ANNUAL NARRATIVE REPORT
Calendar Year 1985

IZEMBEK NATIONAL WLIDLIFE REFUGE
Cold Bay, Alaska

Pavlof Unit of the Alaska Peninsula NWR
Unimak & Amak Islands of the Alaska Maritime NWR

IZEMBEK NATIONAL WILDLIFE REFUGE

P.O. BOX 127
COLD BAY, ALASKA 99571

Including:

Pavlof Unit of the Alaska Peninsula National Wildlife Refuge, and Unimak and Amak islands of the Alaska Maritime National Wildlife Refuge

ANNUAL NARRATIVE REPORT
CALENDAR YEAR 1985

NATIONAL WILDLIFE REFUGE SYSTEM
Fish and Wildlife Service
U.S. DEPARTMENT OF THE INTERIOR

PERSONNEL

1.	John Sarvis, Refuge Manager, PFT, GS-485-12	6/23/74 - Present
2.	Michael D. Blenden, Assistant Refuge Manager, PFT, GS-485-11	8/26/84 - Present
3.	Christian P. Dau, Wildlife Biologist, PFT, GS-486-11	1/30/81 - Present
4.	Avery J. Bates, Maintenance Worker, PFT, WG-4749-8	8/20/81 - Present
5.	Terry Nelsen, Refuge Secretary PFT, GS-303-5	7/21/85 - 12/21/85
6.	Annette E. Alexander, Refuge Secretary, PFT, GS-303-5	1/21/86 - Present
7.	David J. Wilson, YCC Enrollee	6/10/85 - 8/30/85
8.	Randolph C. Belisle, YCC Enrollee	6/10/85 - 8/30/85

REVIEW AND APPROVALS

John Sarvis 4/20/86
Submitted By Date

5/2/86
Alaska Reg. Office (R-7) Date

7/1/86

John Sarvis, Refuge Manager

Micnael Blenden, Assistant Refuge Mgr.

Christian P. Dau
Wildlife Biologist

Annette E. Alexander
Refuge Secretary

Avery J. Bates
Maintenance Worker

Randolph Belisle, YCC Enrollee

David J. Wilson, YCC Enrollee

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INTRODUCTION

The Izembek National Wildlife Range was established in 1960 (Public Land Order 2216) with a boundary encompassing 415,300 acres dominated by wet and upland tundra. Within this area are approximately 95,000 acres of tide lands and lagoons owned by the State of Alaska. These areas have been identified as critical habitat by the state and are largely the basis for the identification and establishment of the refuge. Some of the largest eelgrass beds in the world are in these shallow lagoons and this resource, in addition to resources in adjacent fresh water and terrestrial habitats, support the large numbers of migratory waterfowl which characterize the area in fall through spring. The brown bear and barren ground caribou, both impressive resident game species, occur commonly in the area as well.

The Izembek National Wildlife Range became the Izembek National Wildlife Refuge on December 2, 1980, with the signing of the Alaska National Interest Lands Conservation Act (ANILCA - P.L. 96-487) by President Carter (Figure 1). Under ANILCA, 16 refuges were either established, redesignated (such as our name change), or enlarged, adding 53,720,000 acres to the NWRS for a total of 76.1 million acres of refuges in Alaska. The purposes for which each of these 16 refuges are to be managed were also changed and/or defined. In addition, 13 refuge Wilderness areas were established, totalling 18,560,000 acres. A Wilderness area of 300,000 acres was designated for Izembek. Izembek's total acreage is 320,893 acres.

The Izembek NWR lies near the western terminous of the Alaska Peninsula, approximately 650 miles southwest of Anchorage. The refuge headquarters is in Cold Bay, Alaska, a largely federal and state government town of approximately 200 people. The Cold Bay office also has responsibility for the administration of part of the Aleutian Islands Unit of the Alaska-Maritime NWR (989,000 acres on Unimak Island) and the 1.5 million acre Pavlof Unit of the Alaska-Peninsula NWR. These areas support some of the largest seabird colonies in Alaska with a wide variety of species present. In addition, Unimak Island and the Pavlof Unit support important populations of brown bear, caribou, furbearers and a resident population of tundra swans. Adjacent coastal areas support rich and diversified populations of migratory waterfowl, marine birds and mammals, and fin and shellfish. Several fishery stocks exist in commercial quantities and activities associated with these resources occur on a seasonal basis. This report on Izembek NWR integrates information from the Pavlof Unit and Unimak Island.

The Aleutian Islands National Wildlife Refuge was created from public lands in 1913 by Executive Order 1733. The

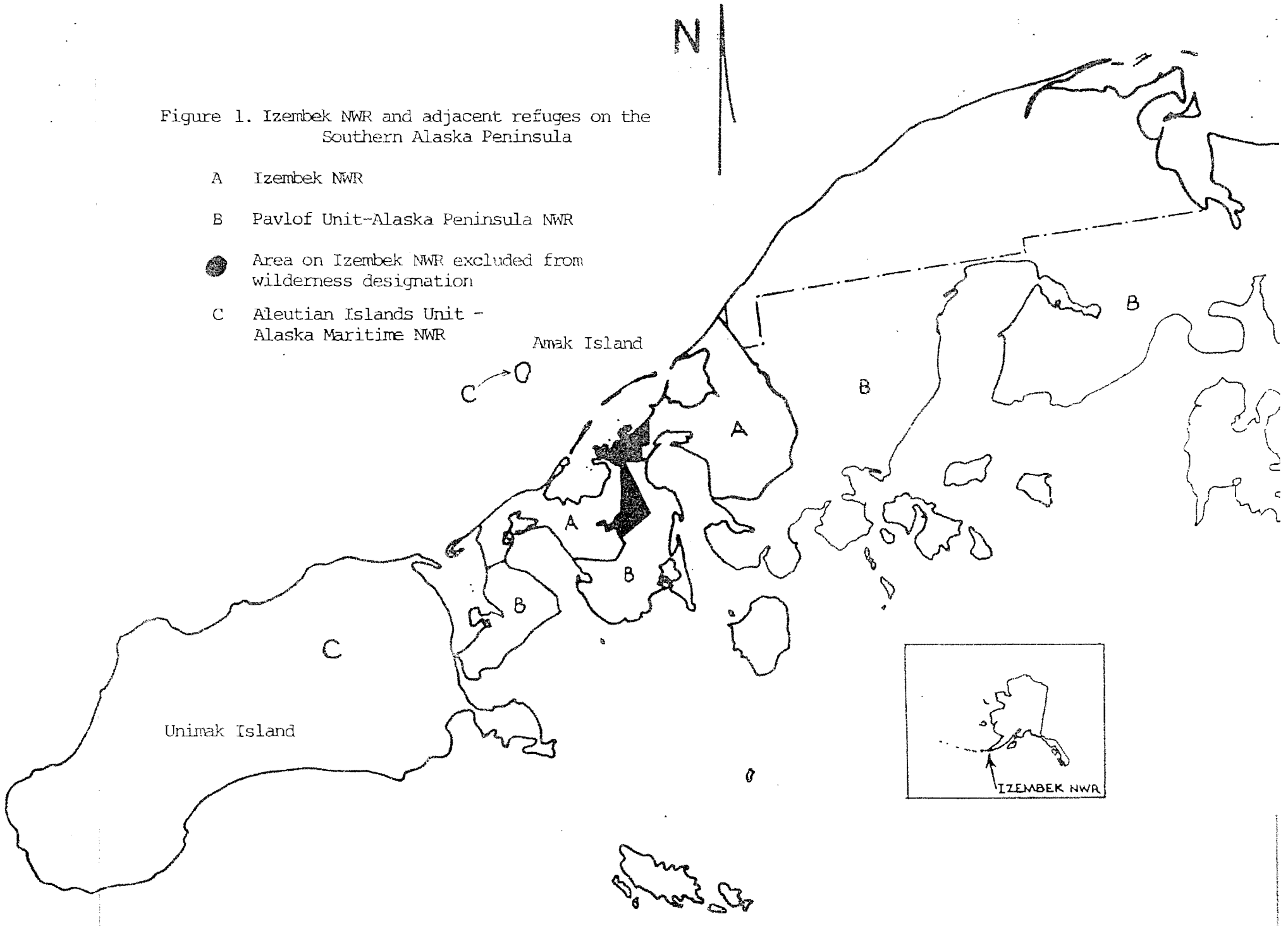


Figure 1. Izembek NWR and adjacent refuges on the Southern Alaska Peninsula

A Izembek NWR

B Pavlof Unit-Alaska Peninsula NWR

Area on Izembek NWR excluded from wilderness designation

C Aleutian Islands Unit - Alaska Maritime NWR

Wet sedge/grass meadows, this one at the base of Frosty Peak on Izembek, characterize fresh-water areas. (Blenden-11/15/85)

The salt tolerant beach-rye grass community boarders coastal areas of the lower Alaska Peninsula. (Blenden-11/15/85)

refuge is administratively divided at Unimak Pass. Unimak (989,000 acres) is managed out of the Cold Bay office for logistical and biological reasons. The split also conforms to natural boundaries, with Unimak Pass forming a distinct and extremely important `biological' divide before the unique Aleutian flora and fauna of the central and western islands. With the passing of ANILCA, came the establishment of the Alaska Maritime NWR with an Aleutian Islands Unit, which included the islands that formerly comprised the Aleutian Islands NWR.
Unimak Island's habitat closely resembles that of the Alaska Peninsula, although its resources are less abundant. Cover, such as alder and willow shrubs, are quite restricted in distribution, and there are fairly extensive, bare or nearly bare, ash and lava flows of varying ages. Especially in the western portion, salmon runs are small or non-existent, due partly to steep terrain and bluffs which make upstream negotiation impossible.

In 1982, management responsibilities for the Pavlof Unit of the APNWR were assigned to the staff of Izembek NWR. The Cold Bay office is more centrally located and hence, logistically able to adequately perform the required management functions.

The unit encompasses approximately 1.5 million acres of which well over half is native-selected or conveyed. This patchwork of land ownership will cause major problems with management of the refuge, in particular, since the native corporations have selected the coastal areas which are also the most important lands to wildlife.

The Aleutian Range runs the length of the unit and provides some of the most spectacular scenery on the Alaska Peninsula. Pavlof Volcano, the highest peak at 8,261 feet, is an active volcano that has erupted several times since 1980. The northern portion of the unit is characterized by lowland meadows interspersed with numerous ponds and lakes and areas of upland tundra. The southern portion is mountainous with steep-sided valleys drained by alder-lined streams supporting good salmon runs.

Maintenance of refuge habitats in their present pristine condition is the goal of the refuge staff. In view of land status changes resulting from ANILCA and the leasing and subsequent development of offshore petroleum rich basins in the Bering Sea, this chore will be no small one. The impacts of petroleum development on Cold Bay escalated in 1984. Up to seven large helicopters from two contract air carriers supplied the crews on three offshore rigs. Numerous helicopter flights in 1984 suggested the real potential for wildlife disturbance. Off-shore petroleum support activities were based out of the Pribilof Islands in 1985, leaving Cold Bay relatively quiet. We don't

anticipate this trend to persist as new OCS leasing is scheduled to occur in 1986. Research into the effects of these activities on black brant and other waterfowl was begun in 1985 to provide support of our ongoing goal of protecting wildlife and its habitats.

A. HIGHLIGHTS

1. Based on climatic conditions and phenology of reproductive events in plant and animal communities, 1985 was 10 to 15 days `later' than normal.

2. One hundred-eighty locations of radio-collared brown bears were obtained and nine new bears were captured. Twenty-three bears are currently being monitored.

3. A record number of 139 tundra swans were banded on Izembek and the Pavlof Unit of the Alaska Peninsula NWR.

4. Counting of geese on aerial photographs of Applegate Cove suggests the average of our 31 aerial surveys of the area was 0.1% low, not bad for ocular estimation!

5. Fifth annual spring emperor goose survey completed in cooperation with WA-MBMN. The population declined 17.3% from 1984 to 58,833 birds.

6. Production of young in the black brant and emperor goose populations was determined to be near record lows (i.e.: 13.7% in brant; 17.4% in emperor geese).

7. Construction of a new U.S. Air Force radar site was allowed on Izembek NWR if the old Grant Point site was removed (see F., 6, Other Habitats).

8. Feral cattle (72 total) were eliminated from Caton Island by Izembek NWR staff making Caton Island finally free from overgrazing.

9. A large Corps of Engineers project to clean up W.W.II debris, including removal and disposal of structures was accomplished satisfactorily.

10. Izembek's 1984 Narrative Report won the `Best Narrative Report by an Alaskan refuge' for the third time in four years with honors going to supporting players RM Sarvis, ARM Blenden, WB Dau, and refuge assistant Taylor.

B. CLIMATIC CONDITIONS

Seasonal climatic conditions are a prime mover in dictating the phenological sequence of biological events on the lower Alaska Peninsula (Table 1). No other factor influences the timing, duration, intensity and success of refuge programs in such a dramatic way. The lower Alaska Peninsula and Aleutian Islands are literally a volcanic cauldron spewing forth a continuous barrage of weather `events' of remarkable intensity and diversity. We live for those events of sun and calm when there is no more beautiful area in the world and through these other events which put man, beast, plant and structure to critical tests.

The spring and summer of 1985 were periods of climatic stress in that neither season really appeared. Our "lived for" days of sun and calm (normally three to four per season) largely escaped us (Table 2). Cool, wet and windy conditions delayed biological and botanical events up to two weeks beyond the norm. The refuge staff continued to rely on the opportunistic approach making the most out of a few hours here and there to pursue our biological investigations. Some projects nevertheless were slighted. The field worker in this part of the world who doesn't make use of nearly every suitable opportunity to work outdoors won't accomplish much.

Spring temperatures averaged 3.1° F per month lower than average which exaggerated the adverse phenological effects of near average levels of precipitation and wind speed. Temperatures returned to normal levels during the summer months, however precipitation was 4.9 inches above average and mean monthly wind speed was 17.2 mph. The spring versus summer characteristics though different, combined to generally delay biological processes and decrease productivity.

Fall, a favorite season in Cold Bay for residents and visitors alike, lasts about 30 days on the average, and usually occurs in October. This year temperatures were average, but approximately 4.25 inches more rain than normal dampened spirits. This trend persisted throughout the winter months as well.

Long-term residents of the area, and there are a few of us, enjoy the changeability of the weather and its tendency to retard overall human population growth.

TABLE 1. Summary of Weather Data, Cold Bay, Alaska, 1985[1]

Month	Av. Temp. (°F.)	Departure from nrml	Precip.	Departure from nrml	Wind Speed (Av. mph)	Peak (mph)
January	36.1	7.8	3.29	0.59	19.5	71
February	27.9	0.4	2.42	0.15	18.1	41
March	30.1	1.5	2.85	0.54	20.7	52
April	26.8	-6.2	1.01	-0.94	18.9	49
May	38.3	-1.2	2.45	-0.02	19.4	60
June	42.5	-2.9	2.19	0.03	18.1	40
July	50.6	0.3	2.27	-0.23	14.7	41
August	50.8	-0.4	5.47	1.77	19.0	64
September	49.5	2.0	7.14	3.37	18.0	52
October	39.6	0.1	6.59	2.30	19.2	47
November	38.9	4.6	7.72	3.68	21.3	59
December	35.6	6.1	4.95	2.10	17.2	48
1985 AVERAGE	38.9	1.0	48.35	13.34	18.7	52

1/ Data reported by the National Weather Service, Cold Bay, Alaska

2/ This figure is the fastest mile (i.e. it is the peak sustained wind one-minute period). Peak gusts (less than one minute duration) are higher.

Table 2. Spring and Summer Weather Conditions, Izembek NWR - 1985.[1]

Month	Av. Temp (°F)			Precipitation (in.)			Av. Wind speed(mph)		Peak Gus (mph)
	1984	1985	Normal	1984	1985	Normal	1984	1985	1984
April	31.6	26.8	33.0	1.79	1.01	1.95	17.8	18.9	40
May	38.0	38.3	39.5	1.20	2.45	2.47	14.8	19.4	39
June	47.0	42.5	45.4	1.45	2.19	2.16	16.4	18.1	43
July	49.7	50.6	50.3	1.77	2.27	2.50	15.5	14.7	32
August	54.7	50.8	51.2	1.48	5.47	3.70	18.4	19.0	45
Overall Average	44.2	41.8	43.9	1.54	2.68	2.56	16.6	18.0	40
% Change from 1984 (+27.5%)			(-5.4%)			(+74%)			(+

1/ Data reported by the National Weather Service, Cold Bay, Alaska.

2/ This figure is the fastest mile (i.e. it is the peak sustained wind f one-minute period). Peak gusts (less than one minute duration) are lighter.

C. LAND ACQUISITION

Native conveyed lands (22g-ANSCA) within the Izembek NWR and conveyed and selected lands adjacent to the Pavlof Unit of the Alaska Peninsula NWR are of varying degrees of importance with respect to acquisition. Three of the village corporations involved have suggested they are interested in land exchanges and two (False Pass and Pauloff Harbor) have approached Realty personnel in the Regional Office on this matter.

The Alaska Peninsula NWR Comprehensive Conservation Plan and the Bristol Bay Cooperative Management Plan have dealt with the potential for land exchanges involving the Fish and Wildlife Service. Our potential trade lands are those areas of the Pavlof Unit of the APNWR adjacent to the town of Cold Bay. We have provided preliminary maps of these areas to the Realty Division which, it appears, will be pressed by the various corporations to proceed with evaluation of their proposals.

The land exchange potentials in the southern Alaska Peninsula area present the possibility of adding valuable wildlife habitat to the refuge while at the same time providing the private sector with commercially valuable land. The disappointment has been the low priority apparently attached to these proposals by the Regional office. The refuge and Native groups want to facilitate this approach and would gain considerably by pursuing these exchanges.

Streams and rivers of the lower Alaska Peninsula remain ice free most of the winter. These areas provide essential rearing habitat for salmon and trout. (Blenden-Jan. 1986)

This stream valley on the Pavlof Unit provides important habitat for anadromous fish, furbearers and brown bear. (Sarvis-7/15/85) (413)28

D. PLANNING

1. Master Plan and 2. Management Plan

On 30 May 1985 the Regional Office released the Final Izembek NWR Comprehensive Conservation Plan for review. Preparation of this plan was mandated by passage of ANILCA in 1980.

In general, the ICCP expresses the Fish and Wildlife Service's desire to continue management of Izembek NWR as has been done in the past. The Service has selected a management alternative that will continue to manage 300,000 acres (95%) as Wilderness. The remaining 15,000 acres (5%) consist of refuge land adjoining the city of Cold Bay and the associated road system. This land was not designated as Wilderness in 1980, due to the extensive system of roads and disturbance from military habitation during WW II. Under the Service's preferred management alternative, this land would not be recommended for Wilderness designation, but would be designated as a Minimal Management Area in which development and vehicular access would be kept at current levels.

The Record of Decision for the Izembek CCP was signed by the Regional Director on August 1, 1985, and we now have a final plan to guide future management of the refuge.

