems.....	104
6. Computer Systems.....	104
7. Energy Conservation.....	104
8. Other.....	104

J. OTHER ITEMS

	<u>Page</u>
1. Cooperative Programs.....	105
2. Other Economic Uses.....	NTR
3. Items of Interest.....	109
4. Credits.....	111

K. FEEDBACK

112

L. INFORMATION PACKET - - - (inside back cover)



Alpenglow on Aghileen Pinnacles as viewed from
refuge headquarters.
December 1991

CFZ

A. HIGHLIGHTS

- Alaska Department of Fish and Game, University of Alaska Cooperative Wildlife Research Unit, and refuge staff continued efforts to understand the decline of the Southern Alaska Peninsula Caribou Herd. (Sections D.5 and G.8)
- Changing of the guard! Refuge Manager Robin West departed for the regional Migratory Bird Coordinator position in Anchorage and Fred Zeillemaker became Izembek's fourth Refuge Manager. (Section E.1)
- Maintenance Worker Schulmeister received an Award of Valor from Secretary of the Interior Manuel Lujan. (Section E.1)
- A cadre of international biologists descended on the refuge to study and exchange information on the Pacific black brant. Representatives from Canada, Japan, Mexico, the (then) Soviet Union, and the United States participated. (Sections G.3 and J.3)
- Pacific black brant and emperor goose productivity counts were conducted for the 29th and 25th consecutive years, respectively. (Section G.3)
- Wildlife Biologist/Pilot Chris Dau participated in his 11th consecutive year of the Spring emperor goose survey and 3rd consecutive year of the statewide breeding pairs survey. (Section G.3)
- Westdahl Volcano on Unimak Island spectacularly roared back to life in November, but eruption activity fizzled by the end of the year. (Section J.3)

B. CLIMATIC CONDITIONS

What will you remember most about Cold Bay? Anyone who's been here will likely say one thing, "wind." And it isn't any wonder. Cold Bay is unique for many things, not the least of which is the wind. The average daily wind speed is a brisk 16.9 mph. Add to that regular monthly blows of sustained winds in excess of 50 mph, and you have an area that people remember.

The next aspect of Cold Bay weather most visitors are likely to notice is the ever-present cloud cover. Eighty to 100% cloud cover, constituting a cloudy day in the eyes of the National Weather Service, is very typical for this area. Days with 0 to 30% cloud cover are considered clear, while 40 to 70% is classified as partly cloudy. Nineteen ninety-one was very near the "average" year in terms of cloud cover. Twelve days were classified as clear, 50 as partly cloudy, and the remaining 303 were cloudy. Thirty year averages for clear, partly cloudy and cloudy days are 12.1, 49.4 and 303.8, respectively.

The other weather feature sticking in the minds of residents and visitors is the rain. Although this area only receives an average of 35.01" annually, it sometimes seems as if it is raining or at least misting all of the time. In fact, we received measurable precipitation ($\geq .01$ ") on 250 days in 1991, amounting to a 39.37" total. Small peaks in precipitation occur in late fall and in the spring, but large amounts at any given time are rare.

Mild temperatures in both summer and winter round out Cold Bay's noticeable climatic quirks. All-time extremes are recorded at $+78^{\circ}$ F and -13° F. The high temperature for 1991 was a balmy 70° F on the Fourth of July, one of our few clear days as well. The low bottomed out at -5° F during February, typically our coldest month. The average annual temperature of 37.9° F was surpassed in 1991 by 1.2° , bringing our annual temperature average to 39.1° F for the year. Weather data for 1991 is summarized in Table 1.

Birds and mammals, which call the lower Alaska Peninsula home for all or part of each year, thrive at varying levels of abundance. Adaptations provide them the characteristics and behaviors necessary to prosper in conditions modern man views as inhospitable. Pacific brant and Taverner's Canada geese, our two primary fall migrants, make important survival-related use of the cyclonic lows we hide from. From 9 November through the end of the month, the two species picked storms of suitable intensity to give them supportive tail-winds along portions of their flights to Mexico and the west coast of the United States. Other local animals exhibit similar, albeit less dramatic, behavioral adaptations with respect to migration (or Annual Leave) largely dictated by the local climate.

A rather unique, somewhat weather related, event gave the residents of Cold Bay a seldom seen glimpse of the Northern Lights on 21 October. Cloud cover keeps the Aurora hidden from lower Alaska Peninsula residents most of the time. While the event is often taken for granted in most parts of Alaska, it was indeed a special treat for the residents of Cold Bay. Even after 11 years here, Wildlife Biologist/Pilot Dau was heard to remark that the event was a Cold Bay "first" for him.



A brant's eye view of snow covered Cold Bay with the refuge headquarters at rear center adjacent to the shore.
December 1991

CFZ

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

	TEMPERATURE (F ^o)			PRECIPITATION (INCHES)			WINDS (MPH)		
Month	High	Low	Average (Deviation)	Amount (Deviation)	#Days (≥.01)	Average	1-Minute*	Gust	
January	45	10	31.1 (+2.8)	2.74 (+0.04)	18	20.1	49	60	
February	50	-5	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	53	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	54	
December	45	8	29.7 (+0.2)	3.32 (+0.47)	24	18.0	45	61	
<hr/>									
\bar{X} = 39.1 (+1.2)			39.37 (+4.36)	250	17.0				

* Greatest sustained wind for a 1-minute period.

C. LAND ACQUISITION

1. Fee Title

Two parcels of excess Federal Aviation Administration land totalling about 1300 acres continue to await transfer to the refuge. The 1270.4 acre parcel is located in the vicinity of the VORTAC site north of Cold Bay. The 25.83 acre parcel is near the World War II incinerator building south of town.

The Nelson Lagoon and Paulooff Harbor corporations remain underselected by 3728 and 1815 acres, respectively, as a result of the Submerged Lands Act. Additional selections to fulfill the Alaska Native Claims Settlement Act (ANCSA) entitlements of these village corporations could theoretically come from existing refuge lands. The Division of Realty has notified the refuge staff that selections to meet the ANCSA entitlements must come from the original deficiency withdrawals made by the Secretary of Interior.

No action was taken on the Nelson Lagoon Corporation's proposed land exchange involving the Kudobin Islands.

D. PLANNING

1. Master Plan

The Izembek National Wildlife Refuge (NWR) Comprehensive Conservation Plan (CCP), mandated by the Alaska National Interest Lands Conservation Act (ANILCA), was completed in 1985. The Izembek Unit is managed under that plan, but currently the Unimak Unit is managed under the Alaska Maritime NWR CCP and the Pavlof Unit is managed under the Alaska Peninsula NWR CCP. Late in the year, refuge and Regional Resource Support (planning) staff agreed to begin the task of combining the appropriate portions of the three plans into a single Izembek NWR CCP. It has been proposed that the Unimak Island Unit and the Pavlof Unit be officially incorporated into the Izembek NWR, however, the necessary legislation to complete the transfer awaits Congressional introduction.

2. Management Plan

Work continued on the Izembek Refuge Fisheries Management Plan throughout 1991. A first draft was received for comment from the Kenai Fisheries Assistance Office in January. Comments were provided on a second draft in November, which is where the plan stands at year's end.

The refuge Automated Data Processing Plan was completed during the year. The plan outlines the needs and priorities for acquiring computer equipment for the station.

The station Safety Plan was revised and approved in 1991.

5. Research and Investigations

Refuge personnel are routinely involved in a number of investigations and surveys which many of us in refuges call "little r" research. Results of studies, surveys and everyday investigations are detailed under the appropriate headings in Section G Wildlife.

Izembek NR83- "Autumn Staging Ecology of Russian, Canadian and Alaskan Pacific Brant at Izembek Lagoon, Alaska"

Personnel from the Alaska Fish and Wildlife Research Center (AFWRC) continued their fall work on brant at Izembek Lagoon in 1991. Efforts included observing and reading color tarsus bands from various colonies to determine arrival dates, departure dates and diurnal movements within the lagoon. These observations will hopefully also be of use in estimating survival rates. AFWRC personnel opportunistically read 1850 tarsus bands, of which most were unique codes (i.e., not a previously observed individual). They also made extensive contributions to refuge efforts to collect annual production data for brant and emperor geese. See Section G.3 **Waterfowl** for details.

Izembek NR83- "Survival and Migration Ecology of Emperor Geese along the Alaska Peninsula"

This continuing AFWRC project, with support and/or cooperative aerial surveys from Migratory Bird Management (MBM), Alaska Peninsula/Becharof NWR Complex and Izembek NWR staffs, includes three to four camps each spring and fall and intensive efforts to observe and read codes on collared emperor geese. Estimated survival between various survey periods results, and preliminary data suggest that over-winter survival of juveniles may be as low as 20 percent (versus 60 percent for adults). Data are also collected on migration phenology and habitat use, including site fidelity, at key staging lagoons. In 1991, Izembek Refuge staff assisted with logistic and aerial survey efforts and a field site at Nelson Lagoon. Two winter, two spring and three fall aerial surveys were accomplished in support of this project. Migratory Bird Management-North performed additional spring and fall surveys and MBM Regional Office personnel supplied productivity data from aerial photography.

Izembek NR84- "Brown Bear Habitat and Movements on the Lower Alaska Peninsula"

In addition to annual fall population size and composition trend surveys (see Section G.8 **Brown Bear**), the refuge staff has performed in-depth evaluations of bear biology utilizing radio telemetry. Two such projects have been undertaken and analyzed. The most recent study will be submitted for publication in 1992. The abstract reads:

From August 1984 to March 1988, 36 radio-collared brown bears (Ursus arctos) marked in 1984 and 1985 were tracked using aircraft to determine seasonal distribution and habitat use. This high density bear population is potentially vulnerable due to varied land ownership patterns, management strategies and increasing public use. Marked bears were located 433 times within a 2002 km² study area on and adjacent to the Izembek National Wildlife Refuge, Alaska. Habitat type was identified at 301 (69.3%) marked bear locations. From May through November, 67% of bear locations were in lowland habitats versus 20% in midland and 13% in upland habitats. Dense alders (Alnus spp.) provided day-bed and escape cover. During the non-denning period, food availability restricted most bears to lowlands and coastal beaches near anadromous fish streams. Elevation, aspect and bear density were determined at 48 dens of marked bears. Uplands usually above 300 m in elevation were preferred for denning. Home range of marked bears averaged 19 km² for males, 12 km² for non-maternal females and 9 km² for 17 maternal females. These small home ranges indicated that all necessary food and habitat requirements were present in a small geographic area.

Izembek NR90 - "Range Ecology and Population Limitation of the Southern Alaska Peninsula Caribou Herd"

A cooperative investigation between Izembek Refuge, the Alaska Department of Fish and Game (ADF&G) and the Alaska Cooperative Wildlife Research Unit to investigate the continuing decline of the Southern Alaska Peninsula Caribou Herd (SAPCH) was continued in 1991. Eric Post, the principal investigator under the direction of Dr. David Klein, visited the area in May, June, July and December in attempts to determine the relationship between qualitative and quantitative characteristics of range vegetation and body size, reproductive success, adult cow and calf survival, and parturition dates in the herd. Field work is to continue through 1992, with annual progress reports in June 1992 and June 1993, and a final product in December 1994.

Field work was initiated in 1991 in the Caribou River area near the Pavlof Unit. Eric and assistant Pernille Boving, a graduate student from Denmark, worked primarily with the distribution, abundance and biomass of forage types. Both assisted with spring aerial surveys of the Pavlof Unit and adjacent lowlands to assess the distribution of caribou prior to and during the calving period. They also spent a short time in the Black Hills area during the post-calving period where herd composition and behavioral observations were made. Floral comparison between this, the primary calving area, and calving areas in the Caribou river area were also accomplished.

In December, Eric and Pernille returned to begin investigating winter range use and floral species composition and distribution. Vegetative samples were collected, as were fecal and urine samples for later analysis. Attempts were also made to collect lower jaws and rumen samples from caribou harvested near Cold Bay. Further information on this project and other aspects of caribou work conducted by refuge and ADF&G staffs can be found in Section G.8 Caribou.



Eric Post and Pernille Boving discuss the caribou project with ARM Chase at the field camp on the Caribou River.
July 1991

CPD

Izembek NR90 - "Pacific Brant Migration Related to Climate"

Wildlife Biologist/Pilot Dau published a manuscript in Wildfowl magazine dealing with brant migration in relation to weather conditions at the time of departure. Brant depart Izembek Lagoon en masse normally at night with strong northwesterly tail winds generated by anticyclonic weather systems. The trans-oceanic flight to Pacific Coast wintering areas, primarily in Mexico, is probably nonstop. Estimated routes of flight were determined using weather charts on which wind speeds and direction are indicated. The short duration fall migration from Izembek Lagoon is apparently energetically costly as indicated by body weight losses.

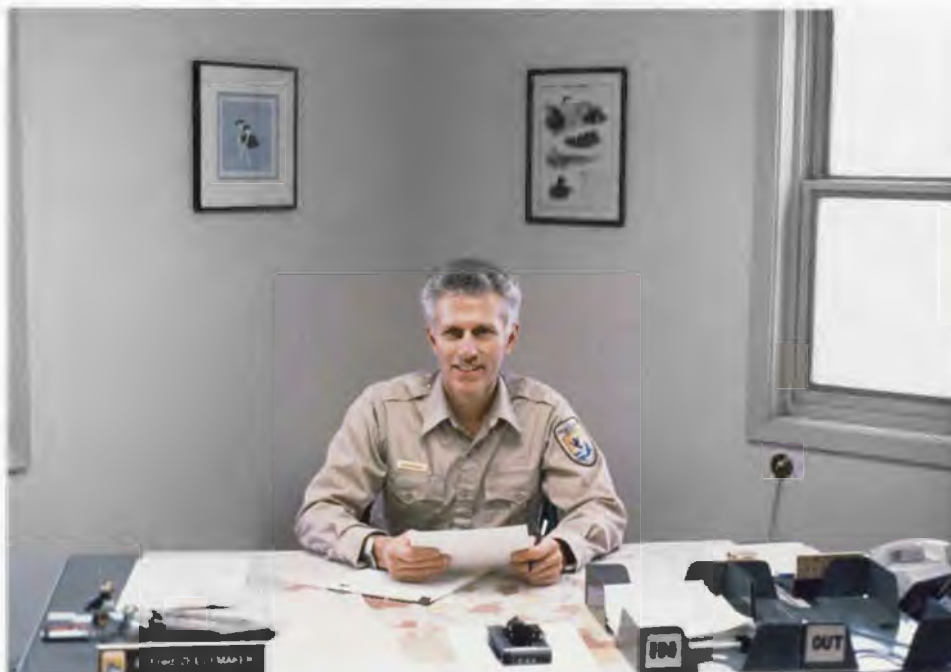
6. Other

Work began on the Southern Alaska Peninsula Caribou Herd Management Plan this year. The plan is an effort to identify population goals and management strategies to guide both the refuge and ADF&G staffs in managing the SAPCH. Additionally, the plan compiles the historic population, harvest and research information on the SAPCH into a single document.

Refuge staff participated in the review of the Pacific Black Brant Management Plan this year. Although we disagreed with the proposal to reduce the population goal by 20,000 birds, the revision was necessary to bring the 10 year old plan up-to-date.

The Public Hearing Draft of the Aleutians East Coastal Resource Service Area was received and commented on in 1991. Refuge staff coordinated with the Anchorage Fish & Wildlife Enhancement Field Station to be certain that FWS concerns were considered. The plan is an effort to achieve harmony in resource management among Federal, State and Native landowners in the area from Port Moller to False Pass.

Refuge and King Salmon Fisheries Assistance Office (KSFAO) staffs commented on the 1991 Russell Creek Hatchery Operations Plan. After expressing our concern over the potential impacts of the hatchery practices on native stocks, ADF&G agreed to allow Service staff to review the annual management plan for the hatchery. Cooperation on the local level has been good and progress continues.

E. ADMINISTRATION**1. Personnel****RM Fred Zeillemaker****MAC****Former RM Robin West****MAC**



ARM Mark Chase

B. Batten (PAO)



ROS Julie Chase

RLW



WB/P Christian P. Dau

MAC



MW Robert P. Schulmeister

MAC

PERSONNEL

1a. Robin L. West	Refuge Manger GS-0485-12, PFT	09/12/88-08/25/91
1b. C. Fred Zeillemaker	Refuge Manager GS-0485-12, PFT	11/17/91-Present
2. Mark A. Chase	Asst. Refuge Manager GS-0485-11, PFT	05/07/89-Present
3. Julie E. Chase	Refuge Ops. Specialist GS-0485-7, PFT	10/07/90-Present
4. Christian P. Dau	WL. Biologist/Pilot GS-0486-12, PFT	01/30/81-Present
5a. Thomas Morey	Maintenance Worker WG-4749-8, PFT	01/29/89-02/10/91
5b. Robert Schulmeister	Maintenance Worker WG-4749-8, PFT	02/10/91-Present
6. Donna Christensen	Secretary (Typing) GS-0318-5	07/01/90-10/12/91
7. Fred Vega	YCC Enrollee	06/03/91-07/26/91
8. Chris Vega	YCC Enrollee	06/03/91-07/26/91

A number of personnel changes occurred during 1991. By year's end, the station had a new manager, a new maintenance worker, an additional permanent full time position, and no secretary.

Following a lengthy detail in the position, Refuge Manager West transferred into the Regional Office in August to assume the duties of the Migratory Bird Coordinator (MBC). Robin had been acting MBC from 3 December 1990 through 7 May 1991.

C. Fred Zeillemaker became Izembek's fourth Refuge Manager in November. Fred transferred from the Deputy Associate Manager position for Idaho/Oregon/Washington refuges in Region 1.

Assistant Refuge Manager Mark Chase served as Acting Refuge Manager from the beginning of the year through 7 May and from 25 August through 16 November 1991.

A maintenance worker job swap between Izembek NWR and the Aleutian Islands Unit, Alaska Maritime NWR, was completed in February. Izembek NWR Maintenance Worker Tom Morey transferred

to Adak and Aleutian Islands Unit Maintenance Worker Bob Schulmeister simultaneously transferred to Cold Bay.

Maintenance Worker Schulmeister received an award from Secretary of the Interior Lujan in Washington, D.C., on 8 May. Bob and Marcia Macone of the Alaska Maritime Refuge were rewarded for risking personal danger while rescuing a man from a burning vessel at Dutch Harbor in 1990. The Regional news release detailing the award follows Section K.



Bob Schulmeister, Izembek Refuge; Constance Harriman, Assistant Secretary; Manuel Lujan, Jr., Secretary of the Interior; and Marcia Macone, Alaska Maritime Refuge, in Washington, DC.
08MAY91

USDI Photo

Refuge Operations Specialist Julie Chase was converted to Permanent Full Time from a Permanent Intermittent appointment on 6 October 1991.

Refuge Secretary Donna Christensen transferred to the Arctic NWR in Fairbanks on 13 October. Donna's husband accepted a transfer to the Fairbanks Federal Aviation Administration office and Donna was able to transfer into a Budget Assistant position at the refuge. At the end of 1991, no replacement had been found for our vacant Secretary position.

The Izembek NWR five year staffing summary is indicated in Table 2.

Table 2. Izembek NWR five Year Staffing Pattern, 1988-1992.

	PFT	PPT	PI	Temporary	Total FTE's
FY-1988	5	-	-	2 (YCC)	5
FY-1989	5	-	-	2 (YCC)	5
FY-1990	5	-	-	-	5
FY-1991	5	-	1	2 (YCC)	5.5
FY-1992	6	-	-	?	6

2. Youth Programs

Two local youths participated in the 1991 Youth Conservation Corps (YCC) program at Izembek NWR. Fred and Chris Vega of Cold Bay assisted the refuge staff in a variety of programs during the eight week program from 3 June through 26 July.

Fred and Chris accomplished a great deal in spite of the postponement of the large Maintenance Management System (MMS) projects we had planned for them to work on. Over the eight weeks, Fred and Chris painted the bunkhouse interior; painted the arctic entries on residences 1, 2 and 3; replaced the road reflectors along the Grant Point road; assembled the L.C. Haney Company billboard signs; helped remove the old Blinn Lake floatplane support building; and assisted in a variety of other tasks around the refuge and headquarters.

The highlight of the program for the enrollees came during the final week when Fred and Chris assisted refuge staff with tundra swan banding. This experience provided floatplane rides, use of small inflatable boats, a chance to handle the swans and an opportunity see a few brown bears up close.

Both enrollees, along with the regular refuge staff, received cardio-pulmonary resuscitation (CPR), First Aid, bear safety and boating safety instruction.



Fred and Chris Vega, 1991 YCC enrollees.
JUNE 1991

MAC

4. Volunteer Programs

The Izembek volunteer program is typically limited to one or two local residents each year, usually spouses of refuge employees. Although we invariably have plenty of work to keep a volunteer busy year-round, the logistics of travel and lodging precludes the use of many non-local people.

In 1991, we had two contacts willing to donate their time, one that fit the "profile" and one that did not. Shannon West, wife of then manager Robin West, assisted in swan banding during a critical period of shorthanded refuge staff. Shannon donated a day to band swans, which resulted in seven banded birds.

Dominik Heilbronner, a university student from Stein, Germany, was the second volunteer. Nick had spent the summer touring Alaska and ended up in False Pass visiting some friends. He contacted the refuge and offered his services to assist in any biological work we might have. As it turned out, the AFWRC folks were in town and they can always use a willing biologist to assist with the brant project. Nick donated over 200 hours in August and September to collecting field data. Details of the brant project are discussed in Section G.3 **Brant**.

5. Funding

Fiscal Year (FY) 1991 funding was the highest in refuge history. FY-1992 funding was somewhat reduced from the record level, but funding remained sufficient for the entire calendar year. The refuge five year funding summary is included in Table 3.

The refuge received a substantial share of the MMS funds in FY-1991. This source of additional dollars has been critical in our effort to maintain 30+ year-old facilities. With the MMS funds, the refuge was able to repair the floatplane dock, replace old vehicle bridges, repair the hangar door, repair the leaking hangar roof and accomplish some refuge road maintenance. Project details are contained in Section I.

Table 3. Izembek NWR five Year Funding Summary, 1988-1992.

(x000)	1260	1411	8610	TOTALS*
FY-1988	442	0	0	442
FY-1989	478	0	28	478
FY-1990	428 ¹	0	47	428
FY-1991	580 ²	0	33	580
FY-1992	532 ³	2	20	532

* - Totals exclude 8610 (quarters maintenance) funds

¹ - Includes \$4,000 earmarked MMS funds

² - Includes \$76,000 earmarked MMS funds

³ - Includes \$37,000 earmarked MMS funds

6. Safety

One lost time accident/injury was sustained by a refuge staff member in 1991. Secretary Donna Christensen aggravated a back problem while performing, of all things, CPR and First Aid Training. Donna was sidelined for nearly a month before she could return to duty.

An accident involving three AFWRC personnel and a refuge vehicle occurred on 25 October. The AFWRC folks were at Cold Bay for continuing brant studies and were travelling to observation sites when the vehicle apparently began to fish-tail on the gravel road, slid over the edge of the roadway and

rolled over down a two foot embankment. Thankfully, no one was injured, but the vehicle sustained damages beyond economic repair.



Refuge vehicle following a roll-over.
OCTOBER 1991

MAC

On 24 October 1989, Refuge Manager West discovered an unexploded 20mm military round in the area of the "bomb craters" adjacent to the Grant Point Road. The area was immediately closed to public access as per 50 CFR 36.42 and the Explosive Ordnance Division from Fort Richardson, Alaska, came out to inspect the site and destroy any potentially dangerous ordnance. In order to manage the area and protect the public, it was determined that the ± 3 acre area should be permanently closed to public use. In conjunction with the closure, it was also determined that an ordnance safety brochure should be developed for areas with potential WWII ordnance. Refuge Staff, working with Resource Support, then developed a brochure that was published in 1991. As yet, the necessary steps to initiate a permanent closure have not been completed.

Staff safety meetings were held more-or-less monthly throughout the year as staff was available. Topics in 1991 included fire safety and operation of the slip-on pumper unit, winter flying, boating safety, bear safety, safety training requirements, low-level flying, CPR and First Aid, and field operations safety.

Regional Aircraft Manager, and former Refuge Manager, John Sarvis presented the mandatory "Aviation Safety Training for Passengers and Observers" to the staff on the 22nd and 23rd of May 1991.

8. Other Items

Refuge Review

Associate Manager Constantino visited Izembek from 27-29 September to conduct an informal review of the refuge programs. The review was originally planned to include ARW John Rogers, Bruce Batten (PAO), and Phil Million (Acting DRD), but had to be modified at the last minute due to developments at Kodiak NWR.

