



ALASKA PENINSULA NATIONAL WILDLIFE REFUGE

King Salmon, Alaska

ANNUAL NARRATIVE REPORT

Calendar Year 1985

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

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Personnel

Ronald E. Hood	Refuge Manager	GS-485-12	09/15/85	Present
Vernon D. Berns	Act. Refuge Manager Pilot	GS-485-12	02/18/82	5/1/85
Jim Savery	Dep. Refuge Manager	GS-485-11	09/29/85	Present
C. Randall Arment	Asst. Refuge Manager Pilot	GS-485-12	10/03/82	Present
John Payne	Asst. Refuge Manager Pilot	GS-485-11	09/29/85	Present
John Solberg	Asst. Refuge Manager	GS-485-07	03/06/83	4/29/85
Randall J. Wilk	Wildlife Biologist	GS-486-07	06/27/83	Present
Dwight Mumma	Biological Technician	GS-404-05	02/19/84	Present
Alan Rogers	Maintenance Worker	WG-4749-08	03/04/84	Present
Janice Collins	Refuge Assistant	GS-303-05	06/11/84	Present
Carl Downing	OAS Pilot	GS-2181-11	06/10/85	9/07/85
Cynthia Kranich	Biological Technician	GS-404-05	05/20/85	11/09/85
Diane Macfarlane	Biological Technician	GS-404-05	05/20/85	9/06/85
Richard Pastor	Biological Technician	GS-404-05	05/28/85	9/06/85



Front Row: Arment, Wilk, Collins
Back Row: Savery, Mumma, Rogers, Hood



Refuge Manager, Ronald E. Hood

Y.C.C.

Rebecca Singley	YCC Enrollee	06/10/85	08/03/85
Denise Tucker	YCC Enrollee	06/10/85	08/03/85
David Chapman	YCC Enrollee	06/10/85	08/03/85
Chris Harding	YCC Enrollee	06/10/85	08/03/85

VOLUNTEERS

Keith Reopelle	05/20/85	08/15/85
Dave Vannier	06/15/85	08/12/85
Robert Weh	06/15/85	08/12/85
Lee Elliott	06/17/85	08/16/85
James Ferrari	05/27/85	08/16/85
Walter Boyce	06/10/85	06/29/85
Karen Wilk	01/01/85	08/22/85

Review and Approvals

Jim Savery 3-15-86
 Refuge Manager Date
acting

Mike Miller 3/26/86
 Refuge Supervisor Review Date

James P. Williams 7/1/86
 Regional Office Approval Date



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INTRODUCTION

Prior to 1971, Alaska Peninsula Refuge was part of the public domain, under the jurisdiction of the Bureau of Land Management. In 1971, the majority of the area was set aside by the Secretary of the Interior under Section 11(a) of the Alaska Native Claims Settlement Act (ANCSA; 88 STAT. 688) as potential selection areas for native regional and village corporations. Part of the area was also withdrawn under Section 17(d)(1) of ANCSA. These public interest lands were withdrawn from all forms of appropriation under the public land laws, except for metalliferous location.

On November 16, 1978 the Secretary of Interior invoked his emergency withdrawal powers under Section 204(e) of the Federal Land Policy Management Act (FLPMA; 90 Stat. 2743) and withdrew approximately 110 million acres throughout Alaska. Public Land Order 5653 (as amended by Public Land Order 5654) covered all of the present Alaska Peninsula Refuge, including all of the (d)(1) lands and those lands available to the native villages and regional corporations but not yet selected. These lands were withdrawn, subject to valid existing rights, for three years from settlement, location, entry and selection under the public land laws. The intent of this withdrawal was to protect Congress' options for national interest lands legislation.

Fifteen months later, in February, 1980, the Secretary of Interior withdrew approximately 37.6 million acres throughout Alaska as national wildlife refuges under Section 204(c) of FLPMA. Alaska Peninsula Refuge was not included, however, in this withdrawal. One likely reason for the omission was the complexity and uncertainty of future land ownership patterns involving both the State and native corporations.

In December, 1980, Congress enacted the Alaska National Interest Lands Conservation Act (ANILCA; 94 Stat. 2371). This act, among other things rescinded the above Order, and designated the Alaska Peninsula Refuge. The refuge thus became part of the National Wildlife Refuge System, managed by the U.S. Fish and Wildlife Service (Fig. 1).

Alaska Peninsula Refuge encompasses about 4.3 million acres of land--an area bigger than the state of Connecticut. It stretches for nearly 340 miles along the Alaska Peninsula in southwestern Alaska. The refuge's northeastern boundary is about 60 miles south of the refuge headquarters at King Salmon and 300 air miles southwest of Anchorage (Fig. 2). Becharof Refuge adjoins the northern boundary of the refuge, while Izembek Refuge adjoins the refuge's southwest corner. Aniakchak National Monument and Preserve splits the refuge into two separate parts.

The Alaska Peninsula contains a variety of landscapes, including tundra, lakes, wetlands, fjords, volcanic peaks, and rugged cliffs.

- 1 Alaska Maritime
- 2 Alaska Peninsula
- 3 Arctic
- 4 Becharof
- 5 Innoko
- 6 Izembek
- 7 Kanuti
- 8 Kenai
- 9 Kodiak
- 10 Koyukuk
- 11 Nowitna
- 12 Selawik
- 13 Tetlin
- 14 Togiak
- 15 Yukon Delta
- 16 Yukon Flats

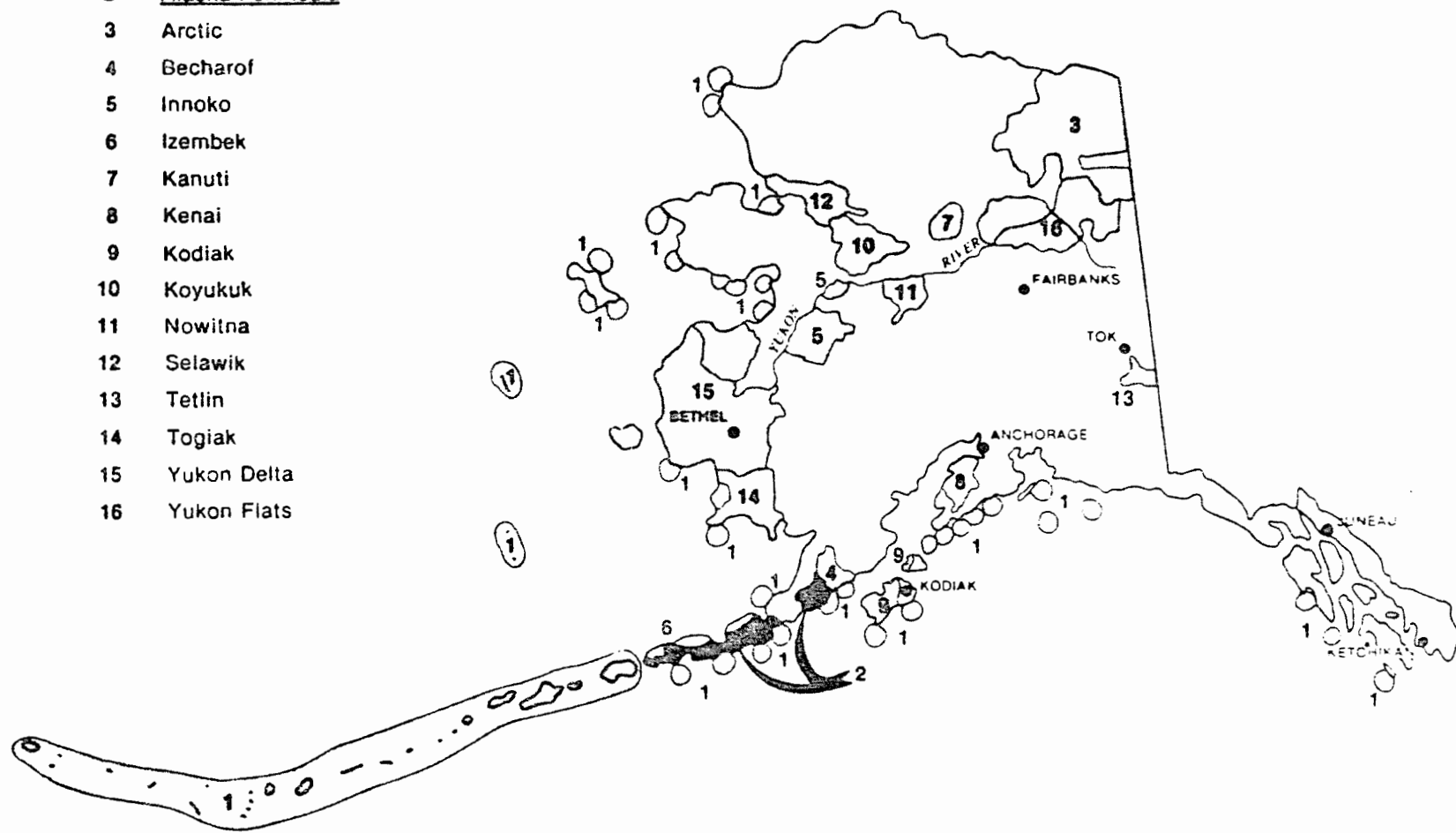


Fig. 1. National Wildlife Refuges in Alaska.

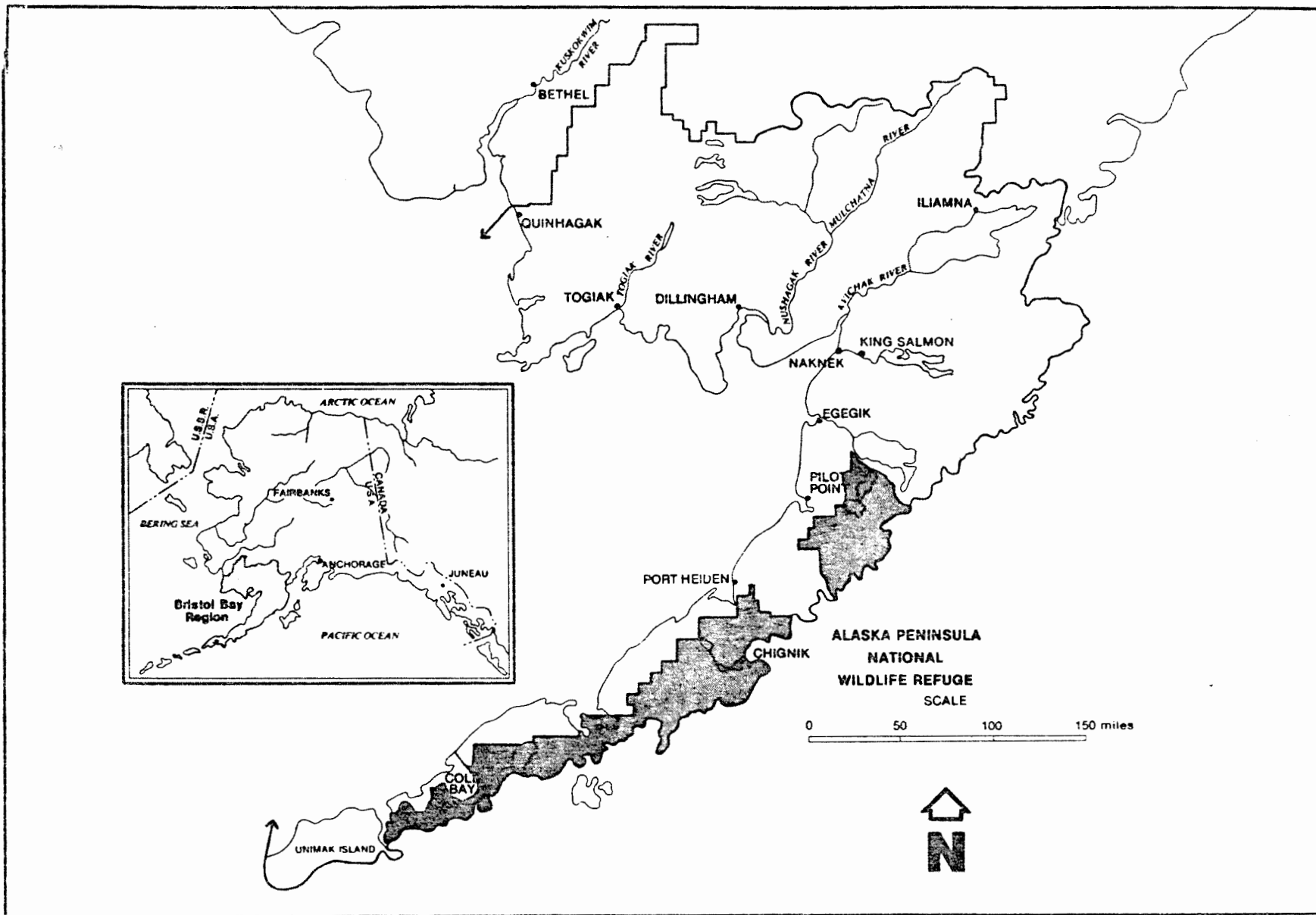


Fig. 2. Location of Alaska Peninsula Refuge.

✓ The Ugashik, Meshik, and Chignik Rivers, and the Ugashik Lakes provide habitat necessary for the five species of salmon that spawn in the refuge. Over 30 species of mammals are present, including brown bear, moose, caribou, wolves and wolverine. Sea otters, sea lions, and harbor seals inhabit the Pacific coast shoreline. The refuge's lakes and wetlands are heavily used by migrating waterfowl.

Section 302(1)(B) of ANILCA set forth the following major purposes for which the Alaska Peninsula Refuge was established and shall be managed:

(i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, brown bears, the Alaska Peninsula caribou herd, moose, sea otters and other marine mammals, shorebirds and other migratory birds, raptors, including bald eagles and peregrine falcons, and salmonids and other fish;

(ii) to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats;

(iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and

(iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in paragraph (i), water quality and necessary water quantity within the refuge.

A. HIGHLIGHTS

Refuge Manager, Deputy Refuge Manager and Assistant Refuge Manager/Pilot positions are filled (Section E.1.).

Bids for construction of four houses for refuge staff were opened on 12/18/85. Unlimited Construction Co., King Salmon, Alaska was apparent low bidder with an offer of \$710,000 (Section I.1.).

Rehabilitation of the bunkhouse (FY 1984 ARMM project) was completed (Section I.2.).

Construction of new hanger begins (Section I.1.).

Vernon Berns, Assistant Refuge Manager/Pilot, receives 30 year service pin and retires (Section E.1.).

Secretary of the Interior, Donald Hodel met with Governor Bill Sheffield in King Salmon to discuss the State's request for a ten-year moratorium on Federal oil and gas leasing in the Bristol Bay area (Section J.3.).

The final Comprehensive Conservation Plan, Environmental Impact Statement and Wilderness Review-Alaska Peninsula NWR was issued on August 1, 1985 (Section D.1.).

The RPRP study to establish baseline data for compatibility evaluations for transportation corridors across the refuge is initiated (Section G.).

B. CLIMATIC CONDITIONS

General

The upper Alaska Peninsula is characterized by polar maritime climate with moderate temperatures, protracted cloud cover, frequent precipitation and high winds.

Large atmospheric differences between interior Alaska and the Pacific Ocean and Bering Sea are the dominate influences on weather. Pacific Ocean and Bering Sea winds with high moisture content blow frequently across the upper peninsula forming fog and clouds which tend to develop into precipitation. High winds and turbulence are especially common in mountain passes. The heaviest precipitation occurs on the Pacific Ocean side of the refuge, while the Bering Sea side enjoys more clear weather but lower average temperatures. Skies are usually cloudy. From fall to spring, the skies are clear to partly cloudy 40 percent of the time, while in summer this occurs only 20 percent of the time. King Salmon averages 50 clear days per year.

Precipitation varies with elevation and distance from coasts. Less than 20 inches of precipitation falls annually in the western lowlands, while as much as 160 inches falls on the Pacific side of the refuge.

Temperatures are generally moderate throughout the year. Daily maximum temperatures exceed the freezing mark during all months while daily minimum temperatures drop below freezing on approximately one-half the days of the year. The King Salmon temperatures average 12 degrees F in December, the coldest month, and 54 degrees F in July, the warmest month. Extremes range from -46 degrees F to 88 degrees F.

Daily winds average 10 to 15 miles per hour. However, most months have peak winds from 40 to 70 miles per hour with the extreme being 94 miles per hour.

At King Salmon the dangerous effects of wind chill can be dramatic. Interior Alaska is known for the low winter temperatures and the Aleutian Islands for their high winds. However, when effects of each area meet on the upper Alaska Peninsula, the wind chill factor may exceed -120 degrees F.

January-March

The year started off with excessively high temperatures. The monthly mean temperature for January was above freezing and 20 degrees above normal (Table 1). February and March exhibited near normal temperatures. As a result of the excessively high January temperatures, the Naknek River was either open or unsafe for crossing during the entire winter making it difficult for residents to get to their winter meat supply of caribou on the other side. Precipitation for the quarter was slightly below normal. The highest winds for the quarter were 55 miles per hour on January 29th.

April-June

April exhibited temperatures 10 degrees below normal while the remainder of spring exhibited normal temperatures. The high for the year was 76 degrees F which occurred on June 29th. At the end of April, the Naknek River was open from Naknek Lake to Bristol Bay and beluga whales could be observed in the lower portion of the river. The Egegik and Ugashik Rivers did not open until mid May, which was a late spring for migratory waterfowl. Precipitation was slightly below normal for the quarter. The last measurable snowfall for the spring was May 12th when 3.8 inches fell. It melted the following day. The highest winds for the quarter were 63 miles per hour on May 17th.

July-September

Temperatures and precipitation amounts were near normal for the quarter. However, precipitation fell on all but 18 days of the quarter. There were no days with clear skies and only seven days with partly cloudy skies, as the remaining 85 days were cloudy. The winds blew 53 miles per hour on August 14th and 52 miles per hour on September 28th.

October-December

Fall temperatures were slightly below normal for October and November. However, December averaged 34 degrees F, which was 22 degrees above normal. As a result, most lakes south of Becharof Lake remained open through the end of the year. Most lakes north of Becharof Lake were frozen by the end of October and remained iced over through the end of the year. Precipitation for the quarter was 7.22 inches which was 2.66 above normal. However, total precipitation for the year was only 0.75 inches above normal. The first measurable snowfall was 1.0 inches which fell on October 20th. The highest winds for the year were on Christmas day at 64 miles per hour.

Table 1. 1985 Climatological Data - National Weather Service, King Salmon, Alaska.

Month	Temperature (degrees F)				Precipitation (inches)			Max. Snow on ground (inches)	Wind (mph)		Sky Cover ^a (days)		
	High	Low	Avg.	Norm.	Total	Norm.	Snow		Avg.	Peak	Clear	Pt. Cldy.	Cldy
Jan	46	8	33	13	.95	1.04	3.7	1	12	55	4	5	22
Feb.	41	-18	11	15	.73	.88	6.4	3	12	43	11	6	11
Mar.	40	-09	23	19	1.27	1.13	8.9	1	14	46	5	6	20
Apr.	47	-15	21	31	.34	1.05	3.4	2	10	41	8	8	14
May	64	23	40	42	1.16	1.18	5.2	3	12	63	4	6	21
June	76	34	47	50	1.23	1.50		0	10	44	1	3	26
July	72	40	54	55	1.31	2.08		0	9	45	0	3	28
Aug.	71	39	53	54	3.24	3.13		0	12	53	0	1	30
Sept.	65	25	47	47	2.64	2.78		0	11	52	0	3	27
Oct.	54	-08	27	33	2.29	1.92	2.5	2	10	46	5	12	14
Nov.	43	-16	25	23	3.35	1.40	9.3	5	10	44	5	3	22
Dec.	47	07	34	12	1.58	1.24	3.6	2	14	64	2	8	21
Total					20.09	19.33	43.0				45	64	256

^a Sky cover: clear = 0 to .3 cloud cover; Partly cloudy = .4 to .7 cloud cover; and cloudy = .8 to 1.0 cloud cover.