The Final Alaska Peninsula NWR Comprehensive Conservation Plan was released by the Regional Office on 1 August 1985. The Izembek NWR staff manages the Pavlof Unit of the APNWR and hence, was involved in this planning process.

This plan describes five alternative strategies for the management of about 4.3 million acres. The strategies cover a broad spectrum of management emphasis. The Service's preferred proposal (Alternative B) occupies a conservative, intermediate position within that spectrum. In maintaining the refuge's natural diversity, the proposal would ensure support of key recreational hunting and fishing. The proposal would also support continued subsistence use of the resources of the refuge while providing additional opportunities for permanent facilities and motorized access in the enhanced public-use management area near Cold Bay. At the same time, the preferred alternative would consider development of a trans-peninsula transportation corridor in the future, subject to the provisions of Title XI of ANILCA.

The plan also evaluates the suitability of non-Wilderness refuge lands for preservation as Wilderness, as required by

Section 1317 of ANILCA. As a result, about 53% of the refuge is proposed for Wilderness designation under the preferred alternative.

As of the end of 1985, a Record of Decision had still not been issued so the Alaska Peninsula CCP is still on hold. The main problem has been changes in Wilderness policy by R.O. and W.O.. The latest word is that no Wilderness designation will be proposed with which we strongly disagree. Wilderness designation and the FWS preferred alternative were supported during the hearings, but now that the hearings are over, major changes are being made.

3. Public Participation

A fundamental part of the CCP process is collection and assessment of public input. Public hearings on the Izembek CCP and Alaska Peninsula CCP were held in Anchorage and local villages in November 1984.

Although attendance was not overwhelming, all of these meetings were beneficial for us as well as those village members present. Discussions ranged from specific comments on one or both refuge plans to comments on specific refuge management practices and Service policy. In spite of some comments criticizing refuge management practices and Service policy, some of which were well deserved, the general concensus expressed contentment with the status quo and skepticism toward significant development.

Both written and oral comments received from the public and other agencies were summarized and considered. Selection of the preferred management alternatives was based, in part, on these comments.

4. Compliance with Environmental Mandates

In accordance with the Alaska Coastal Zone Management Act, the Aleutians East Coastal Resource Service Area was formed. The majority of Izembek NWR, Alaska Peninsula NWR and Unimak Island fall within the boundaries of the Aleutians East CRSA. We submitted comments on the Aleutians East CRSA pre-Public Hearing Draft Coastal Management Plan. This was the first of three opportunities for public comment. At this time, the draft plan serves as an effective back-up and valuable supplement to federal regulations. Several ecologically sensitive areas have been singled out for protection and the plan emphasizes preservation of natural conditions, wildlife and fisheries. In December 1985, the State of Alaska, Division of Governmental Coordination approved the Aleutians East CRSA

policies as part of the Alaska Coastal Policy Council's "District Coastal Management Program".

In addition to fulfilling the CCP requirements of ANILCA and the EIS requirements of NEPA, the Izembek and Alaska Peninsula Master Plans serve also as a Wilderness Review for lands on these two refuges. As of this writing, it appears that no additional lands will be recommended for Wilderness designation on Izembek (95% already designated by ANILCA in 1980). In the preferred alternative of the final Alaska Peninsula CCP, considerable acreage will be recommended for Wilderness on Alaska Peninsula NWR where no Wilderness was designated by ANILCA. It now appears that no Wilderness will be recommended for Alaska Peninsula NWR.

5. Research and Investigation

Refuge Personnel

Seasonal Movements and Distribution of Brown Bear on Izembek NWR

This telemetry project, begun in 1977, was greatly accelerated in 1984 and 1985. Fifty brown bears were captured in 1984 and 14 additional captures were made in 1985. Movements of 33 radio-collared bears were recorded using aerial and ground location techniques. See Section G. 8, Game Mammals, Brown Bear.

Seasonal Movements, Distribution and Productivity of Caribou on Izembek NWR

Census efforts, begun in 1979, were continued in 1985, along with continued ground productivity appraisals. See Section G.8., Game Mammals, Caribou.

Population, Size and Productivity of Black Brant

This continuing program receives a high degree of emphasis during the fall staging period to ensure accurate assessments for management of the species throughout the Pacific Flyway, per the Pacific Flyway Black Brant Management Plan. This work in 1985 is summarized in Section G.3., Waterfowl, Black Brant.

Population, Size and Productivity of Emperor Geese

Emperor geese winter in the Aleutian Islands and the Alaska Peninsula and use the Izembek NWR extensively during the spring and fall migration. Fall productivity surveys and periodic inventories aid in implementing the Pacific Flyway Emperor Goose Management Plan. The 1985 project results are summarized in Section G. 3., Waterfowl, Emperor Goose.

Seasonal Movements and Population Structure of the Resident Tundra Swan Population

This project continued in 1985. 139 new birds and seven previously banded birds were captured. See Section G. 3., Waterfowl, Tundra Swan for complete discussion.

Seasonal Movements and Morphological Characteristics of the Gray-Crowned Rosy Finch, Snow Bunting and McKay's Bunting

This project is a low intensity effort performed primarily at the Cold Bay headquarters of Izembek NWR. Birds are baited to a permanent trap site near the office, captured, banded and released. The age, sex and weight of all birds are noted along with other observations made on physical and plumage characteristics. Banding efforts performed at Cold Bay in 1985 are summarized in Table 3.

Other Personnel

LGL Research Associates Ltd., conducted aerial seabird surveys in the Bering Sea near Izembek Lagoon as part of contract environmental studies funded by NOAA. These and other studies are designed to fulfill the Environmental Assessment requirements for offshore petroleum development. Other NOAA funded environmental studies performed by the Envirosphere Company included seasonal distribution and abundance of whales in near shore waters of the Bering Sea and North Pacific Ocean.

TABLE 3 Passerine Banding, Izembek NWR, 1985

Species	No. Banded AHY M	F	TOTAL	No. Recaptured AHY M	F	TOTAL
Gray-crowned rosy finch	6	5	11	2	1	3
Snow Bunting	180	37	217	58	4	62
McKay's Snow Bunting	4	0	4	0	0	0
Lapland Longspur	2	0	2	4	0	4

E. ADMINISTRATION

1. Personnel

Two personnel changes were made in 1985, both in the Refuge Assistant (typing) position. The position was vacated on July 19 by Bonnie Taylor who had been with the refuge since February 6, 1984. Her replacement, Terry Nelsen, started on July 22 and resigned on December 21. Annette Alexander took over the position, which had been reclassified as Refuge Secretary, on January 19 (See Table 4).

Jeffrey Wilson and Randolph Belisle of Cold Bay were enrolled in our YCC program this year. They worked from June 10 to August 30 on a wide variety of refuge projects.

2. Funding

Shown in Table 5.

3. Safety

One accident occurred this year resulting in YCC enrollee Jeff Wilson's loss of one day of work. While removing paint from a garage door at refuge headquarters, Jeff developed muscle spasms in his back. Apparently, the prolonged use of the electric hand-held wire brush prompted the condition. Use of hand-held equipment, especially if it is heavy, apparently requires more frequent periods of rest.

RM Sarvis attended OAS pilots' ground school and had his annual flight physical during the first week of December. After the second season of using P-K floats a potential problem has been detected. Apparently, temperature fluctuation and vibration during take-off and landing have weakened the adhesive holding the pump-out tubes in place, causing them to separate and fall away from the pump connections on top of each float. This presents a situation where floats can collect a lot of water, even if pumping procedures are routinely followed. This problem was reported to OAS. The best we can do now is visually inspect connections each time float chambers are emptied and reconnect hoses if they need it. This can be a very time consuming project.

Fourteen bears were captured this summer using the immobilization drug Sernylan. This project was completed without mishap. Frequent safety discussions concerning

TABLE 4 Staffing, Izembek NWR

	Full Time	Part Time	Temporary	YCC
FY 1977	3	1	1	-
FY 1978	4	1	1	-
FY 1979	4	1	1	-
FY 1980[1]	3	3	1	-
FY 1981[2]	3	2	-	-
FY 1982	5	-	-	-
FY 1983	5.0 FTE Permanent	-	-	2
FY 1984	5.0 " "	-	-	2
FY 1985	5.0 " "	-	-	2
FY 1986	5.0 " "	-	-	2

[1]Includes 1 PFT and 1 PPT ceiling and funding for Cape Sarichef field station, Eastern Aleutian NWR.

[2]One PFT ceiling and 1 PPT ceiling vacated due to closing of Cape Sarichef field station. One PFT ceiling filled at Izembek.

TABLE 5 Funding for Izembek NWR (in thousands of dollars)

	1210	1220	1240	1260	1360	1500	Total
FY 1977	93 /1	17				5	115
FY 1978	122 /2	25 /3	20 /4				167
FY 1979	128	35	15				178 /5
FY 1980	169	40	16				225
FY 1981	160	75	13				248
FY 1982	207	96	10				313
FY 1983	208 /6	100 /7	10				318
FY 1984				500	10		510 /8
FY 1985				401	15		416
FY 1986				385			385

/1 Includes $3,000 for rehabilitation of Grant Point building.

/2 Includes $9,000 cyclic maintenance.

/3 Includes $10,000 ANCSA.

/4 Includes $15,000 cyclic maintenance.

/5 Includes funding for 3 months' operation and salaries at Cape Sarichef, Unimak Island, Eastern Aleutian NWR.

/6 Includes $15,000 for management of Pavlof Unit of APNWR.

/7 Includes $5,000 for management of Pavlof Unit of APNWR.

/8 Includes $135,000 for ARMM projects, of which $120,000 was for construction of aircraft hangar.

helicopter operations, drug handling and bear behavior were conducted.

RM Sarvis, ARM Blenden, WB Dau, RA Taylor and YCC enrollees Wilson and Belisle received CPR certification on June 12.

ARM Blenden received American Red Cross Basic First Aid Instructor's certification while at FLETC in April.

Additional safety meetings were held on many topics throughout the year.

4. Technical Assistance

WB Dau helped Alaska Department of Fish and Game regional Biologist Dick Sellers capture and radio collar several caribou from the northern Alaska Peninsula caribou herd. These collared animals will enable ADF&G to more easily locate this herd during survey periods.

Refuge staff assisted Alaska Maritime NWR in elimination of feral cattle from several of the Shumagin and Sanak Islands. On September 16 and 19, Izembek staff shot 72 head of cattle from Caton Island, located about 60 miles south of Cold Bay (see F. Habitat Management).

5. Other Items

Special Use Permits

Forty-five special use permits were issued for Izembek NWR, Pavlof Unit of Alaska Peninsula NWR and Unimak Island, Alaska Maritime NWR. Of the total, 14 were for trapping; 11 were to commercial hunting guides; six were for gravel removal; four for geochemical and geologic survey; two for mapping; and one each to conduct volcanic research, seismic research, surfical geology, operation of a set net site, inventory military debris, maintain a navigation tower, collect biological specimens and to maintain an existing cabin.

A portion of the Pavlof Unit near Herendeen Bay; the core drilling program by Exxon occurred in this area in 1985. (413)18 (Sarvis-7/15/85)

An exploratory crew from Exxon was allowed to obtain core samples from locations on the Pavlof Unit of Alaska Peninsula NWR. Equipment was ferried by helicopter and vegetation damage was minimal and temporary. (Sarvis-7/15/85) (413)13

F. HABITAT MANAGEMENT

1. General

Since its establishment in 1960, Izembek National Wildlife Refuge has been managed as a defacto Wilderness. Maintenance of the Wilderness qualities of the refuge has been and continues to be the primary goal of the refuge staff. With the passage of ANILCA, 300,000 of Izembek's total 320,893 acres were designated as Wilderness. Refuge lands on Unimak Island, long administered from the Cold Bay office, were also designated as Wilderness with the passage of ANILCA. It sounds good, but ANILCA also abolished long established special regulations which were paramount in keeping the refuge pristine until Congress could act. And now five years later with mounting pressure from such special interest groups as the petroleum industry, mining, regional and village Native corporations and commercial big game guides, we find ourselves less able to maintain habitat integrity than before ANILCA. We will discuss this topic further in Section K. FEEDBACK.

The Izembek NWR boundary encompasses 94,960 acres of lagoon systems which provide habitats essential to the wildlife of the area. These areas are tidelands owned by the State of Alaska. One, Izembek Lagoon, has been afforded protection by the state as a State Wildlife Refuge (114 SLA 1960, Chapter 20, Article 1) (Figure 2).

The thoughtful planning process leading to the establishment of the Izembek NWR resulted in a refuge characterized by diverse habitats all within the ecological boundary of a single watershed - Izembek Lagoon. Headwaters of the major tributaries on the refuge originate in mountainous areas in the center of the Alaska Peninsula. Drainage from glaciers around 4,800 foot Mt. Dutton and the Aghileen Pinnacles give rise to the Joshua Green River, the largest drainage on the refuge. Frosty Creek and several smaller streams originate from snowpack and glaciers on 6,000-foot Frosty Peak, west of Cold Bay.

The majority of the refuge is below 1,000 feet in elevation. This undulating coastal plain is derived from glacial outwash and deposition, which supports a mixture of low shrub/ericaceous and graminoid tundra. Characteristic species are arctic willow and other Salix spp., crowberry (Empetrum nigrum), mountain cranberry (Vaccinium vitis-idaea), bluejoint grass (Calamagrostis canadensis), white cottongrass (Eriphorum Scheuchzeri), and reindeer moss (Cladonia spp.). Along many watercourses and at intermediate elevations on mountain slopes, dense bands of

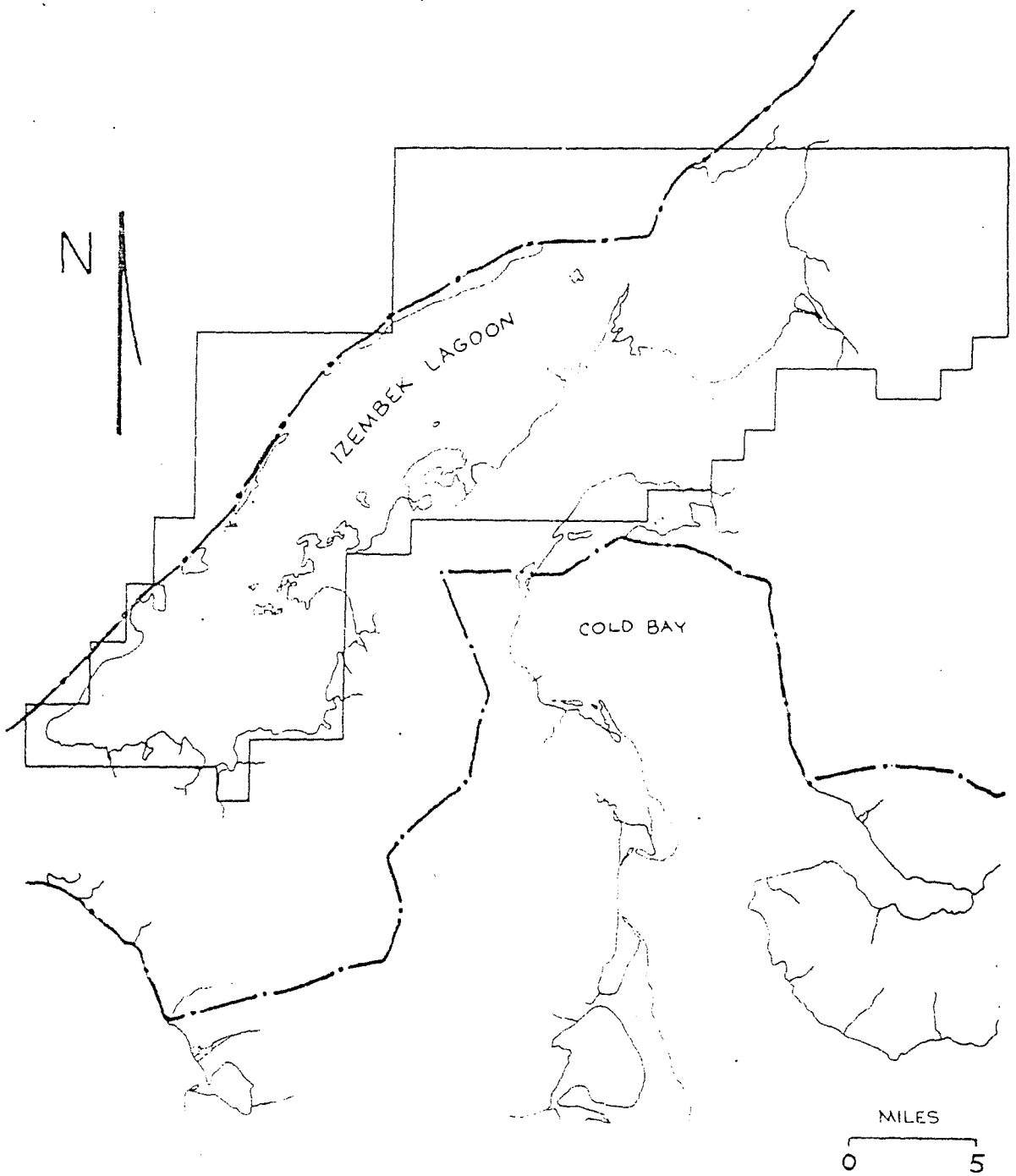


Figure 2. Boundary of Izembek State Game Refuge (————) in relation to Izembek NWR(-·——·——).

Chocolate lily (Fritillaria camschatcensis) is a common wet-marsh plant along the lower Alaska Peninsula.
(P. Blenden-1985)

Marsh marigold (Caltha palustris) along a clear, sparkling Izembek creek.
(P. Blenden-1985)

Sitka alders (Alnus crispa) are found. The cooler than normal spring and early summer climatic conditions in 1985 resulted in retarded plant growth. Alder (Alnus spp.) began to leaf out from 18 to 35 days later than normal and several flowering species (i.e. Myosotis spp., Potentilla spp., Petasites spp., Lupinus spp.) blossomed two to four weeks later than normal. Animal populations also showed delayed phenology as related to reproduction supporting our documentation of the lateness of 1985.

By managing for continuing Wilderness qualities of habitat and addressing the biological program towards big game and migratory waterfowl populations and their habitats, the refuge staff felt fisheries resources were adequately protected. This was a subjective and potentially naive view as development and commercial fishing activities may well increase. Hence in 1984, Izembek NWR entered into a two-fold project with the Fisheries Resource field office in King Salmon. Goals of this project were to identify habitats on the refuge important to the maintenance of the fish stocks and to begin development of a Fisheries Management Plan. This work will be discussed in greater detail in Section G. WILDLIFE 11. Fisheries Resources.

The conveyance of 17,890 acres of Izembek NWR lands to adjacent village corporations has posed potential management problems as the regulations relating to these 22g (Alaska Native Claims Settlement Act) lands may be more liberal than those presently in force. When ANILCA was first passed, it was assumed by us that refuge rules and regulations would remain in effect, as this was the direction that Native corporations were given in ANSCA, in an effort to discourage them from selecting lands from existing refuges. However, in 1983,the solicitor ruled that those regulations do not apply and that new regulations would have to be promulgated. This was certainly a bad decision and will probably result in further degradation of lands that are supposed to be protected, as well as greatly decrease the potential trade value of these lands.