Special Regulations

With the passage of ANILCA in 1980, existing Special Regulations for the Izembek and Unimak Units were abolished. Resubmissions of the Special Regulations for Izembek and Unimak and initial submissions for the Pavlof Unit have been made in 1982, 1985, 1987, 1989 and in 1990. In 1991, the package was again submitted and again returned due to new administrative requirements for publishing regulations. Stay Tuned!

Special Use Permitting

Eighteen Special Use Permits were issued for six different activities in 1991. Permitted activities include:

Big Game Guiding.....	8
Gravel Removal.....	5
Surface Geological Studies.....	2
Seismic Station Maintenance.....	1
Set Net Facilities.....	1
Salvage Operations.....	1

Freedom of Information Act Requests (FOIAs)

Five Freedom of Information Act Requests were responded to by refuge staff in 1991. Requests dealt with structures near water on the refuge, NEPA compliance, the "bomb craters" area, enforcement activities on the closed season for emperor geese, and the status of Steller's and spectacled eiders.

F. HABITAT MANAGEMENT

1. General

Protection of natural habitat integrity has long been the management strategy of Izembek Refuge staff. The areas administered from the Cold Bay office are wilderness in the adjective sense, with a large portion also being wilderness in the legal sense. For these reasons, active management in conventional terms (e.g., water level manipulations, farming, etc.) is not appropriate to meet refuge goals and objectives. Instead, habitat integrity is maintained primarily through the management of human activities which persist in the area. To date, demands in the area have concentrated on the fisheries and wildlife resources instead of the habitat resources (e.g., mining, oil/gas development, etc.).

Serious challenges to habitat integrity have not come about, although some seem to continuously loom in the wind. Though Izembek Refuge and much of the lower Alaska Peninsula have been evaluated and declared to have little to no hydrocarbon development potential, it seems the threat of Bering Sea offshore oil and gas development pressures just won't go away. Should it ever come to pass, Cold Bay will surely become a hub for maintenance and transportation activities for offshore rigs. Increased air traffic over Izembek Lagoon and other wetlands could prove disastrous to staging and wintering waterfowl. Perhaps the greatest potential consequence would result from an "EXXON VALDEZ" event in the Bering Sea. A single incident of this type near Izembek Lagoon during the fall staging period or winter could nearly extirpate the Pacific brant and gravely impact Steller's eider and emperor goose populations.

Additional management challenges have resulted from the confounding land status of the lower Alaska Peninsula brought about by ANCSA & ANILCA. Native and state selections and conveyances have been particularly widespread in the Pavlof Unit. Though specific land development plans of the villages and corporations are unknown at present, they will surely center on economic return for the shareholders. Roads, harbors, canneries, gravel mining and hydro-electric development have all been mentioned as potential uses. Increased development adjacent to the refuge will surely place additional demands on the refuge itself.

The U.S Coast Guard researched the potential of a search and rescue (SAR) station at Cold Bay. This facility would supplement the large Kodiak base from which offshore C-130 fisheries patrols, as well as SAR flights, by either C-130 airplane or HH-3 helicopters are initiated. Such a facility would increase local air traffic and the local population.

2. Wetlands

The premier wetlands of the lower Alaska Peninsula are Izembek Lagoon and associated habitats. Nearly the entire Pacific brant population stages on the lagoon each fall to fatten up on eelgrass prior to migrating south to winter haunts in Mexico. The lagoon also hosts significant numbers of Canada geese, emperor geese, Steller's eiders, a small, semi-migratory population of tundra swans and a variety of other duck species throughout the year. Each fall waterfowl seek out Izembek for the abundant food resources necessary to build fat reserves required to survive the arduous southward migration and/or long winter season. The eelgrass beds within the lagoon are probably the largest of their kind in the world. Izembek Lagoon eelgrass is estimated to annually produce and export (in the form of detached plants) 166,000 metric tons of carbon, 7,400 metric tons of nitrogen and 1,660 metric tons of phosphorous to the Bering Sea.



The eelgrass beds of Izembek Lagoon are probably the largest of their kind anywhere in the world. Ice scours demonstrate the fragility of the ecosystem.

August 1991

RLW

Through its attraction to hundreds of thousands of waterfowl from both sides of the Pacific, contributions to the Bering Sea food web, and its contributions to the international commercial fishing industry, Izembek truly is a wetland of international importance. The area was recognized as a "Wetland of International Importance" in 1986. Although Izembek Lagoon and other local lagoon systems are the wetlands of primary concern, the variety of other refuge wetland types are important as well. Excluding the lagoon, Izembek is nearly 87 percent wetlands. Of the total area, approximately 61 percent is low ericaceous tundra, 19 percent is ponds, lakes and streams, and seven percent is grass/sedge marsh. These associated wetlands are critical to the health of the lagoon through their contributions to the quality of water entering the lagoon. The Pavlof and Unimak units contain substantially smaller proportions of wetlands, since the terrain of those areas are dominated by mountains. Their important wetlands are the riverine and lagoon systems and associated grass/sedge meadows. As with the Izembek unit, "management" is through preservation of the natural ecosystems.

Acting Refuge Manager Chase and Acting Associate Manager Jerry Stroebele met with ADF&G staff in August 1991 to discuss regulations and permitting of activities within the Izembek SGR. Under state regulations, "wheeled-vehicle" access to State Game Refuges is by permit only. Since the lagoon and beaches below mean high tide are state owned, a permit is required to land a plane or operate an ATV within the SGR boundary. It was agreed that all requests would be evaluated on an individual basis, however, activities on the outer beaches and landings at Moffet Point would generally be permitted while activities within the Lagoon proper would generally be prohibited. Aircraft landings at the mouth of the Joshua Green River will be handled on a case by case basis.

6. Other Habitats

Tundra

The U. S. Air Force did not complete investigations and corrective action at Grant Point, Izembek Unit, where suspected contaminants have been observed. The U. S. Army Corps of Engineers program to clear contaminants from former Department of Defense installations at Scotch Cap and Cape Sarichef, Unimak Unit, was also inactive throughout the year.

11. Water Rights

Bureau of Land Management personnel visited the area in June to make navigability determinations on several water courses on Unimak Island. All streams on the northeast portion of the

island were observed by air and deemed navigable. This action is not expected to affect the refuge resources or cause any administrative burdens to the staff since this is in a remote designated wilderness and the waters are passable only by the smallest craft.

12. Wilderness and Special Areas

Large portions of the Izembek Unit (300,000 acres) and the Unimak Unit (910,000 acres) are designated wilderness. However, even the non-designated portions of all three units are "managed" as wilderness. There have not been any serious threats to lands designated wilderness or otherwise to date. It's only a matter of time, however, before a serious issue threatens the habitat of the lower Alaska Peninsula.

Hopefully, official designation will afford the required additional habitat protection at the appropriate time. There are several areas within the Pavlof Unit that meet wilderness criteria. One area includes Pavlof Volcano and the surrounding uplands which are important brown bear denning areas. The area abuts the Izembek Wilderness and is a continuation of the same ecosystem. Designation procedures will be initiated as soon as any additional ownership conveyances are complete and all current ANCSA selections are adjudicated.



Pavlof Volcano, within the Pavlof Unit, potential future designated wilderness.

JUNE 1991

MAC

G. WILDLIFE

1. Wildlife Diversity

There have been 166 species of birds and 25 species of mammals reported as residents or migrants on or adjacent to the three Izembek Refuge units. At least 41 species of fish have also been documented, with most being marine for at least some part of their lives. No new species were added to any of the lists in 1991.

2. Endangered Species

Aleutian Canada goose (threatened) occurrence at Izembek Refuge was verified through the observation of a tarsal banded bird in 1987. Close monitoring of refuge Canada geese during fall composition counts and hunter bag checks have resulted in no additional records. The Aleutian subspecies is apparently a straggler to at least the lower Alaska Peninsula portion of the refuge. There are no recent records for the bird at the Unimak Unit, where Taverner's Canada geese are common each fall.

Arctic and American races of the peregrine falcon may occur in the area during migration, but the presence of light colored birds has never been documented. The unlisted dark plumaged Peale's race is a fairly common resident of the Peninsula.

In December 1990, the Service received a petition to list the Steller's eider and the spectacled eider under the Endangered Species Act. A majority of the Steller's eider population winters at or near Izembek Refuge. In 1991, the refuge staff increased censusing emphasis for this species. A status review and a status determination are expected in 1992. The spectacled eider has been reported at Izembek Refuge, but the single sighting is unconfirmed.

3. Waterfowl

Izembek supports an abundance of waterfowl both in total numbers and in species diversity. Most all of the "typical" North American species visit Izembek, as well as species and populations from the Old World. Eurasian wigeon and common/Aleutian green-winged teal are regular annual visitors. Tufted ducks and even a smew have also been recorded. All four species of eider have been reported at Izembek Refuge. The presence of the spectacled eider, however, is based on only one unconfirmed record over the last 40 years. We believe the species winters in the northern Bering Sea, with only occasional stragglers reaching the Alaska Peninsula or eastern

Aleutian Islands. Common and king eiders regularly winter on the refuge, but are not ever considered abundant. In mild winters, common eiders tend to be the most numerous, while in harsh winters when the south edge of the Bering Sea ice pack approaches the southern end or tip of the Peninsula, a moderate influx of king eiders occurs. The Steller's eider is the most abundant duck observed at Izembek Refuge throughout the fall and winter. This area may be the center of abundance for the species during those times of the year.

Other sea ducks wintering at Izembek Refuge include white-winged and black scoters, common goldeneye, bufflehead, oldsquaw, greater scaup, harlequin duck, and common and red-breasted mergansers. Far less common are the surf scoter and Barrow's goldeneye. The refuge also supports wintering populations of a few thousand brant and emperor geese. Greater white-fronted geese and snow geese are uncommon visitors during the fall staging period at Izembek, being most often observed amidst flocks of emperor and Canada geese. An adult and an immature greater white-front were observed separately in Canada goose flocks on 1 and 10 October, respectively. Four snow geese (an adult and three juveniles) were observed in a flock of emperor geese on 28 October and 9 November.

Tundra Swan

Tundra swans are found on the Izembek Refuge throughout the year. The overwintering of swans on the Unimak Unit, and to a lesser extent on the Izembek Unit, took a dramatic shift in the late 1980's when a majority of the previously resident population began migrating. Many collared birds were found wintering in the Pacific Northwest and even further south, while fewer than 100, rather than the 500-600, remained to winter at Unimak Island. Swan neck collaring on the Pavlof Unit in the mid-1980's indicates this adjacent population is strictly migratory.

Evaluations of habitat utilization, population size and productivity of tundra swans was begun in 1977 and has proven useful in protecting ecological units of the refuge. Tundra swans require remote, undisturbed habitats, such as that characterizing much of Izembek Refuge. Knowledge of this key indicator species continues to be valuable in determining the health and stability of refuge habitats and other wildlife populations using them.

One of our refuge mandates is to conserve populations and habitats in their natural diversity. The annual surveys conducted on tundra swans by the refuge staff are important in fulfilling this essential purpose of the refuge. Surveys include aerial assessments to determine spring population size, distribution, habitat use, nesting density and production. To facilitate and augment these evaluations, numerous swans have

been captured and neck collared for individual identification. Visibly marked swans have not only aided our evaluations during the nesting and brood rearing seasons, but have also identified migratory and non-migratory trends in birds from various parts of the refuge. The importance of collecting these data on an annual basis became apparent in the late 1980's when Izembek Unit swans began to decline in numbers due to observed changes in migratory behavior.

Tundra swans nest throughout lowland habitats on the Izembek, Pavlof and Unimak units of the refuge. After an initial abrupt decline in the size of the nesting population in 1988, the number of swans (breeders and flocked birds) has slowly continued to increase. However, the numbers of collared swans observed is very low, suggesting increases are primarily from local recruitment or immigration. The 1991 Izembek Unit population of 197 swans was 13 percent below the 1979-87 average, when the population was essentially non-migratory, and 26 percent below the 1985 peak population of 266 birds.

Historically, the lower Alaska Peninsula population of semi-migratory tundra swans numbered 500-600 individuals, with most wintering in the Peterson Lagoon area of Unimak Island. It appeared that the summer population on the Unimak Unit was less than 100 individuals even during the population peak. The Izembek Unit contributed another 200-250 birds (197 in 1991), so the historic wintering population likely included birds from adjacent breeding areas on the Pavlof Unit where 500-700 swans spend the summer. Neck collaring projects conducted by refuge staff have not confirmed this assumption, as no marked swans from the Pavlof Unit have been observed in the dwindling wintering population.

Another potential factor in the decline of summering and wintering swans in the Izembek area is emigration into areas used by larger migratory populations. Large populations of swans from the Yukon-Kuskokwim (Y-K) Delta, Bristol Bay lowlands, and the Selawik area, winter in the Pacific Northwest and other western states. Swans marked at Izembek Refuge have been observed in association with those populations and may have been absorbed and drawn to different breeding areas. Two Izembek Refuge swans were reported on the Y-K Delta in 1990 and another two were observed at spring staging areas used by Y-K Delta and Bristol Bay populations in the Cook Inlet area. No further sightings occurred in 1991 in either of these staging or breeding areas.

Capture and banding effort of swans was increased in 1991 over the 1990 level. Twenty new collars were distributed over a three day period in late July. Details of the collaring are summarized in Table 4. From the winter of 1989-90 and throughout 1990, a total of 31 resightings of 15 tundra swans

neck collared at Izembek were reported. In 1991 only seven Izembek swans were reported, two locally, two from California, and three from Washington wintering areas. Both California wintering birds (V2 and Z4) were seen in the Pacific Northwest in 1990 as well, and neither have been recorded again at Izembek Refuge. Interestingly, Z4 was one of the two swans also observed at Alaska spring staging areas in 1990. The three swans (N2, R5, 2K) observed in western Washington (at Ridgefield NWR) near the Oregon state line (and at the Sauvie Island State Wildlife Refuge in Oregon) had been observed there during previous winters. The two other 1991 resightings were of fall birds remaining near their Izembek capture sites. The distribution of the 1991 resightings did not differ from the pattern recorded in the previous three winters (Fig. 2).

Table 4. Summary of tundra swans banded on the Izembek Unit, 1991.¹

DATE	LOCATION	AHY		SY		NECK COLLAR CODE
		M	F	M	F	
24 JULY	Morzhovoi Lake	2	2	1	6	01,17,23,VB,VN, VX,XB,XV,XZ,ZR
25 JULY	New Record Lake	1	1			29,V2
26 JULY	Swan Lake	2	1	1	3	49,63,73,C7,XR XX,ZB

1 - No Recaptures of previously banded swans

Izembek Unit spring nesting surveys have indicated a gradual rebuilding of the population. Total birds and nesting pairs observed in 1988 were down 48 and 53 percent, respectively, from the previous nine year average. In 1989, surveys indicated a 14 percent increase in population size over the 1988 level, which was attributed to an increase in flocked birds, as nesting birds had declined another 36 percent. In 1990, the number of nesting pairs and total birds increased 156 percent and nine percent, respectively. However, these are still 11 percent below the long term averages. In 1991, a total of 197 birds were observed on the survey, a six percent increase over the 1990 level, but the population was still five percent below the long term average (Tables 5 and 6). The number of flocked swans (subadults, nonbreeders and failed breeders) and nesting pairs increased 12 and nine percent, respectively, in 1991 from the 1990 level and were 41 percent above, and four percent below, the long term averages. The data are indicative of the average or better production and survival in 1989 and 1990 which increased the subadult component of the population. Numbers and production of tundra swans using the Izembek Unit has been erratic in recent years and aerial surveys will be continued to monitor future trends.

Checks of tundra swan nests on or near the Izembek Unit in 1991 suggested above normal nesting success. The 86 percent nesting success rate observed this year (Table 7) is well above the 12 year average of 59 percent. A maximum of 78 percent of successful broods had cygnets reaching Class II or Class III in 1991, compared to the 12 year average of 68 percent. Extremely poor fledging occurred in 1989, when only 27 percent approached or reached flight stage. Increasing numbers of nesting birds along with higher rates of nest success and brood survival in 1990 and 1991 are helping the Izembek Unit population rebound from declines in 1988 (low nest density) and 1989 (low nest density and average to poor production).

Reconnaissance of the Izembek and Pavlof units from December 1991 through February 1992 suggest about 53 swans are wintering from Herendeen Bay to Moffet Bay, a minimum of 113 birds from Moffet Bay to Bechevin Bay, and 430 birds on Unimak Island, with 408 of those being on Peterson Lagoon. Although a considerable amount of open water was found on Unimak during a 13 February 1992 search, no other swans were observed. Also, five birds were near Middle Lagoon, Morzhovoi Bay, and 17 were on Mortensen Lagoon during the period. Some neck-collared birds were observed within the flocks, but conditions prevented landing and codes were not read. Little open water was available on the Izembek or Pavlof units so the 13 February count of 430 swans may represent the entire wintering population.

Tundra swans nesting on and adjacent to the Pavlof Unit in the area from the Black Hills to Herendeen Bay have been surveyed from 1984 to 1989 and in 1991. This survey consists of systematic coverage of six 1:63,360 scale maps covering most of the available nesting habitat (Table 8). Those data have provided breeding range determinations for the semi-migratory Izembek Unit swans, as well as indicating that the Pavlof Unit birds observed in 1991 declined by more than 50 individuals from 1988 and 1989 levels, but equalling the 1986-1991 average. The 1991 reductions were primarily due to a 24 and 15 percent decline in the number of flocked swans and pairs without nests, respectively, as the number of pairs with nests and singles actually increased (Table 9).

Tundra swans breed throughout the low wetlands of all three refuge units and are highly visible indicators of seasonal phenology and habitat quality. Swans may also be general indicators of distribution and productivity of other waterfowl, as habitat preferences are markedly similar. For these reasons, tundra swan surveys are a high priority for the refuge. The 14 and seven years of data, respectively, are among the few long-term data sets for the species. A paper summarizing Izembek Unit data analysis was initiated in 1991.

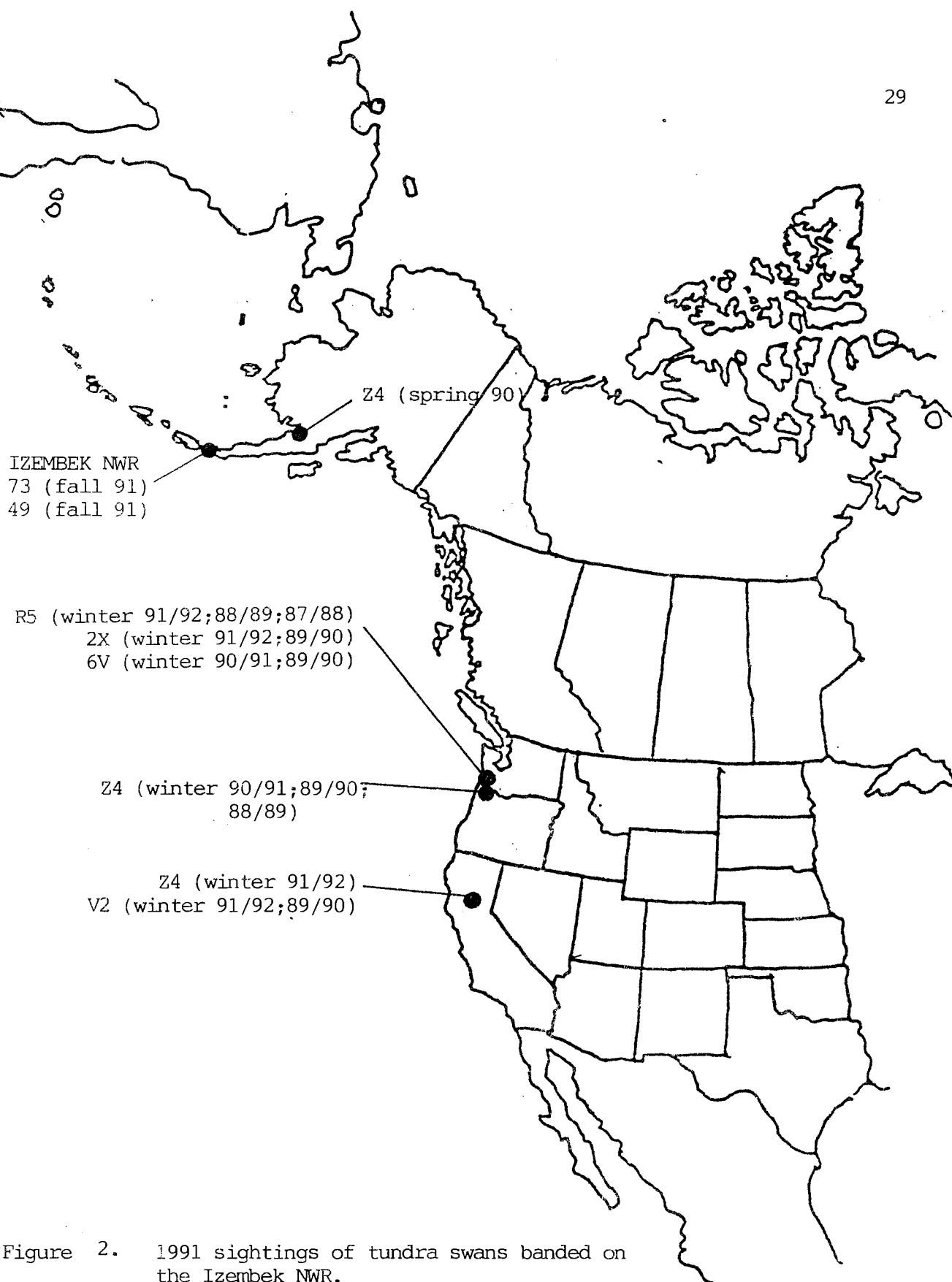


Table 5. Spring nesting surveys of tundra swans on the Izembek Unit and the western portion of the Pavlof Unit NWR, 1978-1991.

	No. of Swans Observed (% of Total)				Total	AreaCov. (sq. mi.)	Density (sq. mi.)	No. of Collared Swans Seen
	Singles	Nesting Pairs	Other Pairs	In Groups				
5/8/78 ¹	6(8)	18(23)	26(33)	28(36)	78	315.5	.25	n/a
4/25,28/79 ²	10(5)	24(12)	96(47)	75(36)	205	413.9	.50	12
5/14-15/80	9(4)	60(26)	84(36)	80(34)	233	413.9	.56	1
5/13,15/81	16(8)	58(29)	94(48)	29(15)	197	413.9	.48	21
6/2,6/82 ³	11(5)	68(30)	92(41)	55(24)	226	413.9	.55	23
5/31-6/1/83 ³	8(4)	48(21)	94(41)	77(34)	227	413.9	.55	37
6/7-8/84 ³	5(2)	78(35)	54(25)	85(38)	222	413.9	.54	42
5/28,30,6/1/85	20(7)	54(20)	52(20)	140(53)	266	413.9	.64	32
5/20/86	11(5)	70(29)	66(28)	90(38)	237	413.9	.57	24
5/19/87	7(3)	76(36)	50(23)	81(38)	214	413.9	.52	30
5/18-19/88	7(6)	28(24)	42(36)	41(35)	118	413.9	.29	7
5/30-31/89 ³	3(2)	18(11)	80(47)	69(41)	170	413.9	.41	6
5/21-22/90	9(5)	46(25)	32(17)	99(53)	186	413.9	.45	3
5/19/91	7(4)	50(25)	30(15)	111(56)	197	413.9	.48	0
Avg. 1979-1991	9(4)	52(25)	67(32)	79(38)	208		.52	

¹ Cathedral lakes, lakes south of Mortensen's Lagoon and west side of Morzhovoi Bay areas not covered. Other areas not covered thoroughly.

² Survey too early to include peak of nesting.

³ Survey late for peak of nesting.

Table 6. Numbers of swans using the Izembek refuge in relation to winter distributional shift.¹

Date	Number of Swans Observed (%)					Area Cov. (Sq. Mi.)	Density (Sq. Mi.)
	Singles	Nesting Pairs	Non-nesting Pairs	In Groups	Total		
Average ² 1979-87 (range)	10.8±4.6 (5-20)	59.6±16.7 (24-78)	75.8±20.0 (50-96)	79.1±29.5 (29-140)	225.2±20.0 (197-266)	413.9	.55±.05 (.48-.64)
Average 1988-91 (range)	6.5±2.5 (3-9)	35.5±15.1 (18-50)	36.0±5.9 (30-42)	80.0±31.4 (41-111)	167.8±35.0 (118-197)	413.9	.41±.08 (.29-.48)
% change ³	-40	-40	-53	+1	-26		-26

¹ Survey area: Izembek Unit, Pavlof Unit south of Cold Bay and Izembek Unit north to Cathedral River.