C. LAND ACQUISITION

1. Fee Title

On November 16, 1978, the Secretary of Interior invoked his emergency withdrawal powers under section 204 (e) of the Federal Land Policy Management Act (FLPMA; 90 Stat. 2743) and withdrew land throughout Alaska. Public Land Order 5653 (as amended by Public Land Order 5654) covered all of the present Alaska Peninsula NWR, including all of the (d)(1) lands and those lands available to the Native villages and regional corporations but not yet selected. These lands were withdrawn, subject to valid existing rights, for three years from settlement, location, entry, and selection under the public lands laws. The intent of the withdrawal was to protect Congress' options for national interest lands legislation. In December 1980, Congress enacted ANILCA. This act, among other things, rescinded the above Order, and designated all of the withdrawn lands as Alaska Peninsula NWR.

Along with ANILCA, major legislation affecting refuge land ownership included the Alaska Statehood Act and ANCSA. These laws implemented the transfer of lands from federal to state and native ownership. The land status is constantly changing because refuge lands selected by natives, native corporations, and the state are in the process of being relinquished, invalidated or conveyed.

Of the 4,359,000 acres of land within the refuge boundary, excluding navigable waters, 2,964,000 acres or 60 percent of the land is under the jurisdiction of the federal government. Table 2 indicates how much refuge land has been selected and conveyed as of January 1984. Figure 3 shows the location of selected and conveyed lands. As of February 1984, a total of 1,528,000 acres or 44 percent of the refuge lands remained selected by natives, native corporations, private interests and the state. These selections are scattered throughout the refuge, but many probably will be invalidated or relinquished.

The native category in Table 2 includes refuge lands selected by 23 villages, seven of which are from the Koniag Region, eight from the Aleut Region, and eight from the Bristol Bay Region. The seven Koniag villages have relinquished their surface selections on the refuge. In addition to the village, the category includes "mineral lieu" (subsurface) estate selected by Koniag Regional Corporation totaling 529,000 acres of which 87,000 acres are in conflict with state selections. Three regional native corporations have also filed historical site applications totaling 61,000 acres.

The state has selected a total of 462,000 acres of which 231,000 acres are in conflict with native selections. A total of 38,000 acres has been tentatively approved for patent to the state.

Table 2. Land status of Alaska Peninsula Refuge as of January, 1984.

Category	Selected Lands	Conveyed Lands
<u>Ugashik Unit</u>		
	Native 238,802 ^a	113,545 (subsurface interim conveyed) ^b
658 (patented)	State of Alaska	205,268 ^a
40.79 (patented)	Private selections	34.97
0	Native allotments	915
<u>Total</u>	445,019.97	114,270.79
<u>Chignik Unit</u>		
	Native 384,212 ^c	460,329 (surface and subsurface interim conveyed)
0	State of Alaska	141,487 ^c
1,033.68	Private selections	62.14
159.93 (patented)	Native allotments	6,357
<u>Total</u>	532,118.14	461,522.61
<u>Wolof Unit</u>		
	Native 475,848 ^d	325,096 (surface and subsurface interim conveyed)
40,327 (tentatively approved) ^e	State of Alaska	73,923 ^d
68.74 (patented)	Private selections	5.00
159.97 (patented)	Native allotments	1,049
<u>Total</u>	550,825	365,851.71

^a Includes 62,849 acres selected by both the Natives and the state.

^b Includes 94,552 acres which have had surface rights conveyed also.

^c Includes 112,854 acres selected by both Natives and the state.

^d Includes 55,118 acres selected by both Natives and the state.

^e Tentatively approved carries the same rights as an interim conveyance; both are only awaiting survey before being patented.

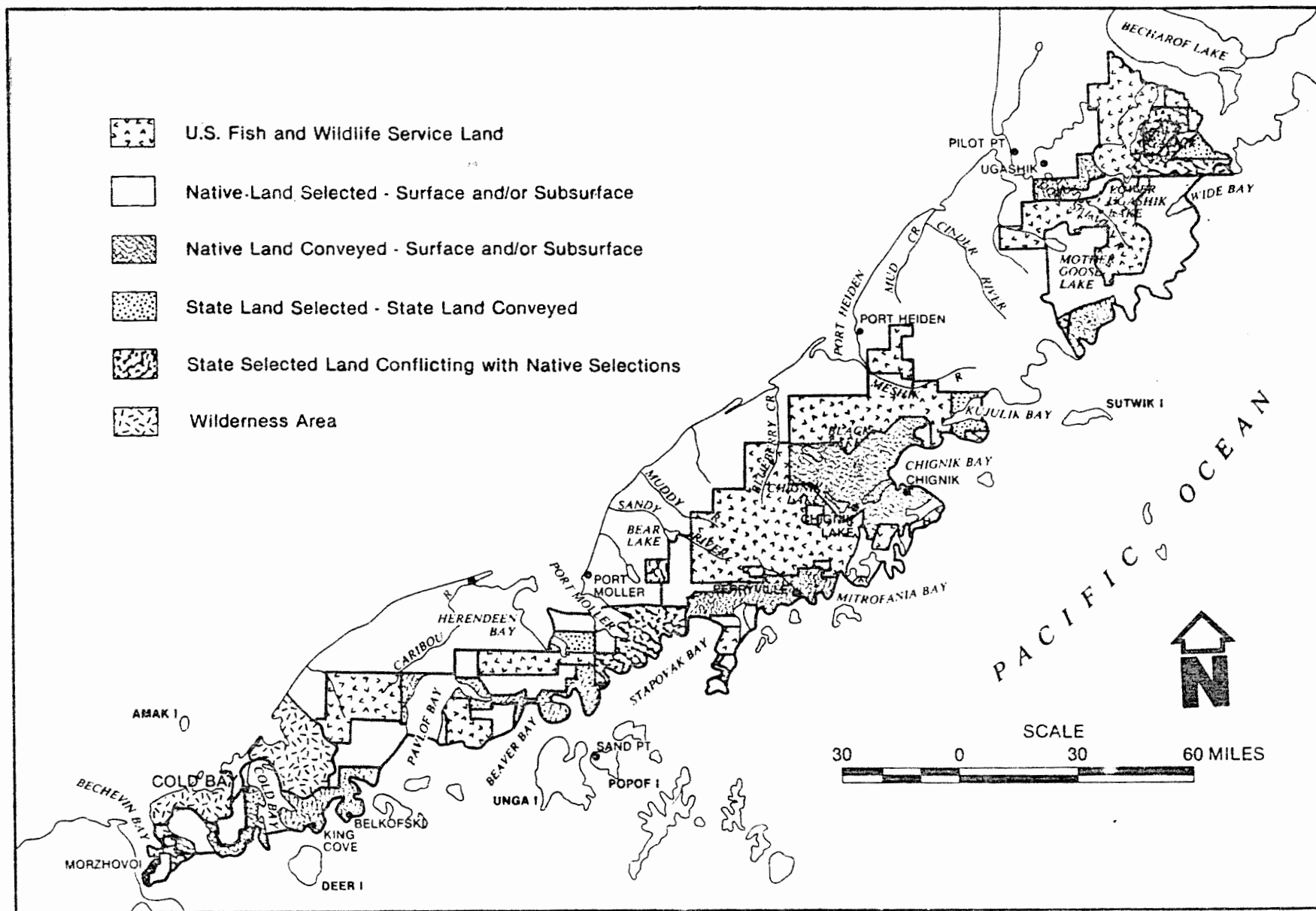


Fig. 3. Land status as of January 1984.

The private category in Table 2 includes four trade and manufacturing site applications, four headquarters site applications, five homestead applications, 74 soldiers additional homestead applications, and four mission site applications.

There are 89 native allotment applications on the refuge, totaling 8,600 acres.

About 22 percent of the lands within the refuge boundary are inholdings. A total of 942,000 acres have been conveyed to native groups, natives, state, and private interest. This includes interim conveyed lands (both surface and subsurface), tentatively approved (TA) lands, and patented lands.

In FY 1984, CAF funds were provided for the construction of four residences for refuge personnel. One of the prerequisites to construction was the purchase of lands. Four lots were selected in various subdivisions in the King Salmon area. On September 8, Clyolyn Campbell, Realty closed the deal on the purchase of the final house lot. Two 1.2 acre lots were purchased on February 22, 1985 in Thelma's Subdivision; one lot of 1.98 acres was purchased in King Salmon Creek Acres on July 16, 1985; and the final lot of 1.0 acre was purchased in Grant "D" Subdivision. The purchase price was \$15,000 per lot.

Conveyance of 2.4 acres of the refuge compound to Paug-Vik Native Corporation was completed. On July 15, 1985, surveyors from the Bureau of Land Management (BLM) established a new headquarter's boundary. By the end of the year a shopping center was being constructed where we had once planned to build a new headquarters.

3. Other.

The final Bristol Bay Regional Management Plan (BBRMP), completed March 1985, and the Alaska Peninsula Refuge Comprehensive Conservation Plan (RCCP) recommended that the three Alaska Peninsula refuges (Becharof, Alaska Peninsula, and Izembek) be reorganized into two refuges to provide better management of fish and wildlife resources. The "Upper Peninsula" refuge would include the Becharof NWR and the Ugashik and Chignik units of the Alaska Peninsula NWR. The Pavlof Unit of Alaska Peninsula NWR would become part of Izembek NWR. Current administration reflects this strategy.

On December 9th, RM Hood made a presentation to the Project ANWR "negotiation team" in the Regional Office concerning lands on the Alaska Peninsula that should be acquired to protect wildlife resources. Emphasis was placed on acquiring inholdings on State Critical Resource Management Areas to protect staging grounds for arctic nesting geese.

D. PLANNING:

1. Master Plan.

Alaska refuges do not utilize master planning as it exists for the refuges in the lower 48 states, but rather complies with Public Law 96-487, ANILCA. Section 304 directs the Secretary of the Interior to prepare comprehensive conservation plans.

On August 1, 1985, the Final Comprehensive Conservation Plan/Environmental Impact Statement and Wilderness Review for the Alaska Peninsula NWR was mailed out for public review. Comments were received until September 9, 1985. Alternate B (the preferred Alternative) would:

- maintain most of the refuge in a relatively undeveloped state;
- emphasize the maintenance of the refuge's natural diversity and key fish and wildlife populations and habitats in their present condition;
- maintain traditional access;
- provide for continued subsistence use of refuge resources;
- maintain opportunities for recreational hunting and fishing;
- provide additional opportunities for public use and motorized access near Cold Bay;
- consider development of trans-peninsula transportation corridor in the future, subject to the provision of Title XI of ANILCA; and
- propose areas with outstanding wilderness values for wilderness designation.

Shortly before the Record of Decision (ROD) was to be issued in September, a restatement of the oil and gas policy for Alaska refuges was issued. By the end of the year, the ROD was still in limbo.

2. Management Plan.

An Alaska Interagency Fire Management Council (AIFMC) fire suppression plan was completed for the area that included the Alaska Peninsula/Becharof NWR's. Assistant Refuge Manager/Pilot Randy Arment participated as a member of the interagency team that wrote the plan. A review of BLM fire history records during the AIFMC planning effort revealed a very low incidence of natural and man-made fires. As a

result, refuge lands were placed in the "limited" suppression category (no initial attack; let burn).

A draft of the Fishery Resource Management Plan for the Alaska Peninsula NWR was reviewed and comments provided to the King Salmon Fishery Resource Station. The draft plan was submitted to the Regional Office for review comment in September.

3. Public Participation.

Public participation continued to be an integral part of the development of the Alaska Peninsula RCCP. As noted above, the final RCCP/EIS/Wilderness Review was submitted for public review on August 1, 1985. A number of strong responses were received from the State of Alaska, Resource Development Council, Citizen's Advisory Commission on Federal Acres, and the Alaska Land Use Council. One important impact that they have had was the restatement of oil and gas policy for Alaska refuges.

4. Compliance with Environmental Mandates.

Both the Alaska Peninsula and Becharof RCCPs are considered major federal actions and include Environmental Impact Statements within the plans.

One contract, for a total value of \$97,460, was awarded to Heritage Research Associates of Eugene, Oregon, for the preparation of a cultural resources overview and predictive model, with limited testing, on the Alaska Peninsula/Becharof, Izembek, and Togiak NWR's. The preliminary report of the background work for this project, along with specific proposals for field testing locations, will be forthcoming in January 1986. Field performance will occur in the 1986 season; with a draft final report due within 45 days after completion of the field work.

Compliance with Section 106 of National Historic Preservation Act was accomplished for construction in headquarters compound and at four (4) residence lots. Regional Archeologist Chuck Deters conducted an archeological survey of these sites in early June. No evidence of archeological sites was found.

5. Research and Investigations

Refuge Resource Problem-Related Projects (RPRP) monies from Becharof NWR are funding ongoing baseline wildlife and vegetation studies on the refuge. In 1985, study areas focused on the Braided Creek, and southern Herendeen Bay areas (Fig. 4). The 1986 efforts will include both sites, as well as the establishment of a new camp in the Dog Salmon drainage. A preliminary summary of some study findings are found in Section G.

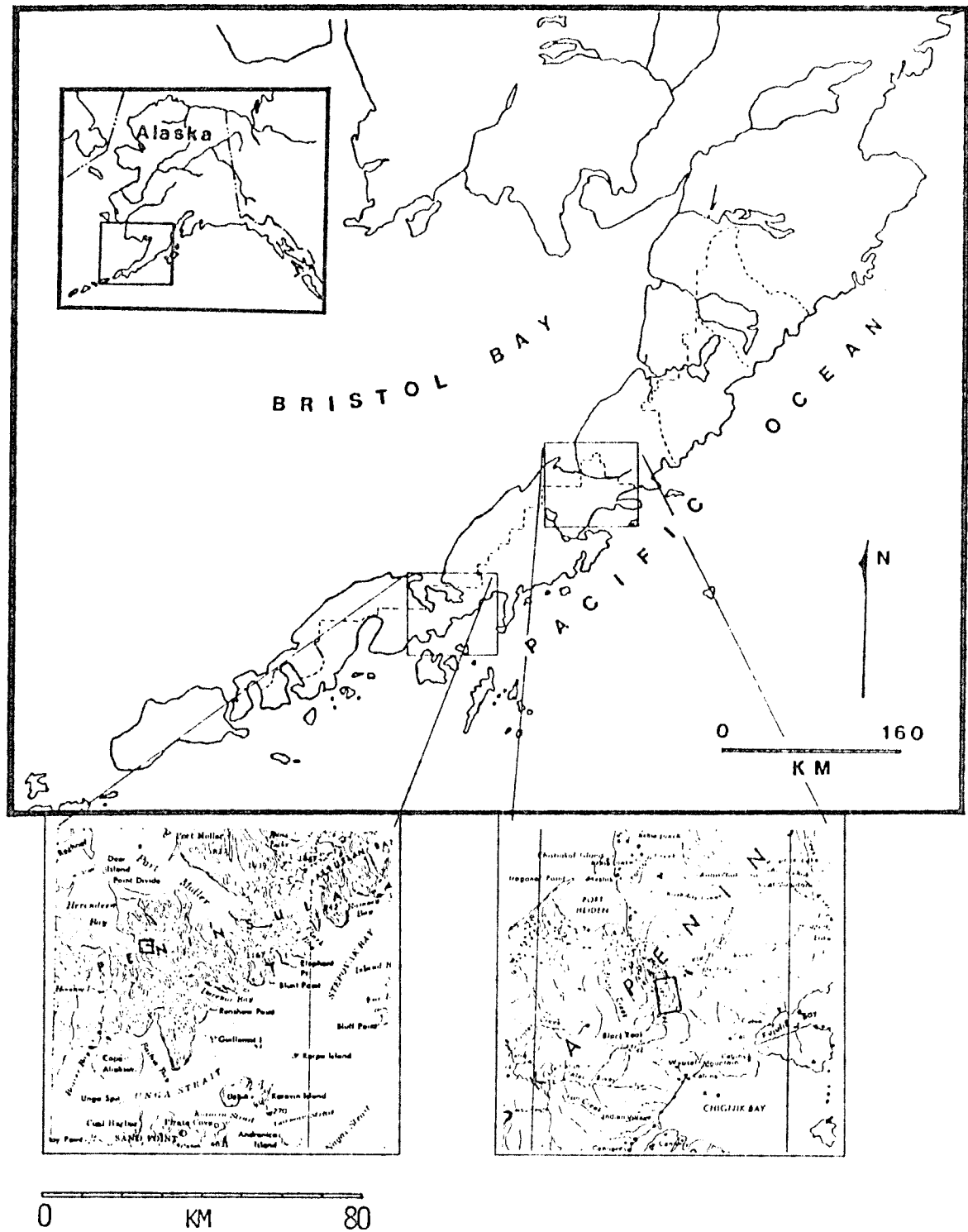


Fig. 4. Braided Creek (upper) and Herendeen Bay study areas, Alaska Peninsula NWR.

E. ADMINISTRATION

The Fish and Wildlife Service intends to reorganize the three Alaska Peninsula refuges (i.e., Becharof, Alaska Peninsula, and Izembek). To accomplish the reorganization, the Service will submit a proposal to Congress to adjust the boundaries. Boundaries would be altered by combining Becharof Refuge (1,461,000 acres) with the Ugashik and Chignik units (approximately 3,365,000 acres total) of the existing Alaska Peninsula Refuge. The Pavlof Unit (the southern 1,535,000 acres of the present Alaska Peninsula Refuge) would be incorporated into Izembek Refuge. The new boundary between Alaska Peninsula Refuge and Izembek Refuge would cross the peninsula at Right Hand Bay, in Port Moller. Becharof Refuge would no longer exist as a separate refuge. Fig. 5 shows the proposed boundary changes; Fig. 2 shows the existing boundaries of the refuges.