A regional task force has been assigned to develop new regulations. The intent of the village and regional corporations, with respect to the development of their lands, is unknown at present, but centers on economic return for the shareholders. In this area, such projects as roads, small boat harbors, gravel mining and thermal and hydroelectric development have been mentioned as potentials. The area promises to be a hub for activities associated with offshore petroleum exploration in the Bering Sea, as well as for an expanding fishing industry. These activities and changing land use patterns will be closely monitored in an attempt to maintain the integrity of the refuge and its wildlife resources. The present status of land conveyance under ANILCA are summarized in Table 6.

TABLE 6 Native Selection of Land Within the Izembek NWR per the Alaska Native Claims Settlement Act

Village	Refuge Lands Conveyed (acres)	Refuge Lands Remaining for Conveyance (acres)	Total (acres)	Remarks
King Cove	9,695	5,760	15,455	22g land
False Pass	8,105	1,264	9,369	22g land
Pauloff Harbor	-	- approx.	320	22g land
Aleut Corp.	-	-	96,030	14 (h) (8)[1]
Aleut. Corp.	-	-	152	14 (h) (1)

[1] In January, 1983, a verbal decision by the Regional Office was made that all 14(h) (8) selections on Izembek are invalid.

2. Wetlands

Approximately 87% of Izembek NWR is characterized as true wetlands. Nearly 200,000 acres of upland tundra (61%), 22,400 acres of wet sedge/grass marsh (7%) and 60,000 acres of pond, lake and riverine areas (19%) make up this total. Most of these areas are covered under Wilderness designation and all are important to the continued stability of fish and wildlife populations on the refuge.

The nearly 100,000 acres of state-owned lagoon within Izembek NWR are essential wetland habitat for up to 250,000 migratory waterfowl in the fall. Eelgrass is the most important food item for migratory waterfowl using the lagoon complex and is essential year-round habitat for numerous fish and invertebrate species. Izembek Lagoon covers an area of approximately 84,220 acres (132 sq. mi.). Of this area, 78% (65,692 acres) is tide flat and of that area, 44,671 acres are covered by eelgrass beds (i.e. 53% of the total lagoon area).

Lacustrine habitats on the refuge are of three broad types. Larger upland lakes without stream connections to salt water are common. These clear, deeper lakes tend to be fairly sterile. Adjoining lakes of variable sizes with distributaries leading eventually to salt water are visually and biologically opposite, being turbid with rich communities of aquatic vegetation. The key to the richness of these lakes is the red salmon which spawn abundantly in them. Nutrients derived from the presence of fish support the submergent vegetation which in turn draws nesting and molting waterfowl.

Salmon also draw brown bear and aquatic furbearers to these lakes further increasing the lakes' importance. The need to map and characterize these fertile lakes in a more quantifiable way was a high priority need identified to Fisheries Resources personnel. The third general lake type is that common to low, wet sedge/grass meadows. These lakes are small, shallow and irregular in shape. Although they are fresh-water, some are susceptible to infrequent intrusions of storm surges from adjacent salt water areas. Wet meadows dotted with these types of lakes are important to nesting waterbirds and to foraging brown bears during spring and summer.

6. Other Habitats

The saga of the Grant Point radar site is a scenario worth repeating. This DEW line radar facility on Izembek NWR is being abandoned in favor of a new MAR (Minimally Attended

Radar) site also on the refuge, about four miles northwest of Cold Bay. Special Use Permit M-195-IZ was issued (October 1984) by the Regional Office for its construction on a previously undisturbed 8.3-acre plot on refuge lands. Ordinarily this use would not be compatible with refuge purposes, however, it was deemed so only if the Grant Point facility was removed and the 91 acres there returned to Izembek refuge. Unfortunately, all the disturbance to refuge lands and construction of the MAR site were to occur before the Air Force restored the old area, so we were apprehensive from the start on whether we would be left "holding the bag" after the Air Force obtained what it wanted. Our fears at this point appear to be holding true.

RCA operates these facilities on contract with the USAF. The new MAR site is now operational and remaining RCA staff at the Grant Point site are busy mothballing (or as they call it "pickling") the building. Why, you might ask, if per the SUP it must be torn down or otherwise removed? Around the Cold Bay office you hear the occasional "short end of the stick", "pulled the wool over" or "slipped one over" type comments relating to the USAF's behavior. Pre M-195-IZ, we had second thoughts about giving DOD the upper hand by allowing them to build new before removing old even after the relating EA, Sec. 810, NEPA documentation etc., etc., all stipulated <u>how</u> this construction could be considered compatible. Currently, the USAF is giving only lip service to the SUP requirements and supporting documents and is probably actively trying to transfer the complex to another entity. As expected, the Service is and will continue to be the last notified concerning its plans.

Construction materials for the MAR site arrived by cool barge on 12 February and were off loaded into the next day. Materials were stored at the work site or at Grant Point while construction continued. Two approximately 45-foot radar domes were removed from Grant Point with one being dismantled and one relocated at the new MAR site. Intensive construction activities continued all summer with two contractors being involved in various phases of the work which was all overseen by the Corps of Engineers.

The USAF took advantage of the refuge again by advising its contractors engaged in construction of the new MAR site, that gravel was available on the refuge in a pit they use under a SUP. Little did it seem to matter that the refuge had allowed use of this pit only for road maintenance. SUP conditions are of little or no apparent importance to the USAF, while it is the essential means by which the Service protects resource values allowing compatible uses of the refuge.

Izembek refuge reminded the USAF of its responsibilities via correspondence in April and August. Although we wrote to

The USAF moved portions of its MAR site from Grant Point inward closer to Cold Bay. The remainder of the site is to be torn down in compliance with the air force's special use permit. (Dau-November 1985)

the Vice Commander of the Alaska Air Command, responses came from staff people in the Corps of Engineers, normally by telephone (i.e. no paper trail). We were advised that it was the intent of the USAF to abandon the Grant Point facility in November and begin the budgeting process to accomplish the permit-stipulated removal. In late September, the Vice Commander wrote us stating:

> "As you are aware, the Alaskan Air Command has nearly completed the relocation of its radar facilities at Cold Bay and has been proceeding with plans to inactivate the site at Grant Point this fall.
>
> Since we last met, there has been a development which will delay plans to permanently close the Air Force's Grant Point facilities. The U.S. Coast Guard has announced plans to establish an operating station at Cold Bay. As a part of those plans, the Coast Guard will be preparing a feasibility study for re-utilization of the Grant Point facilities as an alternative to construction of new facilities at the airport.
>
> Although we have not yet received a written proposal from the Coast Guard, the Air Force has been informally asked to delay closing our site until the feasibility study has been accomplished. We have agreed to that request, and understand that the study will tentatively be completed in the spring of 1986. Should the Coast Guard decide against using the Grant Point site, we can then initiate the planning process for final disposition of the Air Force's facilities."

We weren't particularly surprised, but we were irritated by the Air Force ignoring its agreement with the Service and its feeling that it was proper to consider transferring the facility to any agency even one outside of the Department of Defense.

On 21 October, Colonel Bennett, Vice Commander USAF, and Admiral Lucas of the US Coast Guard Alaska met with RO and refuge staff in Cold Bay. Highlights of this meeting were these:

> 1. The USCG was <u>not</u> going to pursue acquisition of the Grant Point facility.
>
> 2. The USAF was going to abandon the Grant Point facility (now November or December) and plan/budget for its removal <u>if</u> "another user could not be found"

The USAF passed along that one inquiry they had received was from the Aleutian Region School District and the State Representative for this area relative to use of the site as a vocational training center. Izembek refuge is responding and will continue to press for permit compliance. The Representative is still investigating possibilities for use of the site.

In mid-December we received a telephone call from Colonel Bennett who was involved in some budget considerations relating to the USAF presence in Cold Bay. Specifically, he was inquiring about allocation of MWR funding (Morale-Welfare-Recreation). Via this budget package, the USAF plans to maintain such things as lodging facilities and a walk-in freezer for transient DOD personnel enjoying the Izembek outdoor experience (sounds like a hunting and fishing lodge to us). Colonel Bennett volunteered that they hadn't decided whether to have this MWR `lodge' at the new or old radar site. He apparently forgot that per the SUP, the USAF must return the 91-acre Grant Point site to the USF&WS.

During the latter months of 1984, several field trips were made to Izembek NWR by various representatives of the Corps of Engineers for the purpose of surveying WWII debris remaining on the refuge. Apparently, Congress had or was to authorize funds for removal of WWII debris, not only from the Cold Bay area, but all federal government-administered lands in Alaska. The removal of at least 675 metal quonsets and wood frame buildings was scheduled for the summer of 1985.

Special Use Permits were issued to the Corps of Engineers and its contractor Chris Berg, Inc. from Seattle, Washington. Much concern was voiced by refuge staff over clean-up methods. Onsite burial of individual buildings seemed most logical and environmentally suitable. However, COE and FWS archeologists persuaded contracting officials to leave intact the earth berms surrounding most buildings thus preventing onsite burial. Several large burial sites were located on refuge and state land. A second major concern was control of vehicular traffic on the tundra. Most buildings and debris were located adjacent to gravel roads. The remaining buildings required varying distances of travel across fragile tundra vegetation. Initially refuge staff adamantly opposed the use of anything but low pressure rubber-tired vehicles on tundra areas. After discussions with the contractor and demonstration of some track vehicles their restricted use was approved.

Actual clean-up work was initiated during mid-May. Due to good organization of a large crew using up-to-date equipment, the project proceeded at an astonishing rate. Metal quonsets were typically collapsed and crushed in place

with a small bulldozer. This material was then collected and loaded into dump trucks with a "cherry picker" type machine fitted with articulating claws. Since this machine had a tremendous reach, it usually stayed on the road surface. Crews on foot picked up by hand the smaller debris and loaded it into trailers drawn by track equipped 4-wheel ATVs. All areas disturbed during the project were graded to smoth contours, fertilized and seeded to a mixture of perennial and annual grasses. Fertilization and required reseeding will occur next year.

This project permanently changed the character of the Cold Bay area, so long known for those numerous reminders of military presence during WWII. From the wildlife habitat and esthetic point of view, however, we cannot help but feel the refuge is now better off. We are also pleased that this work was completed with very little damage to tundra vegetation and wildlife habitat.

7. Grazing

No feral herbivores are found on Izembek or Alaska Peninsula (Pavlof Unit) NWRs or on Unimak Island. However, the Cold Bay office had long dealt with the Shumagin/Sanak Islands cattle problems directly or indirectly.

This was the `year of the feral cow' and we were happily able to provide support to the Homer office (Alaska Maritime NWR) in eradicating cattle from Caton Island. This operation was coordinated with similar efforts on Simionof and Chernabura Islands. According to the press, we dropped our guise as refuge manager or biologist to become airborne riflemen or government sharpshooters. Regardless of our title, the job was expeditiously completed and as for our part of the operation, Caton Island's 72 animals were destroyed in two days.

9. Fire Management

The lower Alaska Peninsula has very little history of naturally occurring range fires. Wet tundra, continually moist air and no thunderstorms are effective natural fire suppressants. For this reason, we petitioned for and were granted, a Regional Office exemption from preparation of a Refuge Fire Management Plan.

12. Wilderness and Special Areas

On December 2, 1980, 300,000 acres of Izembek were officially designated Wilderness by ANILCA. Preservation of the striking geographic features and conservation of the internationally important fish and wildlife values of the

Heavy equipment was used to remove quonset hut remains during the Corps of Engineers WWII clean-up project. (Blenden-6/26/85)

Seeding of this same area resulted in good ground cover which should help reduce wind and water erosion. (Blenden-11/15/85)

Many skeletal remains of quonset huts dotted areas of Izembek and the Pavlof Unit prior to the 1985 clean-up program. (Blenden-6/26/85)

Isolated refuge areas within the WWII clean-up project were visited with lightweight equipment. Work in such areas was by hand and the refuge staff was pleased with the outcome. (Blenden-6/26/85)

The contractor performed the necessary work while doing minimal damage to already disturbed areas. Re-vegetation of these areas was the final step. Initial sprouting was successful and hopefully a ground cover will endure. This is the same site shown in the top photo. (Blenden-11/15/85)

NATIONAL AUDUBON SOCIETY
CERTIFICATE OF APPRECIATION

Presented to

Staff members of the Izembek National Wildlife Refuge

for their courageous and dedicated efforts

in protecting native wildlife and their habitats on

Simeonof, Chernabura and Caton Islands

by removing feral cattle.

Mary Lou King
Mary Lou King
President
Juneau Audubon Society

David R. Cline
David R. Cline
Regional Vice President
National Audubon Society

Date February 6, 1986

Officers gird for Aleutian cattle slaughter

By JEFF BERLINER
United Press International

In a move to save three Aleutian Islands from the ravages of herds of wild cows, the U.S. Fish and Wildlife Service plans this week to gun down 170 head of cattle and round up 115 others.

"I definitely didn't have this in mind when I signed up for the Fish and Wildlife Service 15 years ago," said Tom Early, who has been assigned to shoot scores of cows in the head from a low-flying helicopter.

The operation, scheduled to start Monday and last three or four days, is designed to clear the bovine population off three uninhabited and treeless islands covering about 21,750 acres in the northern Pacific. The islands form part of the 3.5 million-acre Alaska Maritime National Wildlife Refuge.

Early, assistant manager of the refuge, will aim to kill 90 cows on Chernabura Island with a semi-automatic rifle. Another shooter, flying in a light plane, plans to destroy 80 cows on Caton Island.

On a third island, Simeonof, a helicopter crew will try to steer 115 head of cattle onto a barge. Those that elude the roundup will be shot.

Fish and Wildlife marksmen earlier this year killed 110 old bulls — which stand out because of their longer horns — to prevent them from interfering with the round-up on Simeonof island.

Those that make the barge will be transported to Unga Island, where the Aleut inhabitants will hunt them for food.

Early said sea otters, water fowl and "other critters" live on the islands — and said Congress did not have cows in mind when it voted to protect islands, reefs and headlands along Alaska's coast.

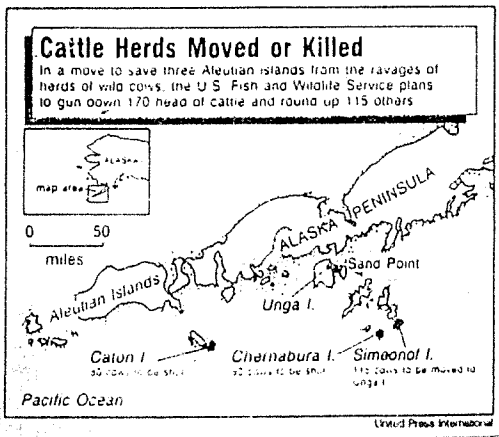
"Cows don't fit into the ecosystem," said Early, saying overgrazing by the cattle has destroyed vegetation needed by other wildlife.

According to Early and George Sura, the U.S. Fish and Wildlife Service public affairs officer for Alaska, cattle from nearby Kodiak Island were introduced to Simeonof in the 1890s by ranchers. The ranchers eventually gave up and moved away, but the hardy Scottish Highland hybrids stayed and thrived on the tundra grasses.

The cattle on Chernabura and Caton Islands were introduced in the 1950s by ranchers who also failed to make a go of it.

Sura said the Fish and

See Page B-3, ALEUTIAN



Aleutian cattle slaughter set

Continued from Page B-1

Wildlife Service had gone to great lengths to harmlessly remove the cows from the three threatened islands, first trying to sell them and then to give them away.

Each time, however, the beasts' would-be recipients failed to surmount the the logistic obstacles to the removal of hundreds of head of cattle from islands 650 miles southwest of Anchorage.

Unlike the cattle on Chernabura and Caton, Simeonof's cows are to get a reprieve so they can be transported to Unga Island, which is owned by a group of Aleut organizations.

The Aleut-owned Shumagin Corp. will provide the barge and the men to escort the cows to Unga.

"We're hoping the herd will reestablish itself," said Sally Crandall of the Shumagin Corp. "This is not for any type of business venture. We are putting them there free to roam. We are putting them there for subsistence."

The residents of Sand Point, a fishing community of 870 near Unga, will be invited to hunt the cows on Unga when they need "to put meat on the table," said Crandall.

While Sand Point's Aleut community jumped at the chance to hunt the cows, Crandall said Aleuts dispute the government's contention that the cows are ruining the islands.

But Early said the cows are doing more than destroying the environment. Because of erosion caused by overgrazing and constant stamping, he said, ancient Aleut villages and burial sites have been unearthed and artifacts have washed out to sea.

ENDING AN UNFINISHED STORY

Q. What ever happend to the wild cattle of Caton, Chernabura, and Simeonof?

A. The cowboys finally showed up
Riding helicoptors,
Their lassos bullets from high-powered rifles.
The wild cattle of the Aleutians
Tossed their horns one last time,
Stomped, charged, and fell.
Now the birds and the wind have the grass
And ghosts of beasts
Too free for coralling,
Too tough for anything but hamburger.

THE ALEUTIAN EAGLE 11/7/85

Aleutian Cattle On Last Roundup

Sharp shooters from the U.S. Fish and Wildlife Service have been sent to the Aleutian Islands of Caton and Chernabura to kill the wild cattle that have been trampling waterfowl habitat there.

According to first reports, 47 of the 72 cattle at Caton have been killed by airborne riflemen. There have been no reports of the extent of the success against Chernabura's 90 cattle.

Riflemen finish killing wild Aleutian cattle

By DAVID FOSTER 9/27/85
The Associated Press

Airborne riflemen this week finished their slaughter of feral cattle trampling waterfowl habitat on three islands in the Aleutian chain, federal officials said.

The killing marks the end of a protracted effort by wildlife officials to remove the cattle, which were destroying vegetation on the windswept, treeless islands. Situated about 550 miles southwest of Anchorage, the islands are part of the Alaska Maritime National Widlife Refuge and provide habitat for waterfowl.

After waiting several days for clear weather, U.S. Fish and Wildlife Service agents riding in a helicopter on Wednesday killed about 140 head of cattle on Chernabura Island, said George Sura, agency spokesman.

"That cleans it all up," he said. The agency has killed about 430 cattle since March on the three Shumagin islands: Chernabura, Simeonof and Caton.

The cattle, wild descendants of domestic animals introduced to the islands in the late 1800s, are mean-tempered, wary animals.

The only cattle remaining on the islands this week were about 10 calves on Simeonof Island, Sura said. Residents of Sand Point on nearby Popof Island were planning to round up those calves and barge them off the island shortly, he said.

The agency has for years wanted to remove the cattle to improve waterfowl habitat. Twice, it tried to sell the wild cattle. When that failed, it offered to give them away. It even offered to let somebody else shoot them, opening a special cattle hunting season.

There were few takers because of the expense and difficulties in reaching the uninhabited islands, which often are shrouded in stormy weather.