² Period prior to shift in winter distribution and decline in summering swans.

³ From 1979-87 average.

Table 7. Summary of 1991 tundra swan nests, Izembek NWR.

Nest No.(Survey No.)	Est. Clutch Size	Status	Brood Size	
			Class I	Class II/III
1(1)	UNK	Unknown	-	-
2(2)	UNK	Hatch	1	1
3(6)	UNK	Hatch	4	4
4(9)	UNK	Hatch	3	3
5(15)	UNK	Hatch	UNK	2
6(16)	UNK	Unknown	-	-
7(17)	UNK	Hatch	2	2
8(22)	UNK	Hatch	1	-
9(26)	UNK	Hatch	1	-
10(27)	UNK	Hatch	UNK	3
11(28)	6	Hatch	4	4
12(29)	UNK	Hatch	1	1
13(31)	UNK	Hatch	5	5
14(32)	UNK	Hatch	-	-
15(33)	UNK	Hatch	4	4
16(35)	UNK	Hatch	1	1
17(37)	UNK	Unknown	-	-
18(38)	UNK	Destroyed	-	-
19(40)	5	Destroyed	-	-
20(41)	UNK	Hatch	6	5
21(43)	UNK	Hatch	5	5
22(44)	UNK	Hatch	5	4
23(46)	UNK	Destroyed	-	-
24(49)	UNK	Unknown	-	-
25(50)	UNK	Unknown	-	-
26(52)	UNK	Hatch	2	UNK
Average	4.6	Nesting Success 85.7% ¹	3.3	3.3

1 Nests of known fate

Table 8. Summary of tundra swan nesting surveys on the Pavlof Unit, Izembek NWR.

Date	Survey Coverage (Maps)	Single	Single w/nest	Pair w/nest	Pair w/brood	Pair w/o nest or brood	Swans in flocks	Total Swans	Area Surveyed (mi ²)	Density (swan/mi ²)
6/12/84	D-5,6	11	5	16	10	39	25	171	281.6	.61
6/6-10/85	C-5,6 D-5,6	35	5	16	0	124	166	486	502.8	.97
5/16-21/86	C-5,6 D-4,5,6	46	18	38	0	92	182	506	678.6	.75
5/27-28/87	C-5,6 D-3,4,5,6	48	14	40	0	91	196	520	707.6	.73
5/19-23/88	C-5,6 D-4,5,6	66	17	35	0	97	287	634	678.6	.93
5/31-6/1/89	C-5,6 D-3,4,5,6	46	12	40	1	147	245	679	707.6	.96
5/20-21/91	C-5,6 D-3,4,5,6	57	0	57	0	125	164	585	707.6	.83
Average 1986-1991 (\pm 1SD)		53 (9)	12 (7)	42 (9)	2 (5)	110 (25)	215 (50)	585 (74)		.84 (.10)
% Change in 1991		+6	-100	+36	-100	+14	-24	0		-1

Table 9. Proportions and densities of single and paired swans in relation to flocked swans on the Pavlof Unit, Izembek NWR.

Year	Swans observed			
	Singles & Pairs (% of total)	Density ₂ (birds/mi ²)	Flock of birds (% of total)	Density ₂ (birds/mi ²)
1984	146 (85)	.52	25 (15)	.09
1985	320 (66)	.64	166 (34)	.33
1986	324 (64)	.48	182 (36)	.27
1987	324 (62)	.46	196 (38)	.28
1988	347 (55)	.51	287 (45)	.42
1989	434 (64)	.61	245 (36)	.35
1991	421 (72)	.59	164 (28)	.23
Averages (SD)	331 \pm 94	.54 \pm .07	181 \pm 82	.28 \pm .10

Brant

Essentially the entire Pacific Flyway brant population uses the Izembek Refuge for up to three weeks each spring and eight weeks each fall. These birds breed in Alaska, Canada and Russia (Fig. 3). The short duration spring staging period is characterized by a gradual transition through the Izembek Lagoon area beginning usually in April. By mid-May most brant have departed the area for northerly breeding grounds. Rarely, a few brant remain at Izembek into early June, and in 1991 two flocks of 23 and 31 birds were observed on 10 July near Grant Point. The birds were without doubt non-breeders or failed breeders which were about to enter the molt. It is likely that these birds spent the flightless period nearby, however, they were not observed again. In fall, the first brant normally arrive in the third week of August, with the population building to a peak in mid-September and remaining at this level until their departure for wintering areas in late October or early November. The fall migration from Izembek Lagoon is largely en masse. After a 55 hour and 3,300 mile flight, the birds arrive in coastal Baja California. The phenology of this fall flight in relation to climatic conditions is the subject of a paper in WILDFOWL 43 and a presentation at the 7th North American Arctic Goose Conference in January 1992.

Annual refuge brant investigations are directed toward the collection of fall data on productivity and population size. These data are collected through a variety of ground and aerial survey efforts performed by not only the Izembek Refuge staff, but also by personnel with the AFWRC and MBM. The cooperative nature of the project has broadened our perspectives and increased the quality and quantity of data obtained.

The Izembek Refuge staff continued to provide assistance to MBM-Juneau by monitoring the numbers of brant over-wintering in Izembek and adjacent



NOVEMBER 1991

CPD

lagoons. These data are important in assessing the abundance and distribution of brant, flyway wide, as determined from the annual mid-winter surveys conducted in January. An aerial survey conducted on 17 December resulted in a count of 6790. Another count on 23 January 1992 (following the mid-winter survey) indicated 5797 brant were present in areas from Izembek Lagoon to Unimak Island. On 10 February 1992 a total of 7200 brant were observed in the same area. In the past ten years, an average of 5251 brant (range 2075-9860) have overwintered at the Izembek Refuge. This is in contrast to subjective reports from the 1950's to the 1970's that indicated brant apparently overwintered in the hundreds. People who grew up on Sanak Island 50 miles south of Cold Bay report that small numbers of brant regularly wintered there in the 1950's and 1960's. Milder winters in recent years may be an important factor in allowing more brant to winter in Alaska. Other potential causative factors, such as nutrition or disturbance, could be preventing brant from assimilating the body reserves necessary to perform the strenuous fall migration to Mexico. Adult brant lose roughly 30 percent of their body weight during the flight.

Brant began arriving at Izembek Lagoon in late March, with 10,676 observed during a 1 April aerial survey. Normally, arrival occurs over about a ten to 15 day period; however, in 1991 arrivals may have been spread over 30 days or more. Flocks from a few hundred to a thousand have been observed during daylight hours flying northwest over Cold Bay. As these birds near the head of Cold Bay, they rise to altitudes up to 1500 feet above ground level (AGL) to cross the three to five mile wide Alaska Peninsula before descending into Izembek Lagoon. Some of the spring influx occurs during nocturnal hours and may not be detected at Cold Bay. A total of 31,399 brant were counted in the Izembek Lagoon area on 5 May. From 2 to 7 May the refuge cooperated with MBM-North in performing an annual coastal waterfowl survey of southwestern Alaska with brant numbers totaling 52,431. This was far fewer than the brant normally observed at that time of year, which may have been due to a delayed arrival from wintering areas. Spring migration of brant from wintering areas to Izembek Lagoon is characterized by short northerly movements over roughly a two-month period.

The types and magnitudes of disturbance factors and their overall effects on fall staging brant was the primary topic of an investigation by AFWRC personnel from 1985 to 1988. That work appeared in a final report to the Minerals Management Service (Ward, D. H. and R. A. Stehn. 1989. Response of brant and other geese to aircraft disturbance at Izembek Lagoon, Alaska. 193 pp.). The emphasis of AFWRC's work at Izembek Refuge has shifted to concentrated efforts on observing and tracking radio and color marked brant from various breeding locations and to analyze their distributional use of the

Izembek Lagoon system. The project involves international participation by biologists from Canada, Japan, Mexico and Russia.

Brant productivity and family group counts conducted at Izembek Refuge in 1991 marked the 29th consecutive year such appraisals have been made. Brant were first seen arriving at the lagoon on 10 August when a flock of 101 birds was observed near Grant Point. The average arrival date for first migrants at the refuge over the 20 years for which we have data is 17 August. Production counts were obtained from 5 September to 22 October, with a total of 43,559 individuals classified to age. Juveniles comprised 12,127, or 27.8 percent, of this total in comparison to the long-term average of 23.4 percent (Tables 10, 11 and 12). Estimated composition of the 1991 population based on the observed percentages and aerial survey counts is presented in Table 13. Productivity of the Pacific Flyway brant population, based on observations from the Izembek area, has been below average in seven of the past eleven years; however, overall population size, determined from mid-winter surveys, is relatively stable. Refuge surveys indicated that 1991 brant productivity was 44.8 percent above the 1990 level (19.2 percent juveniles) and 18.8 percent above the 29 year average of 23.4 percent. Average or better production has occurred only five times in the past 14 years.

Combined 1991 brant nesting success from several areas on the Y-K Delta was 90 percent versus the 64 percent recorded in 1990. Likewise, the mean clutch size during incubation was 3.9 eggs/nest this summer, up from 3.1 in 1990. These data, when compared to data from Izembek Lagoon, provide an index of survival from nesting to the fall staging period.

Family group size data were collected concurrently with Izembek productivity counts. A total of 415 individual families were observed, giving an average of 2.6 juveniles/family (Table 14). Based on our family group counts, survival of young may have been below average, down 0.1 juveniles/family in comparison to the 26 year average. Brood size at Tutakoke River, Y-K Delta, averaged 3.9 goslings per brood early in the brood rearing period and 3.4 overall. Tutakoke River colony research suggests that a considerable amount of brood mingling occurs among brant throughout the fledging period. As yet, data are insufficient to identify the extent or duration of this phenomenon or its implications on family group size data from Izembek Refuge. Other goose species maintain family bonds through fall and winter and sometimes even into the following spring.

The fall staging population of brant at Izembek Lagoon includes birds from Alaska, the western and central Canadian Arctic and the Russian Arctic. These birds are thought to mix throughout

the lagoon and hence our counts should be representative of the entire Pacific Flyway population. Recent efforts using radio telemetry and color marking at selected breeding locations will help qualify the extent of mixing of these population components, their seasonal movements, and fidelity for specific estuaries or parts of estuaries within the Izembek complex.

Radio marking of brant from various breeding areas from 1987 to 1990 helped address questions about fall distribution in the Izembek Lagoon area among other data gaps. Only one radio transmitter was deployed in 1991 on a breeding female at Wrangel Island. This was very significant, however, as brant breed there only during high lemming years and 1991 was the first such occurrence since US/Russian brant work was initiated in 1989. Good lemming numbers are necessary for snowy owls to nest and brant nest only near snowy owl nests where they find protection from arctic foxes. The bird was located at Izembek from 30 October to 4 November, but could not be found on 14 November.

The Izembek Lagoon telemetry efforts involved several techniques, including aerial tracking, the use of directional antenna systems at fixed locations, and the use of mobile antennas. Aerial tracking of radio-equipped brant, done in conjunction with population surveys, is used to determine dates and locations of arriving brant. Radio telemetry data suggest that breeding populations from Arctic nesting areas usually arrive at Izembek later than those from closer areas such as the Y-K Delta. It appears that some migrants may continue to arrive into October as suggested by radio relocation information and aerial survey data (Table 15). Ultimately, we hope to determine the timing of arrivals and departures for each primary breeding location over a series of years. The possible preference of Arctic breeding populations for the Moffet Bay area requires further research. However, it appears that Moffet Bay is important for these and other population components when first arriving in the fall and again just prior to spring departure.

Light-bellied brant predominate in northern and central Canadian Arctic populations. There is an east to west graduation in Arctic Canada of light to dark-bellied plumage morphs, with light-bellied brant seldom seen at breeding locations in Alaska or Russia. The variation in plumage color observed in Canadian Arctic brant is broad and interchange of varying degrees occurs annually at specific nesting locations. Hence, belly color is not always a positive indicator of breeding location. Colony size and production of the various "light" bellied population components is not regularly assessed. These factors complicate attempts to differentiate birds at Izembek Refuge; however, in nearly 30 years of hunting season bag checking, refuge personnel have not documented the

presence of light-bellied forms. Radio telemetry data showed that most of the light-bellied and intermediate color phase brant marked in the Canadian Arctic have preferred the Moffet Bay area. This provided insight into why light-bellied birds have not appeared in hunters' bags. Moffet Bay is a remote virtually unhunted area at the north end of Izembek Lagoon.

In 1991, efforts continued to determine the ratio of dark-bellied to light-bellied brant throughout the Izembek Lagoon complex. No light-bellied birds were detected in a sample of 402 brant at Moffet Bay. At Neumann Island, a narrow barrier island near Moffet Bay where brant gather for sanding and roosting, 48 (5.3 percent) of 912 birds sampled in 1991 were light-bellied. Data from 1991 observations of 12,085 brant at Operl Island, another sanding site ten miles southwest of Neumann Island, resulted in only three light-bellied brant sightings. In 1990, no light-bellies were observed among the 15,290 sampled at that location. In 1990, light-bellied brant made up 61 percent of the Neumann Island sample of 1100 birds. The factors affecting the low number of light-bellied birds observed at the same location in 1991 are undetermined, but could be the result of changes in fall habitat use or very low production in the Canadian Arctic. Izembek observations suggest that population segregation may be occurring in the lagoon complex, however, this may vary seasonally and/or annually.

Biological investigations of Pacific Flyway brant throughout their range in Alaska continued to be a high priority of the AFWRC in 1991. They continued to actively pursue cooperative work with breeding and molting birds on Wrangel Island in Russia and are continuing wintering ground investigations at Bahia de San Quintin and other estuaries in Baja California, Mexico. The AFWRC's fall 1991 investigations at Izembek Refuge were directed primarily to relocating color marked brant from various breeding locations and to collecting observations on diurnal movements, habitat use and migratory timing. These data will supplement previous investigations of the behavioral, temporal and spatial responses to various forms of disturbance (both natural and man caused). Productivity counts of numerous locations were also emphasized. The information being collected will greatly enhance our abilities to cooperatively manage the Izembek Lagoon ecosystem in coordination with the State of Alaska (tidelands owner).

Brant began departing Izembek on 9 November, when an estimated 100,000 left. Smaller departures occurred on 11, 17 and 18 November. The departure of brant from Izembek in 1991 was from six to 19 days later than dates observed during the last ten years. This late departure reflects the mild weather conditions this fall and the delayed appearance of a suitable departure storm.

A total of 110,511 Pacific brant were reported during the mid-winter inventory (January 1992), with 93,185 of these in Mexico (Table 16). These numbers are 13 and 14 percent, respectively, below last winter's levels. The average of eight counts during the peak of the fall staging period at Izembek was 125,831 brant. The Izembek Refuge staff coordinated with personnel performing the mid-winter survey through conducting an aerial brant count in the Izembek area. Totals of 6790, 5797 and 7200 brant were counted during the 17 December 1991, 23 January 1992 and 10 February 1992 surveys, respectively. The total mid-winter survey count of 110,511 brant plus the 5797 at Izembek in January gave a total of 116,308 birds, which is eight percent below the average of peak Izembek counts this fall (Table 15). Considering moderate hunting and natural mortality following departure from Izembek, the two population estimates appear to be in close agreement.

Pacific brant are managed in accordance with the Pacific Flyway Management Plan, which calls for a minimum population of 120,000 birds determined from a three year moving average. The current three-year average is 128,016 birds. If the average falls below the 120,000 bird threshold, a closure of the entire flyway to brant hunting would be instituted. A 1992/1993 midwinter count of fewer than 122,111 brant will bring about such a situation. The brant management plan was re-drafted in 1991 with one of the important changes being a reduction in the population goal from 185,000 to 170,000 birds. The 120,000 bird hunting threshold will likely remain unchanged.



Nearly the entire Pacific black brant population is present at Izembek each fall.
OCTOBER 1991

CPD



A map of the Pacific Northwest region of the United States, including Alaska, British Columbia, and the contiguous United States. The map shows the coastline and major water bodies. Numerous black dots (●) are plotted along the coast of Alaska and British Columbia, representing breeding areas. A dashed line with arrows indicates a migration route from these breeding areas, passing through the Izembek NWR (marked with a circle) and continuing south along the Pacific coast. Several circles (○) are placed along this route, representing wintering areas. The text 'IZEMBEK NWR' is labeled with an arrow pointing to its location on the coast.

IZEMBEK NWR

Figure 3. Breeding area (●) of Pacific black brant and their fall migration route to the Izembek NWR and Pacific coast wintering areas (○).

Table 10. Annual black brant production counts, Izembek NWR, 1970-1991.

Year	Adults	Juveniles	Total	% Juveniles
1970	12,104	6,256	18,360	34.1
1971	4,820	1,953	6,773	28.8
1972	6,599	3,698	10,297	35.9
1973	12,025	4,999	17,024	29.4
1974	13,118	632	13,750	4.6
1975	9,396	5,452	14,848	36.7
1976	7,962	4,340	12,302	35.3
1977	8,856	4,092	12,948	31.6
1978	10,696	1,842	12,538	14.7
1979	13,674	2,349	16,023	14.7
1980	9,618	3,341	12,959	25.8
1981	4,109	936	5,045	18.6
1982	11,509	1,213	12,722	9.5
1983	6,149	1,947	8,096	24.1
1984	9,451	1,499	10,950	13.7
1985	12,032	1,915	13,947	13.7
1986	15,621	2,823	18,444	15.3
1987	17,411	7,882	25,293	31.2
1988	16,138	3,847	19,985	19.3
1989	13,654	4,281	17,935	23.9
1990	24,215	5,750	29,965	19.2
1991	31,432	12,127	43,559	27.8
29 Year Average	12,570	3,826	16,395	23.3

Table 11. Brant production counts by month and location, Izembek NWR, 1991.

Month	Location	<u>Number of brant classified to age</u>		
		Adult	Juvenile (%)	Total
September	Neumann Island	2340	796 (25.4)	3136
	Operl Island	6127	1681 (21.5)	7808
	Lucky Cove	2650	1540 (36.8)	4190
	Grant Point	3214	1149 (26.3)	4363
	Quarter Point	112	12 (9.7)	124
	Outer Marker	170	74 (30.3)	244
Sub-total		14613	5252 (26.4)	19865
October	Operl Island	3158	1119 (26.2)	4277
	Lucky Cove	1351	872 (39.2)	2223
	Quarter Point	1757	736 (29.5)	2493
	Grant Point	1350	822 (37.9)	2172
	Norma Bay	2774	858 (23.6)	3632
	Neumann Island	4198	1825 (30.3)	6023
	Outer Marker	1879	593 (24.0)	2472
	Moffet Bay	352	50 (12.4)	402
Sub Total		16819	6875 (29.0)	23694
Total		31432	12127 (27.8)	43559

Table 12. Brant production counts by geographic areas of Izembek Lagoon, 1991.

Location	No. Adults	No. Juveniles	% Juveniles	Total Birds
Norma Bay	2774	858	23.6	3632
Quarter Point	1869	748	28.6	2617
Operl Island	9285	2800	23.2	12,085
Grant Point	4564	1971	30.2	6535
Lucky Cove	4001	2412	37.6	6413
Outer Marker	2049	667	24.6	2716
Neumann Island	6538	2621	28.6	9159
Moffet Bay	352	50	12.4	402
Totals	31,432	12,127	27.8	43,559

Table 13. Brant population composition, Izembek Refuge, 1991.

Parameters	Est. number of birds	% Change from 1989
Total Count ¹	125,831	+2.2
Est. No. of Juveniles (27.8% of total)	34,981	+47.9
Est. No. of Families (total juveniles 2.6 juv./fam.)	13,454	+47.9
Est. No. of Breeding Adults (No. of families x 2)	26,908	+47.9
Est. No. of Sub-adult and Non and Failed Breeding Adults (total count minus juveniles and breeding adults)	63,942	-21.4

¹ Average of 17 September, 3,6,9,18, and 23 October and 4 November aerial surveys.

Table 14. Black brant family group counts at Izembek Refuge, 1980-1991.

Year	<u>Frequency by Family Group Size</u>								No. Families	No. Juveniles	\bar{X} Juv/Family
	1	2	3	4	5	6	7	8			
1980	26	47	57	39	7	0	1	0	177	489	2.76
1981	34	38	36	27	10	8	1	0	154	431	2.80
1982	18	22	25	20	4	0	0	0	89	237	2.66
1983	25	40	55	26	21	6	0	0	173	515	2.98
1984	19	49	70	39	10	4	1	0	192	564	2.94
1985	125	223	173	73	24	6	0	0	624	1538	2.46
1986	23	46	43	19	4	2	0	0	137	352	2.57
1987	168	263	267	171	66	13	0	0	948	2587	2.73
1988	62	91	65	35	6	4	0	0	263	633	2.41
1989	42	80	72	65	28	16	0	0	303	914	3.00
1990	70	104	106	54	8	7	0	0	349	894	2.56
1991	63	144	142	45	18	2	1	0	415	1066	2.57
26 Yr MEAN	44	80	75	42	14	4	<1	<1	259	694	2.68

Table 15. Aerial surveys of goose populations on Izembek and adjacent lagoons, 1991.

Date	Number of Birds			Observers
	Brant	Canada Goose	Emperor Goose	
5 Sept.	60,561	15,176	1,490	C. Dau/R. West
17 Sept.	105,563	23,642	2,641	C. Dau/M. Chase
20 Sept.	77,383	20,223	3,877	C. Dau/A. Krechmar
3 Oct.	125,585	41,829	2,945	C. Dau/D. Ward
6 Oct.	132,957	27,465	5,171	R. King/A. Brackney
9 Oct.	119,754	36,782	4,500	C. Dau/D. Ward
18 Oct.	106,342	31,550	2,486	C. Dau/M. Chase
23 Oct.	136,978	56,030	1,930	C. Dau/M. Chase
4 Nov.	153,640	67,538	4,982	C. Dau/J. Pearce

Table 16. Black brant mid-winter survey data, Pacific flyway.

Year	Washington	Oregon	California	Mexico (West Coast)	Total	3 Year Running Average
1974/75	6,163	1,507	480	115,340	123,490	126,382
1975/76	7,540	1,769	680	112,056	122,045	125,395
1976/77	14,111	2,100	0	130,756	146,967	130,834
1977/78	18,100	1,110	560	143,117	162,887	143,966
1978/79	8,078	1,255	10	120,070	129,413	146,422
1979/80	7,665	1,015	135	137,550	146,365	146,222
1980/81	10,107	1,790	540	181,760	194,197	156,658
1981/82	6,451	706	485	113,402	121,044	153,869
1982/83	3,113	718	565	104,918	109,314	141,518
1983/84	7,097	930	700	124,703	133,430	121,262
1984/85	11,675	641	801	131,568	144,685	129,143
1985/86	12,026	1,113	706	114,725	128,570	135,562
1986/87	14,371	1,133	736	86,913	103,152	125,469
1987/88	19,831	1,104	947	116,696	138,578	133,317
1988/89	18,538	871	1,033	107,721	128,163	123,298
1989/90	13,756	1,399	992	129,865	146,012	137,584
1990/91	16,221	1,262	1,340	108,555	127,378	138,851
1991/92	13,505	1,397	2,424	93,185	110,511	128,016

Calendar year prior to January mid-winter survey (i.e., 1991 data represents survey done in January 1992).

Emperor Goose

The emperor goose population transits through the Izembek Lagoon complex each spring and fall, and in recent years approximately 4000 to 5000 have overwintered. It appears that essentially the entire population uses the area, but does not congregate in large numbers during either migratory season.

Izembek Refuge and MBM-North staffs cooperated in the annual emperor goose aerial survey of coastal areas from the Y-K Delta to Unimak Island, including the north and south sides of the Alaska Peninsula. The 1991 spring survey 2 to 7 May, as with previous efforts, was initiated when essentially the entire population was believed to be staging in bays and lagoons within the survey area. A total of 70,977 emperor geese were observed in the survey area (Table 17 and Fig. 4). Climatological charts prepared by the National Weather Service and aerial reconnaissance by refuge personnel from the Yukon Delta, Togiak, and Alaska Peninsula/Becharof refuges again provided essential habitat indications used to determine when to initiate the survey.

The 1991 survey total of 70,977 geese increased the three-year average to 61,453 (Fig. 5). Limited hunting of emperor geese may be allowed again when the spring population reaches 80,000 geese based on the three-year moving average (Fig. 5). An action plan and the draft Pacific Flyway Management Plan for emperor geese identify a population goal of 150,000 birds, which is comparable to historic levels. The refuge staff has stressed the difficulty in reaching and maintaining a population of 150,000 emperor geese when hunting is allowed when only 80,000 birds exist. A more biologically sound approach would be that hunting be prohibited if the population falls to 25-30 percent below the identified goal as it is for the brant population (i.e., when fewer than 110,000-115,000 geese are present).