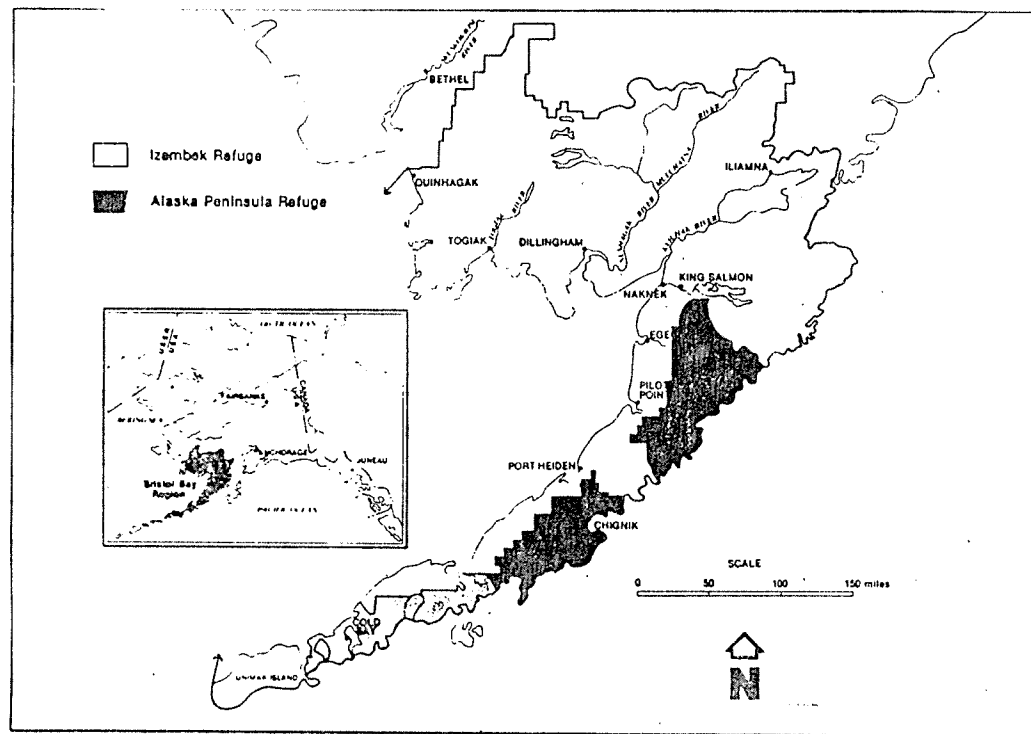


Fig. 5. Proposed boundary adjustments for the three Alaska Peninsula refuges.

The Service is proposing this action for both biological and administrative reasons. The mountainous terrain around Port Moller geographically isolates the big game populations on the Alaska Peninsula. The state uses this physiographic barrier for distinguishing between State Game Management Units 9D and 9E. Two distinct herds of caribou use habitats on either side of this line: one herd uses habitats of the Izembek Refuge and Pavlof Unit of the

Alaska Peninsula Refuge, while another herd uses habitats north of Port Moller, in the Chignik and Ugashik units of the Alaska Peninsula Refuge, and Becharof Refuge. Moose are common north of Port Moller, but are rare in the Pavlof Unit and Izembek Refuge. A distinct, non-migratory subpopulation of tundra swans also nests in the Pavlof Unit and Izembek Refuge.

From an administrative viewpoint, it is impossible for the Service to manage the Pavlof Unit from King Salmon due to frequent storms. Survey and inventory work and intensive species-specific biological programs conducted by the Izembek Refuge Staff are directed toward populations ranging over the Pavlof Unit and Izembek Refuge; the Becharof Refuge staff also directs its programs towards populations ranging over the Ugashik and Chignik units of Alaska Peninsula Refuge. Biologically, it is impossible to adequately monitor wildlife populations without simultaneous work on both Alaska Peninsula and Izembek refuges or on Alaska Peninsula and Becharof refuges. The refuge staff in Cold Bay is in a better logistic position to organize and perform biological programs and to handle the administrative responsibilities of the Pavlof Unit and Izembek Refuge, while the refuge staff in King Salmon are in the logical position to manage the Ugashik and Chignik units of Alaska Peninsula Refuge and Becharof Refuge.

All of the management directions, staff, facilities, and other recommendations proposed in the Becharof RCCP would be incorporated into the Alaska Peninsula RCCP after the change is made. Until the change is made, however, the three Alaska Peninsula refuge plans will be implemented for the refuges as they are presently constituted.

The Alaska Peninsula and Becharof NWRs are currently being managed under this administrative view point. However, funds and personnel ceilings (FTEs) are allotted by refuge. This creates quite an administrative challenge when tracking budgets, FTEs, and payroll.

1. Personnel

Both 1984 and 1985 were years of change. In December, 1984, RM John Taylor accepted a position at the newly established Alligator River NWR headquartered in Manteo, N.C. John was the first manager of the Becharof National Monument which was designated a National Wildlife Refuge with the passage of ANILCA in late 1980.

Following John's departure, Vernon Berns acted as refuge manager until his retirement on May 1, 1985. Vern's retirement surprised everyone. At the staff meeting on March 25, 1985, he announced that he would retire on May 1, 1985. Vern received his 30-year pin at the April 1st staff meeting. On April 15, 1985, Shirley Berns left King Salmon for Kodiak. Vern departed on May 1st. Vern will be fishing commercially.



Vern Berns retires after 30 years with FWS. VDB

Assistant Refuge Manager John Solberg departed King Salmon on April 29, 1985 for Walden, CO. His new position is as Assistant Refuge Manager at Arapaho NWR. John should now have an active social life. King Salmon has a definite lack of young ladies for bachelors' to select from.

On May 12th, Ron Hood was detailed for 120 days from the Regional Office as Acting Refuge Manager. He was Chief, Resource Support, Wildlife Resource, at the time of his detail. On September 15, 1985 Ron was permanently assigned as Refuge Manager, Alaska Peninsula/Becharof NWRs.

Elton "Jim" Savery was selected for Deputy Refuge Manager and entered on duty on September 29, 1985. Jim, wife Barbara and daughters Kim and Kirsten arrived in King Salmon on October 15, 1985. Jim was an Assistant Refuge Manager at Salton Sea NWR, Calipatria, CA at the time of his selection.

Our Assistant Refuge Manager/Pilot Trainee position was filled by John Payne. John comes to us from Bureau of Land Management's (BLM), Realty Office in Anchorage. After reporting to King Salmon on September 31, 1985, John was immediately detailed to the Regional Office to begin his commercial pilot/instrument rating training. In early December, John was detailed to Realty as an ascertainment biologist on Project ANWR.

Construction Representative Walt Szelag spent so much time in King Salmon monitoring the rehabilitation of the bunkhouse that we have designated him a defacto staff member. He has worked hard at keeping the contractor from producing shoddy work.

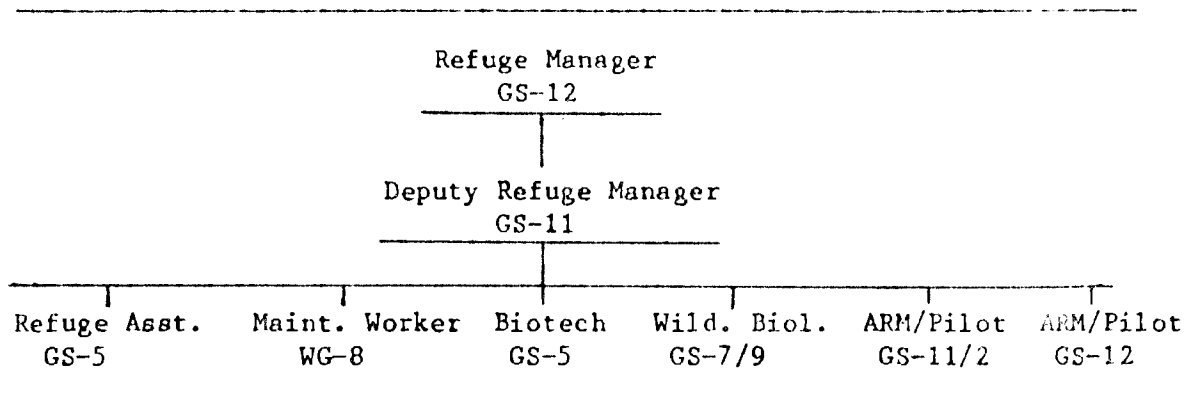


Walt Szelag phoning the Regional Office about another problem. REH

Randall Wilk, Wildlife Biologist returned to graduate school in late August for the fall semester. Randy used a combination of paid leave and leave without pay (LWOP) to attend the University of Wisconsin, Stevens Point, WI to complete required coursework toward a Masters Degree.

Alaska Peninsula/Becharof NWRs have an approved staffing pattern shown in Fig. 6. Our RPRP project provided funding for four temporary positions. These included Carl Downing, OAS Pilot, and three Biological Technicians--Richard Pastor, Diane Macfarlane, and Cynthia Kranich.

Fig. 6. Approved organizational chart for Alaska Peninsula/Becharof NWRs.



These positions require 6.8 FTEs, one local hire and the sharing of FTE and funding of the maintenance position with the King Salmon Fishery Resource Station. The history of FTE allocations is shown in Table 3.

Table 3. Historic record of FTE allocation.

FY	FTE		TOTAL
	AKP	BCH	
86	3.4	3.4	6.8
85	3.4	3.4	6.8
84	3.4	4.0	7.4
83	3.0	3.2	6.2
82	2.0	3.0	5.0
81	1.0	2.0	3.0

2. Youth Programs

One of two Youth Conservation Corps (YCC) enrollees selected on April 18, 1985 waited until May 2, 1985 to decline. A replacement was selected on May 3, 1985. The Regional Office gave us the opportunity to utilize two more YCC enrollees. Recruitment was completed on May 28, 1985. Our enrollees were Rebecca Singley, Chris Harding, David Chapman, and Denise Tucker.

One enrollee provided operational support to the Refuge in the form of office help. Major duties included answering the telephone, filing reports and correspondence, using both the typewriter and the word processor, and distributing mail to various offices. The other three

enrollees worked on general maintenance projects at the headquarters area. Most of these projects could not have been accomplished without the YCC help. The projects included painting the office and cabin boardwalks, staining the dock, replacing chain-link fencing around the compound, general clean-up of scrap material and landscaping around the dock area, and rehabilitation of refuge quarters No. 8. The enrollees also spent a considerable amount of time cleaning the shop and warehouse, washing and waxing vehicles and policing the grounds.

Environmental awareness programs were presented to the enrollees as time permitted by the refuge staff. The topics included an explanation of the National Wildlife System, the function and general description of the Alaska Peninsula/Becharof Refuge and a description of the various wildlife and fisheries projects on the refuge. Overall this year's program went very well.

4. Volunteer Programs

1985 heralded the first group of volunteers in King Salmon, to assist in conducting field studies in the camps established at Braided Creek and Herendeen Bay. The names of the six volunteers and their recent homes of record were:

Lee F. Elliott	Cedar Bluff, Alabama
James B. Ferrari	Delmar, New York
Keith A. Reopelle	Madison, Wisconsin
David M. Vannier	Sierra Madre, California
Robert C. Weh	Fort Atkinson, Wisconsin
Karen I. Wilk	King Salmon, Alaska

Volunteer Walter M. Boyce spent a week in camp before heading back to Alabama for medical reasons.

Considering the diverse educational backgrounds of the volunteers, their contributions were substantial. Their duties included participation in aerial tundra swan surveys, and field studies of wildlife and their habitats discussed above.

A serious drawback of the program still centers around the last-minute withdrawals made by volunteers for other positions offered. We had two volunteers recant their commitments only days before their expected EOD dates. Problems like these sometimes hurt the refuge program rather than help it.



Front Row: Reopelle, Ferrari, Wilk, Kranich
 Back Row: Hood, Mumma, Wilk, Weh, Elliott, Vannier
 Pastor, Downing. TAW.

5. Funding

Table 4. Alaska Peninsula NWR Funding FY81 - FY83

FY	1210	1220	1300	TOTAL
83	\$70K	\$210K	--	\$280K
82	\$70K	\$220K	--	\$290K
81	\$10K	\$ 20K	\$ 32K	\$ 62K

Table 5. Becharof NWR Funding FY81 - FY83

FY	1210	1220	1300	TOTAL
83	\$96K	\$164K	--	\$260K
82	\$64K	\$119K ^a	\$104K	\$287K
81	--	\$ 82K	\$124K	\$206K

^a Includes \$56K spent on Bristol Bay Cooperative Management Plan (BBCMP) mapping.

Table 6. Alaska Peninsula NWR Funding FY 84 to FY 86.

FY	1260				1360	TOTAL
	Base	ARMM	RPRP	TOTAL		
86	\$180.6K	\$ 66.4K	--	\$247K	--	\$247K
85	\$179.5K	\$235.5K ^a	--	\$415K	\$ 5K ^b	\$420K
84	\$285 K	\$130 K ^c	--	\$415K	\$10K ^b	\$425K

^a Includes \$180K for large ARMM Projects.

^b Earmarked to assist King Salmon Fisheries Resource Station in developing a Fishery Management Plan.

^c Earmarked for large ARMM projects.

Table 7. Becharof NWR Funding FY 84 to FY 86.

FY	1260				1360	TOTAL
	Base	ARMM	RPRP	TOTAL		
86	\$201.6K	\$ 56.4K	\$101K	\$247K	--	\$359K
85	\$216 K	\$169 K ^a	\$101K	\$486K	\$ 5K ^b	\$491K
84	\$240 K	\$ 80 K ^c	--	\$320K	\$10K ^b	\$330K

^a Includes \$132K for large ARMM Projects.

^b Earmarked to assist King Salmon Fisheries Resource Station in developing a Fishery Management Plan.

^c Earmarked for large ARMM projects.

Table 8. Base Funding for Alaska Peninsula/Becharof NWRs
FY 81 to FY 8

FY	AKP	BCH	TOTAL
86	\$180.6K	\$210.6K	\$382.2K
85	\$179.5K	\$216.0K	\$395.5K
84	\$285.0K	\$240.0K	\$525.0K
83	\$280.0K	\$260.0K	\$540.0K
82	\$290.0K	\$287.0K	\$577.0K
81	\$ 62.0K	\$206.0K	\$268.0K

A review of tables 4 to 8 is self explanatory. The utilization of soft funds, i.e., ARMM and RPRP, to subsidize refuge budgets is going to have disastrous results when these funds dry up.

6. Safety

Field operation in bush Alaska are inherently hazardous. A number of small aircraft accidents on and around the refuge reinforced the obvious fact that the primary means of transportation is not without peril. Unpredictable weather, operation in remote areas and a healthy population of brown bears all add to the need for constant attention to safety.

The point was driven home on August 26th when refuge Super Cub 3685Z had to make an emergency landing on a lake 18 miles south of King Salmon due to a partial engine failure. Pilot Downing and BT Mumma were picked up by Superintendent Dave Morris, Katmai National Park, and returned to King Salmon. The aircraft was repaired by an OAS mechanic and returned to flight status the next day.

Special emphasis was placed on bear safety precaution training to our seasonal Biotechs and volunteers as well as our staff. Our field season was highly successful. There were no lost time accidents! The YCC program also had no lost time accidents.

On October 9, 1985, our accident free status was broken when MW Rogers dropped a sheet of 5/8" plywood on his left foot and broke his big toe. The break occurred just behind the area protected by his steel-toed shoe. Not thirty-minutes before the accident, he had received his performance evaluation for FY 1985 and had been complimented on an accident free year.

F. HABITAT MANAGEMENT

1. General.

The Alaska Peninsula extends approximately 450 Miles (720km) from near Lake Iliamna to Isanotski Strait at the beginning of the Aleutian Islands. The peninsula's width varies from about 100 miles (160km) at the base to 3 miles (5km) near the southern tip. Alaska Peninsula NWR extends for most of the length of the Pacific side of the peninsula, from the Becharof NWR in the north to Izembek NWR in the south.

The refuge's area of influence includes the Bering Sea, Pacific Ocean and coastal lands. These surrounding waters affect the climate and weather, and provide habitat and migrational pathways for fish, birds, and mammals. Changes that occur on the refuge and adjacent lands and waters are likely to affect each other. It is important to expand and research the different habitats of the refuge which support at least 248 species of resident and migratory wildlife and fish. Many of these species range throughout the refuge, while others occur predominately on the islands off the Pacific coast and on the Bristol Bay lowlands adjacent to the refuge boundaries.

2. Wetlands.

Water is an important resource on Alaska Peninsula NWR affecting the landscape, fish and wildlife populations, human uses, and management of the refuge. The refuge includes 18 major rivers, several hundred streams, approximately 300 lakes (9 major lakes), hundreds of ponds and potholes, extensive wetland areas, and more than 80 coastal bays, coves, lagoons, ports, tidal flats, and harbors (Fig. 7 - 9). Although hydrological and water quality data is scarce, the King Salmon Fishery Resource Station is conducting inventories to gather this type of data on drainages lying in areas likely to be impacted by oil, gas, or mineral development to help assess potential impacts on the refuges fisheries resources.

Run-off rates vary with changes in the seasons. Freeze-up on the refuges is not well documented, but is reported to occur near mid-December on the Ugashik River and in late November to mid-December near Cold Bay. In the winter, when most streams and springs are frozen, run-off rates are lower. Run-off rates increase dramatically with the spring break-up.

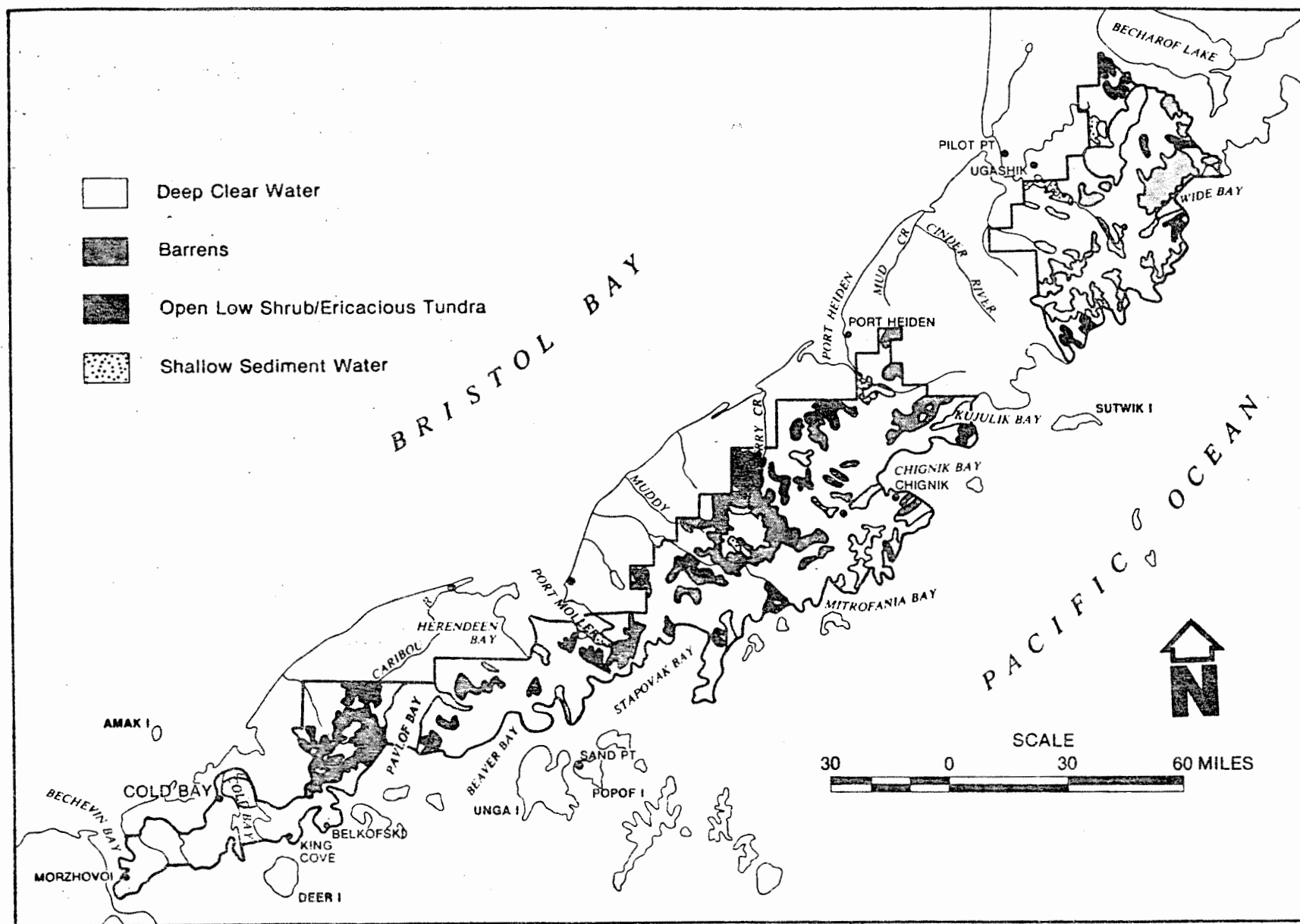


Fig. 7. Cover types-deep clear water, barrens, open low shrub/ericaceous tundra, and shallow sediment water.