Roundup effort fails; Aleutian cattle killed

By JEFF BERLINER
United Press International

An effort to round up cattle grown wild after nearly a century of roaming on a remote Alaskan island has failed and most the animals were shot, federal officials said.

About 100 of the long-horned beasts, described as too tough to domesticate and a threat to other wildlife, were gunned down on Simeonof Island by a U.S. Fish and Wildlife Service employe, officials said Friday.

The cattle have roamed freely on the island since they arrived in the mid-1890s and have resisted all attempts to corral them, officials said.

"The cattle are too wild and they burst right through the corral," said Sally Crandall of the Shumagin Corp., the Aleut group that hoped to domesticate them for beef herds after the Fish and Wildlife Service announced plans to shoot them.

One beast charged Shumagin President Dick Jacobsen, Crandall said, and he had to shoot the charging animal.

Their horns can reach a span of six feet and tend to average four feet, refuge assistant manager Tom Early said before he left to shoot the animals earlier in the week week.

"They busted right through the barbed wire," said Carl Carlson, one of the Sand Point residents who journeyed to Simeonof to help in the aborted roundup. Carlson said cows bolted right through the corral, snapping the barbed wire.

The three islands are part of the Alaska Maritime National Wildlife Refuge and the government said the cattle were destroying the islands' wildlife habitat.

Riflemen kill 47 Aleutian cattle

The Associated Press

Airborne riflemen this week killed 47 feral cattle on one of three islands in the Aleutian chain where the animals have trampled valuable waterfowl habitat, federal officials said Wednesday.

Bob Olendorff, a U.S. Fish and Wildlife Service spokesman, said Wednesday that the federal gunners killed the cattle on Caton Island on Monday before weather temporarily halted the slaughter. He said riflemen would return to kill the remaining 25 cattle on the island when weather cleared.

Olendorff said he has had no word from gunners sent to kill the 90 cattle on the island of Chernabura, and to kill any of the 115 cattle on the island of Simeonof that managed to elude a round-up planned by the Shumagin Native Corp.

The islands have had cattle since the late 1800s. Originally, the animals were mostly Angus, Hereford and Scottish Highland breeds. Their offspring are known to be mean-tempered, wary animals.

After years of negotiation, the Fish and Wildlife Service finally stood firm and eradicated feral cattle from islands of the Alaska Maritime NWR. ARM Blenden is shown with four of the 72 animals shot on Caton Island. (Dau-9/20/85)

Caton Island supports several nesting waterfowl species. The potential exists for expanding populations when overgrazed areas such as this start to recover. (Blenden-9/20/85)

area have always been the primary goals of the refuge so this designation complements and enhances our program goals.

Nearly one million acres on Unimak Island was also designated Wilderness by Congress. Volcanos form the backbone of the Wilderness Area of Unimak Island, from Roundtop in the East to Faris-Westdahl in the West. Perpetual snow fields and glaciers surround the five most prominent peaks; Roundtop, Isanotski, Shishaldin, Pogromni and Faris-Westdahl. At 9,372 feet, Shishaldin is the highest peak on the island, and also the most spectacular, being a near-perfect volcanic cone. This mountain is a National Historic Landmark because it has served as a navigational aid for seamen at least since the days of Russian exploration and was undoubtedly used by the Aleuts well before that. Active volcanos include Shishaldin, Pogromni and Faris-Westdahl. Steam and/or smoke rising from the vent of Shishaldin is quite common. A huge lake, Fisher Caldera, lies in west-central Unimak in the crater of a volcano.

Extensive lava flows of varying ages are found below Shishaldin, Isanotski, Roundtop and Faris-Westdahl. Some of those on the north side of Shishaldin have revegetated, although so sparsely that the nature of the substrate is obvious from the air. Several rivers, among them North Creek, Coal Oil Creek and others unnamed, flow partly through wide ash flats. To the southeast of Roundtop, Isanotski and Shishaldin, are areas several thousand acres in size overlaid with virtually bare lava and ash. These are also drained by sizeable streams.

Cliffs ranging from steep bluffs to spectacular wave-cut promonotories and sea stacks occur along the coast, except at Unimak Bight and along the north side of the island from St. Catherine's Cove to Urilia Bay, where more gentle beaches and dunes are found. The more inaccessible bluffs and cliffs support some seabird nests, but are most important for bald eagles. Because of its large size and unique features, Unimak was proposed as a separate unit for Wilderness in 1972, but designation was held up pending resolution of the D-2 lands issued by Congress resulting from passage of the ANSCA. Finally, a Wilderness area of 910,000 acres was established on December 2, 1980, with passage of ANILCA. Management of Unimak will still be the same since it also has been historically managed as a Wilderness.

G. WILDLIFE

1. Wildlife Diversity

Approximately 142 species of birds and 23 species of mammals have been reported as residents and/or migrants on Izembek NWR. Four species of Pacific Salmon (chum, pink, red and silver), two varieties of trout (dolly varden and arctic char) and stickelbacks are the primary fish species in fresh-water habitats on the refuge. King salmon occur in very low numbers in the Moffett Bay area. A minimum of 23 species of saltwater fish have been reported for Izembek Lagoon.

2. Endangered Species

The endangered Aleutian Canada goose (Branta canadensis leucopareia) may occur on Izembek NWR during fall migration from their western Aleutian nesting areas, however, this use has not been documented by actual sightings. In addition, the Arctic and American races of the peregrine falcon (Falco peregrinus tundrius and F.p. anatum, respectively) may occur in the area during migration, however, use by these species has not been documented either. The nonendangered or unthreatened Peale's race of the peregine falcon (F.p. pealei) is a fairly common resident of the area.

3. Waterfowl

Tundra Swans

Tundra swans are the key nesting waterfowl species at Izembek and utilize the entire refuge. Therefore, a knowledge of their habitat needs and population parameters is essential to managing and protecting refuge ecological units. In order to fulfill one of our mandates of protecting the essentially wilderness nature of the refuge, knowledge is necessary of species such as tundra swans which require wilderness conditions in order to reproduce. Swans are a key indicator species that show the health of refuge habitats and conditions.

This year the usual concentration of tundra swans at Peterson Lagoon on Unimak Island never materialized. Weather was mild throughout the winter with saltwater remaining open and most freshwater lakes open most of the winter. Consequently, swans remained scattered throughout Izembek and Unimak areas. Only three counts were made (Table 7), but due to their scattered occurrences a reliable total count was never obtained. Neck collar observations were not possible due to lack of swans at Peterson Lagoon.

TABLE 7. Winter Tundra Swan Surveys of Unimak Island and Izembek NWR

Date	Immature	Adult	Total Classified	Total Observed	Marked[1] Swans	Swan[2] Location	Area[2] Covered
01/06/78				294	na	I,P,C,S	I,U
02/08/78				309	na	P,C	U
11/13/78				400	1	I,S,P,C	I,U,
11/15/78	40(17.6%)	187	227	235	14	P	P
11/29/78				286	?	P	P
12/05/78	7(4.7%)	143	150	196	4	L,P,C	L,P,C
12/29/78	29(8.0%)	332	361	361	9	P	P
01/05/79				136	1	P	P
01/12/79				264	1	I,S,L,C	I,U
01/24/79				300+	5+	P	P
02/24/79				229	?	I,S,P,C	I,U
03/05/79				241	8	I,S	I,S
03/07/79				236	7	I,S,O,P,C,Z	I,U,Z
11/06/79				266	9	I,S,P,C	I,U
12/12/79				390	?	P	P
12/21/79				493	6+	L,P,C	U
01/02/80				458	?	L,P,C	U
01/07/80				494	5	P,C,	L,P,C
01/09/80	48(11.9%)	354	402	533	17	P,C	L,P,C
02/06/80				573	11	L,P,C	U
10/24/80	3(4.3%)	70	73	92	0	I,P	I,P
10/28/80				247	9	I,S,O,L,P	I,U
11/02/80				148	?	L,P	L,P
01/20/81	26(7.5%)	321	347	540	16+	S,O.L,P,C	U
01/27/81	43(7.6%)	521	564	564	27	L,P,C	U
11/16/81				285	?	L,P	U
12/24/81				598	?	S,O,L,P	U
01/09/82	86(14.7%)	499	585	673	44	L,P	S,O,L,P
02/10/82				270	?	P	P
02/20/82				150	?	S	S
02/24/82	80(13.5%)	512	592	592	30	P,Z	I,U,Z
12/08/82				654	?	P,L	P,L
12/23/82				90	?	I	I
01/17/83	72(12.0%)	527	599	672	44+	I,L,P,C	I,U
02/05/83				517	?	P,L,C	U
03/18/83				162	17	I	I
11/15/83				120	17	I	I
01/20/84				580	44	S,P,O,C	I,U
01/23/84				575	?	P,O	I,U
02/22/84	70(15.8%)	374	444	444	44	P,L	I,U
01/07/85				114	?	I	I(N. ½ only)
01/21/85				168	?	I	I(S. ½ only)
01/22/85				264	3+	I,S,O,L,P,C	I,U
12/30/85				104	?	I	I(N. ½ only)
01/24/86	21(5.2%)	380	401	635	59	P,L	I,U
02/01/86				272	?	L	U
02/02/86				241	5	P	P
7-year av. 10.8%[3]				585[3]			

[1]Includes birds who have lost neck collars, but legband(s) were observed.

[2]I-Izembek NWR, U-Unimak, S-Swanson Lagoon, O-Otter Point, L-Cape Lapin R., P-Peterson Lagoon, C-Christianson Lagoon, Z-Lazaref R.

[3]From peak count each winter (excluding '78 and '85 which were open winters and swans did not congregate enough for reliable total count).

A steaming Shishaldin Volcano provides a spectacular backdrop for Peterson Lagoon where up to 500 tundra swans winter. (Sarvis-1/24/85)
(430)13

The winter of 85/86 is turning out to be more normal with a peak of 635 swans at Peterson lagoon and Cape Lapin including 59 marked birds on January 24, 1986. Consistent peak counts the last few years continue to show a remarkably stable resident population. The combination of nest predation, high cygnet mortality and some adult mortality appear to negate any increase in the population.

Two marked swans migrated to and wintered in the Lower 48 during the winter of 84/85. Swan 6F was one cygnet of an unusual brood of six reported in last year's narrative that wintered in Washington in 83/84. The parents returned and nested in 1984, but only one (0F) of the six cygnets was ever observed here in 1984. After not observing 6F here at all in 1984, we were surprised to learn that she was observed in Washington on November 3, 1984. 6F was regularly observed all winter in the Skagit River area of Washington with 10 sightings from November 3 through February 2. She then moved to the mouth of the Cour d'Alene River in Idaho where observations were made on March 15 and 18. Then on April 4, an Idaho Fish and Game biologist found 6F dead in this same area. She was saved for necropsy, but eventually was misplaced and we were never able to learn the cause of her death.

The other swan that apparently wintered in the Lower 48 was Al. She was sighted in the Eugene, Oregon area with 100 other tundra swans on December 23, 1984. Her migration and wintering behaviors have been quite interesting. Originally neck-collared in 1982, she wintered here at Peterson Lagoon in 82/83, was not observed in 83/84, wintered in Oregon in 84/85 and again stayed here at Peterson Lagoon in 85/86.

After having an open winter, our thoughts of an early spring were not to be realized. Considerable snow and below freezing temperatures occurred in March and April here and throughout Alaska. 1985 turned out to be the latest spring and summer ever recorded with considerable adverse impact on wildlife in Alaska. Swans here nested about two weeks later than usual. Most nest initiation occurred in early May and peaked about mid-May.

The late climatic conditions encountered this spring and early summer also caused delayed nesting by other waterfowl species. Phenology of nesting and hatching in the greater scaup was delayed about five days and 14 to 20 days in the black scoter.

The first nests (#s 16 and 17) hatched on June 8 (Figure 3). This year, there never was a peak in nest hatching. Instead one or two nests hatched per day from June 8 through June 26. One nest (#34) hatched unbelievably late on July 17! Normally by that time in July we're beginning to band adults and sometimes cygnets!

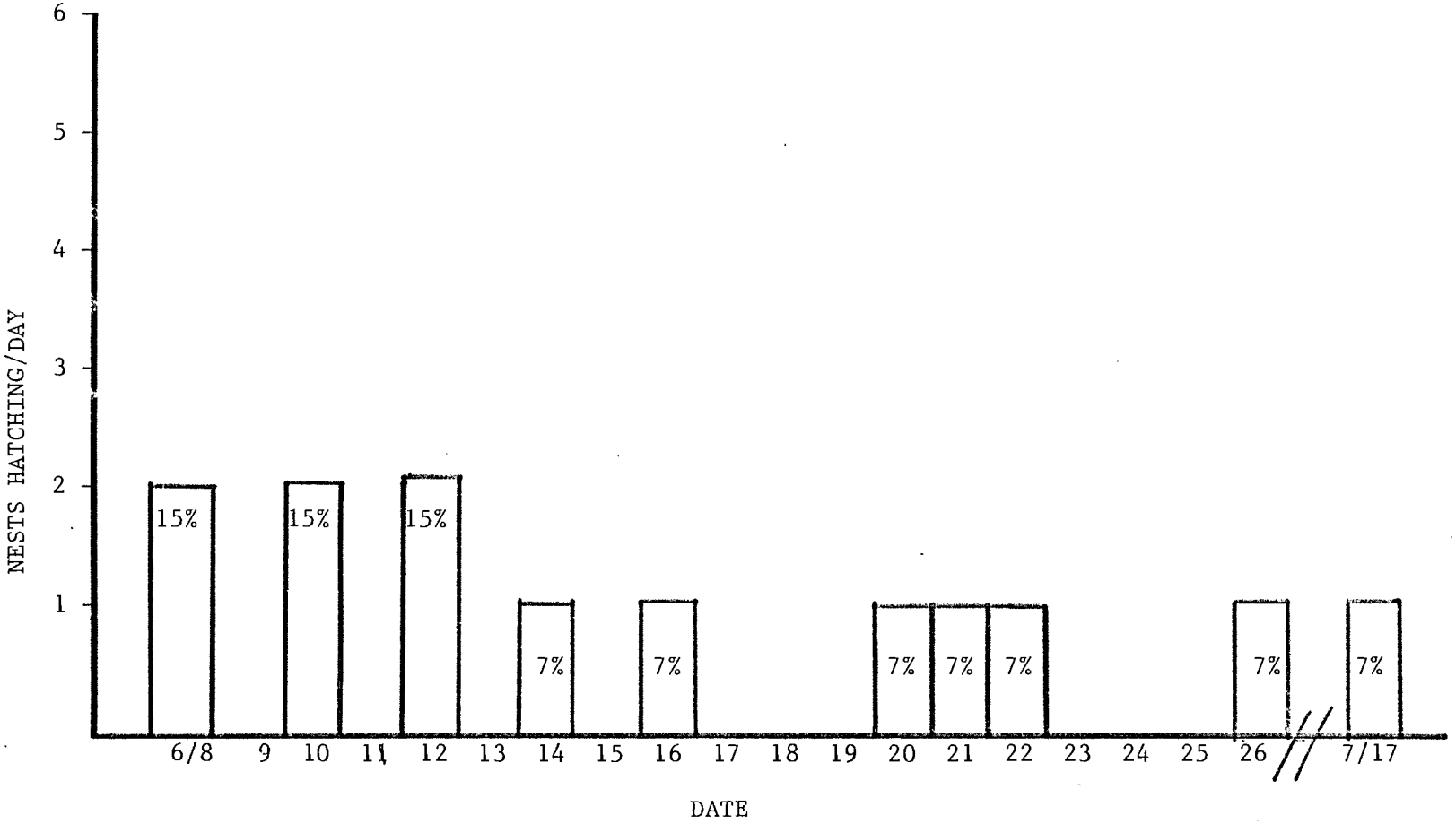


FIGURE 3 . Hatching Dates for 13 successful tundra swan nests in 1985 (nest nos. 28, 33, 35, not included.)

This was the second year that the Pavlof Unit of the Alaska Peninsula NWR was surveyed following the tundra swan survey protocol developed by Waterfowl Investigations. This year the area surveyed was expanded to include complete coverage of four 1:63,000 USGS topographic map quadrangles. The results of these surveys (and 1984's) are summarized in Table 8.

Swan production on the Port Moller D-5 and D-6 quads decreased from 31 nests in 1984 to only 14 nests in 1985, while pairs without nests increased from 39 to 65 again showing the effects of the late, cold spring (Table 8).

This year the Port Moller D-5 quad was surveyed twice to test a new survey procedure. The normal procedure of randomly searching all available habitat within one quad was done on June 6. On June 8, the same area was surveyed by flying every section-line. This was accomplished by flying the perimeter of the quad and entering into the aircraft Loran receiver waypoints for each section-line. Then using the Loran, it was a simple matter to fly each section-line. This turned out to be a much better procedure for covering the area. Navigation and orientation were much easier, it was easier to quickly plot observations on the quad and more observer time was spent looking outside the cockpit for birds.

The final proof was in the numbers obtained, with 225 birds observed using the new procedure compared to only 179 with the random search method (Table 8). One confusing aspect did occur though, when looking at the number of nests. On both surveys nine nests were found, but only four were seen on both surveys. Five other nests were seen on the first survey while a different five were seen on the second survey (i.e. there were 14 nests total in the area). We still feel the section-line method is best, but the nest information seems to indicate the survey lines need to be closer than one mile apart to obtain increased accuracy.

The annual Izembek area nesting survey was done May 28, 30 and June 1 with 266 tundra swans (32 neck-collared) observed on Izembek, Pavlof Unit (SW of Black Hills only) and adjacent areas (Table 9). This total is the most recorded in the eight years swan surveys have been done here. The increase came from more swans being in flocks and singles than past years and was probably the result of the record production which occurred in 1984.

A total of 35 nests were found in 1985 (Table 10) which was three nests below the six-year average. Only 16 of 35 nests hatched yielding a poor 46% nest success rate. Two factors may have contributed to this dismal rate. Undoubtedly the unseasonably cold and inclement weather had an effect. In

TABLE 8. Tundra Swan Nesting Surveys of the Pavlof Unit, Alaska Peninsula, NWR.

Date	Map	Search Method[1]	Single	Single W/Nest	Pair W/Nest	Pair W/Brood	Pair W/O Nest	Birds in Flocks	Total Swans	Avg. Clutch	Avg. Brood
6/12/84	PML(D-5)	RS	8	4	15	6	22	15	113	3.7(11/3)	3.3(20/6)
6/12/84	PML(D-6)	RS	3	1	1	4	17	10	58		3.5(14/4)
1984 TOTALS			11	5	16	10	39	25	171	3.7(11/3)	3.4(34/10)
6/6/85	PML(D-5)[2]	RS	(6)	(1)	(8)		(47)	(62)	(179)	4.9(34/7)	
6/8/85	PML(D-5)	SL	12	3	6		59	80	225	4.7(14/3)[2]	
6/6/85	PML(D-6)	RS	9		5		18	6	61	4.5(9/2)	
6/10/85	PML(C-5)	SL	4	1	5		33	80	161	4.0(16/4)	
6/10/85	PML(C-6)	SL	10	1			14		39	2.0(2/1)	
1985 TOTALS			35	5	16	0	124	166	486	4.4(61/14)	

[1]RS=Random Search; SL=Section-line search using Loran.