Based on comprehensive spring and fall aerial surveys in the late 1980's, the population of emperor geese was low, but gradually increasing. This trend was welcomed after abrupt declines from 1981 to 1986 during which an already slumping population dropped from approximately 100,000 birds to 40,000 birds. Surveys in 1989 were the exceptions, suggesting further declines in both spring and fall numbers. In 1991, the population increased by 5.3 percent in the spring survey and decreased by 31.8 percent in the fall (Table 18). Given favorable nesting conditions, the emperor goose population has shown the potential for growth necessary to return to historic levels in a short time frame. However, the spring population size of 70,977 in 1991 is still 48.9 percent below the historic (mid-1960's) level of 139,000 geese.

Emperor geese began their fall influx at Izembek Refuge on 28 August when a small group was seen at Stapp Creek near Cold Bay. Peak numbers were present beginning in October as determined from eight aerial surveys (Table 15). Rod King and Alan Brackney (MBM-North) conducted the annual fall survey of emperor geese in southwestern Alaska. The total of 74,660 geese counted 4-7 October 1991 was used to estimate the composition of the fall population (Table 19). The fall 1991 population was 32 percent below the 1990 fall level of 109,451 birds. Neck collar resighting data indicate high overwinter mortality is partially responsible for this decline.

Emperor goose productivity counts were performed in 1991 by refuge, AFWRC and MBM staffs during the period 2 September to 24 October. Productivity as determined from Izembek counts was based on aerial photographic surveys and conventional ground counts using spotting scopes. Combined aerial and ground productivity counts through October resulted in 11,481 emperors classified to age, with 2882 (25.1 percent) being juveniles (Table 20). Aerial surveys by the refuge staff in the Nelson Lagoon area resulted in a sample of 864 birds with 26.3 percent (227) juveniles in the population.

Izembek information was combined with similar counts from other bays and estuaries along the north side of the Alaska Peninsula during the period 28 September to 4 October (Tables 21 and 22). The 1991 proportion of young in the population based on all aerial photographic sampling (n=13,764 geese) was 24.5 percent.

Comprehensive surveys using aerial photography provide the most accurate assessment of productivity in the emperor goose population. Temporal variation in the percentage of juveniles using various lagoons along the Alaska Peninsula suggests that family groups follow non and failed breeders in the migration. Data also suggest that some individuals or components may show a high degree of fidelity for certain estuaries and that there is a possibility that specific geographic breeding populations may also segregate during migration.

Family group sizes of emperor geese observed in the Izembek area averaged 3.0 young per family (n=153 families) during the period 2 September to 24 October (Table 20). The average combined Class I and Class II brood size at one study site on the Y-K Delta was 3.4 goslings per family group, according to AFWRC personnel. These data suggest a minimum attrition rate of 12 percent for young emperor geese from hatch into the fall migration period. In 1990, the average Class I brood size was the same as the Izembek family group size, suggesting excellent survival. The rate of mortality in 1991, as evidenced by observed family group size, is 17 percentage points less than the historical 1969 to 1980 average of 29 percent, suggesting good survival of young in 1990 (Table 23).

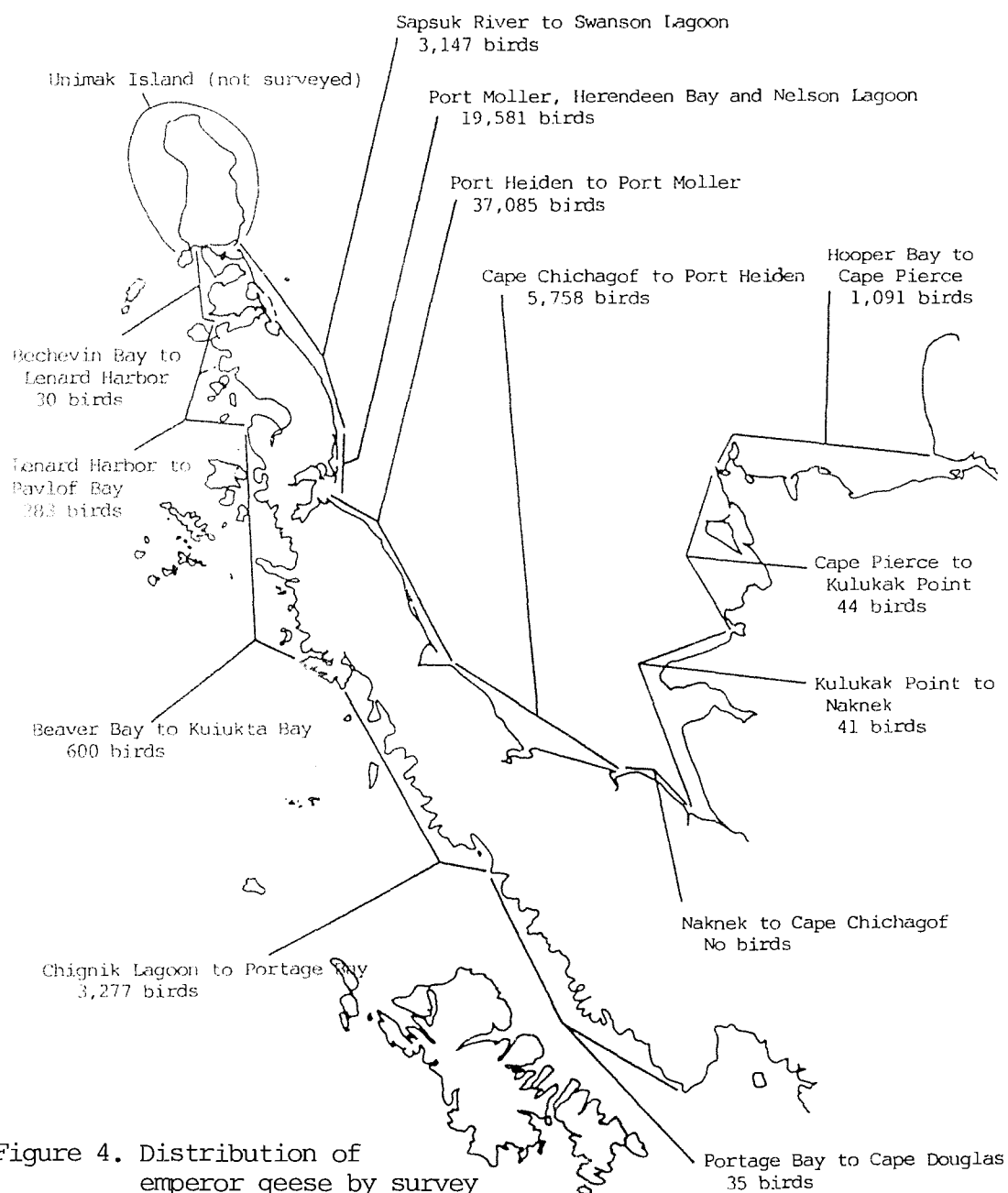


Figure 4. Distribution of emperor geese by survey area, 2-7 May, 1991.

Table 17. Emperor goose numbers observed by segment.

02 May 1991 Wind: East, 15 kts; Overcast; 42 degrees F;
Time: 1245-1645 hours.

Hooper Bay-Nelson Island-Kuskokwim River-Bethal 371

03 May 1991 Wind: East, 10 kts; Overcast - partly sunny;
40 degrees F; Time: 1023-1728 hours.

1. Bethel to Quinhagak	3
2. Quinhagak to Jacksmith Bay	0
3. Jacksmith Bay to Carter Spit	0
4. Carter Spit to Goodnews Bay	18
5. Goodnews Bay to Chagvan Bay	2
6. Chagvan Bay to Nanvak Bay	510
7. Nanvak Bay to Cape Pierce	187
7A. Cape Pierce to Hagemeister Island	42
7B. Hagemeister Island to Tongue Point	2
7C. Tongue Point to Summit Island Point	0
7D. Summit Island Point to Kulukak Point	0
7E. Kulukak Point to Dillingham	41
7F. Dillingham to Kvichak	0
7G. Kvichak to Naknek	0

05 May 1991 Wind: East, 10-20 kts; Overcast; 40 degrees F;
Mid-low tide; Time: 1235-2045 hours.

8. Naknek to Egegik Bay	0
9. Egegik Bay to 6 km South of Goose Point	910
10. 6 km South of Goose Point to Smokey Point	0
11. Smokey Point to Cape Menshikof (Includes Ugashik Bay)	1,514
12. Cap Menshikof to Cinder River lagoon	0

13. Cinder River Lagoon	3,334
14. Cinder River Lagoon to Port Heiden	0
15. Port Heiden to 24 km South of Strogonof Point	25,358
16. South of Strogonof Point to Seal Island	476
17. Seal Islands to Ilnik Lake	11,251
18. Ilnik Lake to Port Moller	0
19. Port Moller to Herendeen	1,614
20. Herendeen to Cape Rozhnof (Including Mud Bay)	5,770
21. Cape Rozhnof to Lagoon Point (Including Kudobin Islands)	12,197
22. Lagoon Point to Kinzarof Lagoon	0

06 May 1991 Wind: East 5-10 kts; Scattered to clear;
40 degrees F; Time: 1110-1435 hours

23. Kinzarof Lagoon	30
24. Moffet Lagoon	2,490
25. Izembek Lagoon	346
26. Applegate Cove to Big Lagoon	253
27. Big Lagoon/Hook Bay	0
28. Morzhovoi Bay	0
29. Bechevin Bay	58
30. Swanson Lagoon	0
31. Urilia Bay	-
32. Southside Unimak Island (Cape Luke to Cape Aksit)	-
33. Otter Cove	-
34. Ikatan Bay to Kenmore Head	0
35. Kenmore Head to Thin Point	0
36. Thin Point to Cold Bay	0

07 May 1991 Wind: West 10 kts. to East 15 kts; Overcast - partly cloudy; 42 degrees F; Time: 1045-1712 hours.

37. Cold Bay to King Cove	0
38. King Cove to Pavlof Bay	4
39. Pavlof Bay	279
40A. Canoe Bay to Seal Cape	0
40B. Seal Cape to Balboa Bay	-
41. Balboa Bay to Dorenoi Bay	45
42. Dorenoi Bay to American Bay	0
43. American Bay to Ramsey Bay	0
44. Ramsey Bay to Ivanof Bay	205
45. Ivanof Bay to Chignik Lagoon	350
46. Chignik Lagoon to Chignik Bay	115
47. Chignik Bay to Kujulik Bay	315
48. Kujulik Bay to Aniakchak Bay	0
49. Aniakchak Bay	35
50. Amber Bay to Cape Kunmik	375
51. Cape Kunmik to Cape Providence	97
52. Cape Providence to Agripina Bay	6
53. Argipina Bay to Wide Bay	0
54. Wide Bay to Portage Bay	2,334
55. Portage Bay to Puale Bay	35
56. Puale Bay	0

TOTAL EMPERORS

70,972

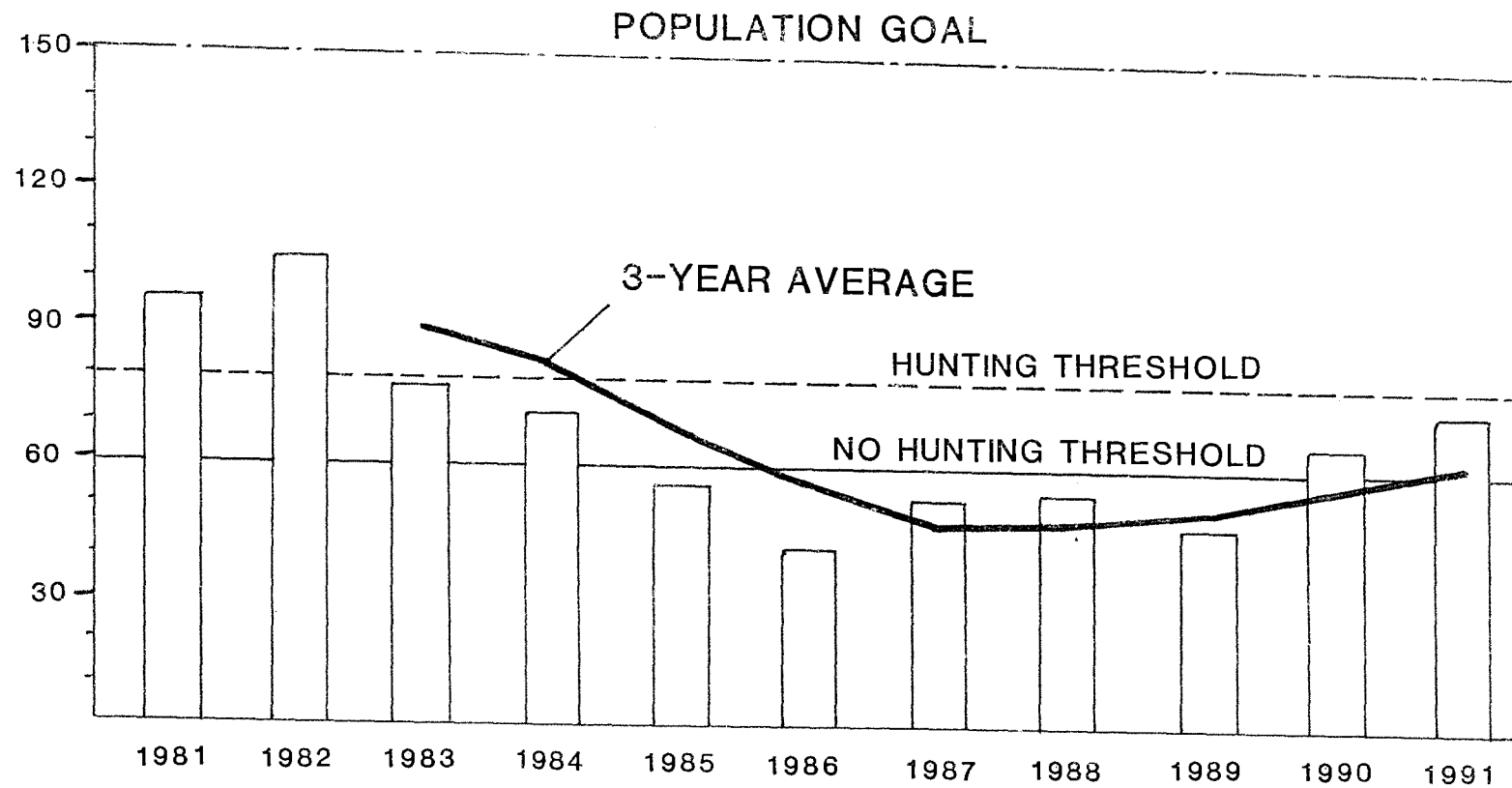


Figure 5. Spring emperor goose survey results with management thresholds and three-year average. (from King and Dau, 1991).

Table 18. Population size and productivity trends in Emperor geese.

Year	Spring Population Size (% change prev. year)	Production ¹ (% young in fall)	Family Group Size	Fall Population Size (% change prev. year)
1980	No Survey	24.8	2.3	65,971
1981	91,267	31.7	3.2	63,156 (-4.3)
1982	100,643 (+10.3)	7.8	2.7	80,608 (+27.6)
1983	79,155 (-21.4)	27.1	3.2	72,551 (-10.0)
1984	71,217 (-10.0)	22.3	2.8	82,842 (+14.2)
1985	58,833 (-17.3)	17.4	2.8	59,792 (-27.8)
1986	42,228 (-28.2)	26.1	2.6	68,051 (+13.8)
1987	51,655 (+22.3)	33.6	3.1	65,663 (-3.5)
1988	53,784 (+4.1)	24.2	3.1	76,165 (+16.0)
1989	45,712 (-15.0)	23.0	3.1	70,729 (-7.1)
1990	67,581 (+47.8)	25.2	3.2	109,451 (+55.1)
1991	70,977 (+5.0)	25.1	3.0	74,660 (-31.8)

¹ Data from Izembek National Wildlife Refuge, (1980-1984) and from Izembek Refuge and other Alaska Peninsula areas (1985-1991).

Table 19. Composition of the emperor goose population based on fall surveys in southwestern Alaska.

	Number of Birds						
	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>
Fall Count	59,792	68,051	65,663	76,165	70,729	109,451	74,660
Est. number of juvenile birds (percent young x total)	10,404	17,761	22,063	18,432	16,268	27,582	18,740
Est. number of families (number HY : Avg. family group size)	3,716	8,881	7,117	5,946	5,248	8,619	6,247
Est. maximum number of breeding adults with young (number of families x 2)	7,432	17,762	14,234	11,892	10,496	17,238	12,494
Est. total number of sub-adults non and/or failed breeding adults (total count minus juveniles and breeding adults)	41,956 (70.2%)	32,528 (47.8%)	29,366 (44.7%)	45,841 (60.2%)	43,965 (62.2%)	64,631 (59.1%)	43,426 (58.2%)

Table 20. Emperor goose productivity counts, Izembek National Wildlife Refuge, 1970-1991.

Year	Adults	Juveniles	Total	% Juveniles	No. of Families	Family Group Size
1970	9,722	4,933	14,655	33.7	383	2.9
1971	8,142	3,458	11,600	29.8	480	2.7
1972	4,680	2,270	6,950	32.7	210	3.1
1973	-	-	-	-	-	-
1974	2,025	377	2,402	15.7	50	2.6
1975	744	405	1,149	35.2	51	2.9
1976	1,023	324	2,247	14.4	207	2.7
1977	996	683	1,679	40.7	108	2.8
1978	1,395	495	1,890	26.2	62	3.0
1979	841	113	954	11.8	53	3.3
1980	1,777	586	2,363	24.8	40	2.3
1981	1,067	495	1,562	31.7	181	3.2
1982	1,653	140	1,793	7.8	32	2.7
1983	1,058	393	1,451	27.1	192	3.2
1984	2,753	795	3,548	22.4	79	2.8
1985	2,245	503	2,748	18.3	125	2.8
1986	3,283	1,381	4,664	29.6	266	2.6
1987	2,989	1,523	4,512	33.8	186	3.1
1988	3,884	1,242	5,126	24.2	200	3.1
1989	3,811	1,136	4,947	23.0	145	3.1
1990	4,002	1,068	5,070	21.1	97	3.2
1991	8,599	2,882	11,481	25.1	153	3.0
25_Yr. X	2,990	1,153	4,156	27.7	148	2.9

Table 21. Annual emperor goose productivity estimates from photographs taken on the northside of the Alaska Peninsula, 1985-1991.

Year	Adults	Juveniles	Total	Percent Juveniles
1985	2,657	536	3,193	16.8
1986	4,721	1,659	6,380	26.0
1987	7,760	2,417	10,178	23.7
1988	8,407	2,773	11,180	24.8
1989	10,044	2,686	12,730	21.1
1990	10,123	3,418	13,541	25.2
1991	10,388	3,376	13,764	24.5
Average	7,729	2,409	10,138	23.2

Data compiled by Bill Butler, Office of Migratory Bird Management, Anchorage including observations collected by the Izembek staff.

Table 22. Estimates of percent juvenile emperor geese from aerial photographs on the Alaska Peninsula, fall 1991.

Date	Location						
	Egegik	Ugashik	Cinder River	Port Heiden	Seal Islands	Nelson Lagoon	Izembek Lagoon
28 Sept.	20.2 (326)	15.2 (125)	-	-	-	-	-
28-29 Sept., 1 Oct.	-	-	29.6 (2846)	26.8 (1937)	21.6 (3221)	-	-
28-29 Sept., 3 Oct.	-	-	-	-	-	24.0 (4071)	-
28-29 Sept., 3-4 Oct.	-	-	-	-	-	-	20.8 (1238)

The number of emperor geese classified from photographs at each location are in parentheses.

Table 23. Estimated juvenile mortality of emperor geese as indicated by clutch and average family unit size during summer and fall, estimated from historical (1969-1980) and current data.¹

	Date	X Clutch Size (n)	X Class I/II Brood Size (n)	X Class III/F Brood Size (n)	X Fall Family Group Size (n)
	1969-80	5.0 (806)	4.1 (517)	3.5 (497)	2.9 (1,805)
	1991	5.1 (97)	3.4 (59)	3.3 (6)	3.0 (153)
Percent loss from preceeding age classification	1969-80		18%	15%	17%
	1991		33%	3%	9%
Percent loss in relation to fall family group size	1969-80	42%	29%	17%	
	1991	41%	12%	9%	

¹ Summer data from Yukon-Kuskokwim Delta study areas (Ely, C.R. pers.comm); Fall data from Izembek NWR.

Neck-collaring of emperor geese at research study sites on the Y-K Delta was discontinued in 1991. However, birds captured in previous years and fitted with yellow neck-collars having black number/letter combinations were again part of the focus of the fall 1991 work by AFWRC in field camps at Nelson Lagoon, Seal Islands/Port Heiden and Cinder River Lagoon. Data was gathered on emperor goose migration, productivity and habitat use from those camps, in addition to intensive efforts to locate and read codes on the neck-collared birds. Data continue to suggest that some individuals show a high degree of fidelity for certain staging areas (confirmed by neck-collar observations) with the birds using preferred lagoon systems for prolonged periods in the fall and then apparently shifting directly and rapidly to Aleutian Island wintering areas.

In 1991, 59 neck-collar observations of 20 separate birds were made, particularly at Neumann Island and Moffet Point in Izembek Lagoon and along the west shore of Cold Bay. These observations will supplement the extensive emperor goose monitoring efforts conducted at Nelson Lagoon and at Seal Islands/Port Heiden in the fall of 1992 to better document fidelity for specific areas and migratory phenology.

Canada Goose

Taverner's Canada geese are an important component in the fall waterfowl concentration on the Izembek Refuge. The first 1991 fall arrivals began on 24 August. The influx of birds continued gradually through September. Largest numbers are present in October each year and aerial survey efforts in the fall of 1991 placed the peak population at 67,538 birds on 4 November (Table 15). The average of eight surveys during the peak Canada goose fall staging period was 38,132 birds (range 20,233 to 67,538). Canada geese disperse over the tundra to feed when there is an abundant crowberry crop as well as throughout nearshore areas of Izembek and adjacent lagoons where they feed on eelgrass. There was a very poor crowberry crop in 1991, hence little upland use occurred except for roosting. The fall surveys concentrate on birds on the water bodies, and, since Canada geese on the tundra are extremely difficult to sight, survey totals reflect minimum population sizes.

The Canada goose is the primary species in the hunter's bag at Izembek. Canada geese are of increasing importance due to the harvest restrictions or closures on other species. Canada geese made up 74.5 percent of the estimated goose harvest and 45.4 percent of the total estimated waterfowl take at Izembek Refuge in 1991 (Table 31 in Section H.8). The adult to juvenile ratio in the hunter harvest based on our bag check data was 1.0:0.6 (Table 32, Section H.8).

The fall departure of Canada geese from the Izembek area began on 4 November, more than two weeks later than in 1990, and continued during daylight hours through 10 November. Canada geese initiate their migration with weather conditions similar to those used by brant, but leave during daylight hours. All Canada geese have usually departed the area by late November. Canada geese declined in number throughout November based on aerial surveys by the refuge staff. The numbers of Canada geese had declined to 6540 on 10 November and 6902 on 14 November. None were observed in December.

Small numbers of cackling Canada geese occur among the masses of Taverner's seen at Izembek each fall. Of the numerous cacklers banded on the Y-K Delta in recent years, none have been recovered by hunters here. Considering the relatively large number of cacklers that have been either standard banded or neck-collared, the few sightings at Izembek, primarily in the Moffet Bay area, seem to confirm the "uncommon" status of this subspecies on the southern Alaska Peninsula.

Steller's Eider

The Steller's eider continues to be the subject of research and investigation by the refuge staff. The value of far-sighted investigations initiated in the 1960's by Izembek's first manager, Robert Jones, is now beginning to be realized as data generated provide the information on which the Service will manage this new "species of concern" in the future. The species molts in large numbers throughout Izembek and adjacent lagoons. From 1961 to 1991, a total of 7008 birds have been banded. Of those birds, 405 (5.8 percent) have been recaptured in the same area in subsequent years. The 1991 banding effort occurred on 4 September at the Cape Glazenap area when 28 birds were banded out of a flock of about 350 eiders.