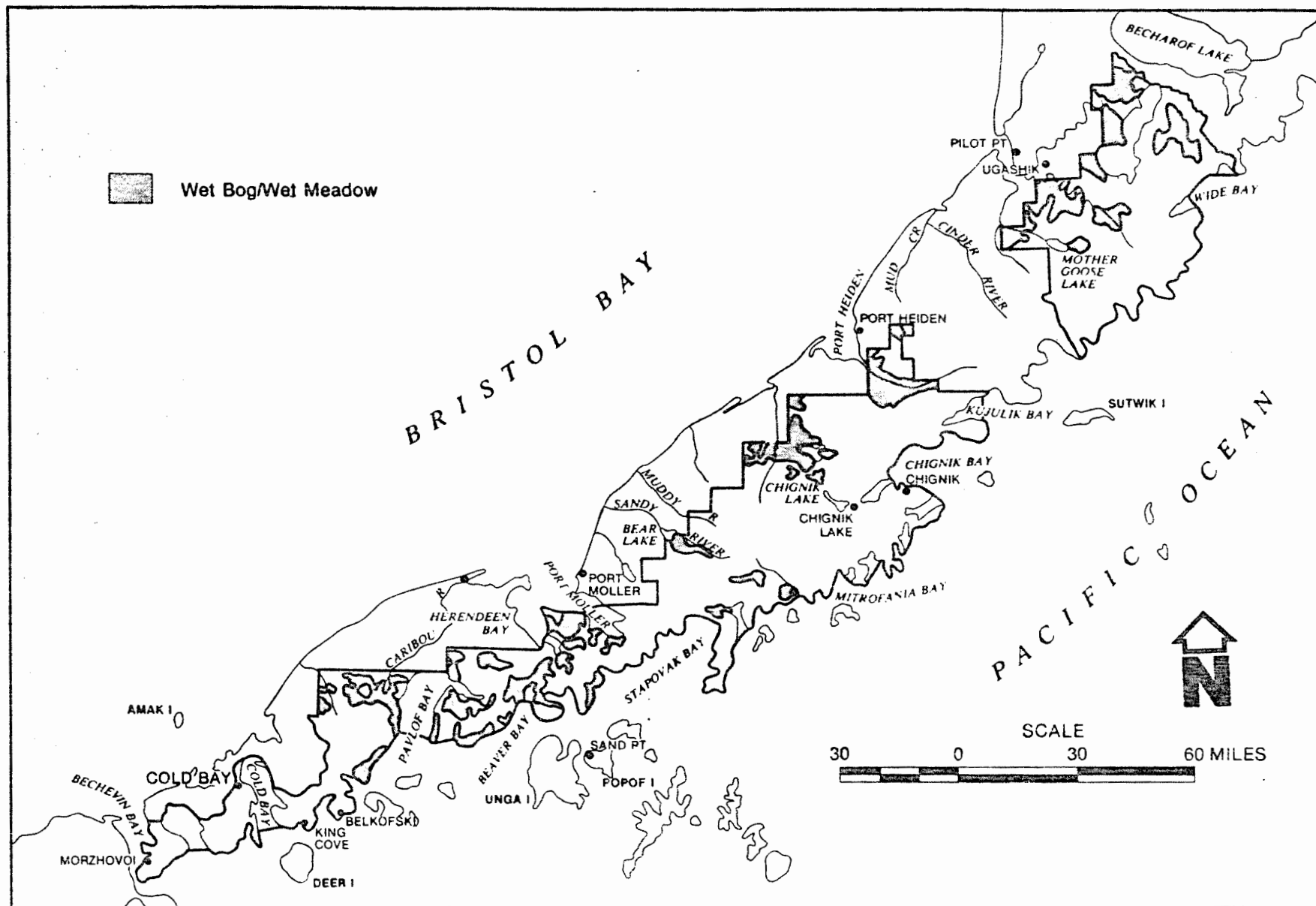


Fig. 8. Cover types-wet bog/wet meadow.

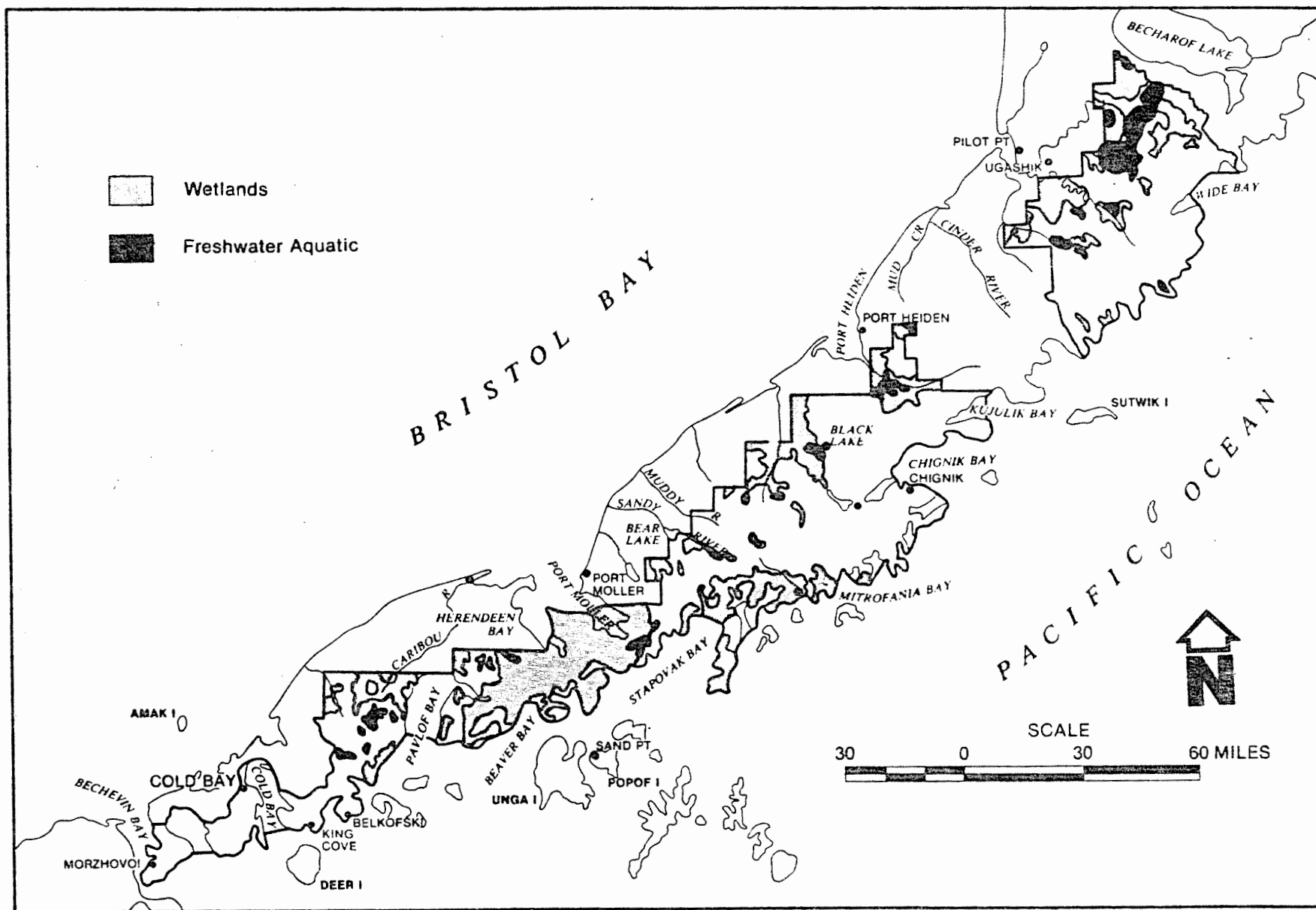


Fig. 9. Ecosystems-wetlands and freshwater aquatic.



Chignik Lagoon located on the Pacific Southern portion of the Alaska Peninsula. WB

3. Forest.

Alaska Peninsula NWR is virtually devoid of trees. Some cottonwoods are found along river drainages in the Ugashik Unit. Willow and alder form dense stands on both side of the peninsula but are more common on the wetter Pacific side.

6. Other Habitats.

Tundra is the major habitat on APNWR and generally falls into three categories: wet tundra, moist tundra, and alpine tundra.

Wet tundra is found generally below the 200 feet (61m) elevation. Crowberry, willow and a variety of forbs characterize the vegetation of the area. Wet tundra is most common on the north side of the Alaska Peninsula with much of the habitat lying outside of the refuge.

Moist tundra, also referred to as heath, is common throughout the lowlands in moderately drained areas.

Alpine tundra occurs at higher elevations on slopes and ridges of the Aleutian Range and other well-drained areas. Crowberry, lichens, and grasses are common in the alpine tundra.



Dog Salmon Drainage on the Alaska Peninsula. JWS

Extensive areas of ice, snow, and bare ground occur in the Aleutian Range above 2,000 feet (610m) elevation. Acreage estimates of all cover types are listed in Table 9.

Table 9. Major Cover Types and Percentage of Total Cover on or Near Alaska Peninsula NWR.

Cover Type	Approximate no. acres	Approximate % total cover
Closed shrub/graminoid	881,000	19.2
Barren	847,000	18.4
Snow/cloud/light barren	616,000	13.4
Miscellaneous deciduous	558,000	12.2
Deep clear water	473,000	10.3
Open low shrub/graminoid tundra	431,000	9.4
Open low shrub/ericaceous tundra	297,000	6.5
Wet bog/wet meadow	258,000	5.6
Marsh/very wet bog	142,000	3.1
Shallow sedimented water	27,000	0.6
All other types	61,000	1.3
Total	4,590,000	100.0

11. Water Rights

During 1985, the Regional Office Habitat Resources staff developed an information package to establish an accelerated Federal Reserved Water Rights and Instream Flow program as a high Regional priority. Refuge staff submitted comments on this package. Eight refuge streams were identified for quantification of in-stream flow requirements and include: Ugashik River, Dog Salmon River, King Salmon River, Meshik River, Braided Creek, Muddy Creek, Sandy Creek and Chignik River on the Alaska Peninsula Refuge. Stream weighting and prioritization will continue in FY 86.

12. Wilderness and Special Areas.

Approximately 1.9 million (53 percent) of the refuge has been selected and recommended for wilderness designation under the Alaska Peninsula RCCP. To make this selection the Service used seven criteria in evaluating the wilderness qualities of the Alaska Peninsula Refuge: land ownership; natural integrity of the area; apparent naturalness; opportunities for solitude; primitive recreation opportunities; size; and the presence of special/unique features. The selection includes approximately 70 percent of the Ugashik Unit and 40 percent of the Chignik Unit.

The Ugashik Wilderness Review Unit - This area extends from the Upper Ugashik Lake on the northeast to the Mother Goose Lake/Chiginagak volcano area on the southwest. The unit has outstanding fish and wildlife resources and habitats, as well as unique scenic and geological areas.

The Chignik Wilderness Review Unit - This area extends from the Meshik River drainage/Kujulik Bay area southwest to Port Moller; the unit contains a variety of habitats, ranging from wetlands to coastal cliffs, to volcanic mountains, and a wide range of fish and wildlife species that use those habitats.

Designation of the proposed wilderness areas will depend on the approval of the President and Congress. In accordance with ANILCA Section 1317(b), the President must advise Congress of his wilderness recommendations by December 2, 1987. The Service will maintain the wilderness qualities of these proposed wilderness areas whether or not they are congressionally designated.

G. WILDLIFE

1. Wildlife Diversity

The Alaska Peninsula's great geographical extension, diverse physiography and narrow, tapering land mass--influenced by the Bering Sea, foster a tremendously diverse environmental regime (refer to Fig. 10 for map and place names). At least 183 bird species, 30 land mammal species, and 11 marine mammals probably occur in refuge habitats or adjacent areas. Freshwater streams harbor at least 24 fish species including five Pacific salmonids during various times of the year.

In 1985, wildlife/habitat studies were initiated in two sites on the refuge. The efforts were a first step in obtaining information about specific wildlife communities. Some preliminary results of those studies are summarized in the appropriate following sections.



Aerial view of portion of Braided Creek study area. RJW

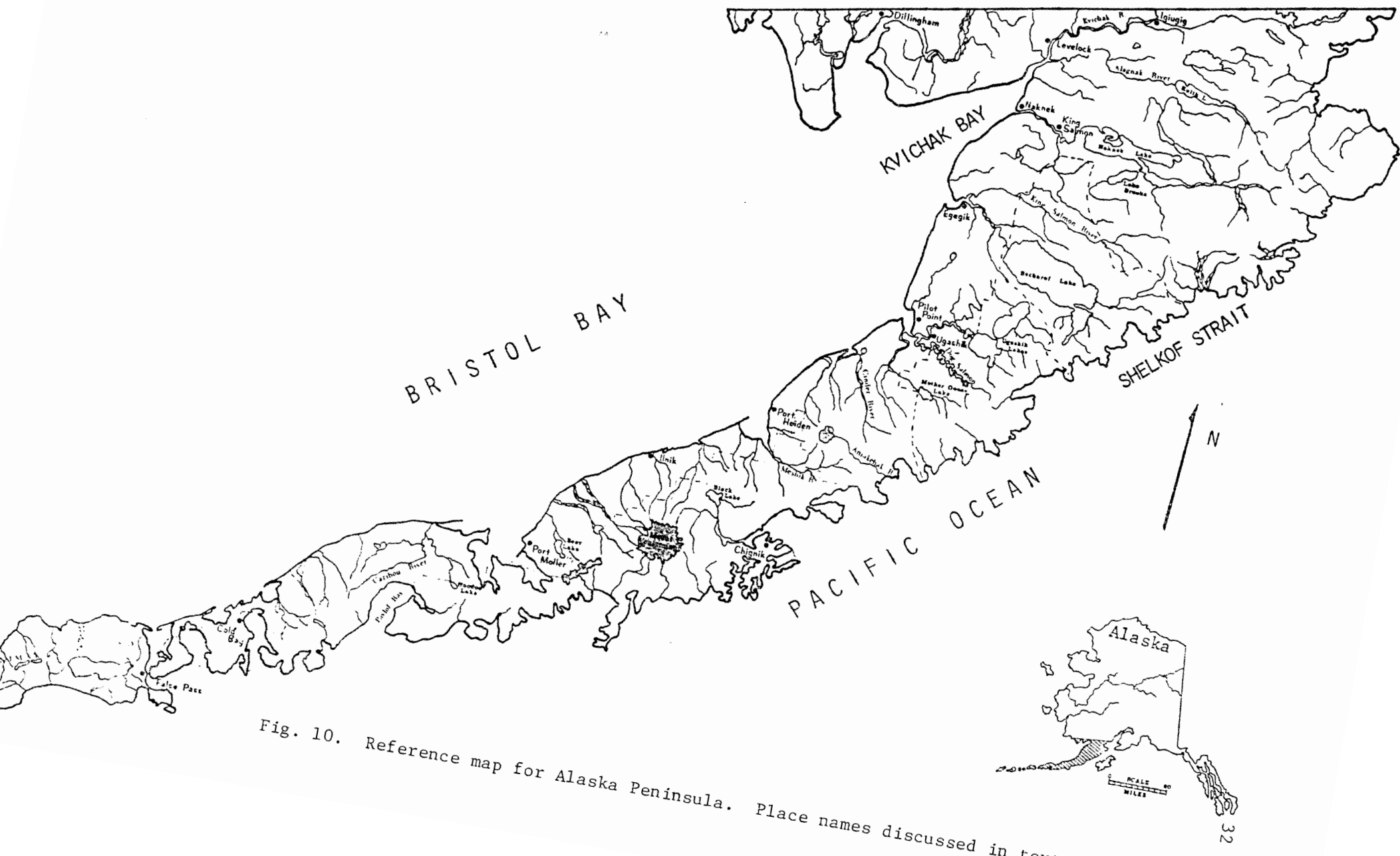


Fig. 10. Reference map for Alaska Peninsula. Place names discussed in text.



On ground. An idyllic look at camp conditions during a respite in late June. RJW



Base camp in lower Lawrence Valley, SE Herendeen Bay. RJW

2. Endangered and/or Threatened Species

The endangered Aleutian Canada goose (*Branta canadensis leucopareia*) may occur on the Alaska Peninsula NWR during migration to their

Aleutian Island nesting areas, however, they have not been documented on refuge lands. The Arctic (Falco peregrinus tundrius) and American (F. p. anatum) races of the peregrine falcon may occur in the area during migration, however, these species have not been documented either. The Arctic peregrine was changed from endangered to threatened status in 1984. Peale's peregrine (F. p. pealei) is the non-endangered/non-threatened race that is a rarely-observed inhabitant of the area.

3. Waterfowl

The Alaska Peninsula's estuaries, bays and wet tundra coastal lowlands are important waterfowl habitats for major populations of ducks, geese, tundra swans and (Pacific) brant. The North American population of emperor (Chen canagica), cackling Canada (Branta canadensis minima) and greater white-fronted geese stage in Bering Sea side estuaries during migration, as do brant, occurring at Izembek Bay at the peninsula's southern terminus (a brant was observed on the Naknek River near King Salmon last spring - blown in by a storm). Most of the Bristol Bay tundra swan population nests on the northern peninsula lowlands, as do pintail, black scoter, scaup, mergansers and numerous other ducks. Waterfowl occurring on study plots during inventories conducted at two refuge study sites are listed in Section 4.



Tundra swans, mallard and pintails heralding spring on the Naknek River in King Salmon. KIW



Bristol Bay lowlands in March, between Egegik and King Salmon. Note some ponds are open. RJW



Swans, geese, ducks and other waterbirds on the Naknek River in April, during aerial survey. RJW

Naknek River Survey

Aerial surveys are conducted over the Naknek River in April and May to record the occurrence and abundance of waterbirds (primarily waterfowl). Approximately 15 miles of River are flown, between the mouth of the river at Bristol Bay, and the outlet at Naknek Lake. Some river segments along the survey route support high bird densities. Since we have no present method for determining errors of our estimates, the data obtained are indexes at best, except perhaps for the physically larger geese and swan species. Table 10 lists peak staging count results for 1983-1985.

Table 10. Highest count^a estimates and species composition for common waterfowl occurring on the Naknek River, 1984-1985

	<u>Estimated observed totals</u>	
	1984	1985
Tundra swan	625	2776
Greater white-fronted goose	2453	1610
Canada goose	182	846
Northern pintail	10	1638
Common/red-breasted merganser	1558	1644
Common/Barrow's goldeneye	1102	733
Mallard	600	263

^aThe highest number occurring during any single weekly count, occurring generally between mid-April and late May.