[2]Not used in totals.

TABLE 9. Spring Nesting Surveys of Tundra Swans

(Area of Coverage: Izembek NWR, Cathedral Lakes, lakes south of Cold Bay to Thin Point and west side of Morzhovoi Bay)

	No. of Swans Observed (% of Total)							
	Singles	Swans (nesting pairs)	Swans (other pairs)	In Groups	Total	Area Cov. (sq. mi.)	Density (sq. mi.)	No. of Collared Swans Seen
5/8/78[1]	6 (8%)	18 (23%)	26 (33%)	28 (36%)	78	315.5	.25	NA
4/25,28/79[2]	10 (5%)	24 (12%)	96 (47%)	75 (36%)	205	413.9	.50	12
5/14-15/80	9 (4%)	60 (26%)	84 (36%)	80 (34%)	233	413.9	.56	1
5/13,15/81	16 (8%)	58 (29%)	94 (48%)	29 (15%)	197	413.9	.48	21
6/2,6/82[3]	11 (5%)	68 (30%)	92 (41%)	55 (24%)	226	413.9	.55	23
5/31-6/1/83[3]	8 (4%)	48 (21%)	94 (41%)	77 (34%)	227	413.9	.55	37
6/7-8/84[3]	5 (2%)	78 (35%)	54 (25%)	85 (38%)	222	413.9	.54	42
5/28,30,6/1/85	20 (7%)	54 (20%)	52 (20%)	140 (53%)	266	413.9	.64	32
Avg. Last 7 Years	11 (5%)	56 (25%)	81 (36%)	77 (34%)	225	413.9	.54	24

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

[2]Survey done too early to include peak of nesting.

[3]Survey a little late for peak of nesting.

TABLE 10 Tundra Swan Production
(Izembek NWR, Pavlof Unit of Alaska Peninsula NWR and Vicinity)

Parameter	1977[1]	1978[1]	1979	1980	1981	1982	1983	1984	1985
Nests with known clutch				17	23	22	14	30	26
Number eggs				82	118	105	75	142	114
Mean clutch				4.82	5.13	4.77	5.36	4.73	4.38
Total nests	?	14+	17+	34	47	44	28	42	35
No. hatched (nest hatch success)	10+	9+	7+	17(50%)	17(36%)	22(50%)	19(68%)	32(76%)	16(46%)
First obs.- # broods (cygnets)				15(51)	17(64)	22(74+)[3]	19(87+)[3]	30(118+)[3]	15(57+)[3]
Average brood size at hatch				3.4	3.8	3.4	4.6	3.9+	3.8+
Last Obs.-before 9/1 No. broods cygnets)	10(34)	9(28)	7(17)	10(22)	13(32)	9(23)	17(49)	22(75)	10(27)
Average brood size at flight	3.4	3.1	2.4	2.2	2.5	2.6	2.9	3.4[4]	2.7
Dates of last observation	7/22	7/21,8/8	7/18	Various	Various	8/22,9/2	Various	Various	8/21-26
Egg hatching success (successful nests only)				78%	65%	85%	90%	86%[5]	89%[5]
Success-eggs to flight stage)				32%	33%	28%	46%	51%[5]	42%[5]
Success-hatched to flight stage				41%	50%	33%	51%	59%[5]	47%[5]

[1]Swan surveys not done before 1977 due to no aircraft at station.

[2]Total nests deduced in 1978 and 1979 from a combination of nest surveys done too early and later brood surveys.

[3]In 1982, 1983, 1984 and 1985; 1 brood, 1 brood, 6 broods and 2 broods, respectively were not observed close enough to their hatching dates to be sure of the original number of cygnets. Number of cygnets at hatch is therefore an estimated minimum number. In addition, two nests hatched in 1984 and one in 1985, but the brood was never observed.

[4]Probably high since many broods were last observed in July. Other duties prevented brood checks normally done in August.

[5]1984- did not use nest numbers 6, 9, 12, 30, 31, 36 and 42 in these calculations.

1985- did not use nest numbers 28, 32, 33, 35 in these calculations.

addition, brown bears appear to be the primary nest predator. During springs when the bear season is open, bear hunters may be causing some bears to stay in alder cover more and not roam the lowland areas as much. And conversely, when bear season is closed, like the spring of 1985, bears may have had more opportunity to utilize lowland areas and locate swan nests. In 1981, 1983 and 1985 (years with no spring bear season) an average of 17 nests hatched, while in 1980, 1982 and 1984 an average of 24 nests hatched. This is undoubtedly not the only factor influencing the number of successful nests each year, but some correlation does seem to exist.

Over the last several years, brown bear numbers in the Cold Bay Road System have been reduced considerably due primarily to hunting. We are concerned with the reduction in bear numbers and instituted changes in the 1984 season to reverse this trend. But this situation has provided an opportunity to further test the theory that bears are the primary tundra swan nest predator. Nesting success in the road system area containing low bear numbers has been nearly twice as high as the rest of the refuge (Table 11). Normally, if there was any difference, it would seem nest success in the more disturbed portions of the refuge would be less than the Wilderness portions, since tundra swans prefer undisturbed nesting territories. But in this case, the benefit of low bear predation more than makes up for any additional disturbance that may be occurring in the central area.

Clutch size was determined for 26 nests. These nests contained 114 eggs for an average clutch of only 4.4 (Table 10). This was the lowest average clutch size recorded so far, again probably due to the very late spring this year.

The 16 nests that hatched this year had an initial cygnet total of a minimum of 57 (Table 12). There were probably a few more than this initially, since one brood was never observed and brood numbers 33 and 35 were not observed uintil 18 and 42 days old, respectively.

Of the 16 original broods, only 10 (63%) containing 27 cygnets reached flight stage, one of the poorest production years yet recorded (Table 12). Cygnet survival was only 47% also one of the lowest yet recorded. As in past years, cygnets perished at a higher rate within the first 10 days of hatching than later with 50% of the cygnet loss occurring then (Figure 4). During the last five years, an average of 50% of the cygnets that died did so when less than 10 days old (Table 13).

TABLE 11 Comparison of Tundra Swan Nest Success Between the Cold Bay Road System Area and the Rest of the Refuge. 48

Year	Nests in Road System Area[1]			Non-Road System Nests		
	Hatched	Unsuccessful	Total	Hatched	Unsuccessful	Total
1981	9 (64%)	5	14	8 (24%)	25	33
1982	8 (80%)	2	10	14 (41%)	20	34
1983	10 (100%)	0	10	9 (50%)	9[2]	18
1984	7 (100%)	0	7	25 (71%)	10[2]	35
1985	3 (75%)	1	4	13 (42%)	18	31
Total	37 (82%)	8	45	69 (46%)	82	151

[1]The Cold Bay Road System Area is described in the ADF&G brown bear regulations and includes central Izembek NWR and lands south of Cold Bay.

[2]Undoubtedly, low since numerous destroyed nests were not located in 1983 and 1984 due to late surveys.

TABLE 12 Summary of 1985 Successful Tundra Swan Nests

Nest No.	Clutch[1]	Hatching Date	No. Cygnets in Brood (age in days) First Obs.	Intermed. Obs.	Last Obs.[2]
4	5	6/14	5(12)	5(52)	4(53)
10	5	6/16	5(10)		0(25)
11	5	6/10	5(1)	4(2)	4(115)
12	6	6/20	6(1)	4(6),4(21),3(27),2(47)	2(83)
14	3	6/21	2(5)		2(82)
16[4]	5	6/8	5(2)	5(4),4(6)	4(107)
17[4]	6	6/8	4(2)	2(4)	2(77)
19[4]	5	6/12	5(2)	1(18),1(42)	0(70)
22	5	6/10	5(2)	5(39),4(43)	4(74)
24	2	6/12	2(2)		0(18)
28	6	?	no observations; egg sacs in nest		0
31	4	6/26	2(5)	2(6)	0(14)
32	(5+)	6/22	5(4)	5(9),4(18),3(25)	3(81)
33	?	6/21	2+(1-18)	1(19)	1(98)
34	2	7/17(!)	1(1)	1(22)	0(35)
35[3]	?	~6/11	3+(42)	3(43),2(71),2(73)	1(105)
16	64+		57+		27
Mean or%	4.0	89% of eggs hatched[5]		42%-eggs to flight(excluding nest nos. 28,32,33,35) 47%-survived from hatch to flight (excluding nest no. 28)	

[1]Eggs in () were derived from first brood observation and eggs remaining in nest.

[2]Cygnets first fly at 65-75 days of age.

[3]Adult female with neck collar before nesting.

[4]Both adults with neck collars before nesting.

[5]Excluding nest nos. 28, 32, 33, 35, this would be minimum egg hatching success since more eggs may have hatched, but the cygnets died before the first brood observation.

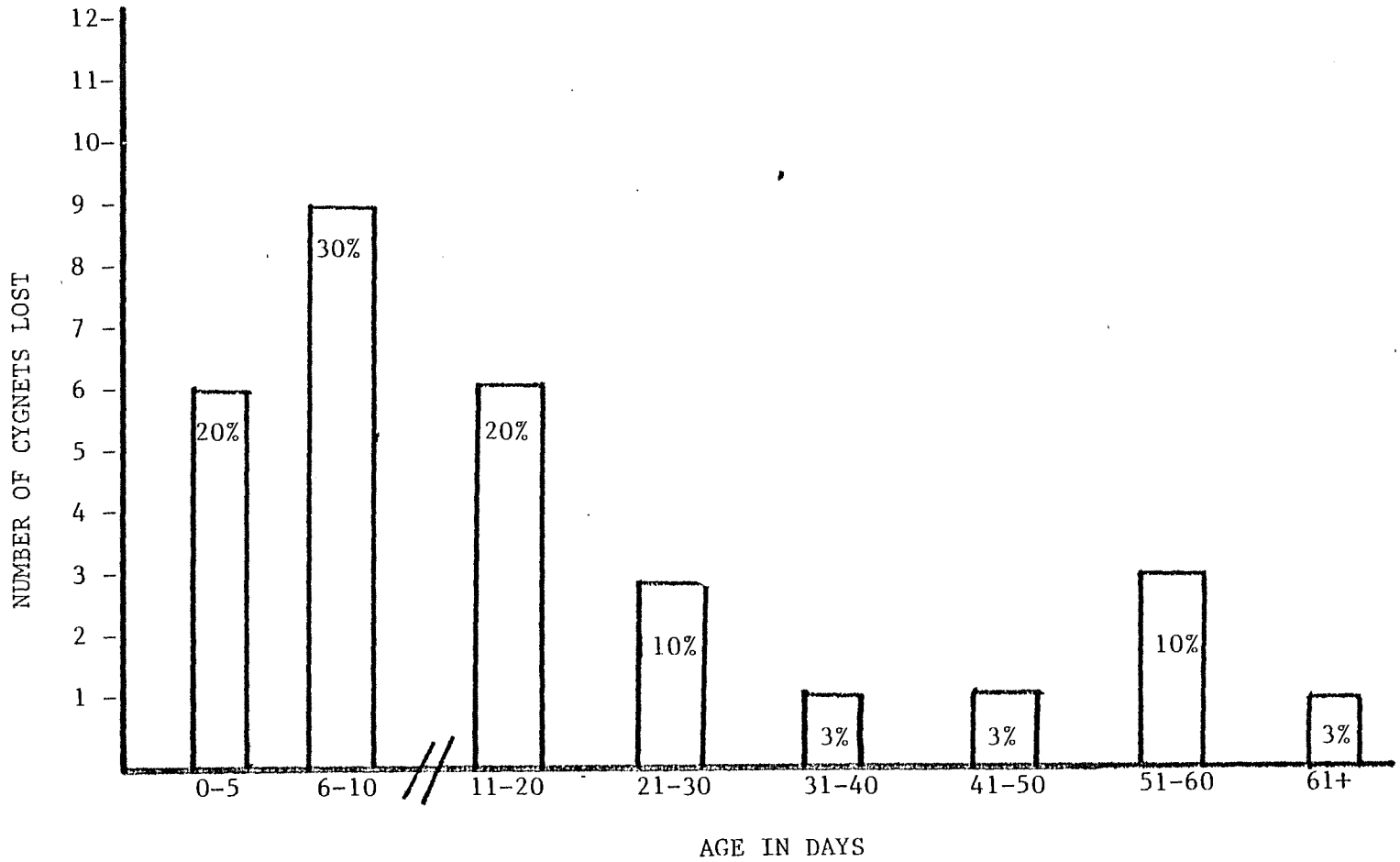


FIGURE 4 Chronology of cygnet loss in 1985 (data from Table 12)

TABLE 13. Chronology of Cygnet Deaths by Age Period, 1981-1985.

	Age of Cygnet in Days								
Year	0-5	6-10	11-20	21-30	31-40	41-50	51-60	61+	Total Cygnets Lost
1981	6(19%)	14(44%)	2(6%)	5(16%)	1(3%)		1(3%)	3(9%)	32
1982	12(24%)	17(33%)	13(25%)	3(6%)	2(4%)	3(6%)		1(1%)	51
1983	9(24%)	6(16%)	9(24%)	7(18%)	3(8%)		3(8%)	1(2%)	38
1984	9(21%)	8(19%)	11(25%)	12(28%)	2(5%)	1(2%)			43
1985	6(20%)	9(30%)	6(20%)	3(10%)	1(3%)	1(3%)	3(10%)	1(3%)	30
TOTAL	42	54	41	30	9	5	7	6	194
%	22%	28%	21%	15%	5%	2%	4%	3%	

We first documented high cygnet loss here during the early years of this study and initially speculated it might be due to diseases or parasites. We had been finding a fair number of dead cygnets, so decided that predation was not a major factor. We sent some cygnets to the National Wildlife Health Lab for necropsy and received results that indicated no disease or parasite problems. We also had over 100 blood samples analyzed for parasites and none were found. With information only obtainable through a longterm study such as this one it now appears that weather may be the most important factor influencing cygnet survival. During unusual years when the weather has been mild during June and early July, cygnet survival has been better (e.g. 1984) than most years when the weather is normally wet, foggy and windy (e.g. 1985). For example, June and early July in 1984 were unusually dry and slightly warmer than normal and cygnet survival was well above average. In 1985, the temperature was several degrees colder than normal and precipitation was back at normal levels. Compared to 1984, 1985 was colder, wetter and had high average wind speeds. 1984 was the best year for cygnet survival while 1985 was one of the worst.

With several years' data on production by neck-collared swans, we have shown that neck collars have no adverse behavioral impacts on tundra swan nesting. This year nine marked pairs nested (Table 14). The female wore a neck collar in all nine pairs and the male also had a collar in five of the pairs. Normally the hatching success rate for marked pairs has been higher than all swan pairs. But this year only four (44%) of the nine successfully hatched, similar to the overall rate of 46% for all pairs. The average clutch size of 44 for marked pairs was identical to the average clutch for all pairs.

For the nine marked swan nests combined, the male was observed incubating seven times and the female 23 times. Although occasionally the male is on the nest more than the female, normally the female does the majority of the incubating. It is interesting to note in contrast, that trumpeter swan males apparently never incubate.

So far, we have still not had any swans nest that were banded as cygnets. The mortality rate in cygnets is high even after their first year. We have banded 111 cygnets so far, but the vast majority of them have not survived to breeding age. Those few that have survived (we have a couple that are now five to seven years old) have not bred yet. We have a saturated, stable swan population. Apparently a swan must be several years older than its biological breeding age to establish a territory and successfully nest.

TABLE 14 Summary of Nine Nests Made by Neck-Collared Swan Pairs in 1985

Nest No.	Collar Number (Male/Female)	Bird Incubating Nest		Clutch	Outcome[1] (date)	Number of Cygnets	
		Male	Female			At Hatch	Flight
13	Uncoll./TO	-	-	?	DM(5/30)	-	-
15	3F/4J	3 (27%)	8 (73%)	4	DM(6/26)	-	-
16	61/46	2 (50%)	2 (50%)	5	H(6/8)	5	4
17	M5/K4	0	4 (100%)	6	H(6/8)	4	2
19	3P/8C	0	1 (100%)	5	H(6/12)	5	0
20	Uncoll./A3	0	3 (100%)	1	DM(6/8)	-	-
21	Uncoll./A6	2 (33%)	4 (67%)	5	DA(6/10)	-	-
23	U3/72	0	1 (100%)	5	DM(6/5)	-	-
35	Uncoll./2U	-	-	?	H(6/11)	3+	1
		7 (23%)	23 (77%)	31 (avg. 4.4)		17	7

[1] H-Hatched; DM-Destroyed, probably mammalian; DA-Destroyed, probably avian.

To date we have obtained information on breeding age from five swans neck-collared when they were one-year-old. Swans 49 and 50 were both collared in 1980 as one-year-old birds and had an unsuccessful nest in 1981 as two-year-old birds. They nested in a marginal area normally used by few swans. The area had not had a nest before, possibly explaining this pair's ability to have a nest at an early age. Swan 49 nested unsuccessfully again in 1982. The third known age individual that has nested is swan 46, who was banded in 1979 as a yearling. In 1981 when she was recaptured her cloaca was stretched, possibly indicating a nesting attempt, but it seems unlikely since the area she frequented was near Cold Bay and thoroughly searched. This bird was observed every summer since 1979, but had its first known nest in 1984 as a six-year-old bird. She nested successfully at Bluebill Lake (a prime nesting territory) with an experienced male (61) who had broods in earlier years with two different females. In 1985, she again had a successful nest with 61 at Bluebill Lake, hatching five young and raising four to flight stage.

Two additional known age birds paired and nested in 1985. Female swan 72 was banded as a yearling in 1980 and male swan U3 was banded as a yearling in 1981. This year they had a nest (#23) in the southwest part of Izembek NWR, but their nest was destroyed. Last year (1984) a double collared pair had a nest in the same location, but we were unable to read the collars before their nest was destroyed and they dispersed. From this year's information, it appears highly probable that U3/72 nested for the first time in 1984 at the ages of four and five years, respectively.

To summarize, there has been quite a wide variation in age at first nesting here possibly due to the stable nature of the population and "saturated" nesting territories. First nesting has occurred for the five known age swans at two (two swans), four, five and six years old.

Swan T0 continues to hold the record for most consecutive years nesting, having nested for five years in a row ('81 through '85). One pair (M5/K4) has nested four years in a row ('82-'85) and one individual (61) has also nested four years, though not consecutively and not with the same mate. Swan 61 nested in '81, '82, '84 and '85 with three different mates. Several other pairs and one individual have nested three years in a row, including 23/28 ('77, '78, '79); 45/48 ('81, '82, '83); C9 ('81, '82, '83); Y4/K9 ('81, '82, '83); Y7/A7 ('82, '83, '84); 8C/3P ('83, '84, '85); and 3F/4J ('83, '84, '85). In addition, swan 74 nested three years ('80, '82, '83) but not consecutively and with two different mates.