Through December 1991, a total of 156 (2.2 percent) banded Steller's eiders have been recovered (shot or otherwise found dead), and of these, 95 were reported during the breeding season (Fig. 6). These data have helped identify the breeding distribution of the Steller's eider in Alaska and Russia. Ninety-two (97 percent) of the breeding ground recoveries of Izembek banded Steller's eiders have been from Russia.

In Alaska, the Steller's eider is now a rare breeding species and totally absent from some of its historical range such as the Y-K Delta. This situation has caused considerable concern, even though the Steller's eider continues to be common in spring and fall staging and wintering areas. The concern was heightened in December 1990 when the Service was petitioned to consider the species for endangered status (see Section G.2).

Aerial survey data has been collected by the Izembek Refuge staff and MBM personnel since 1975 and these data suggest that Steller's eiders are declining at Izembek Refuge during fall, winter, and spring (Fig. 7). The Izembek Lagoon area is only one of several important use areas. Thus, declines could be indicative of an overall population decline or a distributional shift. Downward population trends in Steller's eiders have been observed in comprehensive spring and fall surveys of southwestern Alaska (Fig. 8). Although more intensive survey efforts are needed from fall through spring, the available data seem to indicate that the Steller's eider population is in trouble. WB/P Dau presented a paper summarizing Izembek Steller's eider survey data at the Alaska Bird Conference in November.



Steller's eiders, as seen during aerial surveys. White birds are adult males, females and juveniles are brown. Take a 4 second glance and make a guess! The answer follows Section J.4.
MARCH 1991 CPD

Other Ducks

In 1990 and 1991, statewide efforts to gather duck brood information were continued in an effort to relate productivity data to spring breeding pair survey strata within Alaska. Izembek Refuge is in the Bristol Bay strata segment, as are the Togiak and Alaska Peninsula/Becharof refuges. Plots were randomly selected throughout the strata and three of the 20 samples were on or near the Izembek refuge.

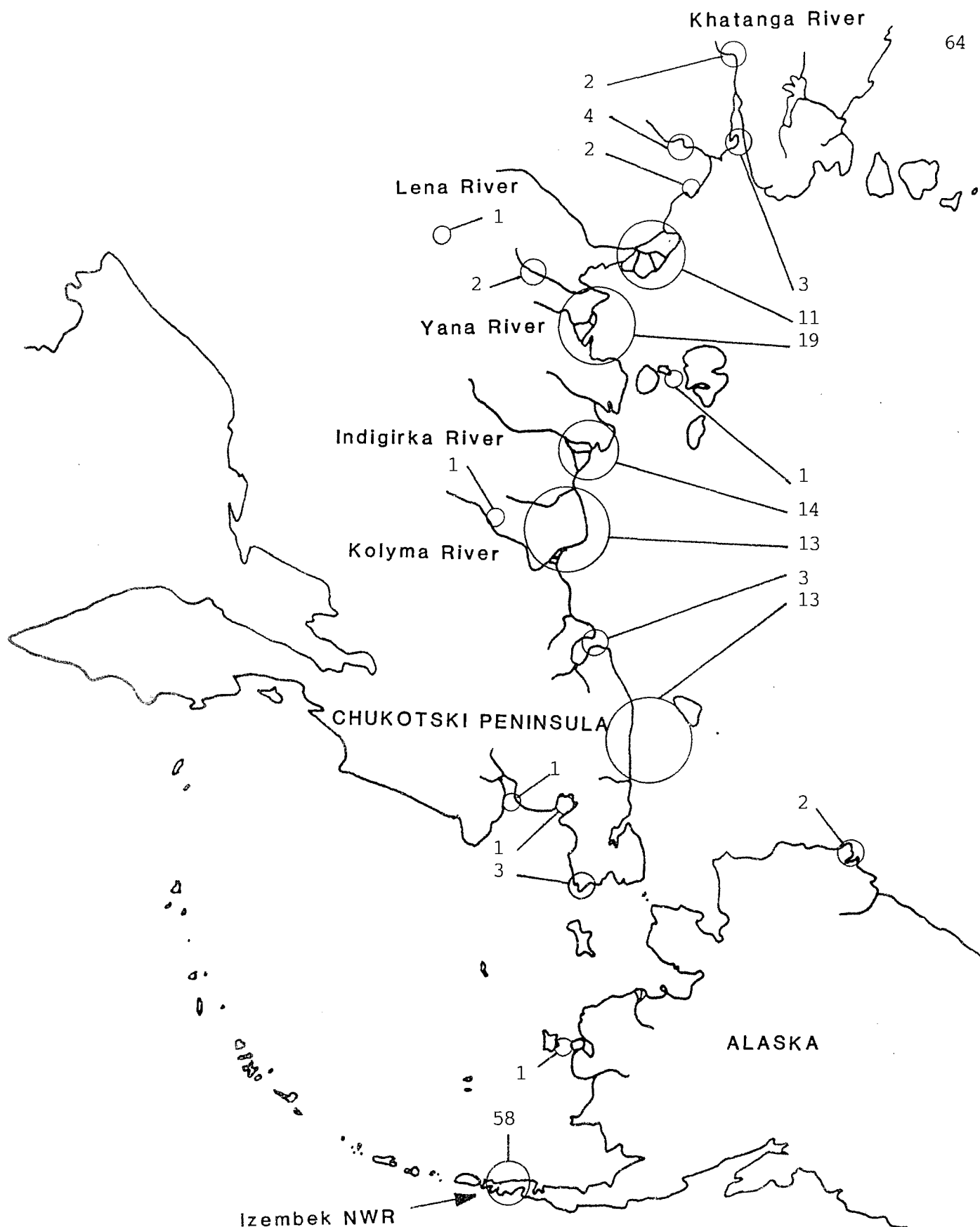


Figure 6. Distribution of 156 direct and indirect recoveries of Steller's eiders banded at Izembek Lagoon (Russia - 94, Alaska - 62).

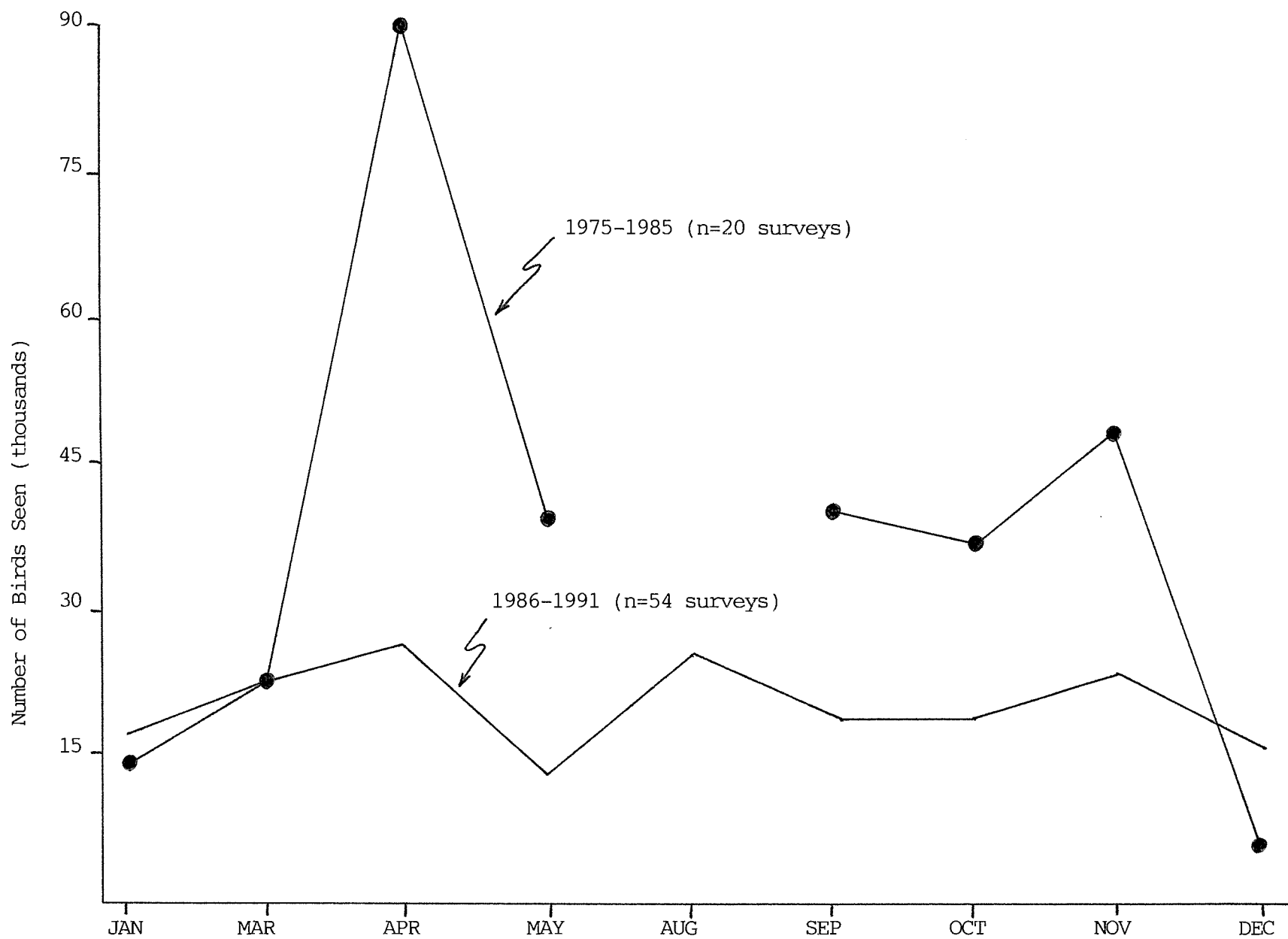


Figure 7 . Averages of monthly aerial surveys of Steller's Eiders on the Izembek NWR.

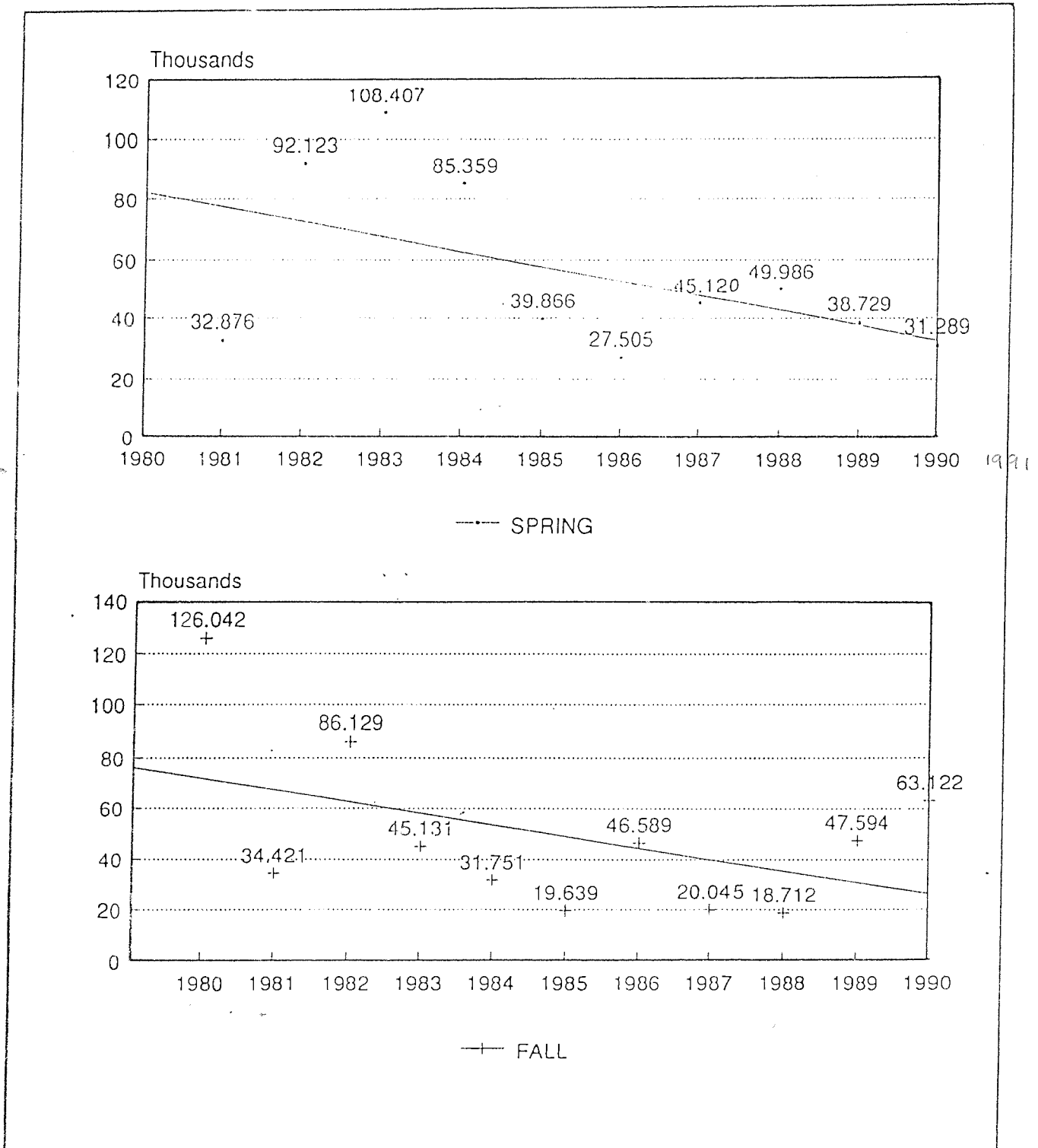


Figure 8 . Steller's eider population trends based on comprehensive coastal surveys in southwestern Alaska (Data supplied by R. King, Migratory Bird Management - North).

The brood survey in the Bristol Bay strata was accomplished by helicopter with Alaska Peninsula/Becharof Refuge Biologist Donna Dewhurst as the observer. A total of 376 water bodies on the 20 sample plots were surveyed and 100 broods were seen, 11 of which were on plots near or on the Izembek Refuge (Table 24).

Table 24. Helicopter brood survey results for local plots, Izembek NWR, 1991.

Area	Date	Plot #	Broods Observed
Caribou River	7-22-91	39	None
VORTAC Site	7-23-91	40	MALL (BH)
Morzhovoi Lake	7-23-91	30	MALL (6,7,7,7,8,8,8) NOPI (8,13) GWT (4,6)

BH = Broody Hen

The refuge staff did not attempt to ground truth the three random plots selected in the area. We did, however, see the need to monitor duck production for trend data on road system lakes known to be important to ducks. Three lakes (Lamprey, "VOR" and Bluebill) were chosen for the annual refuge survey. Trend data from known high density areas are not directly applicable to attempts to estimate brood densities and annual productivity for a large geographic area; however, the three lakes (water bodies) selected in the Cold Bay road system will provide useful data and, due to their accessibility and size, they are cost effective to check on an annual basis.

4. Marsh and Water Birds

The annual Breeding Bird Survey, conducted since 1982, and incidental observations provide indices of population trends, production and habitat use by a variety of unstudied refuge bird species. In this category, only common and red-throated loons, red-necked and horned grebes, double-crested and pelagic cormorants and sandhill cranes occur regularly on the refuge. During the 1991 Breeding Bird Survey only the common loon was encountered (Table 25). Single yellow-billed loons were observed on the Bering Sea off Neumann Island 30 September (Jeff Mason), on Cold Bay near Stapp Creek 5 November (John Pearce/Jeff Mason) and on Cold Bay near the dock on 22 December

Table 25. Results of Spring breeding bird survey conducted on the Izembek Refuge, 1991.

Species	1991*		Range 1982-1991**		Total Yrs Observed
	No. Birds	Stops	No. Birds	Stops	
Pelagic Cormorant	1	1	0-1	0-1	1
Tundra Swan	10	3	2-23	1-8	9
Mallard	1	1	0-9	0-4	7
Northern Pintail	3	1	0-5	0-2	7
Green-winged Teal	3	2	0-5	0-2	3
American Wigeon	1	1	0-2	0-1	2
Greater Scaup	26	4	2-32	1-9	9
Black Scoter	24	6	5-25	3-6	9
Willow Ptarmigan	31	17	3-67	3-27	9
Bald Eagle	2	2	0-3	0-2	4
L. Sandhill Crane	2	2	0-2	0-2	3
Semipalmated Plover	17	10	1-17	1-10	9
Least Sandpiper	6	4	0-10	0-6	8
Rock Sandpiper	105	30	52-105	23-30	9
Dunlin	5	4	0-5	0-4	5
Common Snipe	14	10	1-20	1-10	9
R-n. Phalarope	1	1	0-1	0-1	1
Parasitic Jaeger	1	1	0-1	0-1	1
Mew Gull	9	6	4-21	3-13	9
G-w. Gull	118	17	1-204	1-19	9
Arctic Tern	5	2	0-5	0-2	2
Pigeon Guillemot	3	1	0-3	0-1	1
Tree Swallow	2	1	0-7	0-4	4
Bank Swallow	16	3	0-16	0-3	2
Common Raven	16	13	0-16	0-13	6
Black-billed Magpie	2	2	0-5	0-2	4
American Pipit	35	20	7-35	6-20	9
Savannah Sparrow	37	20	3-41	2-20	9
G-c. Sparrow	20	13	3-20	3-13	9
Song Sparrow	1	1	0-1	0-1	2
Lapland Longspur	81	29	40-92	22-30	9
Total Species	31		18-31		

* This is an automobile survey with thirty (30) three minute stops at half mile intervals. No. Birds is the total heard or seen for the survey; Stops: is the number of stops on which the species was encountered.

** No survey in 1986.

(Zeillemaker). An intermediate phase northern fulmar passed over Izembek Lagoon near Operl Island on 4 October (John Pearce/Jeff Mason). About 20 fork-tailed storm-petrels were observed over Cold Bay near the dock on 21 September (John Pearce/ Tim Fenske) and one was over Cold Bay near the mouth of Trout Creek on 2 October (John Pearce).

5. Shorebirds, Gulls, Terns and Allied Species

Semipalmated plovers and rock sandpipers are the most common shorebird species occurring on the refuge. Shorebirds peak in the area during the fall migration. Extensive inter-tidal flats strewn with detached decaying eelgrass provide ideal shorebird foraging habitat and some noteworthy observations occur each year (Table 26).

Table 26. Unusual Izembek NWR sandpiper and allied species records, 1991.

Species	No.	Date	Remarks
Yellowlegs (sp.?)	150	13SEP91	SE Nelson Lagoon (Dau/West)
Dunlin (w/WESA)	100	10JUL91	Grant Point (Dau/Chase)
W. Sandpiper (w/DUNL)	20	10JUL91	Grant Point (Dau/Chase)
Bar-tailed Godwit	1	05SEP91	Lucky Cove (Pearce)
Bar-tailed Godwit	250	26SEP91	Izembek Lagoon (Pearce)
Bar-tailed Godwit	1	27SEP91	Operl Island (Pearce)
Pomarine Jaeger	47	04OCT91	Operl Island (Pearce/Mason)
Slaty-backed gull	1	SEP-OCT	Stapp Creek (Pearce)
Kittlitz's Murrelet	1	01SEP91	Cold Bay off dock (Pearce)
Kittlitz's Murrelet	3	02SEP91	Cold Bay off dock (Fenske)

6. Raptors

Although no specific raptor studies are conducted by refuge staff, known aeries are monitored annually. In addition, observations of uncommonly observed species are recorded and accessed in our edge-punch card retrieval file system.

Bald eagle, rough-legged hawk, golden eagle, gyrfalcon and short-eared owl nests have been recorded on Izembek Refuge. All five species are uncommon here and only the bald eagle is apparently a regular breeder. Over the past 20 years, five bald eagle aeries have been identified, and only one was active in 1991. Two sites have been used by rough-legged hawks and two by gyrfalcons, and one of each was known to be active this year. Short-eared owls were relatively common during the spring and summer of 1991 as compared to other years, but no

nests were found, and late summer and fall numbers were comparable to previous years.

American kestrels were observed during the period 11 to 23 September in the area between Cold Bay and Grant Point. Observations were usually of single birds, but on 14 September two males and a female were found together. At least in recent years, merlins have been regular migrants. Single merlins were observed on 14 September and 1 October near Cold Bay and at Grant Point, respectively. The fourth Izembek Refuge osprey record was of a single bird at Cold Bay on 1 September 1991. All previous sightings (1983, 1984 and 1990) have also been of single birds.

7. Other Migratory Birds

RM West and ROS J. Chase performed the annual Breeding Bird Survey (BBS) along a 15 mile segment of the Cold Bay road system on 5 June. The nationwide census is coordinated by the MBM Office. Izembek Refuge participation began in 1982. In 1991, totals were 31 species and 597 individuals were observed and/or heard on the Cold Bay BBS (Table 25).

The Audubon Christmas Bird Count (CBC) was conducted by refuge staff and two other participants on 2 January 1992. A total of 2066 individual birds of 31 species were observed (Table 27). It was the 26th CBC for Cold Bay.

Noteworthy incidental observations during the year included a bank swallow over Cape Glazenap 27 September (John Pearce) and a dark-eyed junco at Neumann Island on 11 October (John Pearce/Tim Fenske).

8. Game Mammals

Big game species found on units of the Izembek refuge include brown bear, caribou, moose, wolf and wolverine. Of these, moose are rare, while wolverine, although fairly common, are the most seldom observed. Moose are regularly seen in low numbers in the eastern portion of the Pavlof Unit where willow (Salix spp.) is common. The taller species of willow preferred by moose are rare on the remainder of the Pavlof Unit and on both the Izembek and Unimak Units, hence moose do not prefer those areas. A single animal seen near King Cove in August 1989 and a single medium bull seen on Unimak Island in September 1990 and September 1991 comprise our most recent sightings.

Fur bearers which can be hunted on the refuge include Arctic ground squirrel, coyote, gray wolf, red fox and wolverine. The

Table 27. Results of 1991 Christmas Bird Count, Cold Bay, Alaska
02 January, 1992.

Species ¹	1991	Average Number ² (No. years seen)	% Change from average
Common Loon	2	3 (8)	-33
Yellow-billed Loon	1	1 (4)	0
Horned Grebe	23	13 (15)	+77
Red-necked Grebe	2	3 (12)	-33
Pelagic Cormorant	19	17 (24)	+12
Emperor Goose	116	1158 (26)	-90
Brant	505	1378 (18)	-63
Mallard	46	39 (18)	+15
Greater Scaup	2	27 (8)	-93
King Eider	3	3 (7)	0
Steller's Eider	495	1012 (26)	-51
Harlequin Duck	123*	36 (25)	+242
Oldsquaw	63	209 (26)	-70
Black Scotor	68	144 (23)	-53
White-winged Scotor	57	20 (22)	+185
Common Goldeneye	35	105 (25)	-67
Bufflehead	3	9 (18)	-33
Common Merganser	9	13 (14)	-31
Red-b. Merganser	22	106 (24)	-79
Bald Eagle	25(14a;11i)	12 (26)	+108
Merlin	1*	1 (2)	0
Gyr Falcon	3	2 (14)	+50
Willow Ptarmigan	1	7 (17)	-86
Rock Sandpiper	80	42 (9)	+90
Glaucous-w. Gull	71	150 (26)	-53
Pigeon Guillemot	7	6 (18)	+17
Black-billed Magpie	17*	4 (18)	+325
Common Raven	90	87 (26)	+3
Northern Shrike	1	1 (18)	0
Snow Bunting	113	41 (26)	+176
Rosy Finch	63	54 (26)	+17

Total number of species 31

Total number of individuals 2,066

Number of observers: 6 (N. Chambers, J. & M. Chase, C. Dau, F. & M. Zeillemaker)

Observation time: 8:15

Distance covered: ± 50 miles

¹ A total of 57 species have been observed in the 26 years of counts.

² Average for year during which the species was observed.

* New Christmas Bird Count high number observed.

coyote appears to be slowly pioneering into the area with an unconfirmed report in 1949 and the first documented reports of single animals in 1984 and 1985. The species was not reported again until fall 1989 when a specimen was taken at Pavlof Bay. The red fox is a commonly hunted species on the refuge with most taken by people who are also engaged in trapping activities. There is essentially no harvest of ground squirrels on the refuge in that the Aleuts have not traditionally used the species for clothing.



Red fox are common on the lower peninsula. The local population exhibited good production in 1991, rebounding from the 1990 rabies outbreak.
AUGUST 1991

MAC

The interest in game mammals on the refuge by both consumptive and non-consumptive users centers primarily on brown bear and caribou populations. Both species are hunted, with non-resident hunters accounting for most of the bear harvest while local residents are the primary users of caribou. Declining herd size, due to low recruitment and poor survival in the Southern Alaska Peninsula caribou herd, has brought about management decisions that limit the harvest and provide preferential use to local residents.