Tundra Swan Surveys

Since 1983, aerial tundra swan surveys have been conducted on the northern peninsula (including refuge lands) to document the distribution, abundance and productivity of swans summering on the Bristol Bay lowlands. Swans are highly visible and information about them can be used to monitor the welfare of sympatric waterfowl species using the same habitats. An attempt is being made to stratify survey units from swan data recorded on topographic maps. Tables 11-14 are preliminary summaries of swan data through 1985. In February, WB Wilk presented a paper to the first Alaska Bird Conference and Workshop, titled, "Aerial Tundra Swan Survey on the Northern Alaska Peninsula".



Tundra swan nest on Braided Creek study plot. DDM

Table 11. Tundra swan adult/subadult densities and study area population estimates from northern Alaska Peninsula aerial surveys, 1983-1985. Preliminary estimates do not include aerial correction index, and are based on simple number : area ratio extrapolation. Study area was based on 18061 km² of potential viable tundra swan habitat.

	Area sampled (% of total)	Single/paired swans per km ²	Total swans per km ²	Estimate
1983				
June	39.3	0.16	0.23	4109
July-Aug.	25.4	0.15	0.24	4391
1984				
June	82.3	0.17	0.24	4414
July-Aug.	54.4	0.18	0.29	5277
1985				
June	62.1	0.20	0.33	5889
July-Aug.	28.2	0.16	0.30	5352

Table 12. Tundra swan population structure from observations made during northern Alaska Peninsula aerial surveys, 1983-1985. Numbers in parentheses to right are percentages with cygnets included. Numbers in parentheses below are percentages that do not include cygnets.

	Paired/single swans	Flocked swans	Cygnets	Totals
June				
1983	1140 (67) (70)	476 (28) (30)	94 (5)	1710
1984	2454 (64) (68)	1180 (31) (32)	200 (5)	3834
1985	2292 (59) (63)	1370 (36) (37)	194 (5)	3856
July-August ^a				
1983	687 (49) (62)	427 (31) (38)	280 (20)	1394
1984	1817 (45) (63)	1055 (26) (37)	1193 (29)	4065
1985	923 (45) (61)	588 (30) (39)	463 (23)	1974

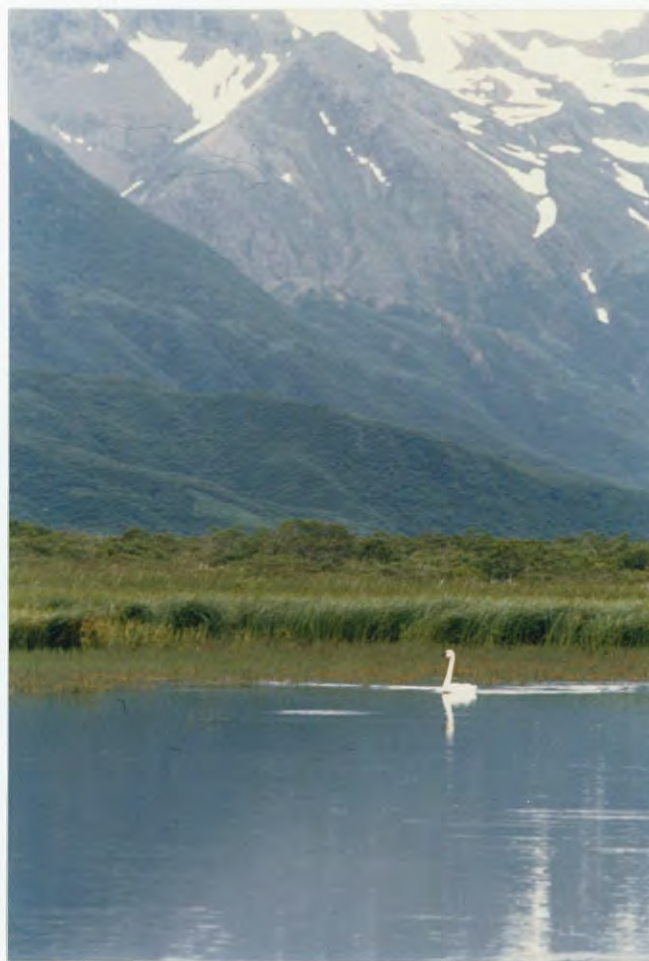
^aIn 1983 and 1984, production counts ended 2 August. In 1985, counts ended 25 July.

Table 13. Tundra swan pair success determined from aerial production survey observations on the northern Alaska Peninsula, 1983-1985^a

	Pairs observed ^b	Pairs with broods	Pairs with broods (%)
1983	343.5	95	27.7
1984	908.5	351	38.6
1985	461.5	157	34.0

^aPacific coast data not included.

^bPossible breeding pairs calculated by the formula: pairs + (singles/2)



Tundra swan and Aleutian Mountain setting. CLK

Table 14. Tundra swan flock and brood sizes from northern Alaska Peninsula aerial surveys, summer 1983-1985.

	Survey type and year ^a					
	N	P	N	P	N	P
	1983		1984		1985	
Flocks						
Number	31	93	65	159	75	76
Mean	15.4	4.6	18.2	6.6	18.3	7.7
S. E.	2.5	0.2	4.4	0.6	3.5	1.4
Broods						
Number	26	96	65	355	68	157
Mean	3.4	2.9	3.1	3.4	3.0	2.9
S. E.	0.2	0.1	0.1	0.1	0.1	0.1

^aN = nesting counts conducted in June; P = production counts conducted in July to early August.



Menyanthes trifoliata (buckbean) wetland. CLK



Foraging yellowlegs. SHL

Emperor Goose Surveys

Refuge staff have assisted the Migratory Bird Office in Anchorage and Fairbanks, and Izembek National Wildlife Refuge conducting spring aerial emperor goose surveys. Our data supplements Izembek's more extensive spring (and fall) surveys for comparative purposes. The data also provide information about local temporal population shifts. In the recent past, we have assisted in fall enumerations as well. The emperor goose is one of four arctic geese that have undergone recent population declines. The aerial surveys are presently the best method for monitoring the population. Summaries from spring/fall surveys are listed in Tables 15-16.

Table 15. Spring population size and productivity trends in emperor geese.^a

Year	Population size	Production (% young)	Family group size
1980	-	24.8	2.3
1981	91,267	31.7	3.2
1982	100,643	7.8	2.7
1983	79,155	27.1	3.2
1984	71,217	22.3	2.8
1985	58,833	-	-

^aData from Izembek NWR.

Table 16. Fall population size of emperor geese.^a

Year	Population size
1979	59,114 ^b
1980	63,091 ^b
1982	80,608
1983	72,551
1984	82,842

^aData from Izembek NWR.

^bSurveys not conducted on south side of peninsula.

4. Marsh and Waterbirds

The peninsula is an important summering area for numerous waterbirds which use the wet tundra lowlands for breeding areas. Table 17 is a list of species and their statuses determined from studies conducted this summer in two study areas on the peninsula. The list is not a complete representation of all species occurring on the refuge, but does document those species encountered in first-time, on-ground studies conducted by the refuge.

Table 17. Species composition and status of waterfowl, marsh and waterbirds observed in two study areas in Alaska Peninsula National Wildlife Refuge, summer 1985.

	Study area and status ^a	
	Braided Creek	Herendeen Bay
Loon spp.	CV	-
(Common, red-throated, arctic)		
Red-necked grebe	UB	-
Tundra swan	CB	CV
Canada goose	UB	-
Mallard	CB	UB
Northern pintail	M	-
Gadwall	M	-
American wigeon	CB	-
Green-winged teal	CB	M
Greater scaup	CB	-
Harlequin duck	RV-CB	CB
Common eider	CV	-
Common/Red-breasted merganser	RV	-
Red-breasted merganser	RV	CB
Lesser sandhill crane	CB	-
Common snipe	CB	UB

^aStatus classes: CB = common breeder, UB = uncommon breeder, RV = regular summer visitor, CV = casual or accidental visitor, M = migrant, - not present.



Field crews searching nesting tundra bird study plots. CLK

5. Shorebirds, Gulls, Terns and Allied Species

Numerous shorebirds migrate along or breed on the Alaska Peninsula. Major staging areas occur on or near the refuge in Izembek and Nelson Lagoons, Port Heiden and Ugashik and Egegik Bays.

Nesting seabirds flourish along the peninsula's coast. The steep, rocky cliffs of the Pacific coast are particularly suited for the colony-nesting species, black-legged kittiwakes, common and thick-billed murres, horned and tufted puffins, red-faced, pelagic and double-crested cormorants, pigeon guillemots and gulls. The present status and abundance of many of these species is unknown and requires updating. Table 18 is a list of species and their status determined from studies conducted in the southern Herendeen Bay, and Braided Creek areas of the refuge in 1985.

An attempt was made to document shorebird use of the intertidal flats in a portion of the Herendeen Bay study area in 1985. Weekly counts were made for a one-hour period prior to low tide. Figure 11 shows the results of those counts.

Table 18. Species composition and status of shorebirds, gulls, terns and allied species observed in two study areas in Alaska Peninsula National Wildlife Refuge, summer 1985.

	Study area and Status ^a	
	Braided Creek	Herendeen Bay
White-winged scoter	-	CV
Semi-palmated plover	CB	CB
Greater yellowlegs	RV-CB	UB
Spotted sandpiper	UB	-
Short-billed dowitcher	UB	-
Red-necked phalarope	CB	UB
Ruddy turnstone	-	M
Pectoral sandpiper	CV-UB	-
Dunlin	CB	-
Least sandpiper	CB	CB
Western sandpiper	CV-UB	M-UB
Rock sandpiper	-	CB
Parasitic jaeger	RV	-
Glaucous-winged gull	RV	CB
Mew gull	CB	RV
Bonaparte's gull	-	RV
Black-legged kittiwake	-	CB
Pigeon guillemot	-	CB
Marbled murrelet	-	UB
Kittlitz's murrelet	-	CV
Horned puffin	-	CB
Belted kingfisher	CV	UB
Arctic tern	CV-UB	UB

^aStatus classes: CB = common breeder, UB = uncommon breeder, RV = regular summer visitor, CV = casual or accidental visitor, M = migrant, - not present.

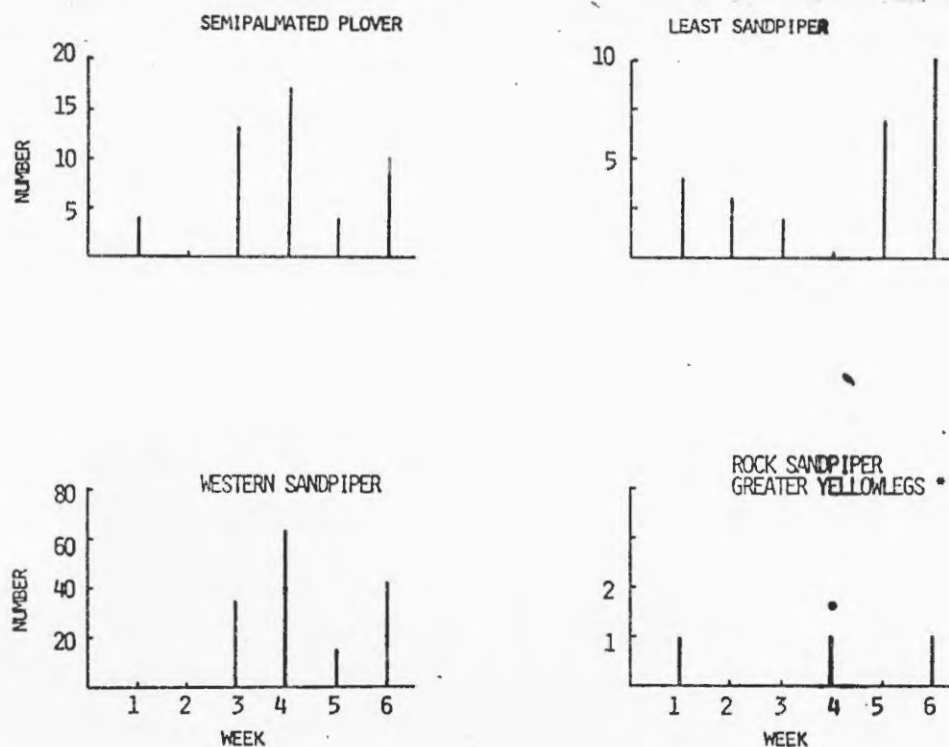


Fig 11. Results from weekly surveys conducted in intertidal stretch of shoreline during low tide in southern Herendeen Bay, late June-early August 1985.



Horned puffins in SE Herendeen Bay. RAP



Pelagic cormorants and black-legged kittiwakes flourish in coastal habitats. DDM



6. Raptors

Bald eagles are common nesting species on the refuge and Alaska Peninsula. Nests are constructed atop cliffs and seastacks, and occasionally, they are found in tree tops. A recent survey conducted by the Office of Raptor Management along the Pacific side estimated eagle numbers at $1422 \pm 21\%$ for adults and $418 \pm 38\%$ for juveniles (95% CI). Presently, eagles and other birds of prey are not regularly monitored by refuge personnel. Table 19 lists the status of raptors observed during field studies on two refuge locations in 1985.

Table 19. Species composition and status of raptors observed in two study areas in Alaska Peninsula National Wildlife Refuge, summer 1985.

	Study area and status ^a	
	Braided Creek	Herendeen Bay
Bald eagle	RV	CB
Rough-legged hawk	-	UB
Northern harrier	CV	-
Gyr Falcon	-	UB
Short-eared owl	CV	-
Great-horned owl	-	CV

^aStatus, classes: RV = regular visitor, CB = common breeder, UB = uncommon breeder, CV = casual or accidental visitor.



Bald eagle aerie in SE Herendeen Bay. RAP

7. Other Migratory Birds

Numerous other migratory birds use refuge and adjacent peninsula lands for various needs, including breeding, migration, resting and wintering. Table 20 - 21 lists other migratory and resident birds observed during field studies in 1985.

Table 20. Species composition and status of other migratory and resident birds observed in two study areas in Alaska Peninsula National Wildlife Refuge, summer 1985.

	Study area and status ^a	
	Braided Creek	Herendeen Bay
Willow ptarmigan ^b	CB	CB
Rock ptarmigan ^b	CB	CB
Cliff swallow	CV	-
Violet-green swallow	CB	-
Tree swallow	CB	CV
Bank swallow	CB	CB
Black-billed magpie ^b	CB	CB
Common raven	RV	UB
Black-capped chickadee ^b	CV	UB
American dipper	CB	-
American robin	CB	-
Gray-cheeked thrush	CB	-
Hermit thrush	-	CB
Water pipit	CB	UB
Yellow wagtail	-	UB
Northern shrike	CB	CV
Orange-crowned warbler	CB	CV
Yellow warbler	CB	CB
Wilson's warbler	CB	CB
Common rosefinch		
(<i>Carpodacus erythrinus</i>) ^c	CV	-
Rosy finch	CB	UB
Common redpoll	CB	CB
Savannah sparrow	CB	CB
American tree sparrow	CB	-
White-crowned sparrow	CB	-
Golden-crowned sparrow	CB	CB
Fox sparrow	CB	CB
Lapland longspur	CB	CV
Snow bunting	CB	UB-M

^aStatus classes: CB = common breeder, UB = uncommon breeder, RV = regular summer visitor, CV = casual or accidental visitor, M = migrant, - not present.

^bResident species.

^cNot absolute confirmed observation.



Vigilant tree swallow near its nest box at sunset
in Braided Creek field camp. RJW

Table 21. Species composition of common nesting bird species occurring during weekly upland runway transect counts, Braided Creek study area, Alaska Peninsula National Wildlife Refuge, Alaska 1 June-9 August 1985.^a

	Weekly total (mean \pm SD)			Total obs.
	June	July	August	
Willow ptarmigan	3.00 \pm 1.41	0.25 \pm 0.43	2.50 \pm 2.50	21
Common snipe	0.20 \pm 0.40	0.25 \pm 0.43		2
Tree swallow	7.80 \pm 3.66	2.25 \pm 1.48		48
Gray-cheeked thrush	0.60 \pm 0.49	0.50 \pm 0.87		5
American robin	0.60 \pm 0.49	1.50 \pm 2.06		9
Orange-crowned warbler	2.60 \pm 2.87	4.50 \pm 3.20	1.00 \pm 1.00	33
Yellow warbler		0.25 \pm 0.43		1
Wilson's warbler	9.80 \pm 5.90	1.75 \pm 0.83	1.50 \pm 1.50	59
American tree sparrow	0.20 \pm 0.40	0.75 \pm 0.83		4
Savannah sparrow		0.75 \pm 1.30		3
Fox sparrow		0.25 \pm 0.43		1
Golden-crowned sparrow	10.20 \pm 1.72	20.25 \pm 7.26	2.50 \pm 2.50	137
White-crowned sparrow	7.00 \pm 6.72	10.50 \pm 1.66	3.50 \pm 3.50	84
Lapland longspur	0.80 \pm 0.75			4
Common redpoll	7.40 \pm 4.32	5.25 \pm 3.34	0.50 \pm 0.50	59
Unknown passerine	1.8 \pm 0.75	5.75 \pm 1.79	5.50 \pm 0.50	43

^aOther species observed: mallard, northern pintail, American wigeon, lesser sandhill crane, greater yellowlegs, short-billed dowitcher, glaucous-winged gull, mew gull, arctic tern, bank swallow, common raven, and northern shrike.

^bOnly two surveys were conducted in August. The second survey occurred during high winds, thus observations were limited.

8. Game Mammals

Alaska Refuges are open to sport and subsistence harvest. Fig. 12 shows the three Alaska Department of Fish and Game game management subunits on the Alaska Peninsula, and their approximate boundaries relative to refuge lands.