As in previous years, brood movements were monitored to identify the extent of brood rearing habitat with special

emphasis on the location of preferred areas. Lakes with outlets large enough to support even a small run of salmon were fertile and had good stands of aquatic vegetation (primarily Potamogeton perfoliatus, P. filiformis and Sparganium hyperboreum). Ponds with similar vegetation stands are present in wet marshes and these, in addition to the somewhat deeper lakes with salmon runs, were used preferentially by swans during the nesting, molting and brood rearing periods. We are collecting data on lake type and use on a seasonal basis and feel this is essential to providing the protection necessary to maintain the tundra swan population and to protect refuge wilderness habitats. Additional limnological information was gathered on these lakes in 1985 by the Fisheries Research crew.

This was a record year for swan banding. We caught 139 new swans plus seven previously marked swans (Table 15). Last year was the first year the refuge aircraft was on floats and we had hoped this would facilitate banding swans. But unfortunately, the weather and press of other duties combined to leave little time for a test of the utility of floats for banding. This year we finally were able to try the floats out for banding and they proved very successful. The ability to reach many heretofore inaccessible areas plus having an extra "boat" on the banding lakes combined to make a successful banding season.

We put neck collars and plastic and metal tarsus bands on 111 of the new swans captured before running out of the plastic markers. Metal legbands only were placed on the remaining 28 new swans captured. In addition to placing the markers, we recorded age, sex, plummage characteristics, eye color, size of bill, size of yellow spot on lores, wing and leg measurements. Weight and presence or absence of external parasites were also recorded. Before releasing the swans, photos of facial pattern were taken.

This year, banding efforts were expanded into the Pavlof Unit along the Caribou River near Nelson Lagoon. A large swan population occurs in this area. We were anxious to determine if these were part of the resident flock which remains here all winter or if they migrate to the Lower 48. Five of us used Paul Gunderson's "cabin" for a base camp. On July 29 and 30 we made four different banding drives and captured 77 swans (neck collaring 50), including the most ever (35) in one drive. We were surprised at how easy and cooperative these birds were to capture. They were obviously not as "experienced" with banding drives as Izembek birds!

In particular while banding the Pavlof Unit birds, the floatplane proved invaluable. Up to 28 bandings were made in one day shuttling personnel, equipment and captured swans to various locations. Our two YCC employees got to

Dipnetting from inflatable boats is our primary capture technique for molting tundra swans.

Mats of aquatic vegetation shown here slow the operation by continually binding the propeller of the outboard motor. (410)10
(Sarvis-8/15/85)

Fifty neck collars were placed on tundra swans on the eastern portion of the Pavlof Unit in 1985 and 25 other swans were leg-banded in this area. We have one report of a bird which migrated to Washington, but have seen none of these birds ourselves this winter. (415)38
(Sarvis-7/24/85)

This cygnet, held by ARM Blenden, was capable of short flights when captured during banding operations in 1985. It eventually tired enough that we were able to capture it. (424)26
(Sarvis-8/23/85)

TABLE 15 Summary of Tundra Swans banded and neck-collared in 1985, Izembek NWR and vicinity.

Date	Location	ASY M	ASY F	SY M	SY F	L-M	L-F	Neck Collar Codes
7/22/85	L.#119-Outpost Rd.	1	1					5M,8M
7/22/85	L.#31(nr. Crabarm L.)				1			0M
7/22/85	L.#3(nr. Kinzarof)		1					AA
7/23/85	L.#98(nr. N. Record L.)	3		3	8			7M,9M,AC,AF,AJ,AK, AM,AP,AT,AV,AY,PC, PP,PT
7/24/85	Morzhovoi L.	1	4	4	7			CA,FA,FC,FP,FT,JA, KA,MA,PA,PJ,PK,PU, TA,TT,VA,YA
7/25/85	L.#45(Baldy Village)		1					FF
7/25/85	L.#22(Grant Pt.)	1	1					CK,FU
7/25/85	L.#183(S. end)	1	1					FJ,TC
7/29/85	Seal L.(Caribou R.)	12	13	1	3			CC,CF,CJ,CP,CT,FK, FM,FY,JF,JT,KC,KF, KP,KT,KU,MF,DF,TF, TJ,TK,TP,TU,UF,YC, YF,YP,YT,YU,YY
7/29/85	3 Section L.(Caribou R.)	4	4	1				CU,JC,JJ,JP,JU,TY, YJ,YK,YM
7/29/85	Cabin L.(Caribou R. area)	1	1					JK,MJ
7/30/85	35 Swan L.(David R. area)	1	5	1	3			CY,JY,KJ,KK,KY,MK, MM,MY,PY,UY
8/5/85	Cathedral L.	1	1			2	2	MP,MT,MU,UC,UP,UT
8/15/85	Bluebill L.					1	3	PM,TM,UJ,UK
8/23/85	L.#73(nr.Morzhovoi L.)					4		CM,JM,UM,UU
8/23/85	L.#52(Bering Inlet area)						1	MC
8/24/85	Paul Hansen's L.					1	2	KM,81,90
8/26/85	Upper Left-Hand Valley	1				1	1	89,98,99
8/26/85	L.#55(nr. Surprise L.)	1						91
Total - 1985		28	33	10	22	9	9	111
Cummulative Total (1978-1985)		98	119	27	43	54	57	398

1. In addition, C7, K5, 2U, 9U, 7K, 1M and 2M were recaptured in 1985.

2. Also, 28 additional swans were legbanded only in 1985: (13-ASY-M, 7-ASY-F, 4-SY-M, 1-SY-F, 1-L-M, and 2-L-F).

experience Alaskan style camping, too. The first night they gleefully claimed the cabin (bear proof they said) while the rest of us chose a tent (mosquito proof). For some reason, our contented smiles while we peacefully slept kept being interrrupted by a lot of thrashing, slapping and cussing sounds in the nearby cabin.

Results of the Pavlof Unit bandings are beginning to trickle in, but are still too few to make final conclusions. So far we have reports of three individuals observed in the Lower 48, CP near Conway, Wash., on January 19 and CT and JY near Corvallis, Ore., on January 19 and February 5. 16 out of 61 swans collared in the Izembek area in 1985, were identified at Unimak on January 24, 1986, while none of 50 Pavlof Unit birds were there. So far no Izembek birds have been reported wintering in the Lower 48 this winter while three Pavlof Unit birds have been identified.

In 1985, 22 (15%) of the 146 swans captured had leeches (Theromyzon rude) in their eyes (Table 16). Over the eight years that we have checked swans for leeches, 95 (20%) out of 391 have had them in their eyes. Eighty-six had leeches (up to four) in one eye and nine had leeches in both eyes. They do not appear to be causing significant mortality, but one wonders how much a swan's forward vision is affected by the large bulge a leech causes under the nictitating membrane.

After eight years of neck collaring swans, our resightings card file is bulging. Of the 398 swans collared so far, 264 (66%) have been resighted at least once since collaring (Table 17). As of this writing, we have compiled 6,223 observations of individual swans. Each different date that a swan is observed is counted as one observation. Our need for some computer time is obvious. We had hoped to begin analyzing this information and compiling it for publication this winter. Unfortunately, staff shortages and the press of other duties precluded accomplishing any more than what is included in this report.

The most observed individual so far is swan 61 (an adult male collared in 1980) who has been seen 153 times. This bird has been an interesting one. He nested and successfully raised broods in 1980 and 1981, did not nest in 1982 or 1983, and again nested and successfully raised a brood in 1984 and 1985. In three of the four nesting years, he was with a different female. In 1980, he nested and raised three cygnets (63, 64, 66) with swan 62 in the Y lakes area. Swan 62 was last seen 10/24/80. On 3/9/81, he was observed with swan 16, and they raised one cygnet (U0) in 1981, again, in the Y lakes area. That year he did most of the incubating. Swan 16 was last observed on 2/5/82. During the summer of 1982, 61 was not observed, but we are 99% sure he did not nest, since all nests were located in

TABLE 16 Occurrence of Leeches in Tundra Swan Eyes, 1978-1985.

Year	ASY-M	ASY-F	SY-M	SY-F	L-M	L-F	Total Swans W/Leeches	Swans W/O Leeches
1978	1	2			1	2	6(22%)	21
1979		1					1(6%)	17
1980	3	3					6(14%)	38
1981	7	6		4	3	2	22(29%)	54
1982	4	3			1		8(12%)	58
1983	6	4	3		4	6	23(26%)	67
1984	4				1	2	7(37%)	12
1985	9	4	2	1	2	4	22(15%)	124
Totals	34	23	5	5	12	16	95(20%)[1]	391

[1]86 swans had leeches in one eye and nine had leeches in both eyes.

TABLE 17 Summary of Neck-Collared Tundra Swan Observations

Time Period	Year Collared 1978	1979	1980	1981	1982	1983	1984	1985	Total
Prior to Collaring[1]	30	68	261	1,013	293	854	45	238	2,802
1978-Band thru Fall	120								120
1979-Winter	12								12
1979-Spring to Molt	51								51
1979-Band thru Fall	15	23							38
1980-Winter	10	15							25
1980-Spring to Molt	18								18
1980-Band thru Fall	22	1	174						197
1981-Winter	10	5	43						58
1981-Spring to Molt	217	17	338						572
1981-Band thru Fall	29	1	26	253					309
1982-Winter	5	2	31	37					75
1982-Spring to Molt	5	3	111	53					172
1982-Band thru Fall	8	2	34	22	183				249
1983-Winter	3	1	8	11	20				43
1983-Spring to Molt	6		83	63	147				299
1983-Band thru Fall	6		19	5	12	328			370
1984-Winter	2		9	8	8	221			248
1984-Spring to Molt			23	9	22	100			154
1984-Band thru Fall	2		2	3	4	15	18		44
1985-Winter					1	13			14
1985-Spring to Molt	2		43	13	36	62			156
1985-Band thru Fall	4		6	1	1	4	4	130	150
1986-Winter	2		4	4	8	9	4	16	47
Total Observations	579	138	1,215	1,495	735	1,606	71	384	6,223
Number Collared	27	16	37	66	52	76	13	111	398
Number Resighted At Least Once	25	9	36	54	38	66	7	27	262
Resighting Rate	93%	56%	97%	82%	73%	87%	54%	24%	66%

[1]Consists mainly of observations of individually recognizable broods and parents prior to initial neck collaring.

1982. He was next observed 1/17/83 wintering at Unimak again, and then seen 5/31/83 paired with swan 46. They did not nest in 1983. Then in 1984, 61 and 46 nested in a new territory (Bluebill Lake) and raised two cygnets (5K, 2H). Again this year, 61 and 46 nested at Bluebill Lake and raised four cygnets (PM, TM, UJ and UK). He is again nesting at Bluebill Lake in 1986, but his mate is uncollared. We have not yet determined if his mate is new or if 46 has lost her collar.

In contrast to swan 61, swan 23 (after raising broods with 28 in 1977, 1978 and 1979) lost his mate in early 1980. He has been observed every year since. Some of the times he was alone and some with five different females (16, Y0, F8, 6T, and an uncollared swan); yet he has never re-nested in six years. Swan 23 is one of the older swans we know of, being a minimum of 13 years old now, which may explain his failure to breed lately. He has been observed 82 times with the latest observation February 2, 1986, at Peterson Lagoon.

Fall and early winter of 1985 were mild with most water remaining open almost until year's end. Consequently, by December swans still had not built up to peak numbers at Unimak Island. The last few days of December brought colder temperatures and all of January 1986 was cold, causing swans to finally concentrate at Peterson Lagoon and Cape Lapin River (see next year's report for further details).

Black Brant

The Alaskan nesting population of black brant, primarily those using the Yukon-Kuskokwim Delta, continues to decline while the Pacific flyway population as a whole undulates around a gradual, but less severe, long-term decline. It has become apparent to refuge staff and others that assessments of nesting success, colony size and population dynamics information from the Canadian arctic and Wrangel Island (USSR) as well as Alaskan breeding areas is necessary to more precisely manage the flyway population. The Izembek NWR area continues to be a melting-pot for the population with all but possibly the Central Canadian arctic light-bellied brant being represented. The fall status of these light-bellied birds which winter in the Puget Sound area of Washington is undetermined.

Productivity counts of fall staging black brant were begun by the Izembek NWR staff in 1963 and this year's efforts mark the 23rd consecutive appraisal. A total of 13,947 birds were classified to age with 1,915 (13.7%) being juveniles. This is identical to the proportion found last year (Table 18). This is the third lowest level of productivity thus far observed at Izembek. Production in four of the past five years has been below the 23-year

TABLE 18 Annual Black Brant Production Counts, Izembek NWR

Year	Adults	Juveniles	Total	% Juveniles
1963	3,968	1,243	5,211	23.9
1964	13,324	4,577	17,901	25.6
1965	21,210	5,050	26,260	19.2
1966	9,927	7,134	17,061	41.8
1967	15,219	3,081	18,300	16.8
1968	15,110	3,117	18,227	17.1
1969	12,829	3,577	16,406	21.8
1970	12,104	6,256	18,360	34.1
1971	4,820	1,953	6,773	28.8
1972	6,599	3,698	10,297	35.9
1973	12,025	4,999	17,024	29.4
1974	13,118	632	13,750	4.6
1975	9,396	5,452	14,848	36.7
1976	7,962	4,340	12,302	35.3
1977	8,856	4,092	12,948	31.6
1978	10,696	1,842	12,538	14.7
1979	13,674	2,349	16,023	14.7
1980	9,618	3,341	12,959	25.8
1981	4,109	936	5,045	18.6
1982	11,509	1,213	12,722	9.5
1983	6,149	1,947	8,096	24.1
1984	9,451	1,499	10,950	13.7
1985	12,032	1,915	13,947	13.7
23 Yr. $\bar{X}$	10,596	3,228	13,824	23.4

average. This is a continuous span of poor production more severe than that found elsewhere in the historical record.

Family group size data were collected concurrently with productivity counts from 20 September to 23 October. A total of 624 individual families were observed giving an average of 2.5 juveniles/family (Table 19). As mentioned, productivity was depressed in 1985 and based on our family group counts, so was survival of young (i.e. down 0.3 juveniles/family in comparison to the 23-year average). Average brood size of brant on the Yukon-Kuskokwim Delta in July was 4.4 which suggests that on the average, two young/family were lost during the interim.

Black brant were first seen this fall on 5 August, nearly two weeks earlier than normal (i.e. average is 17 August n=14 years). First arrival date last year of 6 August was comparable. This suggests a possible early migration of non and failed breeders both years from the Yukon-Kuskokwim Delta where brant experienced poor production. Peak fall influxes of black brant appear quite consistent year to year, occurring in the latter part of September.

In 1985, Izembek NWR joined with the Alaska Office of Fish and Wildlife Research to initiate a project dealing with certain parameters of the spring and fall staging and the wintering population of black brant on Izembek Lagoon. The project designed by Dirk Derksen (AOFWR) will quantify the effects of various types of disturbance on staging brant. An increase in disturbance from aircraft traffic, most notably helicopters associated with offshore oil development, is assured. We hope to minimize the adverse effects on waterfowl by using data obtained in this study. Levels of aircraft and other forms of disturbance in 1985 were at "normal" levels primarily due to the absence of oil related activities this year. Hence, an important aspect of the research effort will be to determine the behavior of staging brant and other species under such conditions. Some planned disturbances were performed using a small helicopter (Bell 206), and various forms of fixed-wing aircraft.

Various types and durations of behavioral responses of black brant and other waterfowl were noted. Numerous other aircraft disturbances were observed (i.e. approximately 0.8 flights/hour during daylight hours) and again behavioral responses were documented. Research personnel present for all or a portion of the fall data collection period included Derksen, Cal Lensink, Bob Stehn, Dave Ward, Andy Loragner and Jim Sedinger.

Two aerial counts of black brant on Izembek and adjacent lagoons were performed this fall. On 3 October, the refuge staff performed a census totaling 105,168 brant and on 13 October, Wildlife Assistance personnel Rod King (WA-MBMN)

TABLE 19 Black Brant Family Group Counts at Izembek NWR, 1974 - 1985

No. of Juveniles	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	20 Yr. X
1	26	22	36	49	13	22	26	34	18	25	19	125	36
2	44	66	59	77	31	64	47	38	22	40	49	223	67
3	19	48	78	71	29	37	57	36	25	55	70	173	62
4	13	31	40	29	24	17	39	27	20	26	39	73	36
5	2	14	19	13	10	5	7	10	4	21	10	24	12
6	1	5	4	1	3	0	0	8	0	6	4	6	3
7	0	3	1	0	0	1	1	1	0	0	1	0	1
8	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Families	105	189	237	240	110	146	177	154	89	173	192	624	218
Total Juveniles	239	543	674	603	326	361	489	431	237	515	564	1,538	585
Mean Family Size	2.28	2.87	2.84	2.51	2.96	2.47	2.76	2.80	2.66	2.98	2.94	2.46	2.72

and Bill Eldridge (WA-RO), performed a replicate survey finding 135,680 brant. Composition of fall staging population based on this peak count is presented in Table 20.

The fall population of brant remained intact until sometime between 21 October and 3 November. We estimated that 100,000 birds departed on their exodus to the west coast of Mexico during this period. Pre-migratory behavior (i.e. high spiraling flights) was noted only on the afternoon of 2 November. A census flight was performed by the refuge staff on 4 November and 21,885 black brant were estimated to still be remaining. The refuge staff notified individuals at key Pacific Coast locations when the departure occurred in the hopes that observers would be able to make sightings of migrating brant. On 27 October a flock of 100 and several smaller flocks of brant were seen arriving at Scammons Lagoon in Baja, California. We have no further data on arriving brant, so it is not possible to confirm that this movement was an index of the population's peak arrival in Mexico.

We did not get specific timing on a second departure of approximately 14,000 brant which occurred between 5 and 15 November nor were confirming sightings made in the Pacific states or Mexico. On 29 November there were still 7,765 brant on Izembek and Kinzarof lagoons which were thought to probably represent our over-wintering population. However, only 3,010 brant were accounted for during a 24 January aerial survey of the area.

We were allowed use of the USAF radar this fall in another attempt to monitor the brant departure. The equipment has been moved from the Grant Point site to a new site five miles to the southeast (see section F. HABITAT MANAGEMENT, 6. Other Habitats). The equipment is becoming too sophisticated for viewing slow moving objects (i.e. brant flocks) and in fact, is apparently designed to eliminate such `clutter', so we obtained no new data on departure directions or altitudes in 1985. This avenue of investigation, at least via the USAF, may be fruitless in the future without technical assistance from radar specialists.