Brown Bear

Management activities associated with the lower Alaska Peninsula brown bear population in 1991 consisted of aerial surveys of study areas on the Izembek and Unimak Units and continued monitoring of the sport harvest. The sport harvest of brown bears is allowed in spring and fall during alternate regulatory years. In 1991, the fall season was open, with the spring 1992 hunt being the next season. The Izembek staff monitors hunter activity on the refuge which is primarily in the form of commercial guiding of non-resident hunters. The Izembek Refuge, in cooperation with ADF&G, is a designated sealing office for species such as brown bear for which both hide and skull must be sealed prior to transport outside Alaska.



A young brown bear "tries his paw" at fishing in Frosty Creek. This youngster is suspected of being responsible for many of the "nuisance bear" complaints received in 1991.

JULY 1991

MAC

Refuge aerial surveys provide an index of population size and productivity on both the Izembek and Unimak units (Table 28). The surveys are conducted during crepuscular periods (morning or evening), as bears are most active then and throughout the nocturnal hours. In 1991, the indicated population size of the Izembek Unit was 27 percent above the 1990 level and 20 percent

Brown Bear

Management activities associated with the lower Alaska Peninsula brown bear population in 1991 consisted of aerial surveys of study areas on the Izembek and Unimak Units and continued monitoring of the sport harvest. The sport harvest of brown bears is allowed in spring and fall during alternate regulatory years. In 1991, the fall season was open, with the spring 1992 hunt being the next season. The Izembek staff monitors hunter activity on the refuge which is primarily in the form of commercial guiding of non-resident hunters. The Izembek Refuge, in cooperation with ADF&G, is a designated sealing office for species such as brown bear for which both hide and skull must be sealed prior to transport outside Alaska.



A young brown bear "tries his paw" at fishing in Frosty Creek. This youngster is suspected of being responsible for many of the "nuisance bear" complaints received in 1991.

JULY 1991

MAC

Refuge aerial surveys provide an index of population size and productivity on both the Izembek and Unimak units (Table 28). The surveys are conducted during crepuscular periods (morning or evening), as bears are most active then and throughout the nocturnal hours. In 1991, the indicated population size of the Izembek Unit was 27 percent above the 1990 level and 20 percent

Table 28. Fall aerial brown bear survey results, Izembek and Unimak Units, Izembek NWR, 1991.

Area	Date	Single Bears			Females with ¹			Total Females with Family Groups	Total Bears
		Small	Med.	Large	COY	Yrl.	2.5		
<u>Izembek Unit</u>									
N.E. Izembek	4 Sept.	19	28	3	9w/17	7w/11	4w/9	20	107
<u>Average</u>									
1976-91		13	20	3	8w/17	7w/14	1w/3	16	89
<u>Unimak Unit</u>									
N.E. Unimak	5 Sept.	21	20	3	9w/20	4w/5	2w/5	15	89
S.E. Unimak	10 Sept.	0	5	0	0	1w/2	0	1	8
<u>Average</u>									
N.E. Unimak (1978-1991)		9	21	3	4w/9	4w/7	.6w/1.6	9	58
S.E. Unimak (1976-1991)		2	4	.2	1w/3	1w/3	.4w/.5	3	14

¹ Total females with young in each age class.

above the 1978-1991 average. Similar data for northeast Unimak suggests a population 51 percent above 1990 and 53 percent above 1978-1991 level. A low population index was obtained for southeast Unimak, however, where data indicates the 1991 level was 65 percent below the 1990 level and 43 percent below the 1976-1991 average. The low population index there may be due to lower than normal runs of salmon in the area. Available survey data are only trends suggesting that brown bear populations in these remote areas are healthy.

Refuge aerial surveys are timed to provide an annual index of population trends. Seasonal phenology, the timing of salmon runs and the magnitude of salmon runs in and adjacent to the survey areas and observer experience are potential biases that may affect survey results. In combination with data on the magnitude, age, and sex of the harvest, these surveys help guide refuge and state management strategies for brown bear in the lower Alaska Peninsula.

The first seasonal sighting of a bear to venture from his den occurred on 8 March in 1991. By May, the bears were out in full force and causing considerable headaches for many of the locals. From the time the bears leave their dens, until the beginning of the salmon runs, bears often frequent the town dumps in search of food. Several bears decided to kill time around Cold Bay in 1991, which led to a number of complaints of marauding bears being received at the refuge office. In contrast, when bears were scarce around Cold Bay in 1990, numerous people complained that they could not see any bears. Many of these folks in 1991 were the same complainers as in 1990! Refuge staff responded to a number of these calls and attempted to escort the bears out-of-town with the aid of cracker shells and rubber slugs. Two individuals were "thumped" with the 12 gauge rubber slugs, which were extremely effective in both instances. Both of these individuals had become accustomed to the cracker shells which no longer had any effect on these particular individuals.

Caribou

The Southern Alaska Peninsula Caribou Herd (SAPCH) has been in steady decline since 1983. The herd ranges from Herendeen Bay and Canoe Bay southwest to the tip of the Alaska Peninsula (Fig. 9). The main portion of the herd winters in the Cold Bay area, with smaller wintering populations occurring north of Pavlof Bay and Morzhovoi Bay. Normally, in March and April the herd migrates to calving and summer ranges between the Black Hills and Trader Mountain. Up to 100 animals summer in the Morzhovoi Bay area. Since a peak of roughly 10,200 animals in 1983, the herd has declined due to poor recruitment and high adult mortality. Productivity has been approximately 10 percent lower in the southern versus northern Alaska Peninsula herd. Cooperative work by ADF&G and Refuge staff intensified

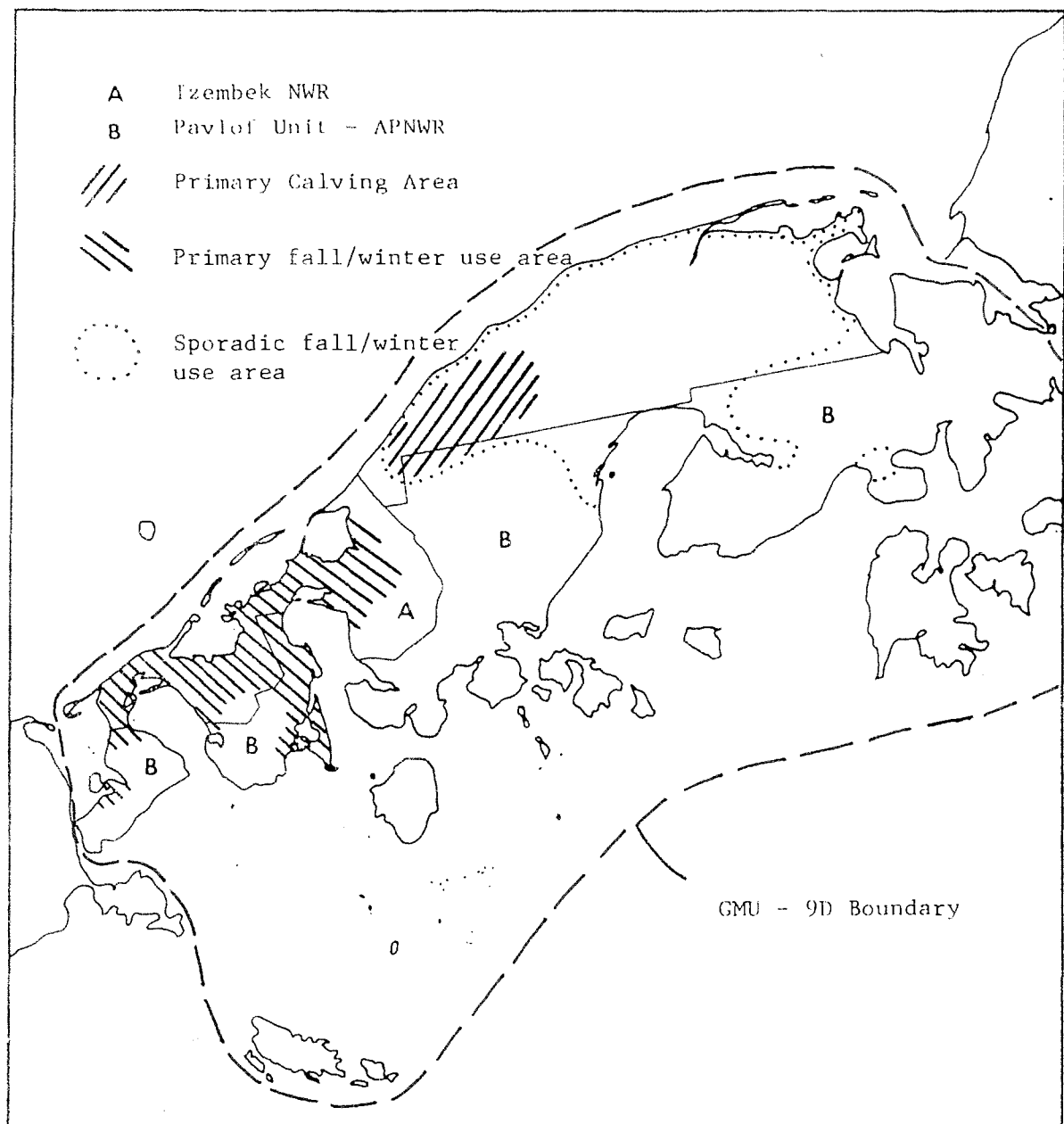


Figure 9 . Seasonal distribution of the southern Alaska Peninsula caribou herd, Game Management Unit (GMU) - 9D.

in 1990 and 1991 in an effort to more closely monitor population trends and to determine the cause, or causes, of the decline. The low rate of recruitment observed in the SAPCH (average 11%) appears to be due to low survival resulting from poor nutrition in both pregnant cows and their calves.

In 1991, the Refuge and ADF&G continued financial and field support for Eric Post, a graduate student with the Alaska Cooperative Wildlife Research Unit, University of Alaska - Fairbanks. During the period 10 May through July, Eric Post and his assistant Pernille Boving concentrated on the relationship between qualitative and quantitative characteristics of range vegetation in the Caribou River flats area. These data should be useful in conjunction with information on body size, reproductive success, adult cow and calf survival and parturition dates for the two primary subgroups of the herd. On 7 December, Eric and Pernille returned, concentrating their efforts along the Cold Bay road system where the bulk of the herd winters. Wintering range data collection and aerial radio tracking flights were performed as weather allowed until their departure on 21 December due to deep snow.

On 16 and 17 December, weather and snow conditions were conducive to a complete census of caribou in all lowland habitats from Herendeen Bay south to the end of the Alaska Peninsula. Caribou wintering northeast of the Black Hills/Trader Mountain area numbered 1263 and another 1567 were found to the southeast for a total of 2830 animals. The total count was better than expected, but still 14 percent below the 1990 estimate of 3300 animals. ADF&G biologists estimated the SAPCH population in October at 3000 animals. Considering the effects of natural mortality and harvest, our subjective estimate may be quite close. Snow cover in most areas was over 90 percent and we believe few animals were missed. Eleven gray wolves and five brown bears were also observed during the survey.

Fourteen of the 19 collared animals known to be alive during the summer were located during the winter survey. Additional radio-tracking was accomplished during waterfowl surveys on 23 and 27 January and 10 and 12 February 1992. Radio collars on seven of the adult cows were replaced by ADF&G personnel in April. The seven cows are part of the study segment of 12 originally captured in the spring of 1990. Of these 12, four are known to be dead and one is suspected of having a non-functioning radio.

Productivity surveys are conducted jointly by ADF&G and the refuge staff in mid-June as an indicator of early calf recruitment. ADF&G and refuge staff then conduct pre-hunt

surveys, usually in September or October, to determine herd composition, recruitment, and summer survival (Table 29).

Table 29. Annual recruitment and population size of the Southern Alaska Peninsula Caribou Herd, 1983-1991.

Year	Fall Calf Composition	Winter Count
1983	15 %	10,203
1984	15 %	NA
1985	9 %	NA
1986	13 %	NA
1987	16 %	6,401
1988	12 %	3,407 ¹
1989	3 %	3,957
1990	6 %	3,300 ²
1991	13 %	2,830

¹ Post-calving census.

² Estimated total based on December and January efforts.

Calving normally begins about 1 June with a peak by 10 June. Most caribou in the SAPCH calve near the Black Hills/Trader Mountain area. Post-calving distribution and population size was documented by Izembek Refuge staff from 21 June through July on nine separate flights. Dick Sellers and Toby Boudreau of ADF&G performed aerial photographic flights on 8-9 July. Combined, the surveys indicated approximately 2000 caribou, primarily cows and calves, made up the post-calving population. It was further determined that they congregated in mid-June south of the Black Hills and in July moved to the Trader Mountain area and then to the Cathedral River. Most of the bull population segregates itself from the rest of the herd until late summer.

Post-calving observations are primarily keyed to determining distribution and abundance as productivity data are difficult to collect from large herds when using fixed-wing aircraft. However, ADF&G personnel were able to classify 457 animals, of which 82 (18%) were calves. Observations of small peripheral herds sampled for composition by the refuge staff indicated that 21 percent of the caribou aged (n=66) were calves. This figure is very likely biased high in relation to other segments of the herd; however, it may indicate good production in such smaller groups.

Another important goal of post-calving survey efforts was to determine the reproductive status of 19 female caribou with

active radio collars. Reproductive status was determined for 14 cows. Only two (14%) of 14 cows observed in the Black Hills/Trader Mountain area were observed with calves. At least one of the cows had lost her calf by mid-September. The five remaining cows were located in the post-calving herd, but were not individually observed.

Differential recruitment between the two primary use areas (Black Hills/Trader Mountain and Caribou River flats), was again observed in 1991 and may be a regular occurrence related to range condition, animal density or predation. Calves comprised 20 percent of a small sample of 79 caribou in the Caribou River area in October versus 12 percent (n=804) in the Black Hills/Trader Mountain area. The total of 883 (13 percent calves) sampled provides one indication of 1991 productivity of the SAPCH, subjectively it was estimated that approximately 3000 animals were present in the population during the 24-25 October survey.

Productivity was not estimated again until mid to late December when a portion of the herd (approximately 1500 animals) was viewed in the Cold Bay road system area. Thirty-six calves (9%) were observed in a sample of 409 animals by Eric Post and Pernille Boving. These data indicated good calf survival from the October level of 13 percent versus the normal rate of loss of up to 50 percent through fall.

There are few large bulls in the SAPCH; however, pregnancy and birth rates are high (comparable to other Alaskan herds), so the bull component is apparently adequate to allow for good production. Dick Sellers' (ADF&G) counts in October indicated 8.9 percent of the herd was medium and large bulls. Our ground counts in 1990 placed the level of large bulls at 4.5 percent. The December 1991 counts by Eric Post indicated 4.4 percent bulls present; however, since most animals had dropped their antlers by this time, it is likely that medium sized animals were not readily distinguishable. Bulls, medium and large combined, comprised 19 percent of both the Black Hill/Trader Mountain and Caribou River segments in mid-October. The low 4.4 percent bulls found in late December near Cold Bay may be due to small sample size or variations in migratory phenology of different population components.

The age structure of the hunter harvested animals is also indicative of the sustained poor recruitment to the SAPCH. Since 1986, Refuge staff has been collecting lower jaws from hunter killed animals. Jaws collected from 1986-1990 were aged by ADF&G personnel based on tooth wear and replacement. In 1991 the 18 jaws collected were aged by the Department of Fisheries and Wildlife at New Mexico State University using sectioned incisors. Over the past five seasons, 79 percent of the reported caribou harvested, for which jaws were collected,

has been at least five years old. The 1990-1991 season was restricted to bulls, of which nine (53%) were five years old or older, with one illegally taken cow being nine years old. Results of the jaw aging are contained in Table 30. There is normally selection for larger bulls, and thus the age structure may be biased high due to a large number of the bulls being taken prior to dropping their antlers. However, even with some selection taking place and the small sample size, all data still suggest that the 1989 and 1990 cohorts are probably quite small segments of the SAPCH. The 1991/92 season was closed during the months of October and November, thus most bulls harvested have been antlerless. It will be interesting to see how the age structure compares when no antler selection is taking place.

Table 30. Summary of sex and relative age of hunter harvested caribou, for which jaws were collected SAPCH, 1986-1991.

SEASON	n	TOTAL (%)			AGED TO 5+ YEARS (%)			
		M	F	U	M	F	U	ALL
86/87	40	16(40)	14(35)	10(25)	10(63)	12(86)	9(90)	31(78)
87/88	51	28(55)	22(43)	1(2)	24(86)	19(86)	1	44(86)
88/89	40	20(50)	19(48)	1(2)	18(90)	16(84)	0	34(85)
89/90	20	13(65)	7(35)	0	11(85)	5(71)	0	16(80)
90/91*	18	17(94)	1(6)	0	9(50)	1(100)	0	10(56)
TOTAL	169	94(56)	63(37)	12(7)	72(77)	53(84)	10(83)	135(80)

* Bull only season. 1 cow taken illegally.

Intuitively, it is believed that poor nutrition may be the key factor affecting calf survival during the summer. The population increased through the 1970's, placing more demand on forage resources. Preferred forage species such as lichens may have not been able to keep pace with demand. The graduate project was begun in 1990 will address these concerns by comparing analysis of ground cover and biomass in summer and winter habitats and actual food habits of the caribou. Fecal pellets were collected on the winter range from 1988 to 1991 and on the calving range since 1989. Samples collected in 1991 have yet to be analyzed, but will likely confirm previous data.

The high percentage of mosses found in the winter diet may be an indication that this herd is nutritionally stressed and that preferred lichens, which are often associated with mosses, are actively sought even though their abundance and biomass are low. Field sampling to determine availability of vegetative species which was initiated in 1988 in the Cold Bay road system, provided some indication of relative abundance of forage species. More intensive systematic evaluations are being undertaken by Eric Post in important segments of the summer as well as winter portions of the SAPCH range and it is hoped these data will help quantitatively address herd nutrition.

Scant data are available on caribou resident on Unimak Island. From over 4000 animals in the early 1970's, the herd has continually dwindled to fewer than 200 in 1991. Caribou are largely restricted to the area from Urilia Bay to Swanson Lagoon on the north side of the island and in the southeast section from Lazaref River to Ikatan Bay. On 28 June 1991 we were fortunate to locate a loose assemblage of 168 animals on the northern portion of the island between North Creek and Coal Oil Creek. Sixteen (9.5%) of these animals were calves, indicating productivity of this small component of the SAPCH was slightly lower than the poor recruitment documented for the remainder of the herd. There are historical records of caribou interchanges between Unimak Island and the Alaska Peninsula, but no recent sightings are available and no radio-equipped animals have made the one mile swim to the island.

9. Marine Mammals

Gray whales are common spring and fall migrants in nearshore waters along both the Bering and Pacific sides of the Alaska Peninsula. They prefer shallow water during migration and are occasionally seen in estuaries, including Izembek and Nelson Lagoons.

The first sighting of a gray whale during spring migration was on 14 April at Cape Glazenap. First spring reports for Cape Sarichef at the west end of Unimak Island have typically occurred during the last week of March and Izembek Lagoon area early reports typically occur during the first week of April. Spring migration normally ends by mid-June. Fall migrants are less commonly reported, but that passage may extend well into October or even November. Killer whales are rarely seen in the Izembek area, but are likely more common in offshore areas.

Sea otters occur in all salt water areas, where they are common to abundant. Harbor seals are also commonly observed, with small concentrations (<50) of hauled out animals occurring in Izembek and Kinzarof lagoons.

10. Other Resident Wildlife

Willow ptarmigan are abundant in the lowlands of the lower Alaska Peninsula and Unimak Island. Rock ptarmigan are uncommon, occurring only in higher elevations. Ptarmigan are not intensively studied by the refuge staff. Their harvest levels are also not monitored; however, an index to their general abundance is obtained from our annual breeding bird survey (Table 25) and from ADF&G collections of subjective impressions of small game abundance from a randomly selected sample of hunters in various geographic areas of the Alaska. Casual observations of broods during the summer and hunter contacts in the fall suggest 1991 was an excellent year for ptarmigan of the lower Alaska Peninsula. Along with the apparently larger numbers of ptarmigan, more shrews, voles, ground squirrels and short-eared owls were observed in 1991. All possibly relate to the depressed red fox population due to the rabies outbreak of 1990.

The hunting season for ptarmigan opened on August 10 and locals pursued them prior to the opening of waterfowl season in September. After the Canada geese and brant depart the area, interest in ptarmigan hunting picks up again until the season ends on April 30. The bag limit was 20 per day.

Arctic ground, or "parka", squirrels are an important resident species in the area providing food for raptors, foxes, wolves and even brown bear. The mild winter of 1990-91 apparently confused one squirrel which was seen at the base of Baldy Mountain on 4 January. The more typical "first of the season" sighting occurred on 16 March near the FAA residences in Cold Bay.

11. Fisheries Resources

Primary resident and anadromous fish species include arctic char, Dolly Varden, pink (humpback) salmon, sockeye (red) salmon, coho (silver) salmon, and chum (dog) salmon, threespine stickleback and, in much smaller numbers, steelhead and chinook (king) salmon. The marine species have been found in Izembek Lagoon and Cold Bay. Although the anadromous fishery resources are not directly "managed" by the refuge staff, they are of particular interest in that they are an extremely important part of the Izembek Lagoon and Cold Bay drainage food chains, especially for brown bears and bald eagles. The King Salmon Fishery Assistance Office (FAO) began field work in 1986 on the Izembek Refuge to provide baseline data for the refuge Fisheries Management Plan (FMP). After several field seasons and completion of the data, a draft plan was prepared and supplied to the refuge for review. The comment and review process on the FMP continues.

The King Salmon FAO completed the report on the investigations of the fisheries resources around the Cold Bay road system. Field work for the report was completed during the summers of 1985 and 1986.

Refuge staff, along with Service Fisheries staff, became involved with the annual operational planning for the Russell Creek Hatchery in 1991. The refuge expressed concerns over the fate of brood stocks destined for refuge waters which were being effected by hatchery weir operations downstream from the refuge boundary. Details are found in Section D.6.

King Salmon FAO staff surveyed Russell Creek in late September for the presence of steelhead as part of a global warming study. One juvenile fish was caught during the intensive sampling effort. A thermograph was installed in Russell Creek by refuge staff as part of the investigation.

14. Scientific Collections

No scientific bird or mammal collections occurred in 1991. However, several specimens have been salvaged from beaches or donated during the hunting seasons over the years. Six birds and one small mammal were prepared for display and another 25 birds and three mammals were prepared as study skins during the year. The refuge maintains collections of local fauna for use during school programs, visitor inquiries, and pre-season waterfowl seminars, as well as for scientific purposes.

As part of continuing investigations of SAPCH demography, refuge staff organized the collections of jaws and stomach contents from hunter killed animals. In cooperation with the ADF&G, age and measurement data were also obtained (see Section G.8 **Caribou**).

Flora collections are maintained for all three units of the refuge. They are used in a fashion similar to the vertebrate collections. Although the herbarium provides examples of all common and most of the uncommon species, the refuge staff endeavors to make additions and fill some voids each year.

16. Marking and Banding

Due to the mild winter of 1990-1991, no rosy finches or snow buntings were banded during the 1991 calendar year.

Tundra swan banding effort was increased in 1991 over recent years. Refuge staff, volunteers, and the YCC students banded and placed individually coded neck collars on 20 swans over a three day period in July. Swan banding is gradually gearing

back up after falling off in the late 1980's. Details, including individual neck codes, are found in Section G.3 **Tundra Swan.**

Steller's eider banding was resumed in 1991 with a minimally successful effort. Refuge staff, AFWRC personnel and Jean Cochrane (Fish & Wildlife Enhancement), who compiled much of the information for the petition finding, banded 28 birds out of a flock of 350. Steller's eiders are banded during the molting period (late August or September) when swimming birds are driven by boat into a land based pen with hazing fences that extend into the water. After six years without banding and having only one veteran eider bander in the group, the effort was more of a learning experience than anything else. Banding efforts will intensify in 1992.



Chris Dau "ringin' and flingin'" Steller's eiders near Cape Glazenap while Jeff Mason of the AFWRC looks over the rest of the captives.
SEPTEMBER 1991 RLW



Molting yearling male Steller's eider.
SEPTEMBER 1991

RLW

ADF&G personnel recaptured seven of the adult cow caribou equipped with visible radio collars in April. Radios were replaced and annual weights and measures taken to determine the seasonal variability of body condition (see G.8 **Caribou**).