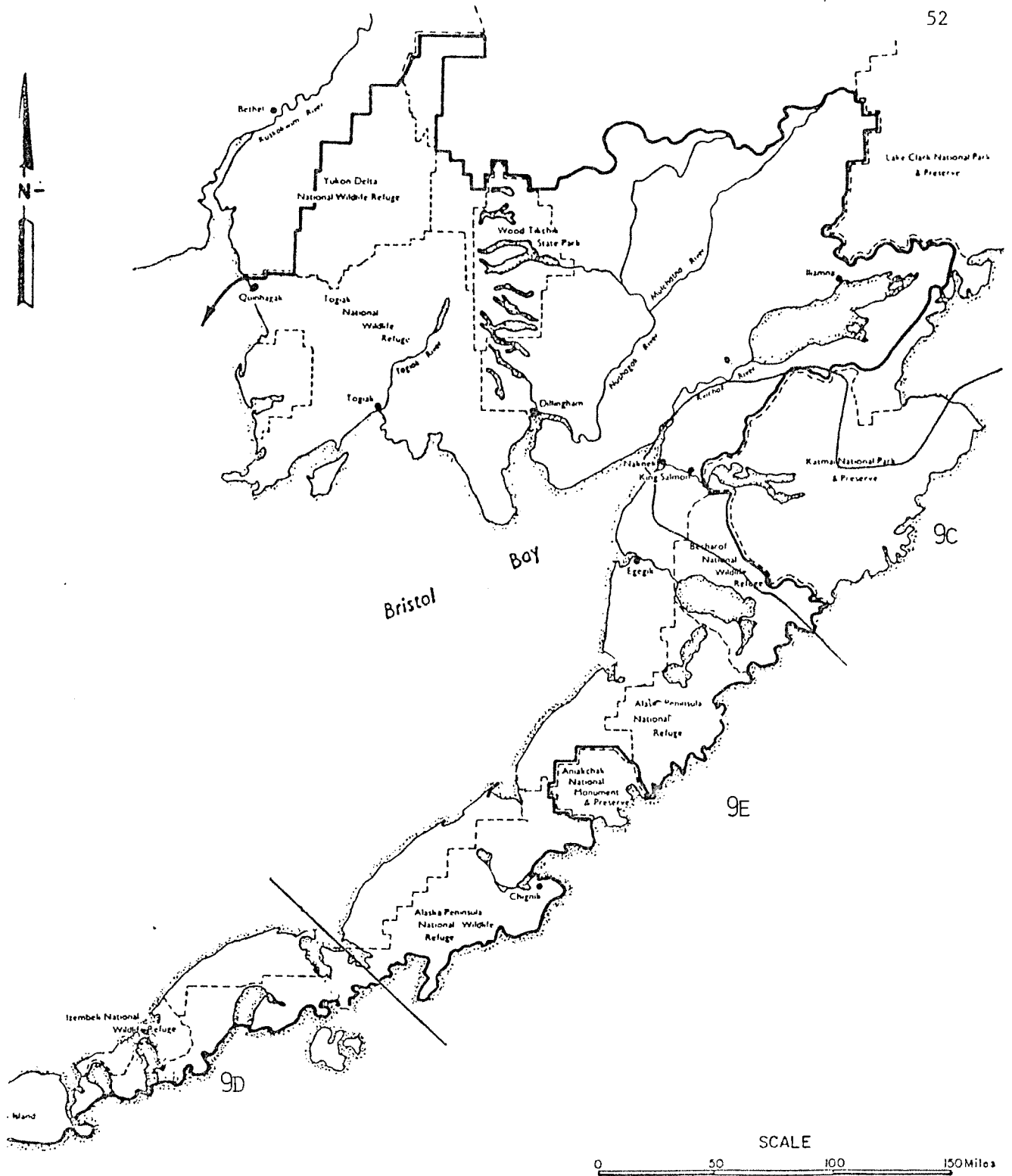


Fig. 12. Alaska Peninsula Refuge boundaries in relation to Alaska Department of Fish and Game Management Subunits and other political boundaries.

Brown Bear

In recent years, the refuge has made significant contributions in obtaining brown bear data from aerial surveys in previously unstudied (or minimally studied) areas. Annual brown bear composition surveys of the tributaries to the Ugashik Lakes and Black/Chignik Lakes have been conducted by refuge and state personnel, respectively. The refuge is primarily responsible for the Ugashik unit, while state biologists monitor Black Lake and Chignik Lakes, although we have covered for each other in the past. In 1985, inclement weather forestalled the surveys in Ugashik, therefore, none were conducted. Tables 22 - 23 and Fig. 13 show the results from surveys conducted through 1985.

In late 1983, a brown bear radio-tracking study was initiated on adjacent Becharof Refuge. Since brown bears characteristically do not recognize refuge boundaries, bears have been radio-located on Alaska Peninsula Refuge. To date, all locations made on the refuge have been on the east side of the Ugashik Lakes.



Behemoth brown bear dwarfing the Aleutian Range in the background. RJW

Table 22. Ugashik Lakes Brown Bear Salmon Stream Trend Counts, Alaska Peninsula NWR, 1965-67, 1969 and 1981-1984.^a

Date	Sow/w young		Cubs		Yrlgs.		Cubs & Yrlgs.		Singles		Total Sample	Mean ltr. sz.		Best Survey No. of Bears		Comments
	N	% ^b	N	%	N	%	N	%	N	%		Cubs	Yrlgs.	Bears	Pr/hr	
1965	14	22	14	22	18	28	32	49	19	29	65	--	--	--	18.1	None
1966	12	22	13	24	15	27	28	51	15	27	55	--	--	--	19.6	None
1967	12	21	17	29	11	19	28	48	18	31	58	--	--	--	24.2	None
1969	16	24	14	21	24	36	38	56	13	20	67	--	--	67	22.3	None
1981	30	20	31	21	33	22	64	42	57	38	151	--	--	43		6 counts
1982	34	20	35	20	28	16	63	36	75	43	174	--	--	51		5 counts
1983	55	21	46	17	76	29	122	46	87	33	264	2.2	2.2	92	35.3	4 counts
1984	13	19	16	23	13	19	29	42	27	39	69	2.0	2.6	35	16.2	2 counts

a Survey dates varied and are combined unless otherwise specified.

b Percentage of total bears.

Table 23. Brown Bear Composition data from Black/Chignik Lakes aerial surveys,
1958-1985, Alaska Peninsula

Date	Sow/w young		Cubs		Yrlgs.		Cubs & Yrlgs.		Singles		Total Sample	Mean ltr. sz.		Best Survey No. of Bears		Comments
	N	% ^b	N	%	N	%	N	%	N	%		Cubs	Yrlgs.	Bears	Pr/hr	
8-1-58														76		No raw data.
8-6-59														73		No raw data.
1962	439	26	512	30	376	22	888	52	391	23	1718	--	2.02	118		27 counts
8/65	65	28	75	32	60	25	135	57	36	15	236	2.21	1.94	123	49.2	2 counts
(6th & 7th)																
8/9/66	24	22	37	34	14	13	51	47	33	31	108	--	--	108	43.2	1 count
8/10/67	42	27	70	45	16	10	86	55	27	17	157	--	--	82	30.4	2 counts
8/13/68	30	23	55	43	18	14	73	57	25	19	129	--	--	67	20.9	3 counts
7/28/69	148	22	196	30	145	22	341	51	174	26	663	--	--	122	44.4	6 counts
Fall-70	70	22	53	17	84	26	137	43	114	36	321	--	--	126	4.0	3 counts
July-70	51	20	25	13	80	41	105	54	40	20	196	--	--	106	40.8	2 counts
(27th & 28th)																
8/71	6	18	7	21	8	24	15	45	12	36	33	--	--	--	--	part. cnt.
Sumr.-72	38	23	33	20	50	30	82	49	47	38	167	2.2	2.1	NA	NA	Mis.obs.
8/74	39	23	43	25	46	27	89	52	44	26	172	--	--	95	43.0	2 counts
(6th & 7th)																
8/75	9	26	7	21	7	21	14	41	11	32	32	--	--	NA	NA	Mis. obs.
8/76	65	26	42	17	100	40	142	56	45	18	252	2.5	2.1	115	40	4 counts
8/8/82	53	19	71	25	45	16	116	41	113	40	282	2.1	2.4	148	50.7	2 counts
8/83	139	22	171	27	122	19	293	46	199	32	631	2.3	2.1	173	55.8	4 counts
(9th to 12th)																
8/84	127	24	107	20	139	26	246	46	160	30	533	2.1	1.8	171	64.0	4 counts
(7th & 8th)																
8/85	129	22	108	18	170	28	278	46	192	32	599	2.2	2.2	215	67.9	3 counts

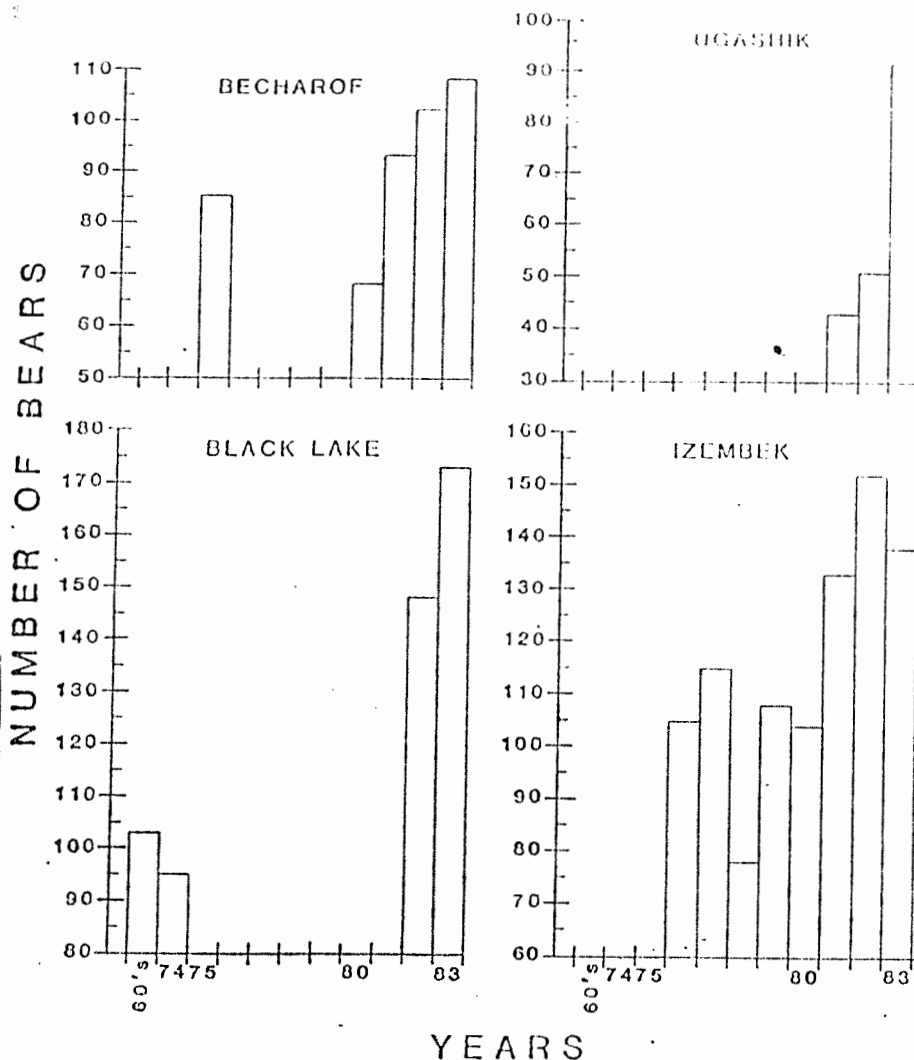


Fig. 13. Brown bear totals from highest composition/trend counts in four Alaska Peninsula locations (ADF & G table).

The 1981 Records of North American Big Game classify the peninsula Alaska Brown Bear as *Ursus arctos middendorffi*, distinguishing it from the conspecific grizzly bear (*Ursus arctos horribilis*) which is generally associated with interior ranges. Other taxonomists have split this difference and consider the behemoths of Kodiak Island as *U. a. middendorffi*, (e.g., The Wildlife Management Institutes, Big Game of North America (1978) and lump the coastal brown bear of the mainland with interior grizzlies. Nonetheless, the Boone and Crockett

record lists the number 6 brown bear as being taken near Port Heiden on the Alaska Peninsula in 1961. Forty-six of the top 100 brown bear listed were taken on the Alaska Peninsula, rivaling Kodiak Island's 53.

Barren-ground caribou

The Alaska Peninsula caribou herd is composed of the northern and southern subherds. The ranges of the two are split at Port Moller. Izembek NWR monitors the smaller southern herd, while state game biologists monitor the northern population. Population estimates for the northern subherd are listed in Table 24. In 1985, post-parturition counts showed an estimated 18,978 animals in the northern herd, of which 27.0% were calves.



Alaska Peninsula caribou. SHL

Table 24. Sex and age composition of the northern Alaska Peninsula caribou subherd.

Year	Season	Bull:Cow Ratio	Calf:Cow Ratio	Calf % in Herd	Population Estimate
1970	Fall	48.3:100	46.1:100	22.9	
1975	Fall	33.0:100	44.6:100	25.1	10,340
1976	Spring	--	--	--	11,368
1978	Fall	48.3:100	55.2:100	25.0	--
1980	Fall	52.8:100	56.5:100	27.0	--
1981	Spring	--	--	27.8	16,600 ^a
1981	Fall	33.6:100	39.2:100	22.7	--
1982	Spring	52.5:100	55.4:100	26.7	16,800 ^a
1982	Fall	43.1:100	51.6:100	26.5	--
1983	Spring	--	--	28.5	18,000 ^a
1983	Fall	39.2:100	26.7:100	16.1	--
1984	Spring	--	--	24.5	19,000 ^a
1984	Fall	39.0:100	39.0:100	22.0	--

^a Post calving photo count with aid of radio telemetry.



Caribou fording a peninsula stream. SHL

The refuge assisted state biologists in their annual caribou capture/radio-collaring efforts in April. Radio telemetry is used as an aid in locating caribou for surveys, and to obtain data on seasonal migration of this highly nomadic species.

The estimated annual herd harvest is 1000-1200 animals. Most hunters take bulls. The 1981 Records of North American Big Game (Boone & Crockett) list the number 1 barren-ground caribou (Rangifer tarandus granti) as being taken at Ugashik Lake in 1967 (Fig. 14). Thirty-seven of the top 100 caribou listed were taken on the Alaska Peninsula.

Moose

Moose trend surveys have been flown by state game biologists on the peninsula since 1962. Data from game management unit 9E from 1969-1972 compared with 1982-1983 suggest a 60% moose decline during the 12 year period (ADF&G data). Some biologists theorize that the peninsula's dense brown bear population may be a major factor contributing to this decline. The results of aerial surveys conducted for moose in the Dog Salmon drainage by state biologists are listed in Table 25.

The number four Alaska-Yukon moose (Alces alces gigas) listed in the 1981 Boone and Crockett record book was taken in 1967 at Mother Goose Lake. Twenty-two of the top 100 moose listed in the record were taken on the Alaska Peninsula, primarily during the 1960's.

Mammal and Scent Station Indexes

In 1985, we attempted to quantify the occurrence of big game and mammalian predators in the Braided Creek and Herendeen Bay study sites. We used daily observations and established predator scent stations (baited with predator survey discs) to obtain these data. Fig. 15 shows the comparative seasonal abundance of three big game species observed in the Braided Creek study area, between Braided and Landlocked Creeks. Tables 26-27 show the indexes to predator occurrence in both study areas.



ograph by Lens Unlimited

Fig. 14. WORLD'S RECORD BARREN GROUND CARIBOU
SCORE: 463 $\frac{6}{8}$

Locality: Ugashik Lake, Alaska. Date: 1967.

Hunter and owner: Ray Loesche.

Table 25. Moose Sex and Age Ratios From Fall Counts Conducted on Park Border area which includes the extreme northern Boundary of Becharof Lake. (ADF&G data).

Date	Tot.M ^a per 100 F ^a	Sm. M ^b per 100 F	Sm M % in Herd	Sm M per 100 m Calves	Calves per 100 F	Calves per 100 F > 2 yrs	Incidence of twins per 100 F w/calf	Calf % in herd	Animals per hour	Total sample
11/21/81	23.2	10.1	7.4	140.0	14.5	16.1	11.1	10.5	47.5	95
11/30/82	31.0	7.1	5.1	150.0	9.5	10.3	0	6.8	67.4	118
10/22/83	33.0	4.4	2.9	44.4	19.8	20.7	13.3	12.9	69.5	139
11/07/84	27.8	4.3	3.1	70.6	12.1	12.7	13.3	8.7	65.3	196
12/06/85	20.5	2.6	2.0	85.7	10.30	10.5	9.1	7.8	45.0	153

a M = Male F = Female

b Small = possible yearlings

c Raw data unavailable to check ratios.

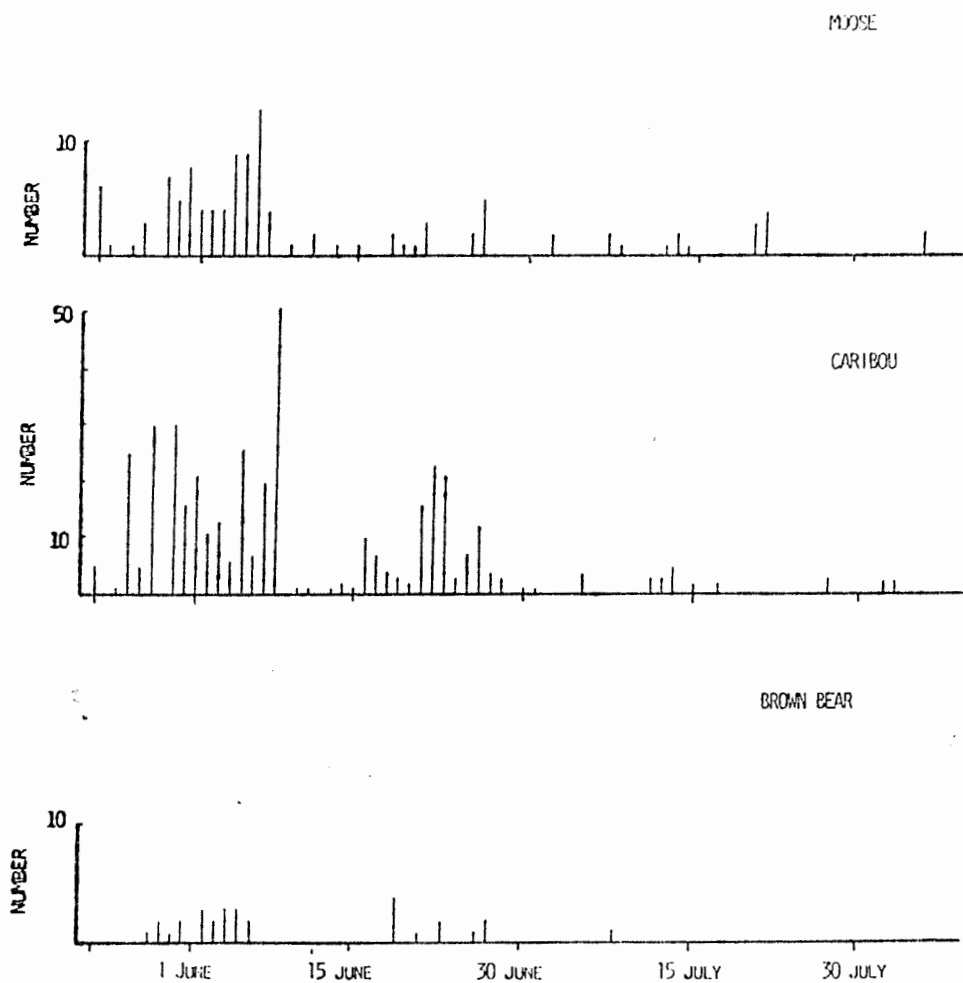


Fig. 15. Daily abundance of 3 large game species observed in Braided Creek study area, Alaska Peninsula NWR, 1985.

Table 26. Species composition and occurrence indexes from 17 scent stations in Braided Creek study area, Alaska Peninsula National Wildlife Refuge, 1 June-10 August 1985.

	Index ^a			
	June	July	August	Overall
Red fox	250.00	222.22	281.25	245.81
Gray wolf	71.43	0.00	0.00	33.52
Brown bear	35.71	31.75	0.00	27.93
Wolverine	23.81	0.00	0.00	11.17
Least weasel	11.90	0.00	0.00	5.59
River otter	250.00 ^b	0.00	-	166.67 ^b
Unid. small mammal	23.81	31.75	0.00	22.35
Overall	428.57	285.71	281.25	351.96

^aExcept for otter, indexes based on 84, 63, and 32 scent station nights in June, July and August, respectively. Other non-target species tracks identified were barren-ground caribou, willow ptarmigan (dusting site), lesser sandhill crane, common raven, and other unidentified birds. Highest values indicate highest occurrence of station visits.

^bData based on four and six nights for station placed along Braided Creek shoreline in June and July, respectively.