Izembek NWR was given a unique opportunity to monitor black brant movements within Izembek Lagoon this fall due to the presence of a bird carrying a backpack radio transmitter. This female black brant was one of two birds marked on Melville Island in the Canadian arctic on 15 July 1985. The other bird, a male light-bellied brant, was not located in the Izembek area. The brant monitored (frequency 164.082) was located five times by aerial tracking in October and November. Interestingly, we were not able to receive the signal from shoreline positions within line-of-sight of the

TABLE 20 Composition of the Black Brant Population, Izembek Lagoon

	Number of Birds			
	1982	1983	1984	1985
Peak Count	146,945	147,933	123,602	135,680
Est. number of hatching - year birds (percent young X total)	14,004	35,652	16,933	18,588
Est. number of families (number of HY ÷ Avg. family group size)	5,265	11,964	5,838	7,435
Est. maximum number of breeding adults with young (number of families X 2)	10,530	23,927	11,676	14,870
Est. total number of sub-adults and non-and/or failed breeding adults	122,411	88,354	94,993	102,222
	(83.3%)	(59.7%)	(76.9%)	(75.3%)

bird. Although located once in Applegate Cove, the bird showed a preference for the central Izembek area (Figure 5). This bird apparently departed between 5 and 15 November but by month's end Washington Division of Game personnel had not picked up its signal in the Puget Sound area.

Spring migrating black brant began appearing in the Cold Bay/Izembek Lagoon area on 21 April. These immigrants joined approximately 6,900 brant which over-wintered in the area. Peak arrival occurred in the last week of April with some incoming birds seen as late as 15 May. An aerial survey conducted on that date including Izembek and adjacent bays and lagoons resulted in a count of 74,016 brant. Movements from Izembek to northern breeding areas was in progress in mid-May, somewhat later than normal due to cold climatic conditions. Adverse weather conditions throughout spring and summer resulted in a late year and poor productivity for brant and other coastal nesting waterfowl in Alaska.

WB Dau worked throughout the year analyzing large format (i.e. nine inch by nine inch) aerial photography of Izembek Lagoon. Numerous replicate aerial surveys performed in October 1984 and complete photographic coverage of the lagoon on 18 October provided a unique opportunity to attempt to compare ocular estimates to an actual head-count. The area from Applegate Cove to the south end of Izembek Lagoon was chosen as the sample area. Photographic coverage of this area was achieved with 46 frames of nine-inch by nine-inch color film exposed from 5,000 feet ASL (Figure 6). An alpha/numeric grid was prepared which effectively divided each photogaph into 1,296 equal quadrants (or binocular microscopic fields). To facilitate counting, each quadrant was divided into four equal parts which could be counted by viewing with a binocular dissecting microscope (Figure 7). A viewing platform, light table and data sheets were prepared and the counting process was begun.

Six aerial photographic runs over the Applegate/south end area were necessary to obtain complete coverage. Each frame has an overlap area with the frames before and after it as well as with frames on adjacent runs. These areas of over and side lap were identified and measured, so that the actual count area per frame could be determined, thereby eliminating over or under counting as much as possible. It was necessary to view 27,176 binocular microscopic fields (i.e. 591/photograph or 45.6% of each photo) to survey the entire area. A total of 3,647 (13.4%) of these had birds on them. Hence, of the estimated 42 sq. mi. in the survey area, birds were present in only 5.5 sq. mi.. The photographic coverage was accomplished on a flooding tide when birds are congregated nearer to shore, hence, the spatial distribution found was normal.

FIGURE 5 Black brant radio locations, adult female (freq. 164.082), fall 1985, Izembek Lagoon area.

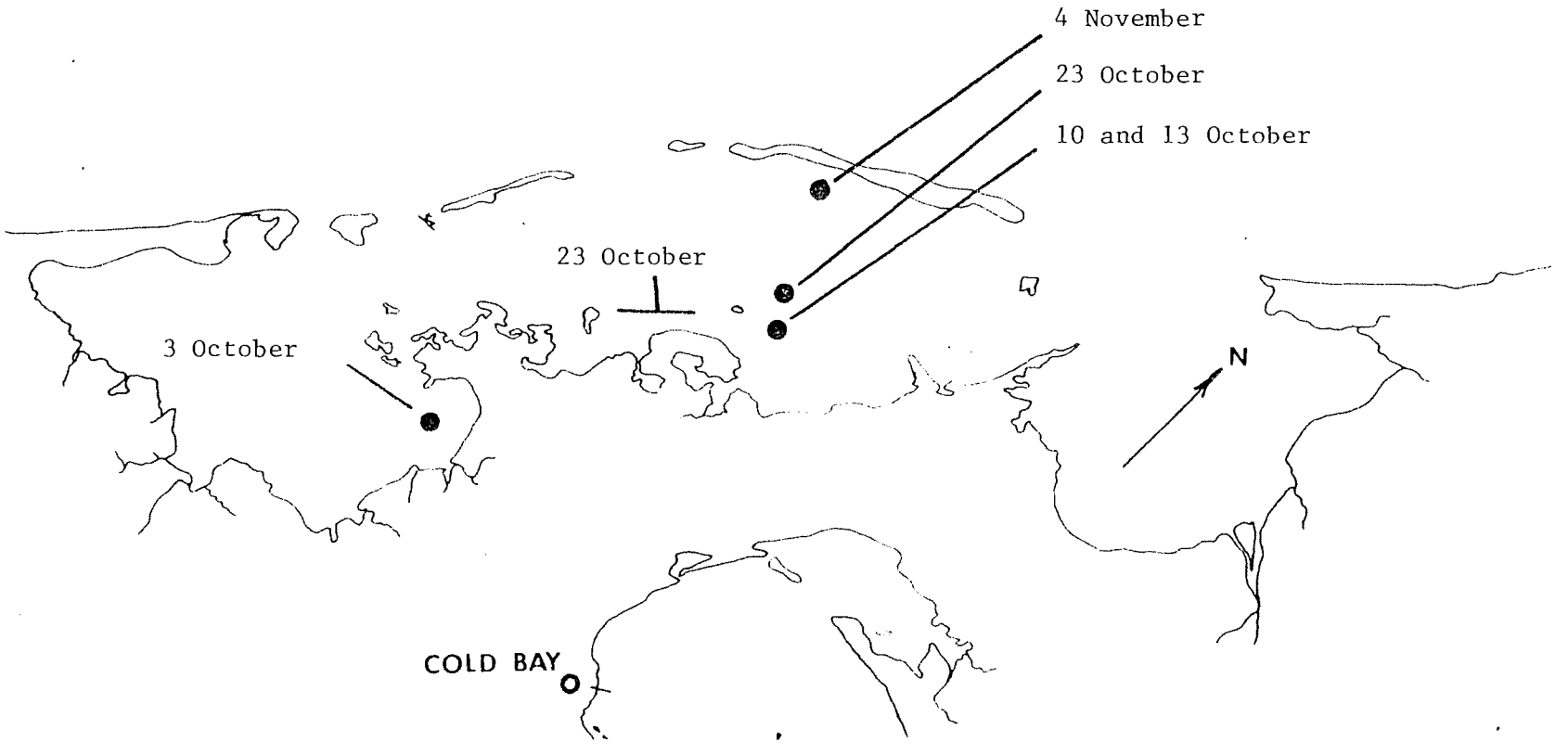


FIGURE 6 Aerial Photographic Flight Paths Flown at 5,000 feet ASL, Izembek Lagoon, 18 October 1984.

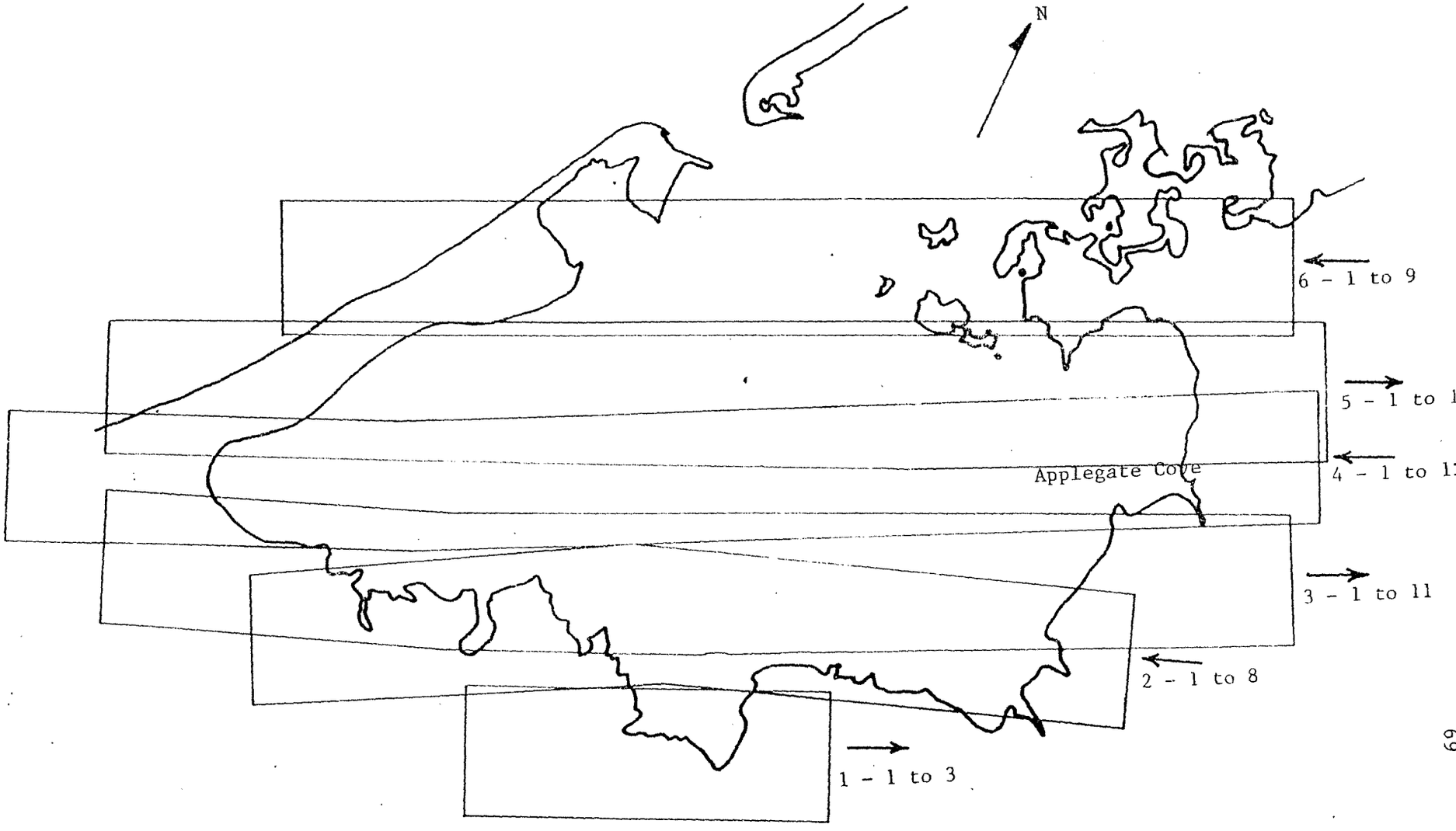
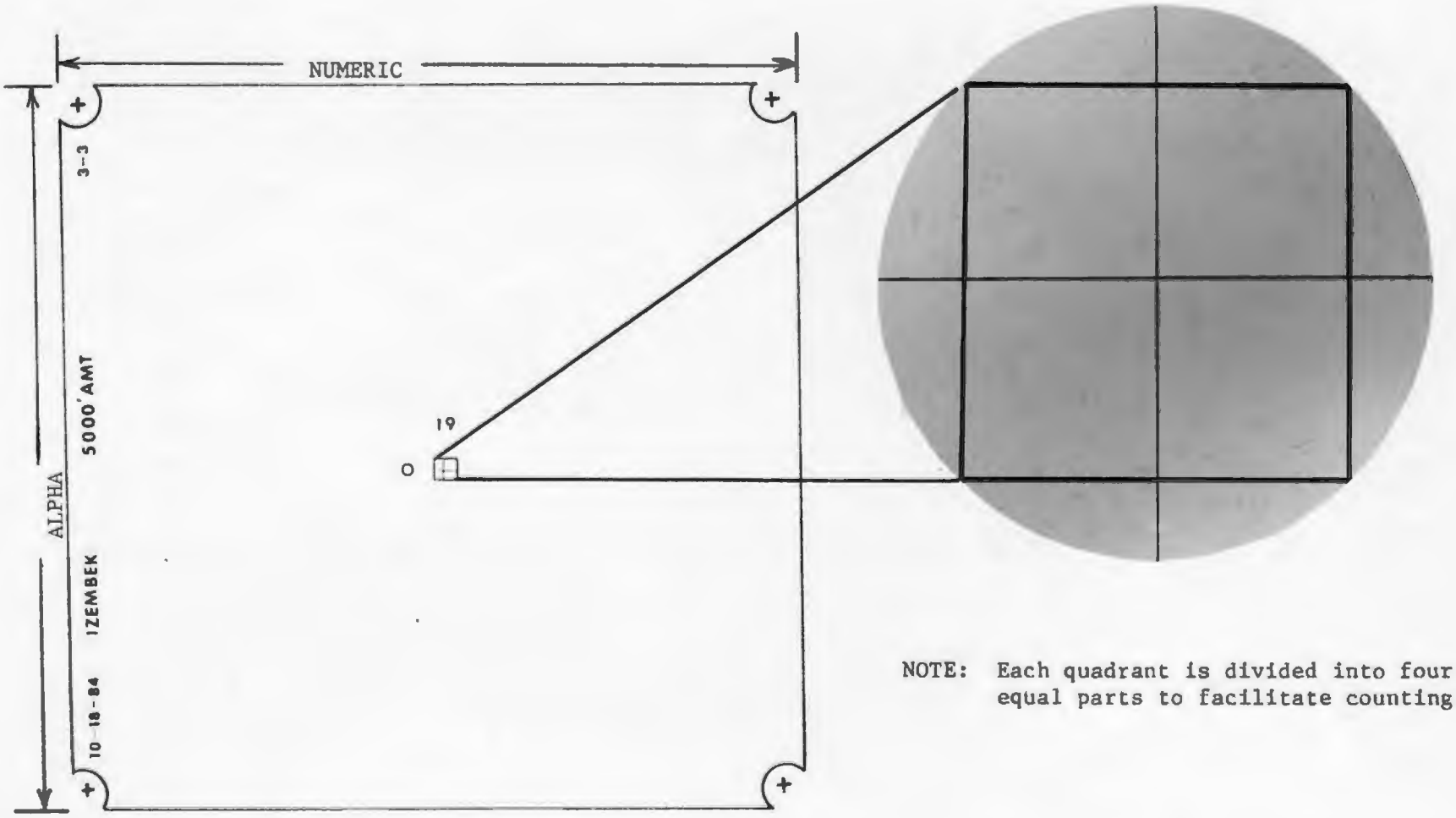


FIGURE 7 Aerial photographic counting procedure using alpha/numeric quadrants (n=1296/9"x9" photograph) viewed at 18X magnification with a binocular microscope (example not to scale).



NOTE: Each quadrant is divided into four equal parts to facilitate counting.

Total birds on the photographic count was 111,278. Species of goose could not be determined on the color negatives used and ducks could not routinely be eliminated, so they are included in the total as well (Figure 7). Numbers of ducks were determined on only one of the 31 aerial surveys performed as the emphasis was on geese. Hence, the photographic count was first corrected by subtracting the number of ducks observed on this survey of 15 October (i.e. Steller's Eider 19,448; puddle ducks 11,935). The photographic count was now of geese which were then prorated to species based on the average percent composition determined from the 31 replicate surveys (Table 21). Surprisingly, close agreement in the photographic count and the average of the aerial surveys was obtained (i.e. 79,895 geese on photographs versus 79,829 geese as the average of the ocular aerial survey).

The primary concerns relative to the establishment of an aerial photographic/aerial ocular census procedure is the high number of replicate ocular surveys necessary to estimate species' populations with 10 to 15% confidence limits and the minimum of 200 man-hours it took to view the aerial photographs of even a portion of the lagoon. It is possible now, however, to insert a "known" into the formula (i.e. number of geese) and hence, we may be able to obtain statistically valid results from such a procedure by subsampling both components (i.e. a lesser number of ocular surveys and a lesser number of aerial photographs). We will be evaluating the various possibilities at future regional migratory bird workshops.

A total of 128,570 black brant were reported during the January 1986 mid-winter inventory with 114,725 of these in Mexico (Table 22). The peak fall count for southwestern Alaska was 137,377 brant (Rod King, WA-MBMN). Considering that a minimum of 3,010 birds over-wintered in Alaska, and the bulk of hunting mortality had occurred, the fall and mid-winter censuses were in quite close agreement.

Canada Goose

WB Dau with assistance from the YCC crew and volunteer P. Blenden prepared the rocket net/banding site on 23 August. Preparations for firing were completed on 9 September. During the remainder of September and throughout most of October use of the site by geese was minimal, in fact re-baiting was not necessary. As a result no firings were made and the equipment was picked up and winterized on 18 October. A total of 418 Canada geese have been captured at this site from 1977 to 1983. No recoveries of these birds were reported during the 1984/85 hunting season. Previous recoveries have been centered primarily in the Willamette

TABLE 21 Comparison of aerial survey counts and photographic count of the Applegate Cove/Southend area, Izembek Lagoon, October 1984.

	Species (% of total geese)			Total
Index Type	Black Brant	Canada Goose	Emperor Goose	
Aerial Survey Average (n=31)	60,016 (75.2)	19,617 (24.6)	196 (0.2)	79,829
Photographic Count /1 /2	60,081	19,654	160	79,895

/1 'Goose' count prorated to species based on percent # compositions derived from aerial surveys.

/2 'Ducks' were combined with geese on the aerial photographic count. Number of ducks, determined on the basis of one aerial survey, was deleted to obtain the 'goose' count.

TABLE 22 Black Brant Mid-winter Survey Data

/1 Year	Washington	Oregon	California	Mexico (W. Coast)	TOTAL	3 Year Running Avg.
1974	6,163	1,507	480	115,340	123,490	126,483
1975	7,540	1,769	680	112,056	122,045	126,055
1976	14,111	2,100	0	130,756	146,967	130,834
1977	18,100	1,110	560	143,117	162,887	143,966
1978	8,078	1,255	10	120,070	129,413	146,422
1979	6,618	1,015	135	137,550	145,318	146,222
1980	10,107	1,790	540	181,760	194,197	156,658
1981	6,451	706	485	113,402	121,044	153,869
1982	3,113	718	565	104,918	109,314	141,518
1983	7,097	930	700	124,703	133,430	121,262
1984	11,793	641	801	131,568	144,803	129,182
1985	12,026	1,113	706	114,725	128,570	135,601

/1 Calendar year prior to January mid-winter survey (i.e. 1985 data represents survey done in January 1986).

Valley area of Oregon where the `lesser' Canada goose is undergoing a population increase. To confuse this situation, it appears that cackling Canada geese are also wintering in this area in increasing numbers.

Taverner's Canada geese made up 51% of the total estimated goose bag taken by Izembek hunters in 1985 (n=1,280 geese). This is considerably lower than the 80% recorded in 1984. Adult birds made up 67.6% of the Canada geese aged in field bag checks (n=34 geese) well above the 10-year average of 48.0% (Table 23). Juvenile geese are more vulnerable to hunting than are adults based on data from numerous studies on various species. Subjectively, the low percentage of juveniles in this fall's harvest and the high adult/juvenile ratio may suggest that Taverner's Canada geese in western Alaska exhibited very poor productivity in 1985.