17. Disease Prevention and Control

A rabies outbreak swept through the area's red fox population in the spring of 1990. The population was noticeably lower than normal after mid-1990, but appeared to have returned to normal levels by the end of 1991. No foxes exhibiting behavioral characteristics of rabies, (acting strange and/or with a snout full of porcupine quills) were observed throughout 1991.

H. PUBLIC USE

1. General

The majority of refuge public use comes from the residents of Cold Bay, King Cove, Nelson Lagoon, and, to a lesser degree, False Pass and Sand Point. Consequently, our public use and interpretive programs are geared primarily for this audience. The presence of the refuge in this area greatly influences these people's lives. They in turn, have the potential to greatly influence refuge resources. Therefore, it is imperative that we reach these local residents through effective interpretation and environmental education programs.

In February, refuge staff made their annual visit to the King Cove School. The staff contacted approximately 120 students and 10 teachers in several groups. Topics included the National Wildlife Refuge System, local caribou and waterfowl populations, lead poisoning in waterfowl, and the use of steel shot. Teachers were informed of the refuge's resources and the upcoming Alaska and National Wildlife Weeks.



King Cove 1st Graders enjoy visits by the refuge staff. Skulls and study skins are always a hit with the younger crowd.

FEBRUARY 1991

MAC



King Cove 5th graders attempt to track down a caribou radio collar hidden on the school grounds.

FEBRUARY 1991

MAC

Several classes from the Cold Bay School visited the refuge headquarters periodically during the year. In April, three classes visited in conjunction with Alaska and National Wildlife Weeks. Refuge staff met with the groups and discussed the 1991 themes of wetlands and wildlife and polar habitats. The kids learned what wetlands are, different animal adaptations for living in wetlands, and the value of wetlands. The combined FWS/ADF&G new curriculum, Wetlands and Wildlife, was introduced to the three teachers and 19 students. In October the fourth and fifth grade classes came to learn bird identification as part of a month long bird unit. Identification techniques focusing on the local waterfowl were discussed.

The Izembek environmental education (EE) program received greater attention in 1991 due to the increased staff. Environmental education materials were amassed and organized into an EE Resource Library which is available for use to the educators in the Aleutians East Borough School District.

Schools and individual teachers are allowed to check-out these materials for use in their classrooms. Several materials were received or purchased in order to update and expand the refuge library.

Information about the 1991 Alaska and National Wildlife Weeks and the 1993 Goose Management Plan calendar contest were also distributed to the six schools in the district.

In September, ROS Chase attended the first ever Environmental Education Workshop for the Region. Definitions of EE, how to use and emphasize EE, and some sample activities and resources were discussed in the week-long session. Local teachers from each refuge's area were included, a novel and innovative approach for disseminating EE information. Mr. Ray Vergin from Sand Point participated for Izembek. This training, hopefully the first of an annual effort, provides the support refuges need to initiate and improve on the Service's increased emphasis on environmental education.

5. Interpretive Tour Routes

Although Izembek has no tour route per se, the road system does provide recreational access for visitors and thus provides us another "avenue" for interpretive information dissemination. Four of eight covered L.C. Haney billboard/bulletin board-type signs were installed on Grant Point Road, Outer Marker Road, and Outpost Road. Maps, hunting information, and bear safety information were posted on each billboard. The billboards were brought in for the winter months to reduce wear-and-tear and all eight will be placed along refuge roads again next spring.

The road to Grant Point terminates at the Grant Point Wildlife Observation Facility. The octagonal building contains interpretive panels about bird identification and the history, physiography, and ecosystem of the lagoon area. The deck binoculars housed in the facility are mounted on a locking pedestal and swivel to provide 360° viewing through the seven picture windows and door.

6. Interpretive Exhibits/Demonstrations

The refuge has several year-round interpretive displays located in Cold Bay. Large plexiglass map panels with accompanying wildlife/habitat panels describing the Izembek Refuge are on permanent display at the Reeve Aleutian Airways terminal. Some of the smaller wildlife panels and a Service shield emblem are displayed at the smaller MarkAir terminal. Bulletin boards at the Reeve terminal and local store provide information about the refuge, the Service, and local wildlife happenings.

7. Other Interpretive Programs

As an ongoing effort to keep the user public informed, several outreach activities are routine to the Izembek staff. Open houses, periodic letters to box-holders, visits to local communities, and articles submitted to the local newspaper are all informal public relations activities.

An open house was hosted at the refuge headquarters in July to discuss the mandatory use of steel shot for waterfowl hunting and the upcoming hunting seasons. Nine people attended. It appears that folks are accepting steel as an effective alternative to lead, but are still concerned about gun damage.

One letter was sent to box-holders in Cold Bay, Sand Point, Nelson Lagoon, King Cove, and False Pass in July, providing updates on the area's wildlife populations and summarizing hunting regulations for the fall seasons.

Refuge staff hosted an open house 28 February at the King Cove Corporation building in conjunction with a visit to the King Cove School. The refuge staff was available to answer local concerns about caribou, emperor geese, and subsistence, among other things. Unfortunately, only one person showed up. However, communication only requires two people and in spite of the low attendance the meeting was well worth our while.

Several articles were submitted to the local newspaper, the Aleutians East Borough Advocate throughout the year. Topics included the Izembek Christmas Bird Count, proposed caribou regulations and steel shot, the YCC program, swan banding, the Youth Fishing Day, and snow buntings. At least six articles per year are sent to the paper discussing refuge activities, local wildlife populations or other timely topics.

8. Hunting

Hunting is responsible for a large percentage of Izembek Refuge public use. On the Unimak and Pavlof units, nearly all of the public use can be attributed to hunting. On the Izembek Unit, waterfowl, caribou, brown bear and ptarmigan are the primary targets of interest. This is true for the Unimak and Pavlof units as well, with the exception of the waterfowl. The Cold Bay road system provides ready access to excellent hunting for all species and consequently, with the exception of brown bear, most of the hunting is done within the road system. Brown bear hunting is limited within the road system to a 2-bear harvest quota per season. The hunt is by registration permit with no limit on the number of permits. Though the harvest is limited, the system does provide many locals, and a few non-locals, the

opportunity to hunt brown bear locally. The majority of the bear hunting occurs outside the road system and much of this is by non-resident hunters utilizing a guide's services. With the exception of brown bear, most hunting pressure comes from local residents. In the past, large numbers of non-local hunters flocked to Izembek to experience fantastic hunting and liberal bag limits on both waterfowl and caribou. Since the closure of the emperor goose season in 1986 and the reduction in bag limits for other waterfowl species as well as caribou (from four to one for non-locals in 1986), hunting pressure has decreased dramatically from the non-local public. Due to the subsistence lifestyle, local pressure is rather constant over time.

Waterfowl

Waterfowl hunters, both local and non-local, probably account for greater than 50 percent of the public use-days on the refuge. During the peak of the season, mid-September through mid November in 1991, it is estimated that 20-30 hunters use the refuge each day. While this may not sound like high public use, no other single activity generates as much use of the refuge.

Waterfowl hunter bag checks are an important function at Izembek Refuge. While most often associated with law enforcement, the checks typically provide more biological data than evidence. During the 1991 season, only one refuge officer was available to field check hunters. As a result, data was somewhat limited this year. Statistics that are always of interest to the refuge staff include age ratios of harvested birds and the number of geese/ducks per hunter hour of effort. From the 147 bag checks in 1991, the average hunter spends approximately four hours in the field per hunt. In 1991, the average hunter in this period bagged 1.2 Canada geese, 0.36 brant and one duck (Table 31). All of these numbers are approximately half of those calculated in 1990. The failure of the crowberry crop likely is somewhat responsible for the reduced success on Canada geese. Without the berry crop, flight lines of the birds are less predictable and birds may spend less time flying overland and more time on the lagoon. The Canada goose age ratio was also of interest this year, as the number of adults harvested exceeded the number of juveniles by a ratio of 1:0.6 (Table 32).

Caribou

Caribou harvest is largely local subsistence take with a few non-local hunters taking animals on combination brown bear/caribou hunts. As the caribou arrive on their wintering grounds around Cold Bay, hunting activity is heavy for a short period as many hunters are trying to take large bulls before

Table 31. Summary of waterfowl bag check data, Izembek NWR, 1991.

Hunter Information

Month	No. Hunter Contacts	No. Hours Hunted	Hours/ Hunter	No. Ducks (Cripples)	No. Brant (Cripples)	No. Canadas (Cripples)
September	75	309	4.12	86 (9)	46 (3)	80 (9)
October	60	216	6.13	46 (2)	7	66 (6)
November	12	29	2.40	2 (3)	1	9 (2)
Total	147	554	3.77	134 (14)	54 (3)	155 (17)

Species Harvest by Age and Sex

Species	Adult			Immature			Unknown			Cripple	Total	% of Harvest
	M	F	U	M	F	U	M	F	U			
Black Brant	9	10	0	6	4	0	0	0	25	3	57	15.0
Canada Goose	21	27	0	13	11	5	0	0	78	17	172	45.4
Snow Goose	0	1	0	1	0	0	0	0	0	0	2	0.5
Goose Total	30	38	0	20	15	5	0	0	103	20	231	
Northern Pintail	9	5	0	8	11	0	0	0	9	2	44	11.6
Mallard	19	4	0	7	1	0	2	0	1	4	38	10.0
Gadwall	1	0	0	2	1	0	0	0	0	0	4	1.1
Green-winged Teal	5	3	0	9	1	0	0	1	2	2	23	6.1
American Wigeon	0	0	0	1	2	0	0	0	0	1	4	1.1
Shoveler	0	0	0	0	0	0	0	0	1	1	2	0.5
Greater Scaup	0	1	0	0	0	0	0	0	0	3	4	1.1
Harlequin	0	0	0	0	0	0	0	0	3	0	3	0.8
Unknown Duck Species	0	0	0	0	0	0	0	0	25	1	26	6.9
Duck Total	34	13	0	27	16	0	2	1	41	14	148	

Table 32. Age ratio of Canada geese in hunter's bags, Izembek NWR, 1976-1991.

Year	Canada Geese Harvested		Total	Adult:Immature Ratio in Harvest
	Adults(%)	Immatures(%)		
1976	78 (38.6)	124 (61.4)	202	1.00:1.60
1977	32 (43.2)	42 (56.8)	74	1.00:1.30
1978	29 (37.7)	48 (62.3)	77	1.00:1.70
1979	98 (53.3)	86 (46.7)	184	1.00:0.91
1980	30 (43.5)	39 (56.5)	69	1.00:1.30
1981	113 (57.1)	85 (42.9)	198	1.00:0.77
1982	74 (50.7)	72 (49.3)	146	1.00:0.97
1983	51 (49.1)	53 (50.9)	104	1.00:1.04
1984	37 (41.6)	52 (58.4)	89	1.00:1.40
1985	23 (67.6)	11 (32.4)	34	1.00:0.48
1986	11 (50.0)	11 (50.0)	22	1.00:1.00
1987	17 (51.5)	16 (48.5)	33	1.00:0.94
1988	50 (48.5)	53 (51.5)	103	1.00:1.06
1989	94 (56.0)	74 (44.0)	168	1.00:0.79
1990	40 (46.0)	47 (54.0)	87	1.00:1.18
1991	48 (62.3)	29 (37.7)	77	1.00:0.60
Total	825	842	1,667	1.00:1.02

the bulls shed their antlers. For the 1990-91 season, nearly a third of the caribou were harvested during a two week period beginning 28 October; the caribou arrived in the road system in numbers on 27 October. Documented harvest totaled 35 animals. Thirty-four were bulls and a single illegal cow was taken. Intuitively, it is believed that the documented harvest is about 40-50% of the actual harvest.

Due to the federal subsistence responsibilities and the continued decline of the SAPCH, regulations for the 1991-92 season underwent some changes. In light of the current population, refuge and ADF&G personnel met in order to establish guidelines for the 1991-92 harvest. It was agreed that the total harvest should target no more than 100 bulls. In order to protect the animals during their most vulnerable period, the 1991-92 season was split with a total closure during the months of October and November. Additionally, the traditional opening day of 10 August was restored for Game Management Unit (GMU) 9D. It was also agreed upon that should the herd fall below 2500 animals, based on the mid-winter census, all harvest, subsistence and otherwise, would be curtailed. Federal subsistence regulations for the 1991-92 season permit only residents of GMU 9D and False Pass to hunt caribou on federal public lands.

Brown Bear

The 1991 brown bear season for GMU 9D opened on 7 October and ran through the 21st. Eight registered guides were issued special use permits for commercial guiding and booked roughly 50 clients among them.

The Unimak Island hunt is open each spring and fall by drawing permit. Seven permits are issued each spring and eight permits each fall. During the 1991 spring hunt, six permit holders showed up and harvested three bears between them. All hunters reported beautiful weather and seeing many bears. Those that did not take bears reported several opportunities, but were holding out for larger animals. Six of the eight fall permit holders showed up and took six bears. Bears are typically more concentrated in the fall and usually more bears are seen. However, the average size is typically smaller for fall harvested bears as was the case this year.

The Cold Bay Road System hunt opened on 7 October along with the regular fall bear season. Twelve hunters put in 22 hunter days before the two bear quota was reached. The season was closed by emergency order at 11:59 pm on 9 October. Both bears taken in the road system area were adult boars and the second bear nearly met Boone and Crockett minimums. The second bear taken was an old radio-marked bear from the Izembek telemetry

study. The collar was long gone but he still retained the lip tattoo identifying him as IZ23. Old IZ23 was originally marked in 1983 when darted near the Outer Marker. He was 23 years old and the largest bear taken in GMU 9D this season.

Thirty of the total bears taken in GMU 9D and 10-Unimak Island in 1991 were sealed out of the refuge office. Sows outnumbered the boars 17 to 13. As a result, average sizes seemed somewhat smaller this year. Of the 30 bears sealed, none possessed the minimum skull measurement (length plus width) of 28 inches to tentatively make the Boone & Crockett record book.

9. Fishing

Sport fishing within the Refuge proper is somewhat limited due to access and is basically confined to Frosty Creek, upper Russell Creek, and a few lakes. The majority of sport fishing in the area is concentrated on lower Russell Creek and to a lesser extent, Trout Creek. Both of these streams flow out of refuge lands but the actual fishing occurs off refuge.

Sport fishing high-use seasons are basically the months of June through October. Non-local use is typically greatest in September when fisherman can combine their trip with some goose hunting. Silver, or coho, salmon are the species of primary interest.

Abuse of the silver salmon resource runs rampant in September among chiefly non-local users. Parties come out for a limited time with only one concern: taking home as much fish as possible. Snagging and "double-dippin'" are commonplace. Since the fishing is off refuge, staff LE officers are in that "gray area" of jurisdiction. Attempts to have Alaska Fish and Wildlife Protection (FWP) Officers, who are in Cold Bay for the commercial fishing season, stay on until mid-September were initiated in 1989. The FWP officers typically leave Cold Bay around 1 September and we feel the extra two weeks would be well worth their while. The lone Refuge Officer available in 1991 devoted his time to the waterfowl hunters during this period.

Several local anglers expressed concern over the Russell Creek steelhead run this year. Though the run is very small to begin with, it appeared that in 1991 it was even further diminished. Being such a small run (probably <200 fish), it is susceptible to a number of potential disasters. Refuge, FAO and Russell Creek Hatchery staffs discussed the need to assess the steelhead run. Funding is limited (Okay non-existent) but this project will be a priority for fisheries work in the future. Additionally, baseline surveys on all species, distribution, and run timing for the Russell Creek stocks all need to be investigated.

A Youth Fishing Day was sponsored by the refuge during National Fishing Week in June. Eight kids, ages four to 13, participated in a "fishing derby" at Quonset Pond. RM West and ROS Chase conducted environmental education lessons while three local parents aided in supervision of the kids. Prizes for all anglers were donated by refuge staff, with a grand prize for the largest fish caught, a monster 13 inch char. This was the first year of what we plan to make an annual National Fishing Week activity. The derby was a great success.



National Fishing Week derby participants. The young angler 3rd from the right proudly displays the derby winner.

JUNE 1991

RLW

10. Trapping

Izembek NWR and the Unimak Unit (Aleutian Islands Unit of Alaska Maritime NWR) require trapping permits as per 50 CFR Part 36. Two permits were issued for Unimak and five for Izembek for the 1991-92 trapping season. The special conditions for the trapping permits were updated in 1989. All special conditions and changes were discussed and explained in detail at a November public meeting. All trapping is basically "recreational," though some trappers are more serious than others.

11. Wildlife Observation

Wildlife observation is a common past-time for residents of Cold Bay. With the road system access, many residents drive the area year-round to view and photograph wildlife. Bears and caribou seem to be the primary species of interest for this activity, since many of the residents come from outside of Alaska and have never seen brown bears or caribou before. Although this type of use is hard to measure, it appears that this non-consumptive recreational use may be increasing, especially use of the Grant Point wildlife observation facility, during the spectacular fall concentrations of waterfowl.

12. Other Wildlife Oriented Recreation

A local resident constructed a "mobile cabin" for recreational use of the refuge. Following completion, the structure was parked on the refuge to support recreational activities, primarily fishing. Refuge staff met with the owner and easily reached agreement on the use of the facility on the refuge. The owner agreed not to leave the structure unattended on the refuge.



"Mobile cabin" constructed by a local resident. The structure is used to support fishing and hunting activities.

JUNE 1991

RLW

15. Off-Road Vehicles

All-terrain vehicles (ATV) are a common mode of transportation in Cold Bay and area villages, so the potential for off-roading problems is high. Actual problems are typically isolated instances of people driving off-road to retrieve a caribou or people off-roading in an ATV for a short distance to gain access to the beach. The latter is most common at the end of the Pintail Lake Loop where it is less than 100 yards to the beach. Most of this off-roading occurs during waterfowl season by hunters who are too lazy to walk. Use of the beach within the Izembek SGR with any wheeled vehicle requires a permit from the State of Alaska. This became an issue in 1991, as the regulation had not been recognized in the past. After the initial reaction to the "new" restriction, compliance has been good. Permits for wheeled vehicle access to the SGR are issued by the Habitat Division of ADF&G who coordinates with the refuge.

Vehicle travel is limited to the designated Cold Bay road system by 50 CFR and is also included in the preferred alternative of the Izembek Refuge CCP. Under the preferred alternative of the CCP, it also provides for maintenance of the existing road system, but without any new road construction on the refuge. The current road system was so designated in a public meeting in the 1970's. The drivable portions of the roads that persisted from the military occupations of the 1930's and 1940's were left open and designated as the road system. At that time, Cold Bay vehicular traffic was mainly passenger four-wheel drives. ATV's were unheard of at that time. As a result, if a road was impassable to a passenger 4x4 it was closed at that point. With the surge in popularity of the ATV, a few challenges have arisen as to why a given road is closed. As the road system stands now, access is excellent for all refuge activities. Opposition to points where a road has been closed is typically from a small group that wants to drive somewhere else to hunt or trap.

16. Other Non-Wildlife Oriented Recreation

Emeric Fisset, the Frenchman whose ambition it was to walk from Barrow to Cold Bay, finally arrived at his destination 9 June, after spending nearly a year walking across Alaska. Fisset left Barrow 1 August 1990 and encountered numerous hardships and adventures along the way. Refuge Manager West was the first to greet Fisset and walked the last mile into Cold Bay with him. Fisset talked of a trek across Siberia next. A narrative of the adventure was published in the January 1992 issue of Alaska Magazine.



Emeric Fisset arrived in Cold Bay 9 June after leaving Barrow on 1 August.

JUNE 1991

RLW

Beachcombing is a popular pastime among local residents. The beaches of the Pacific Ocean and Bering Sea in the area are littered with "treasures" and junk from nature and civilization, past and present. Much of the beachcombing is done during the summer when temperatures are warm and in the fall in conjunction with a waterfowl hunt. These beachcombers are usually content to find a small glass ball fishing float and call it a day. There are also a few very serious beachcombers who concentrate their efforts on the outer beaches in the late spring. The primary trophies of interest are walrus tusks and large (12"-16") glass fishing floats. The idea is to get out to the outer beaches in the spring as soon as the weather permits, thereby having first crack at the bounty brought ashore or exposed by the winter storms.

Much of the animal parts collected on the beaches must be registered pursuant to the Marine Mammal Protection Act of 1972. The Izembek Refuge office is a designated sealing agent for beach found marine mammal parts. A new procedure for sealing beach found walrus ivory was initiated in 1991. The process now includes lead seals and ultra violet markers, instead of being engraved as in the past.

17. Law Enforcement

Refuge officers' law enforcement activities are primarily geared toward the waterfowl, caribou, and brown bear seasons in the local area. For the better part of 1991, there was only one Refuge Officer on the refuge staff in Cold Bay. The refuge received assistance from Jim Sheridan, Division of Law Enforcement, for a one week period during the waterfowl season.

One Violation Notice was issued in 1991 for the taking of a cow caribou during the bull-only season.

The Regional policy on enforcement of migratory bird hunting during the closed season (spring waterfowl harvest) continued to receive emphasis in 1991. No evidence of spring waterfowl harvest in the area was discovered. It is unlikely that spring waterfowl harvest in this area occurs other than incidentally. During the time when the birds are moving back through to nesting grounds, commercial fishing operations are gearing up for the salmon and herring openers and most area residents are occupied with that process.

Steel shot compliance was better than expected through the first season of its requirement in Alaska. Only one "stash" of lead (about 40 rounds) was discovered in the field. The area was staked out, but no one returned to the area. A few hunters complained that the steel loads "bounce off" their quarry, but most admitted that they noticed no difference between the steel and traditional lead loads.

A formal request was initiated in 1991 to obtain a State of Alaska law enforcement commission for Refuge Officer Mark Chase to enforce Title 5 (wildlife related regulations) of the Alaska Administrative Codes and part 16 (wildlife related) of the Alaska Statutes. The refuge staff believes that with subsistence issues, the overlay SGR, and sport fishing problems, State authority is warranted and necessary for full resource protection. The action is on hold pending the drafting of a Regional policy for which ARM Chase has the lead.

I. EQUIPMENT AND FACILITIES

2. Rehabilitation

A concentrated effort to rehabilitate the interiors of Quarters 1, 2 and 3 was undertaken in 1991. The three homes were constructed in 1963 and were overdue for some fairly major work. Refuge staff, along with help from Walt Szelag (Regional Engineering office), rescrewed all sheetrock in walls and ceilings, painted all interiors and replaced mouldings and window trim in the three residences. Additionally, carpet and linoleum were replaced in all four refuge homes. New bathroom cabinets, sinks and shower doors were installed in Quarters 1, 2 and 3, along with garbage disposals and new kitchen plumbing. All single-strand electric wires remaining in the homes and not enclosed in conduit were replaced with romex. Following the rehabilitation efforts, it is like living in a new house. The 8610 fund is a wonderful thing!

Work to rehabilitate the bunkhouse interior was also begun in 1991. Refuge staff and the YCC crew rescrewed sheetrock and painted the interior. New furniture was also ordered for the bunkhouse.

A mid-January cold snap froze the bunkhouse water main, causing minimal damage. When MW Morey repaired the line, he also rerouted it to prevent similar problems in the future.

On 1 August, MW Schulmeister and ARM M. Chase applied primer to the garage roofs at Quarters 1, 2, 3 and 4. When we get a suitable calm, dry day, hopefully in 1992, the paint coat will be applied. This is a good example of a project that could likely be accomplished in a couple weeks in most locations. The Cold Bay weather, however, has drawn repainting building roofs out into a three year ordeal. The office roof is planned for 1992 also.

The main lifting beam on the aircraft hangar door was replaced. The original beam rusted out in only six years. It will be interesting to see if the replacement, which is made of thinner material, lasts as long. The door spring tensioners, pulleys and cables were also replaced. Walt Szelag traveled to Cold Bay in order to assist MW Schulmeister with this task.

3. Major Maintenance

The refuge received \$76,000 of the Maintenance Management System (MMS) funds in 1991 to complete four projects. The earmarked funds were dedicated to the replacement of first and second bridges on Frosty Road, maintaining area roads, rehabing the float plane dock, and rehabing the aircraft hangar. The

Alaska Department of Transportation crew graded Frosty Road between First Bridge and Second Bridge in May and did additional grading of the road in July in preparation for the bridge replacement work. Walt Szelag, Harold Shipley and Pete Clement, comprising the Regional Office Engineering Construction Team, arrived on 23 July to assist with the MMS projects. The Team completed their work and departed Cold Bay on 29 August. The effort was the second construction season that Walt's crew provided such assistance to the Refuge. The refuge staff was very pleased with the results of their efforts and appreciates their hard work. In addition to the MMS projects, Walt and his crew also assisted the staff in installing the L.C. Haney billboard signs and rehabilitating the refuge residences

Maintenance Worker Schulmeister constructed an ATV bridge at the site of the former Fourth Bridge on Frosty Road in October. The former vehicle bridge was destroyed by a local resident in a front-end loader attempting to retrieve a stuck vehicle.