Table 27. Species composition and indexes for beach scent stations on southern Herendeen Bay, Alaska Peninsula National Wildlife Refuge, 30 June-30 July 1985.

	Index ^a
Red fox	266.67
Brown bear	155.56
Mink ^b	88.89

^aIndex based on 45 station nights.

^bfrom station in riparian zone.

9. Marine Mammals

Sea otters, Steller's sea lions and harbor seals occur along the Pacific coast. Few walrus occur on the Pacific side, however there is a haulout area which sometimes includes several thousand walrus at Cape Seniavin on the Bering Sea side. Several whale species occur in offshore waters. In spring, belukhas (beluga whales) visit some of the major river tributaries to Bristol Bay in search of smelt and salmon smolts. The refuge data base on marine mammals is scant.

The 1981 Records of North American Big Game lists the number 5 walrus as being taken from the Alaska Peninsula. Seventeen of the top 100 walrus listed have been taken in the Bristol Bay/Bering Sea area.



Walrus haulout at Cape Seniavin. DDM

10. Other Resident Wildlife

Lynx, beaver, and arctic and snowshoe hare are other residents of the Alaska Peninsula. In 1985, a coyote was taken by a local trapper. Coyotes are rare on the peninsula.

We conducted small mammal live-trapping in grids established in several locations in the two refuge study sites in 1985. Trapping success was horrendous (22 individuals captured in 2178 trap-station nights in Braided Creek, and 21/880 in lower Lawrence Valley) and probably reflects low abundance of small mammals in the study areas in 1985. We observed a tremendous abundance of small mammals on the peninsula in 1984. Our trapping indexes may indicate a population crash following a year of peak abundance. Tables 28-30 are summaries from small mammal trapping.



Rock ptarmigan in the alpine zone
of the Aleutian Range. KIW

Table 28. Species composition and capture rates of small mammals in the Braided Creek live-trapping grids, Meshik River drainage, Alaska Peninsula National Wildlife Refuge, June-August 1985^a.

Vegetation complex	Capture rate								
	Total captured/total trap station-nights								
	Period								
	1	2	3	1	2	3	1	2	3
	<i>Sorex cinereus</i>			<i>Clethrionomys rutilus</i> ^b			<i>Mustela nivalis</i>		
Upland	0/490	4/294	13/294	1/490	0/294	1/294	1/490	0/294	0/294
Lowland	1/500	0/300	1/300	0/500	0/300	0/300	0/500	0/300	0/300

^aCapture period dates: 1 = 24-29 June; 2 = 21-23 July; 3 = 4-6 August.

^bOne individual was recaptured; data do not appear in table.

Table 28 cont.

Lower Lawrence Valley small mammal grids. Column headings from above table unless otherwise specified.^a

	S. cinereus ^b			S. monticolus			Z. hudsonius		
Upland	3/160	6/120	4/160	2/160	0/120	0/160	0/160	0/120	3/160
Lowland	1/160	1/120	0/160	0/160	0/120	0/160	0/160	0/120	2/160

^aCapture periods: lowland, Period 1: 3-17 July; Period 2: 15-18 July; Period 3: 23-27 July; upland, Period 1: 9-13 July; Period 2: 20-23 July; Period 3: 27-31 July.

^bOne unid. Sorex spp. was captured in upland during period 1 and is included in this category.



Volunteers recording biological data from small mammals. CLK

Table 29. Species composition, sex, weight and capture mortality for small mammals in lower Lawrence Valley, southern Herendeen Bay live-trapping grids, Alaska Peninsula National Wildlife Refuge, July 1985.^a

	Period 1	Period 2	Period 3
Weight (mean g \pm SD)			
<i>S. cinereus</i> ^b			
upland			
male	3.20 (1)	3.50 \pm 0.41 (3) ^c	4.30 (1)
female	6.80 (1)	3.50 (1)	5.33 \pm 1.03 (3)
lowland ^d			
male			
female			
<i>S. monticolus</i>			
upland			
male			
female	10.80 (1) ^e		
lowland			
male			
female			
<i>Z. hudsonius</i>			
upland			
male			19.80 \pm 1.63 (5)
female			
lowland			
male		21.00 (1)	23.50 (1)
female			
Capture mortality (mort./total capt.)			
<i>S. cinereus</i> ^b	4/4	4/4	4/4
<i>S. monticolus</i>	2/2		

^aTrapping periods are found in other small mammal tables.

^bOne capture mortality of genus *Sorex* unid. to species, sex, weight.

^cTwo juveniles in this category were captured/released without sexing, weighing.

^dAn unid. adult from this category was captured (mortality) but not sexed or weighed.

^eAn adult female capture mortality in this category was not weighed.

Table 30. Species composition, sex, weight and capture mortalities for small mammals in the Braided Creek study area, Meshik River drainage, Alaska Peninsula National Wildlife Refuge, June-August 1985.

	Period 1	Period 2	Period 3
Weight (mean g \pm SD)			
<i>S. cinereus</i>			
upland			
male		3.33 \pm 0.47 (3) ^a	3.29 \pm 0.42 (9)
female		6.75 (1)	4.93 \pm 0.91 (4)
lowland			
male			
female	4.45 (1)		4.50 (1)
<i>C. rutilus</i>			
upland			
male	24.00 (1)		21.00 (1) ^b
female			
lowland			
male			
female			
<i>M. nivalis</i>			
upland			
male			
female	35.10 (1)		
lowland			
male			
female			
Capture mortalities (mort./total cap.)			
<i>S. cinereus</i>	1/1	3/4	10/14
<i>C. rutilus</i> ^c			
<i>M. nivalis</i>	1/1		

^aNumber in parentheses.

^bSex unknown.

^cOne recapture mortality during Period 1 not discovered until Period 2.



Purple mountain saxifrage in alpine zone
in upper Landlocked Creek. CLK



Cessna Caravan and crew loading up at end of the
field season. CLK

11. Fisheries Resources

A draft fishery management plan for Alaska Peninsula/Becharof refuges was prepared by the King Salmon Fishery Resources Project Leader and sent to the Regional Office for review.

Anadromous and resident fish species compositions, distributions, population characteristics (age class) and migration timing were investigated in the Herendeen Bay/Balboa Bay proposed pipeline corridor. Four species of Pacific salmon (coho, chum, pink and sockeye) occur in the area and previously undocumented populations of coho were found rearing in several streams. A chum/sockeye hybrid apparently occurs naturally in the Nelson Lagoon area just north of Herendeen Bay. Peak out-migration of chum and pink salmon occurred prior to 7 June and continue through July. Adult chum generally return to spawn at 0.4 years of age beginning the first week in July.

14. Scientific Collections

During 1985 field studies, an attempt was made to collect refuge herbarium specimens in both study areas. To date over 300 specimens have been collected and are archived in the refuge herbarium. To date, bird and mammal specimens have been collected and prepared only as random mortalities that were encountered in the field or in King Salmon.



Ornate lady slipper orchid. RAP

16. Marking and Banding

The refuge banding program was initiated in 1983. The program is presently two-dimensional, focusing on opportunistic banding of passerines year-round, and tundra swan banding during the summer.

Our present swan banding methods include the use of a small float plane, pilot, and assistant. The team searches tundra wetlands from the plane until a brood is observed. If conditions are suitable for landing, the team, once on water, either eases the brood to land and runs them down, or scoops the cygnets off the water with a fish landing net or bare hands. Basic measurements are recorded and cygnets are banded and fitted with alpha-numeric color-coded tarsus and neck bands.

Reports of banded swans have come from Alaska, British Columbia, Alberta, Washington and Oregon. Tables 31-32 are banding summaries.

Table 31. Preliminary summary of banded swans and observation records for tundra swans banded on the northern Alaska Peninsula 1983-1985.

	Number banded	Observation site(s)
1983	39	Vancouver, B. C., Whatcom Co., WA, Summer Lake, OR,
1984	9	Langdon Reservoir near Calgary, Alta. (spring); Sauvie Lake Wildl. Area, OR (fall); Malheur Lake, OR (fall); S. Kenai Peninsula, AK (fall)
1985	2	nothing reported



Banded and collared tundra swan cygnet. UKN

Table 32. Species composition, and total numbers of passerines banded on FWS compound, King Salmon, Alaska, 1984-1985.^a

	Total banded	
	1984	1985
Fox sparrow	10	7
White-crowned sparrow	22	5
Golden-crowned sparrow	2	1
Snow bunting	0	1
American robin	2	0
American tree sparrow	5	1
Tree swallow	2	0
Common redpoll	8	93
Dark-eyed junco	1	0
<u>Black-capped chickadee</u>	<u>0</u>	<u>6</u>
Totals	52	114

^aIn 1984, three cackling Canada goose goslings were banded.

H. PUBLIC USE

1. General

From a historical perspective, the recreational use of the refuge is difficult to distinguish from subsistence use. Local residents have combined the two activities for years as they hunted, fished, trapped and gathered plants. Recreational use by nonlocals can be distinguished and is definitely increasing. Although past recreational data are scarce, this trend is obvious from the increase in air-taxi pilots, outfitters, and activities of the local guides. Fig. 16 shows popular access areas of the refuge.

8. Hunting

Sport hunting constitutes a major use of Alaska Peninsula NWR. Commercial guiding includes hunts for world-class trophy moose, brown bear and caribou. Forty individuals applied for Special Use Permits to commercially guide on the refuge and nearby Becharof NWR in 1985. Harvest of moose and caribou for 1985 are unavailable. The Alaska Department of Fish and Game (ADF&G) in King Salmon has provided 1984 caribou harvest data for the Alaska Peninsula, Game Management Units (GMU) 9C and 9E on and off the refuge. They included moose hunter and harvest data for Alaska Peninsula NWR. These figures are reflected in Tables 33-36.

Waterfowl and ptarmigan hunting usually occur incidental to big game hunting. Fishing is also part of many big game outings. Gross hunting and fishing estimates for Alaska Peninsula NWR in 1985 include 1,076 visits, and 67,952 activity hours.

Table 33. Estimated caribou harvest for the Alaska Peninsula Sub Units 9C and 9E, 1984.

	<u>Caribou</u>			
	<u>M</u>	<u>F</u>	<u>ukn</u>	<u>Total</u>
Total	569	166	8	743

Table 34. Estimated moose harvest and hunter success on the Alaska Peninsula NWR, 1984

Total Hunters	Resident ^a		Non-Resident ^a		Total Moose Harvested
	+	o	+	o	
68	12	23	14	19	26

^a+ = successful, o = unsuccessful.

Table 35. Brown bear harvest for the Alaska Peninsula, 1975-1984 GMU 9C and 9E.

Date	Total Bears	% male	Mean Age		% 5 yr. old	
			M	F	M	F
1975-76	261	62	6.4	6.8	48.7	51.3
1977-78	311	64	5.9	7.1	45.3	54.7
1979-80	316	68	6.1	6.2	46.7	53.3
1981-82	339	59	5.9	6.4	47.0	53.0
1983-84	268	63	6.2	6.8	51.3	46.1
Mean	299	63	6.2	6.8	47.8	51.7

Table 36. Brown Bear Harvest for Alaska Peninsula NWR.

Date	Total Bears	% male	Mean Age		% 5 yr. old	
			M	F	M	F
1984-spr.	74	69	6.7	5.8	66.7	56.5

Figures 17-18 show general areas of recreational harvest of moose and caribou.

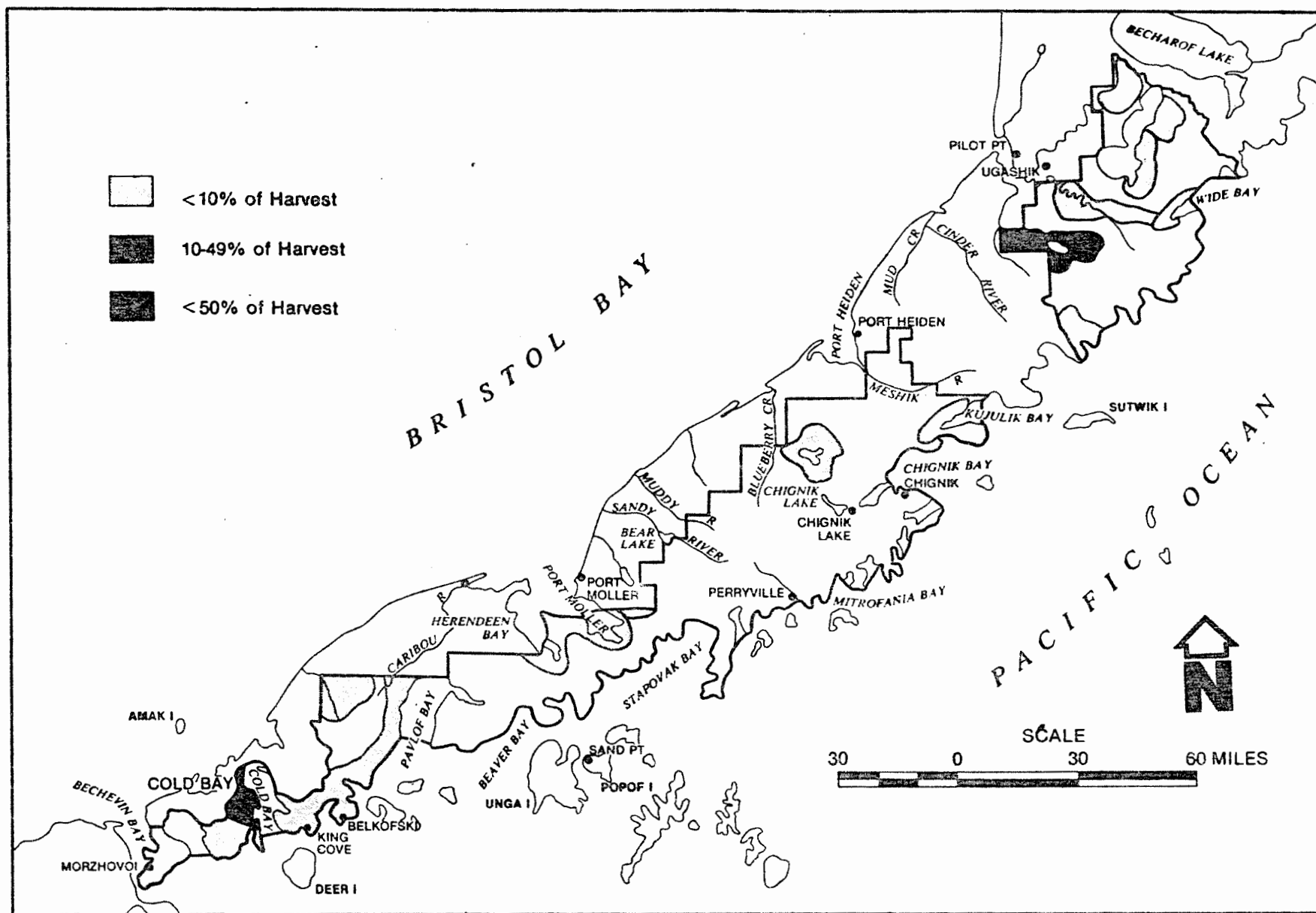


Fig. 17. Areas used for caribou recreational hunting.

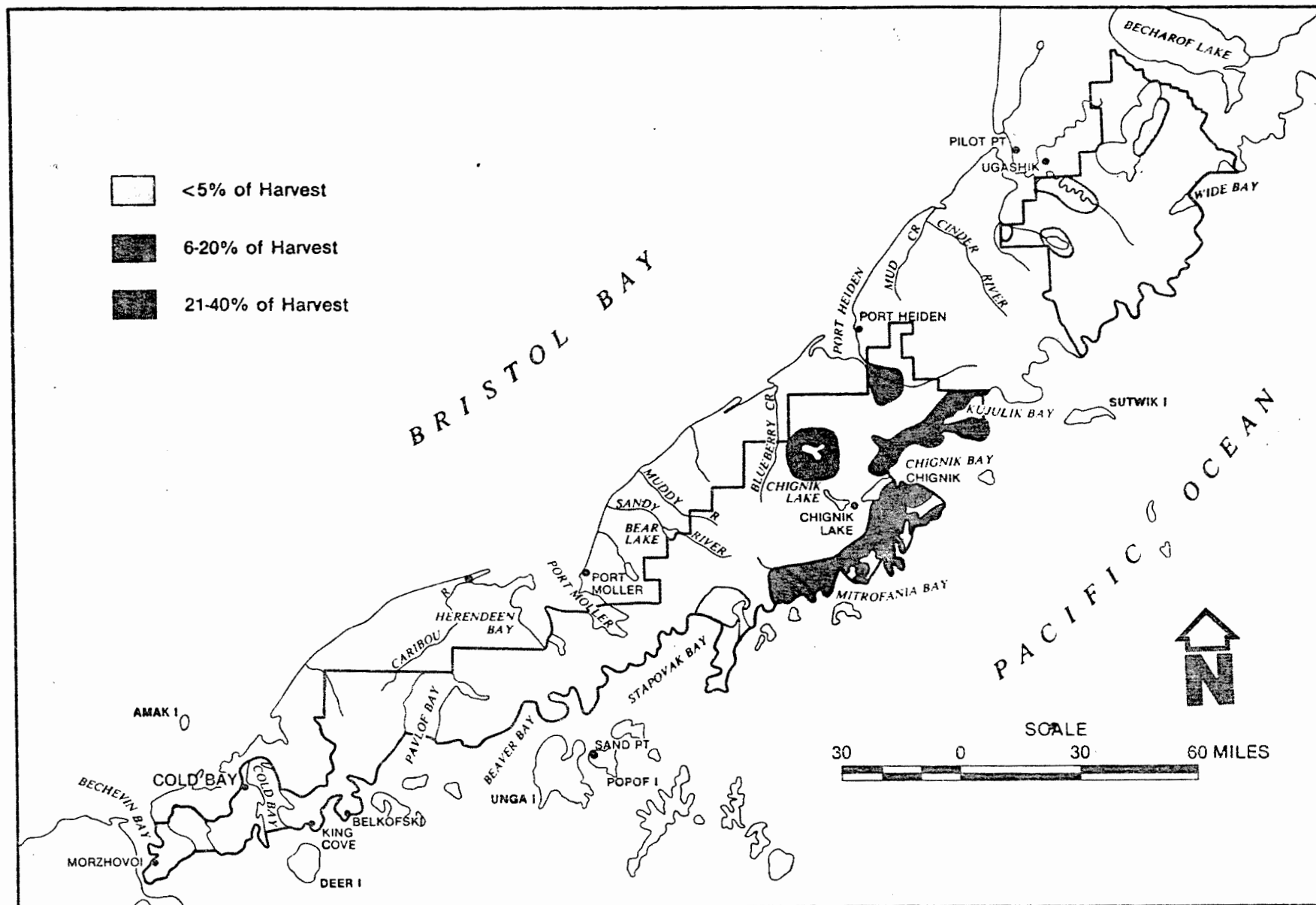


Fig. 18. Areas where local residents hunt moose on the refuge.

Approximately one-third of the brown bear hunted in Alaska have been taken on the Alaska Peninsula since hunting of the species took hold in the early 1960's. Most bears are taken by commercially-guided non-resident hunters during the fall season. State hunts occur one season every year in either spring or fall. Data from ADF&G show that at least 165 bear were harvested from the Alaska Peninsula during May, 1984. Table 36 lists recent harvest data from the Alaska Peninsula.