4. Equipment Utilization and Replacement

On 26 July, aircraft N745 blew an intake manifold on takeoff. Pilot Dau landed safely and an Office of Aircraft Services (OAS) mechanic accomplished the necessary repairs on 29 July. A 100 hour inspection was also completed during the visit. In August, aircraft N745 required a replacement left aileron and magneto. The annual inspection was completed in May and was followed by a gear change from tundra tires to floats. The plane was removed from Blinn Lake on 15 November and underwent a gear change back to tundra tires and received another 100 hour inspection.

After amassing a total of eight hours on our new Case 480 backhoe/loader, a tremendous fluid leak developed. A Case mechanic happened to be in town working on State equipment and discovered that the leak was due to a factory defective pump housing. The part was replaced as warranty work but the refuge ended up paying an \$1100 bill for travel and lodging for the mechanic. Acting Manager Chase discussed with the vendor the absurdity of charging us for warranty work on an eight hour old piece of \$40,000 equipment when the mechanic was already in town anyway! It was conveyed, and confirmed by the regional Contracting Office, that the Service had purchased the piece of equipment with a warranty which covered parts only and thus we were stuck with the bill. The State did not have to pay it as they had a warranty which covered transportation for the mechanic as well. Our only question is why would we purchase a piece of equipment for a remote station and not get a full warranty? The thousand or so dollars saved on the purchase price really wasn't saved at all.



MMS project of replacing the float plane support building. The dump truck belongs to the State.
AUGUST 1991 MAC



The new float plane support building. Former Manager Robin West gives the straight skinny to Associate Manager George "Indiana Jones" Constantino.
SEPTEMBER 1991 MAC



New Second Bridge on Frosty Road.
AUGUST 1991

RLW



New Third Bridge on Frosty Road.
AUGUST 1991

RLW

5. Communications Systems

Aircraft N745 received a replacement VHF radio in January when the then current unit ceased to function. The "old" radio was in the plane less than one year. Problems with the FM radio were also resolved in February.

Three mobile radios with telephone patch capabilities and radio/telephone interconnect units were received in September. The system allows after hour communication between field researchers, Refuge Officers on patrol, and refuge staff at their residences.

6. Computer Systems

A second 386 computer was received in May. The additional unit serves as a work station for non-clerical refuge staff and provides backup capabilities should misfortune befall the older unit. The purchase also included an HP Paintjet XL printer.

7. Energy Conservation

In April, water heater insulation blankets and timers were installed on all station water heaters.

As part of the rehabilitation of the refuge residences, several door frames were replaced in various locations. The new frames and jams cut down on the drafts which were common around the old doors frames.

8. Other

The construction of a shop building at refuge headquarters is the station's number one priority Refuge Needs Information System (RNIS) project. A new shop building would allow for all refuge vehicle maintenance to be performed without having to move the current building's contents outside, and would provide a bay for the new backhoe/loader. The backhoe/loader is currently being stored off-site at a leased former U.S. Air Force storage building which may not be available in the future. Also, removal of shop facilities from the current headquarters office/shop building would relieve the strain on staff space and storage room.

J. OTHER ITEMS

1. Cooperative Programs

International Brant Project



Part of the International contingent which descended on Izembek to study the brant. Left to right: Sergei Ganusevich (USSR), Arseni Kretchmar (USSR), Greg Susich (VOL), Gabriella Ibanez-Hernandez (Mexico), Dr. Dirk Derksen (AFWRC), Brant (Labrador Retriever), Yevgeni Lobkov (USSR), Niels Dau (Cold Bay), Lee Tibbets (AFWRC), Tim Fenske (AFWRC), David Ward (AFWRC), Cherni (Labrador Retriever), Yoshihiko Mayabayashi (Japan), Sergei Karhitonov (USSR), and Jens Dau (Cold Bay).

SEPTEMBER 1991

CPD

The cooperative Pacific black brant program generated considerable international interest at Izembek this year. Throughout the fall season, biologists, the news media and VIP's descended on Cold Bay as a result of the brant program. The biological achievements of the program are discussed in G.3 **Black Brant**. In this section we will focus more on the human aspects of this remarkable program and field season.

Pacific black brant nest in Canada, Alaska and the former Soviet Union (now Russia) and winter primarily in Mexico but also in Canada, the United States and Japan. This year, for the first time, biologists from all of these countries gathered at Izembek to exchange information, collect data and interact with their colleagues from around the world. From the former Soviet Union, Sergei Karhitonov (Ringing Centre-Moscow) made his second trip to Izembek accompanied by Arseni Kretchmar from the Magadan District of Biological Problems, Yoshihiko Mayabayashi represented Japan, Gabriella Ibanez-Hernandez represented Mexico and Neal Dawe represented Canada. U.S. representatives in addition to the refuge staff included Dr. Dirk Derksen (AFWRC), David Ward (AFWRC) and the entire AFWRC field crew: Jeff Mason, Lee Tibbets, John Pearce, Tim Fenske and volunteer Greg Susich from Humboldt State University, California. All visitors stayed in the refuge bunkhouse and spent days, and in cases weeks, sharing information on all aspects of life in the various countries. All of the scientists participated in the field collection of data for the brant project and we were able to work most of them into an aerial survey of the area. Friendships were made and contacts solidified and it was difficult to say goodbye when the field season came to a close.

With all of the international attention, and some hustle by our Public Affairs Officer Bruce Batten, the news media picked up on the project as well. Tim Woolston and Russ Weston of NBC Channel 2 in Anchorage visited the refuge to do a story on the international cooperation involved with the brant project. Tim and Russ braved the wind, rain and cold to interview all of the foreign biologists and David Ward while they worked in the field. Channel 2 aired an excellent story about the program on 27 September.

In addition to picking up on the international visitors, the news media reported the migration status of the brant from Izembek Lagoon to Mexico. Our Regional Public Affairs Office did an outstanding job of creating visibility for the brant migration. Local newscasts and papers from as far away as Phoenix, Arizona, and Denver, Colorado, as well as all the major cities on the west coast, took an interest in reporting the migration.

Bruce Batten (PAO) and Phil Million (Acting DRD) visited the refuge in conjunction with the international activities, but primarily to take part in the station review along with ARW John Rogers and Associate Manager Constantino. A meeting came up unexpectedly, causing ARW Rogers not to make it and AM Constantino to have to leave early. Bruce and Phil, however, were able to meet the international biologists and go through a quick review of refuge programs, including a tour to see the fall staging waterfowl concentrations.



Bruce Batten (PAO) and Phil Million (Acting DRD)
looking over the staging waterfowl concentrations
from Grant Point.
SEPTEMBER 1991

MAC

US/USSR BIOLOGICAL EXCHANGE PROGRAM

Mr. Yevgeni Syroechkovski of the Russian Bird Ringing Centre was a guest of Izembek Refuge for the month of December. In addition to preparing for a presentation at the January Arctic Goose Conference in California, Yevgeni assisted us with eagle mortality surveys, aerial censuses and the Christmas Bird Count. He also joined the refuge staff in celebrating Christmas and the New Year.

In addition to the brant biologists and Yevgeni, two other Soviet scientists visited Izembek in 1991. Drs. Sergei Ganusevich and Yevgeni Lobkov travelled to Cold Bay after spending some time in the Cordova area with AFWRC personnel. Dr. Lobkov works on the Kronotsky State Biosphere Reserve, which is somewhat analogous to a National Wildlife Refuge. Dr. Ganusevich is a raptor biologist in Moscow and while at Izembek had numerous opportunities to observe gyrfalcons, bald eagles and rough-legged hawks. Both Sergei and Yevgeni participated in several aspects of the refuge program and were glad to help out with whatever was going on.

The dramatic changes in late 1991 to what was the Soviet Union present many unique opportunities in both research and management on Alaska refuges and Russian Nature Reserves. Cooperative field work involving Service and Russian Academy

of Sciences biologists began in 1989 in both countries and has expanded since then.

Correspondence and the exchange of biological data and literature preceded the exchange of personnel by up to ten years in the past and this interchange has established a healthy atmosphere of cooperation between Izembek Refuge staff and two of Russia's most important nature reserves in the Far East, Wrangel Island in the Chukchi Sea and Kronotsky on the Kamchatka Peninsula. As the following photographs show, the Kronotsky Reserve encompasses habitats ranging from coastal lagoons to volcanic peaks in striking similarity to the Izembek Refuge at the same latitude, but 1350 miles to the east. Many components of flora and fauna are identical, with the most notable examples being coastal estuaries with eelgrass important to migratory waterfowl and salmon, and densely vegetated riparian habitats important to brown bear.

With input from both Izembek Refuge and Kronotsky Reserve, an informal proposal was discussed 18-22 February 1991 at the US-USSR Environmental Agreement Joint Committee meeting in Moscow. The proposal was to consider the two wildlife units as "biosphere bridges" or "sister refuges" as a component of three candidate pairs and the only one involving a National Wildlife Refuge. Administratively, we don't know if any official agreements will be completed due to current political uncertainties and other priorities. Operationally, we are proud to unofficially consider ourselves the first US-Russian "sister refuge/reserve" site established in Beringia.



Unimak Island? No, the Kronotsky Reserve, USSR.
DATE UNKNOWN Yevgeni Lobkov



Pavlof Volcano, Trader Mountain and the Southern Alaska Peninsula caribou herd calving grounds?
No, the Kronotsky Reserve again, 1350 miles east of Izembek at the same latitude.

DATE UNKNOWN

Yevgeni Lobkov

3. Items of Interest

Westdahl Volcano

On 29 November, Westdahl Volcano on Unimak Island's west end roared back to life in spectacular fashion. The eruption ended a 13 year dormancy since the last activity in 1978. Airline pilots reported an ash cloud to 25,000+ feet and lava flows coming from several vents along a large fissure in the mountain. The flow progressed down the southeast flank of the mountain as lava, ash and steam eruptions continued sporadically for over a month. The last significant activity occurred on 16 January 1992 and is likely that this will be all for this latest flurry from Westdahl. Effects of the eruptions on human life were limited to a few ash dustings and ground rumblings in False Pass which lies roughly 50 miles to the east of Westdahl. The volcano did provide Cold Bay residents with a few intense sunsets, that is when one could see the sunset through the clouds.

POLISH SHIP CREW CHANGES

The Polish fishing fleet began using Cold Bay in 1991 as the Alaskan port from which to conduct their crew changes. Approximately 10 ships docked in Cold Bay where the ships' crews were exchanged for fresh crews flown in from Poland. The folks coming off the boat then were returned, via airplane, to Poland. In the past, these transfers have taken place in Seward, Alaska, but Polish officials opted for Cold Bay in 1991 in an effort to decrease the defection rate of the crews. Their reasoning is presented in the attached news clip where the INS chief in Anchorage is quoted as saying "Nobody seems to want to jump ship in Cold Bay." In spite of their perceptions, a few disgruntled workers tried it anyway - apparently reasoning that even Cold Bay is better than going home.



Vessels of the Polish fishing fleet dock in Cold Bay to change out there crews.
JULY 1991

MAC

4. Credits

Photos: CFZ - RM Ziellemaker
 RLW - former RM West
 MAC - ARM M. Chase
 JEC - ROS J. Chase
 CPD - WB/P Dau

Introduction Zeillemaker
 A (Highlights) M. Chase, Zeillemaker
 B (Climate) J. Chase
 C (Acquisit'n) M. Chase, Zeillemaker
 D (Planning)
 1-4 Zeillemaker
 5 Dau, Zeillemaker
 6 staff
 E (Administration)
 1-2 M. Chase
 4 J. Chase
 5-8 M. Chase
 F (Habitat) Zeillemaker
 G (Wildlife)
 1 Dau, Zeillemaker
 2 J. Chase
 3 Dau
 4-5 Zeillemaker
 6 Dau, Zeillemaker
 7 Zeillemaker
 8 Dau, Zeillemaker
 9-10 J. Chase
 11 Zeillemaker
 14 Dau
 16 J. Chase
 17 Zeillemaker
 H (Public Use)
 1-7 J. Chase
 8-10 Dau, M. Chase
 11-17 J. Chase
 I (Equip/Fac) M. Chase, Zeillemaker
 J (Other)
 1 Zeillemaker, Dau, M. Chase
 3 M. Chase
 4 Zeillemaker
 K (feedback) Dau
 L (Info Pack) staff
 Typing J. Chase, M. Chase, Zeillemaker
 Editing staff
 Assembly staff

Answer to the eider quiz from page 63. We counted 1403 (twice!).

K. FEEDBACK

Brant and Their Management

Work began in 1991 to update and revise the Pacific Flyway Brant Management Plan. The refuge received and reviewed February and May drafts, preparation of which was coordinated by Eric Nelson, Sacramento NWR. Eric worked with brant while stationed at the Humboldt Bay NWR. Overall, the product we've seen provides an excellent update of historical information and compilation of data obtained since the original plan was finalized in 1978. Our primary concern was the erosion of the population goal from 185,000 to 170,000 birds. We are unclear as to whether this reduction relates to a re-analysis of historical wintering data on which the 1978 goal was based, an apparent inability of the population to build to historic levels (especially at coastal wintering sites in California, Oregon and Washington), or some form of administrative intervention. In any event, our concern is that managers continue to actively press for programs that will allow populations to return to historic biologically attainable levels.

Pacific brant spend essentially all their life on "public lands" managed as federal or state refuges, tidelands, and estuaries with extensive biodiversity. Many important sites, especially in Mexico, are threatened by various forms of development. Brant are visibly sensitive to development and related disturbance in these marine habitats. If historic staging and/or wintering numbers cannot be maintained, we as managers should take this as an indicator of potentially larger problems facing these irreplaceable estuarine habitats. Development and people may "prefer" such areas, but can adapt to other locations. Brant and other species of marine animals and plants cannot adapt, only perish, if their habitats are lost. Lowering-our-sights with respect to management goals or easing the level of protection that our public lands need (and that our mandate to maintain biodiversity requires) could allow an unacceptable level of habitat erosion to become even worse.

Snowy Owls, Their Relationship and Importance to Arctic Waterfowl

State and federal hunting regulations in Alaska allow resident hunters to take snowy owls with "no limit; however, a bird may only be taken for food or clothing, and no bird may be sold or offered for sale." This unrestricted take is allowed in coastal areas from Bristol Bay to the North Slope, the range of Alaska's arctic nesting geese. This regulation has long been maintained and we not only doubt its need and appropriateness, but also wonder about the long-term biological effects of such management. Russian biologists working in arctic areas have

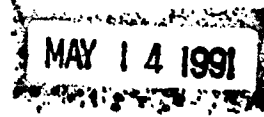
noticed a commensal nesting relationship between snowy owls, brant and common eiders during studies at Wrangel Island. The phenomenon may be widespread in the arctic. Brant and eiders occur there in low densities and both are vulnerable to predation by arctic foxes. The owls are very territorial and their active defense against foxes protects not only their nests and young, but also those of the brant and eiders which nest only within snowy owl territories. The owls follow the cycle of the lemming population, their primary prey, and so don't nest every year. Likewise for brant and eiders. At Wrangel Island, the presence of snowy owls is essential to the continued existence of nesting populations of brant and eiders. Do similar relationships occur in Alaska, or did they in the past? Snowy owls have been extirpated as a nesting species on the Yukon-Kuskokwim Delta. Data suggest they may have been common into the 1950's. There are even the Nyctea Hills on Nelson Island as a remembrance. Their name remains but the birds are gone, possibly as a result of short-sighted regulations. There were even a few pair of snow geese on the Y-K Delta as late as the 1950's. One can only speculate on any commensal relationship that may have existed between that species and snowy owls.

In Russia the owl-waterfowl relationship seems to occur at extreme edge-of-range sites. Low numbers and productivity may be characteristic in such areas, hence the owls all important role. Most waterfowl research in Alaska has been directed to high density habitats, one of which, as noted, no longer has breeding snowy owls. In other Alaskan areas researched thus far, where owls still remain, a commensal relationship has not been noted. Never-the-less, we should be very concerned about such ecological relationships in areas populated by species of concern, such as all arctic nesting geese and eiders. We recommend that the Service propose closing the season on snowy owls or initiate studies to understand the ecological relationships between nesting snowy owls and other nesting birds.

U.S. FISH & WILDLIFE SERVICE

ALASKA

1011 E. TUDOR RD.
ANCHORAGE, ALASKA
99503



91-22(1)

IZEMBEK NWR
RECEIVED

For immediate release

MAY 20 1991

COLD BAY, ALASKA

For further information, contact
Bruce Batten 786-3486 or
Diana Weaver 786-3309

Tiglax crew members receive awards for valor

Secretary of the Interior Manuel Lujan and Assistant Secretary for Fish and Wildlife and Parks Constance B. Harriman presented valor awards May 8 to two federal employees who heroically rescued a man from his burning boat in Dutch Harbor. The Washington, D.C., ceremony honored crew members of a U.S. Fish and Wildlife support vessel headquartered in Homer, Alaska.

Marcia Macone of Homer, a cook/deckhand; Robert Schulmeister of Cold Bay, an engineer; and Homer resident Kevin Bell, first mate, all working on the *M/V Tiglax*, responded to a radio call for help while moored at Dutch Harbor on July 25, 1989. The call came from Jack Aldridge, whose 180-foot wooden boat, anchored in the harbor, was engulfed in flames and plumes of black smoke.

MORE

DISPATCH: ALAS



TOM HETTICH / Special to the Daily News

The Polish trawler Orycin changes crews earlier this month in Cold Bay on the tip of the Alaska Peninsula. The crews, who fly in from Poland, used to transfer in Seward. But being that close to Western civilization resulted in a lot of ship jumpers, according to the U.S. Immigration and Naturalization Service. Polish officials switched to Cold Bay about six months ago, "and that seems to have solved the problem," said INS chief in Anchorage, Norbert Legue. "Nobody seems to want to jump ship in Cold Bay."

Edited by Larry Campbell

SOUTHEAST

FULL-TIME MAYOR JOB FACES CHALLENGE

JUNEAU — A group has begun a petition drive to let voters decide sooner whether Juneau should have a full-time, full-salaried mayor. And the guy who originally proposed the change, the mayor himself, is

good idea.

"Perhaps naively I did not anticipate the furor this proposal has ultimately caused," Botelho said. "It's time to cry 'uncle.'"

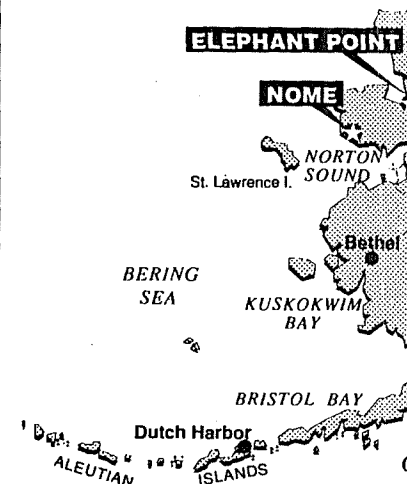
The change has not given the mayor any additional powers. Juneau does not have a strong-mayor form of government, in which the mayor can veto assembly decisions and performs the duties of a city manager.

Redden Net, says Alaska fisherman use from 800,000 to 1 million pounds of web a year.

O'Toole said gillnetters in Cordova average throwing away two nets each year, for a total of about 70,000 pounds. If the recycling effort proves successful, O'Toole hopes to encourage other coastal fishing communities to do the same.

— Cordova Times

BARR



Another of the elders said that in the past, they would clean an intestine like a long balloon. When dried, it was made into a raincoat by sewing all the strips together.

— Lyn Kidd
Barrow S.

NORTHWEST

VILLAGERS GO WITHOUT BELUGA THIS YEAR

ELEPHANT POINT — Beluga whale hunting here on Eschscholtz Bay was poor this season, according to Buckland residents.

"This was one of the worst years we've had," said Raymond E. Lee Sr., 53. "Not a beluga in

Library
U.S. Fish & Wildlife Service
1011 E. Tudor Road
Anchorage, Alaska 99503

Tiglax valor awards/2

Macone and Schulmeister pulled alongside the burning vessel in an inflatable boat from the *Tiglax* and found Aldridge clinging to a line attached to a boat fender. Putting themselves at risk in a potentially explosive situation, with no oxygen masks or fire protection, they pulled Aldridge aboard their boat and took him to the *Tiglax*.

Aldridge later said that he was close to falling in the water when Macone and Schulmeister rescued him. He had no flotation equipment, was inhaling heavy smoke, and was having difficulty breathing when they arrived. At the *Tiglax*, Bell gave Aldridge oxygen until paramedics arrived. Bell received an exemplary act award earlier this year for assisting in the rescue.

Fish and Wildlife Service Regional Director Walter O. Stieglitz recommended that valor awards be presented to Macone and Schulmeister for their response to Aldridge's plight. The valor award is presented to Department of the Interior employees who have demonstrated unusual courage involving a high degree of personal risk in the face of danger.

-FWS-

K. FEEDBACK

Brant and Their Management

Work began in 1991 to update and revise the Pacific Flyway Brant Management Plan. The refuge received and reviewed February and May drafts, preparation of which was coordinated by Eric Nelson, Sacramento NWR. Eric worked with brant while stationed at the Humboldt Bay NWR. Overall, the product we've seen provides an excellent update of historical information and compilation of data obtained since the original plan was finalized in 1978. Our primary concern was the erosion of the population goal from 185,000 to 170,000 birds. We are unclear as to whether this reduction relates to a re-analysis of historical wintering data on which the 1978 goal was based, an apparent inability of the population to build to historic levels (especially at coastal wintering sites in California, Oregon and Washington), or some form of administrative intervention. In any event, our concern is that managers continue to actively press for programs that will allow populations to return to historic biologically attainable levels.

Pacific brant spend essentially all their life on "public lands" managed as federal or state refuges, tidelands, and estuaries with extensive biodiversity. Many important sites, especially in Mexico, are threatened by various forms of development. Brant are visibly sensitive to development and related disturbance in these marine habitats. If historic staging and/or wintering numbers cannot be maintained, we as managers should take this as an indicator of potentially larger problems facing these irreplaceable estuarine habitats. Development and people may "prefer" such areas, but can adapt to other locations. Brant and other species of marine animals and plants cannot adapt, only perish, if their habitats are lost. Lowering-our-sights with respect to management goals or easing the level of protection that our public lands need (and that our mandate to maintain biodiversity requires) could allow an unacceptable level of habitat erosion to become even worse.

Snowy Owls, Their Relationship and Importance to Arctic Waterfowl

State and federal hunting regulations in Alaska allow resident hunters to take snowy owls with "no limit; however, a bird may only be taken for food or clothing, and no bird may be sold or offered for sale." This unrestricted take is allowed in coastal areas from Bristol Bay to the North Slope, the range of Alaska's arctic nesting geese. This regulation has long been maintained and we not only doubt its need and appropriateness, but also wonder about the long-term biological effects of such management. Russian biologists working in arctic areas have

noticed a commensal nesting relationship between snowy owls, brant and common eiders during studies at Wrangel Island. The phenomenon may be widespread in the arctic. Brant and eiders occur there in low densities and both are vulnerable to predation by arctic foxes. The owls are very territorial and their active defense against foxes protects not only their nests and young, but also those of the brant and eiders which nest only within snowy owl territories. The owls follow the cycle of the lemming population, their primary prey, and so don't nest every year. Likewise for brant and eiders. At Wrangel Island, the presence of snowy owls is essential to the continued existence of nesting populations of brant and eiders. Do similar relationships occur in Alaska, or did they in the past? Snowy owls have been extirpated as a nesting species on the Yukon-Kuskokwim Delta. Data suggest they may have been common into the 1950's. There are even the Nyctea Hills on Nelson Island as a remembrance. Their name remains but the birds are gone, possibly as a result of short-sighted regulations. There were even a few pair of snow geese on the Y-K Delta as late as the 1950's. One can only speculate on any commensal relationship that may have existed between that species and snowy owls.

In Russia the owl-waterfowl relationship seems to occur at extreme edge-of-range sites. Low numbers and productivity may be characteristic in such areas, hence the owls all important role. Most waterfowl research in Alaska has been directed to high density habitats, one of which, as noted, no longer has breeding snowy owls. In other Alaskan areas researched thus far, where owls still remain, a commensal relationship has not been noted. Never-the-less, we should be very concerned about such ecological relationships in areas populated by species of concern, such as all arctic nesting geese and eiders. We recommend that the Service propose closing the season on snowy owls or initiate studies to understand the ecological relationships between nesting snowy owls and other nesting birds.