Alaska statutes allow the taking of wolf and wolverine with either hunting or trapping license. Animals taken by firearm and trapping are listed in Table 37.

The above laws also apply to fox and lynx in Alaska. Fox harvest data is lacking, however numbers are high, evidenced by the high local trapper trade. There were no lynx registered for the refuge during the 1983-84 season.



Non-resident hunter with early season caribou. DDM

9. Fishing

The Alaska Peninsula is by far one of the best sport fishing areas in the State of Alaska. Most river and lake systems on the Peninsula can only be reached by float or wheeled planes and by boat from hunting and fishing lodges or villages located on and off the refuge. Several private fishing lodges operate within the refuge. Lodge owners generally promote catch and release angling ethics. A gross estimate of Refuge fishing use for 1985 was 650 visits and 8,240 activity hours.



Silver salmon or coho in spawning colors is a fighter. SHL



This angler displays a chinook or "King" salmon. TAW



Angler with sockeye or
"red" salmon. SHL



Angler with an average size
arctic grayling. The world
record arctic grayling was
taken at the Ugashik Narrows
on Alaska Peninsula NWR in
1981, weighing just under
5 lbs. GMS



Angler with an adult Dolly varden. Many people refer to large Dolly vardens as arctic char, although arctic char are generally found in lakes and Dolly varden in flowing water. SHL

10. Trapping

Historically, trapping was a full-time endeavor during the Alaska Peninsula winter. At the turn of the century, most of the islands off the Pacific coast were occupied by fox ranchers. The prevalence of dilapidated cabins are testimony of the bygone era. Wolverine, wolf, otter, lynx and beaver must be sealed and recorded by ADF&G. Red fox, mink and ermine are trapped on the refuge but are not required to be sealed, therefore accurate figures are not available. Trapping harvest is listed in Table 37.

Table 37. Fur-bearer harvest by trap and gun, APNWR and adjacent areas, 1984-1985.

Species	Date	M	F	UKN	Total
Wolverine	1984-85	4	3	5	12
Wolf	1984-85	2	5	0	7
Otter	1984-85	6	5	12	23
Lynx	1984-85	2	2	0	4

Beavers are abundant in most drainages of the refuge. Because of low fur prices for beaver pelts it is not worth the cost involved to fly into these remote areas to trap beaver. Most beaver are trapped off refuge where there are off road vehicle (ORV) trails which make easy travel to trapping areas near most villages. A resident trapper is allowed to trap up to forty beaver a season.



This trapper displays a large female lynx.



Beavers are abundant in most drainages
of the refuge. VDB

11. Wildlife Observation

The high cost of travel, lack of support facilities and weather hinders refuge visitors exclusively interested in wildlife observation. Regular commercial air service to Katmai National Park (NP) is an appealing alternative to visitors of the Alaska Peninsula. Katmai NP offers comfortable amenities in an attractive wilderness setting. Brown bear photography opportunities are excellent there, particularly during the peak red salmon run. Generally, people interested strictly in on-ground wildlife observations understandably by pass the refuge in favor of the NP.

12. Other Wildlife Oriented Recreation

Nature photography usually occurs incidental to hunting and fishing. A gross estimation of 348 visits and 1074 activity hours occurred in this category.



No, we don't have "Big Foot" on our refuge although we do have a resident that can lay a track 14" long. Most visitors can bet they will see large brown bear tracks along any stream that has a salmon run. SHL

13. Camping

Most camping on the refuge is associated with hunting and fishing. The average trip is usually 3-4 nights. Most commercial guides have cabins on the refuge, but also operate out of spike camps. Many tent campers are usually non-guided, do it yourself type camping trips.



These campers are mixing a little ptarmigan hunting with their caribou hunt.

15. Off-Road Vehicling

Three-wheeled all-terrain vehicles (ATV's) are a mainstay means of transportation for off-road movement on the peninsula. Most villagers near the refuge have three-wheelers. ANILCA allows traditional means of surface transportation for subsistence purposes however, three-wheelers are not considered traditional. Some commercial big game guides use tracked ATV's but, are limited to use only on trails defined before the refuge was established.

17. Law Enforcement

Most law enforcement activities were confined to learning where problems existed on the refuge. Information obtained from local contacts revealed that some illegal activities do exist, especially during bear season.

Special Agent Roger Parker patrolled the Naknek River during waterfowl season and other remote refuge areas during bear season. One incident was investigated as a possible airborne hunting violation.

The refuge staff also assisted the special agents by transporting part of their construction crew out of Pilot Point. The crew had been repairing ice damage to the LE cabins in that area.

Refuge staff registered marine mammal parts for six people during CY 85. These included the following:

- 2 Whale vertebrae
- 3 Walrus skull with tusks
- 1 Tip of walrus tusk

20. Cabins

ANILCA mandates FWS to require permits of all people who currently own or use cabins on the refuge. The permit gives legal statute to use the cabin(s) for traditional and customary purposes such as commercial fishing, guiding, trapping and subsistence activities. The permit also protects refuge wildlife, habitat and other resources, ensuring that the cabin(s) and associated uses will not be detrimental to the refuge through its special conditions.

The permits normally issued for five-year periods, may be renewed until the death of the last immediate family member using the cabin(s), provided the cabin's continued use is compatible with the purposes for which the refuge was established. Contension of ownership, the association of cabins with guides fee schedule, etc. have resulted in the issuance of combination cabin/guiding permits on an annual basis to assure all guides are treated equally.

The refuge currently has 38 known cabin sites within the Ugashik and Chignik subunits. However, as time passes, additional cabins may be found during aerial wildlife surveys, and by word of mouth. The current status of the cabins is as follows: 6 are on inholdings, 21 have been permitted, 3 applications are pending due to a combination of factors including cabin/land ownership dispute, legitimate use/need of cabin, construction date, etc., 1 is used for administrative purposes and 7 applications have been denied.

I. EQUIPMENT AND FACILITIES

1. New Construction

Four new lots were purchased during the year in various subdivisions in the King Salmon area for the construction of the four new residences. Since the last lot was purchased in August, there was not enough time for CGS to award the contract for building of the houses and the 1985 construction season was missed. Engineering collected soil samples from all lots for analysis. Bids for the residences were finally opened on December 12, 1985. A total of ten bids were received. The engineering estimate was \$880,880. Only one bidder was higher.

<u>OFFEROR</u>	<u>BID</u>
Unlimited Construction Co.	\$ 710,000
Titan Construction Co.	710,587
KHO Construction, Inc.	736,000
Gorsuch Construction	788,900
N & L Construction, Inc.	825,000
Stanton & Stanton	834,447
Straub Construction, Inc.	834,900
G & S Construction	850,000
Gaston & Associates	867,869
Copper Valley Construction	1,110,074.

Unlimited Construction Company of King Salmon is the apparent low bidder. However, the contract will not be awarded until they can secure proper bonding.

MW Rogers constructed two (2) 10 foot by 10 foot storage areas in the office warehouse section. This will provide more storage area for Fisheries and Refuge equipment and supplies.

The contract for construction of the new aircraft hangar was awarded to Alaska Corporation for a bid of \$232,900. The contract Number is 14-16-007-85-6524. Regional Office Engineering personnel surveyed the lot and established corner markers. Construction footings and some framing for the foundations were completed prior to the onset of winter weather. Work will resume in the spring. This hangar will be shared with the National Park Service (NPS) and will be a welcome addition to the refuge facilities.

In 1984, 2.4 acres of refuge compound was conveyed to the Paug-Vik Native Corporation. Consequently, the wind generator and tower had to be disassembled and moved. MW Rogers aided by the Air Force personnel and their crane reerected the wind generator tower on refuge property. After the tower was completed, Enertech Representative, Kenny Forest, arrived in King Salmon to install the new 5 KW generator to replace the "lemon" we had before. Bristol Bay Telephone Cooperative employees assisted by MW Rogers installed the new underground cable from the tower site to the office building for connection to the indicator monitors.



With the help of the Air Force (and their crane), the wind generator and tower were reerected on refuge property. DDM

After conveyance of the 2.4 acres of refuge compound, a survey was conducted by BLM to reestablish refuge compound boundaries. With the completion and marking of this survey, MW Rogers and YCC crew were able to erect the chain link fence around the upper portion of the refuge compound that had been removed the previous year.

2. Rehabilitation

Engineering arranged for a U.S. Navy Seabee Reserve Unit to complete the rehabilitation of the riverfront bulkhead. A crew of 13 arrived on a Friday evening and with the use of Air Force and refuge heavy equipment, worked for two days but were unable to finish the project. MW Rogers and the YCC crew finished the project by removing the old piling and bulkhead and hauling it off to the dump. The area was then graded to the river's edge and seeded.



Old pilings and timbers along the Naknek River
before rehabilitation. DDM



After rehabilitation of the riverfront bulkhead
with dock in place. DDM

During the bulkhead rehabilitation project the AVGAS fuel system that had been installed in 1984, had to be removed. After completion of the bulkhead modifications, the hose stand and fuel dispensing unit were installed closer to the aircraft mooring dock. This sure makes fueling a lot easier for the aircraft during float operations.

The bid for rehabilitation of the old bunkhouse was awarded to Unlimited Construction Company of Kodiak, Alaska. The total cost of the ARMM project was \$216,760 and the contract number was 14-16-0007-84-6432. Several problems were encountered during the project that resulted in contract modification. These included the discovery of dryrotted wood in the building foundation, the removal and disposal of the large walk-in cooler, addition of a restroom for the handicapped, and a new wall in the bunkroom. The contractor was given an extension of the completion date to February 15, 1986. The quality of work by the contractor appears to be quite good but the rate of progress was extremely slow during most of the year.



Bunkhouse before rehabilitation. DDM



Rehabilitation of the old bunkhouse involved almost complete reconstruction. DDM

MW Rogers began major rehabilitation to quarters No. 8 as part of our ARMM program. The project encompassed new subflooring, vinyl flooring, kitchen cabinets, a kitchen window, electrical wiring, carpeting, metal roof and chimney. This should bring the residence up to FWS standards.

3. Major Maintenance

The PA-18 supercub was taken to Anchorage twice during the year for 100 hour inspections. Early in the year a Loran C and a transponder were installed in the plane.

Late in October, due to the high tides and unseasonably heavy ice flows in the Naknek River, the refuge dock broke loose and floated approximately 200 yards upstream and froze in the ice. Refuge and Fisheries staff worked most of the next day to dislodge the dock from the ice and move it back to the FWS property. Refuge staff with the assistance of Air Force personnel and their crane removed the dock from the river for winter storage. Repairs and alterations to the dock will be made in the spring prior to being put back into the river.



Dislodging the dock from the ice after it broke loose from its moorings. GMS

MW Rogers and BT Mumma checked and organized all newly acquired field gear and supplies for the two field camps in the Braided Creek (Meshik) and Herendeen Bay areas.

General maintenance to residences included repairing all windows and frames in quarters #8, installing a new hot water heater in quarters Nos. 9 and 10, installing new cabinets, counter top, hot water heater and floor heater in quarters No. 11 and repairing the roof on quarters No. 14.

4. Equipment Utilization and Replacement

Efforts continued this year in cleaning up most of the junk around the headquarters compound that had accumulated through the years by the National Marine Fisheries Station (NMFS). MW Rogers and the YCC crew cleaned up the riverfront "boneyard" of rotten lumber, scrap metal and old motors. This area has now been graded and seeded.

The new Chevrolet S-10 pickup that was ordered in FY 1983 finally arrived on station April 25, 1985. This vehicle took a while to get here due to contracting problems but it is a welcome addition to the rolling stock.

In 1984, a Data General 10 SP micro-computer was installed by Information Resource Management (IRM) personnel at refuge headquarters. At that time, it was a simple unit with only one other terminal and two printers; one dot matrix and one letter quality. During the past year, the staff outgrew the small system and two more terminals were added, along with another letter quality printer and a tape drive unit.

The computer is widely used for word processing. A budget tracking program was added making it more effective to see where and how refuge money is being spent. Currently IRM is working on a new budget tracking program that will be compatible with the one that the Regional Office uses. It will also give a better tracking feature for keeping up with how much money is spent on repairs to equipment and facilities.

There are many fine software programs available for the Data General. We have some of them in our office but have not been able to use them to the fullest potential. The computer is shared with the Fishery Resource Station and we have found it is not capable of handling all the programs that we would like to have available. We have had to unload or "dump" programs from the computer that are not being used to make room for the ones that are used frequently.

The station has a System's Manager who is generally responsible for overseeing the daily functions of the computer such as "bringing it up", and "taking it down" and running "backups" to save all files. The System's Manager is also responsible for troubleshooting minor and sometime major problems that are experienced by all users.

With the installation of a Modem on our system this year we were able to transmit information from our system console to the Regional Office in Anchorage. With the Modem, the IRM office could call into our computer and try to rectify any problems we might be experiencing via the phone line instead of making a trip to King Salmon.

After using the word processing feature on the computer for the last year, we can't help but wonder how secretaries got along without them for so many years.

7. Energy Conservation

In February, Enertech Alaska installed the new 5 KW wind generator which is a replacement for the "lemon" we had before.

Productions figures for the last 10 months have been rather impressive.

March	780 KWH	August	434 KWH
April	400 KWH	September	733 KWH
May	653 KWH	October	580 KWH
June	324 KWH	November	718 KWH
July	277 KWH	December	1021 KWH

This is a total of 5,920 KWH of electricity generated for the refuge. If this type of production continues it will be a welcomed savings for the refuge energy budget.

8. Other

The Western Administrative Support Center of the U.S. Department of Commerce sent Realty Specialist, Lane MacKenzie to do a real property inventory of the National Marine Fisheries Service Research Facility (otherwise known as refuge headquarters for the Alaska Peninsula/Becharof NWRs). Lane spent a day inspecting, photographing and measuring the facilities. He was very impressed with the Fish and Wildlife Service improvements.

Refuge Manager Hood met with the Chignik City Council to discuss the RCCP proposal for a subheadquarters to be located in Chignik. The City Council is seeking to broaden its economic base and was particularly interested in the idea that the village corporation could build our facilities and rent them to the FWS. Overall, the Council was receptive to the subheadquarters proposal.

Refuge staff developed and submitted projects to the Regional Office for the new computerized Refuge Needs Information System (RNIS). This is the first time that any systematic needs assessment has been completed for the Alaska Peninsula NWR.

J. OTHER ITEMS

1. Cooperative Programs

Alaska Peninsula/Becharof NWR is continuing to work cooperatively with local ADF&G personnel. ARM Berns assisted State personnel with radio-collaring twelve (12) caribou in the Cinder River/Port Heiden area on April 3rd and 4th. Everything went well until the second day when they had to wrestle several caribou to the ground because of a bad batch of drugs.

On July 17, RM Hood met with Dick Sellers and Dan Timm of ADF&G. Among the topics discussed was a potential cooperative brown bear study among ADF&G, NPS, and FWS. The study would center on population dynamics of an unhunted vs. hunted population of bears. An interagency meeting was held on August 14th in Anchorage to discuss this cooperative bear study. Attendees included Al Lovas (NPS), Layne Adams (NPS), Dave Morris (NPS), Katherine Jope (NPS), Dan Timm (ADF&G), Dick Sellers (ADF&G), Sterling Miller (ADF&G), Larry Calvert (FWS), and Ron Hood (FWS). Sterling Miller agreed to prepare a draft research proposed for review by all.

2. Items of Interest

Confirming what was obvious to the residents of the Alaska Peninsula, AMOCO's western area office issued a public announcement in January that the Becharof No. 1 wildcat well is being plugged and the site abandoned. Oil company officials said the well was drilled to a depth of about 9,000 feet. Company officials declined comment on the status of AMOCO's newly constructed airstrip at the Becharof No. 1 site. State stipulation at the time the company received its permit to drill required the airstrip to be "reclaimed" after AMOCO's operations are complete, although the state's definition of what constitutes a completed operation is neither specific or clear.

On June 13th, Secretary of the Interior Donald Hodel arrived in King Salmon on OAS Goose 780 to meet with Governor Sheffield to discuss such issues as lands selection/TAPS corridor; subsistence; Alaska Land Use Council; and Lease Sale 92. The Secretary's party included Bill Horn, Deputy Under Secretary, Al Powers, Alaska OCS Manager; and Robert Gilmore, Regional Director, FWS. The Governor's party included Lennie Boston, Special Assistant; John Greely, Press Secretary, Commissioner Don Collinsworth; and Commissioner Bill Ross.

The schedule for the day included a briefing for Mr. Hodel at the Fish and Game Bunkhouse followed by a "public" meeting where Bristol Bay residents stood in line to testify against the lease sale. Next, the Governor took the Secretary on a tour of the area fishing industry with visits to Leader Creek Marina (boat yard) and Alaska Far East Fish Packing (cannery) in Naknek. RM Hood served as a driver while ARM/P Arment assisted the camera crew. The day ended with the Secretary's party flying to Brooks Camp in Katmai National Park.

Commercial guide Jim Cann owns two sites within the Becharof NWR Wilderness. He had a cabin located on each of these inholdings. On July 6th, the second of these cabin burned down. Arson is suspected.

On July 24th, Don Weathers, Chief of Office of Physical Facilities, Washington, D.C. and Rudy Berus, Regional Engineer, Anchorage, Alaska toured the refuge headquarters and inspected existing facilities and ongoing construction.

Ed White, ARD-Administration, and Diane Kugler, WO-Executive Direction visited the refuge on August 22nd as part of the Executive Direction Programmatic.

On August 29th, Wally Soroka, SRA, Anchorage conducted a firearms qualification session at the Borough Range in King Salmon. ARM/P Arment qualified for the Alaska Peninsula/Becharof NWR, RM Sarvis and ARM Blendon qualified for Izembek and RM Fisher and ARM Hotchkiss qualified for Togiak NWR.

On September 5th, OAS Pilot Carl Downing departed from King Salmon after completing his summer assignment; he flew N716 to Anchorage on its final trip as a Service aircraft. The aircraft was sold by OAS. We understand that the successful bidder was Vern Berns.

Bill Meck, Real Estate Appraiser from Region I and Jim Dooley, from Region III used our office as a base for their investigations of the Northeast end of Lake Illiamna. This is part of Project M--no, thats Project ANWR now! The appraisers were here from October 16th to 24th.

Alaska Peninsula/Becharof NWRs served as hosts for two study teams during October. Bill Butler, Wildlife Assistance, used our facilities while conducting aerial counts of cackling Canada geese. We also provided assistance to Bob Gill, Karen Bollinger and Margaret Peterson, Wildlife Biologists from Research for their ground truthing study of cacklers in the Ugashik River area. They have determined from their study that Ugashik and Cinder River tidal areas are of such great importance to the cackling Canada geese that efforts to acquire privately owned lands in that area should be high priority.

3. Credits

This narrative was a joint effort by all the refuge staff with special kudos to our typist for deciphering our penmanship and working diligently on revising the manuscript.

Section authors are listed below:

Hood	Sections Introduction; A; C; D. 1-4; E. 1, 2, 5, 6; J. 1, 3,; and editing.
Savery	Sections F. 11; H. 17; I. 1-4, 7, 8; J. 4 and editing.
Arment	Sections B; F. 9, 12; H. 20.
Wilk	Sections D. 5; E. 4; G. 1-10, 14, 16; editing. typing.
Mumma	Sections F. 1, 2; H. 1, 8-11, 13, 15.
Collins	Section I. 6; typing, compiling and editing.
Fishery Resource Station	Section G. 11.