Emperor Goose

Emperor goose productivity was below average (n=19 years) in 1985 for the fourth consecutive year. Ground and aerial counts conducted on Izembek and adjacent lagoons and other estuaries along the north side of the Alaska Peninsula suggested that juveniles comprised 17.9% of the population (Table 24). A total of 3,343 birds were included in this sampling which was largely accomplished using low-level oblique aerial photography. Izembek NWR coordinated with Wildlife Assistance and Research personnel to perform this year's appraisal of productivity. The refuge performed one aerial photographic flight primarily in the Nelson Lagoon area on 24 September. The remainder of our effort consisted of traditional ground counts performed from shoreline points on Izembek Lagoon and ground productivity and family group counts conducted on or adjacent to the refuge from 16 September to 4 December. Research Division personnel engaged in the black brant energetics/disturbance study were of tremendous help, collecting the bulk of the data presented (Table 25).

In both 1984 and 1985, fall migrating emperor geese arrived approximately 10 days earlier than normal (i.e. 4 August in 1984 and 3 August in 1985). This suggests that some birds, probably non and failed breeders initiated and completed the molt (i.e. flightless period) ahead of normal in these years, which in terms of break-up on the Yukon-Kuskokwim Delta were average and late,respectively. No birds observed on the Yukon-Kuskokwim Delta were flying by the first week of August (Margaret Peterson, personal communication) suggesting that early migrants arriving at Izembek this fall may be molters from St. Lawrence Island.

Production of emperor geese monitored in July on the Yukon-Kuskokwim Delta was depressed with 64% of 417 nests

TABLE 23 Age Ratio of Canada Geese in Hunter's Bags, Izembek NWR

Year	Canada Geese Harvested Adults (%)	Immatures (%)	Total	Adult: Immature Ratio in Harvest
1976	78 (38.6)	124 (61.4)	202	1.00:1.6
1977	32 (43.2)	42 (56.8)	74	1.00:1.3
1978	29 (37.7)	48 (62.3)	77	1.00:1.7
1979	98 (53.3)	86 (46.7)	184	1.10:1.0
1980	30 (43.5)	39 (56.5)	69	1.00:1.3
1981	113 (57.1)	85 (42.9)	198	1.30:1.0
1982	74 (50.7)	72 (49.3)	146	1.03:1.0
1983	51 (49.1)	53 (50.9)	104	1.00:1.04
1984	37 (41.6)	52 (58.4)	89	1.00:1.4
1985	23 (67.6)	11 (32.4)	34	2.09:1.0
TOTAL	565 (48.0)	612 (52.0)	1,177	1.00:1.08

TABLE 24 Emperor Goose Productivity Counts

Izembek NWR, 1966 - 1985

Year	Adults	Juveniles	Total	% Juveniles	No. of Families	Family Group Size
1966	699	265	964	27.5	132	2.5
1967	1,457	585	2,042	28.7	66	3.3
1968	1,195	585	1,780	32.9	40	2.8
1969	4,149	2,980	7,129	41.8	161	3.3
1970	9,722	4,933	14,655	33.7	383	2.9
1971	8,142	3,458	11,600	29.8	480	2.7
1972	4,680	2,270	6,950	32.7	210	3.1
1973	-	-	-	-	-	-
1974	2,025	377	2,402	15.7	50	2.6
1975	744	405	1,149	35.2	51	2.9
1976	1,023	324	2,247	14.4	207	2.7
1977	996	683	1,679	40.7	108	2.8
1978	1,395	495	1,890	26.2	62	3.0
1979	841	113	954	11.8	53	3.3
1980	1,777	586	2,363	24.8	40	2.3
1981	1,067	495	1,562	31.7	181	3.2
1982	1,653	140	1,793	7.8	32	2.7
1983	1,058	393	1,451	27.1	192	3.2
1984	2,753	795	3,548	22.4	79	2.8
1985	2,245	503	2,748	18.3	125	2.8
19 Yr. $\bar{X}$	2,834	1,135	3,969	28.6	147	2.9

TABLE 25 Emperor Goose Productivity Data Collected at Times and Locations Along the Alaska Peninsula, 1985.

DATE	LOCATION	TYPE OF SURVEY	NO. FLOCKS	X FLOCK Size	TOTAL GEESE	NO. JUVENILES (%)	REMARKS
24 Sept.	Nelson Lagoon	Aerial Photo	51	26	575	120 (20.8)[1]	Izembek staff
16 Sept./ 4 Dec.	Izembek Lagoon	Ground	NA	NA	2,748	503 (18.3)	Izembek staff & Rsrch
2 Oct.	Cinder River	Aerial Photo	-	-	51	8 (15.6)	Wildlife Assistance
2 Oct.	Seal Islands	"	-	-	171	36 (21.0)	" "
3 Oct.	Nelson Lagoon	"	-	-	113	9 (0.8)	" "
3 Oct.	Izembek Lagoon	"	-	-	272	31 (11.4)	" "
6 Oct.	Nelson Lagoon	"	-	-	503	91 (18.1)	" "
6 Oct.	Izembek Lagoon	"	-	-	472	104 (22.0)	" "
6 Oct.	Morzhovoi Bay	"	-	-	402	68 (16.9)	" "
10 Oct.	Cinder River	"	-	-	283	21 (7.4)	" "
10 Oct.	Seal Islands	"	-	-	241	61 (25.3)	" "
10 Oct.	Port Heiden	"	-	-	156	34 (21.8)	" "
10 Oct.	Nelson Lagoon	"	-	-	65	3 (4.6)	" "
10 Oct.	Izembek Lagoon	"	-	-	39	4 (10.3)	" "
TOTAL					6,091	1,093 (17.9)	

[1] Based on a weighted average proportioned by subsamples within individual flocks there were 19.4% juveniles in the 24 September sample.

hatching one or more eggs. Although slightly better than the 60% nesting success reported in 1984, we found a lower productivity rate in 1985 versus 1984 based on our surveys at Izembek. Subjectively, these observations also suggest that the Soviet component of the population may have exhibited very low production in 1985 in comparison to 1984. Soviet nesting emperor geese may comprise approximately 25% of the total population and our management efforts are hampered due to the lack of annual census and production information from these nesting areas. These data suggest that failed breeders were numerous in the population both years and this factor may have manifested itself in an early fall migration. Researchers on the Yukon-Kuskokwim Delta found the average clutch size for emperor geese in 1985 to be 5.1 eggs/nest (n=265). Average brood size in July was 3.5 young/family. Average family group size based on fall ground counts at Izembek, was 2.8 young/family group. This suggests a loss of approximately one young/family during the interim.

The Izembek NWR staff performed three aerial surveys of emperor geese on Izembek and adjacent lagoons to determine numbers present. These were performed on 3-4 October and 29 November with counts being 4,883, 4,695 and 2,774 geese, respectively. Another count performed from 10-14 October by Rod King and Bill Eldridge (WA-RO) throughout southwestern Alaska put the total population of emperor geese at 59,972.

"Declining numbers of emperor geese" is the concensus of local and non-local hunters familiar with the Izembek Lagoon area. However, 17 years of aerial surveys conducted during the peak fall staging period from mid-September through October suggest the average population to be 5,904 $\pm$ 2,960 (1SD) emperor geese. Although our 1985 counts during this period are below average and possibly indicative of the overall population decline, we feel that local distributional shifts may have occurred due to disturbance including selective hunting pressure. Local hunters prefer Canada geese due to superior palatability, however, non-local hunters are more interested in shooting emperor geese due to their uniqueness and color plummage. Emperor geese continue to make up a consistently low percentage of the total estimated goose take on the refuge. In 1985, we estimated the emperor goose harvest at 120 birds or 9.3% of the total take of 1,280 geese (See H. PUBLIC USE, 8. Hunting). Emperor geese comprised 10% of the harvest in 1984.

Three neck-collared emperor geese were observed by Research personnel in September and October. Two adults (48C and 29C) with four uncollared young were observed east of Grant Point on 27 September. A single adult (96J) was observed on 1, 12 and 21 October in the Grant Point area. These birds were captured and marked during banding operations conducted

at Kokechik Bay on the Yukon-Kuskokwim Delta on 29 July 1984 (29C, 48C) and on 3 July 1985 (96J).

The fifth annual spring emperor goose survey in southwestern Alaska was performed by Rod King (pilot, WA-MBMN) and WB Dau (observer, Izembek NWR) from 12 to 16 May 1985. Timing of the 1985 survey was delayed due to cold temperatures and inclement weather which effectively slowed the progression of spring migration of emperor geese out of the Aleutian Islands. A total of 58,833 emperor geese were observed. Numbers of emperor geese observed, summarized by survey segment, are presented in Table 26 and a mapped distribution of observations in Figure 8. The 1985 total suggests a 17.3% reduction from the 1984 spring count of 71,217 birds. Supplementary reconnaissance and counts were accomplished prior to the survey by personnel of the Alaska Peninsula NWR. These flights enabled the survey crew to refine the starting time of the project. Weather conditions on 12 and 13 May were excellent, permitting coverage of the Bethel to Naknek and Naknek to Cold Bay segments, respectively. Freezing rain precluded survey attempts on 14 May. Remaining survey segments including the south side of the Alaska Peninsula were flown on 15 and 16 May.

On 11 May and 13 May, supplementary counts, of the south and north sides of the Alaska Peninsula, respectively, (east of Cold Bay) were performed by Randall Arment (pilot/observer) and Dwight Mumma (observer) of the Alaska Peninsula NWR. Comparison of emperor goose numbers in comparable segments of these surveys showed close agreement (ie. King/Dau=53,856; Arment/Mumma=57,315).

We believe very few emperor geese were outside of the survey area during the 12-16 May period. Michael Reardon (Yukon Delta NWR) received a report of an emperor goose sighting at Toksook Bay on 11 May; however, none were reported at coastal field camps to the north until 17 May with peak influxes occurring 20 to 21 May. Hence, we believe very few birds were north of the survey area on 12 May. Only 185 emperor geese were seen west of Izembek Lagoon and Cold Bay suggesting that essentially all birds had left the Aleutian Islands.

Dr. E. Lobkov of the Kronotzky State Reserve in eastern Kamchatka reports that few emperor geese are seen in the Commander Islands, Kurile Islands or along the eastern coast of Kamchatka during spring migration (personal communication). This further supports our belief that the vast majority of the emperor goose population is found in southwestern Alaska during spring migration and that this survey is our most accurate index of population size.

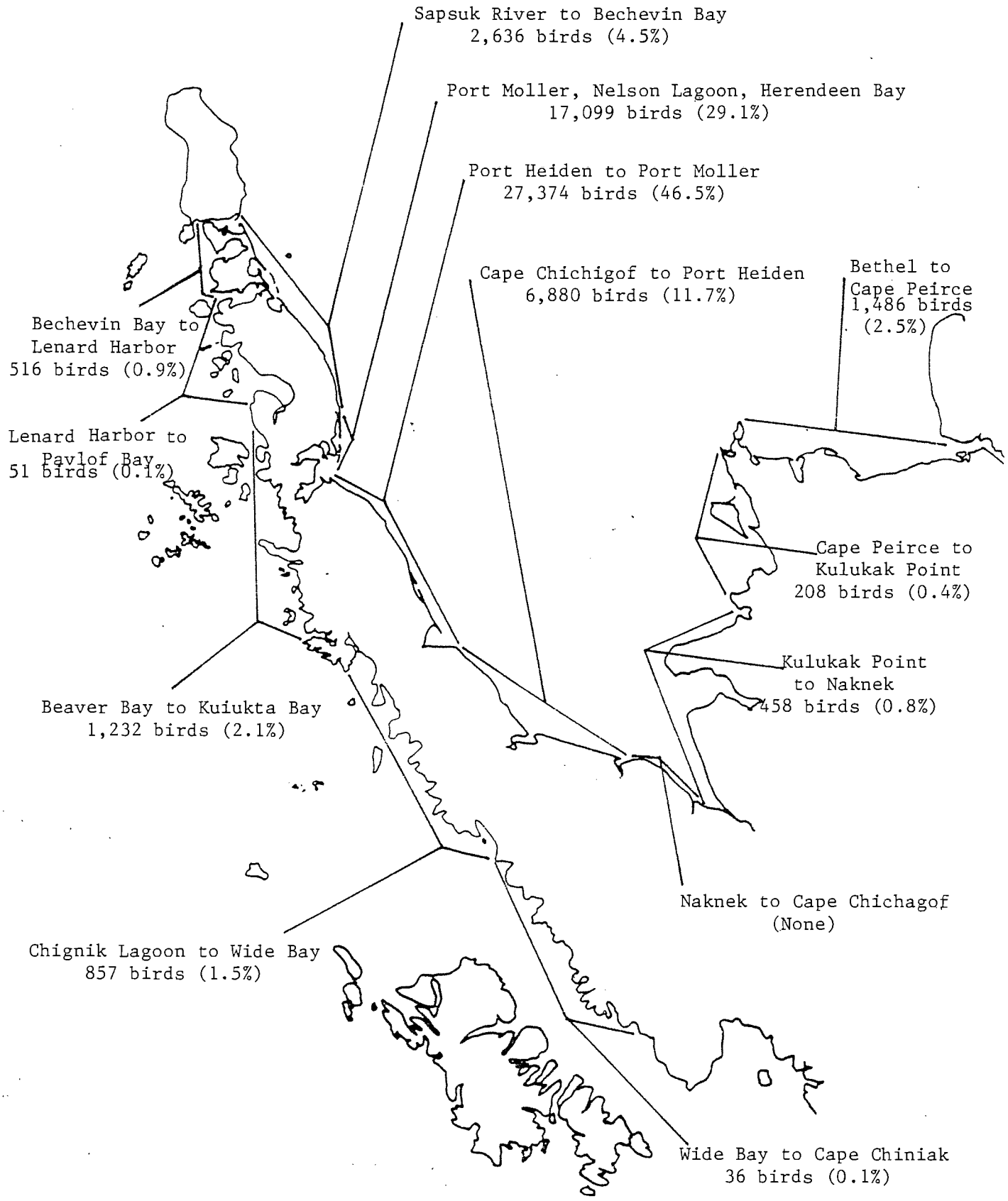
The emperor goose population continues to decline based on these coordinated spring aerial surveys in southwestern

TABLE 26

Summary of Emperor Goose Sightings By Survey Area, 12 - 16 May, 1985

Date	Location	Number of Emperor Geese	Observers
12 May	Bethel to Kwigillingok (mouth of Kushkokwim R.)	0	King/Dau
"	Eek Island to Quinhagak	0	"
"	Quinhagak to Jacksmith Bay	425	"
"	Jacksmith Bay to Carter Bay	179	"
"	Carter Spit to Platinum	77	"
"	Platinum to Security Cove (incl. Chagvan Bay)	82	"
"	Security Cove to Cape Peirce (incl. Nanvak Bay)	723	"
"	Cape Peirce to Tongue Point	208	"
"	Tongue Point to Kulukak Point	0	"
"	Kulukak Point to Dillingham	458	"
"	Dillingham to Nakeen	0	"
13 May	Nakeen to Cape Chichagof	0	"
"	Cape Chicagof to Goose Point (incl. Egegik Bay)	520	"
"	Goose Point to Cape Menshikof (incl. Ugashik Bay)	789	"
"	Cape Menshikof to Port Heiden (incl. Cinder River Estuary and Hook Lagoon)	5,571	"
"	Port Heiden to Base of Strogonof Point (incl. Port Heiden)	20,447	"
"	Base of Strogonof Point to Ilnik (incl. Seal Islands Lagoon)	6,927	"
"	Ilnik to Port Moller (village)	0	"
"	Port Moller (village) to Point Divide	23	"
"	Point Divide to Sapsuk River mouth (incl. Herendeen Bay, Nelson Lagoon, Mud Bay and Kudobin, Deer and unnamed sand islands)	17,076	"
"	Sapsuk River mouth to Moffett Point	0	"
"	Moffett Point to Strawberry Point (incl. Moffett Bay)	1,246	"
15 May	Strawberry Point to Cape Krenitzin (incl. Izembek Lagoon and Applegate Cove)	1,390	"
"	Cape Krenitzin to Chunak Point (incl. Hook Bay, St. Catherines Cove and Hot Springs Bay)	0	"
"	Boiler Point to Littlejohn Lagoon (incl. Little, Middle, Big and Littlejohn Lagoons)	185	"
"	Littlejohn Lagoon to Delta Point (incl. Old Man's, Mortensen's and Norse Lagoons)	4	"
"	Delta Point to Lenard Harbor (incl. Kinzarof Lagoon)	327	"
16 May	Lenard Harbor	0	"
"	Belkofski Bay	0	"
"	Volcano Bay to Arch Point	25	"
"	Arch Point to Jackson Lagoon	26	"
"	Jackson Lagoon to Canoe Bay	0	"
"	Canoe Bay	0	"
"	Canoe Bay to Dorenoi Bay	159	"
"	Dorenoi Bay to Mitrofania	1,073	"
"	Mitrofania to Chignik Lagoon	181	"
"	Chignik Lagoon to Base of Cape Kumliun	0	"
"	Base of Cape Kumliun to Cape Kuyuyukak	272	"
"	Cape Kuyuyukak to Cape Kilokak	0	"
"	Cape Kilokak to Hartman Island	40	"
"	Hartman Island to Coal Point	364	"
"	Coal Point to Cape Kekurnoi	36	"
"	Cape Kekurnoi to Cape Chiniak	0	"
	12 - 16 May Total	58,833	

FIGURE 8 Percentage distribution of emperor geese by survey area, 12 to 16 May 1985.



Alaska. These annual spring surveys, in addition to providing the best available index of the size of the emperor goose population, are refining our knowledge of the migratory behavior of this and other waterbird species in critically important coastal bays and estuaries.

Productivity of emperor geese based on fall counts at Izembek Lagoon suggested 22.4% of the population was composed of juveniles in 1984 (18-year average 27.1%). As mentioned, Izembek NWR data in combination with other Alaska Peninsula information resulted in an overall productivity figure of 17.4% young in 1985. Below average production has appeared to accelerate the population decline. Fair production of young in 1984 and 1985 only helped reduce the rate of population decline. In 1984, reductions in daily bag (i.e. from six to two birds) and possession limits (i.e. from 12 to four birds) of emperor geese were instituted. At Izembek NWR where much of the fall harvest is believed to occur, these restrictions resulted in a 51% reduction in harvest in 1984 (n=76) versus 1983 (n=156). However, the estimated emperor goose harvest at Izembek increased by 58% (n=120 geese) with identical regulations in 1985. It is apparent that other mortality factors must be evaluated and reduced if possible. Management practices should be immediately initiated or modified to benefit the emperor goose population.

Steller's Eider

We failed to have suitable conditions in 1985 to perform our annual banding operation on non and failed breeding Steller's eiders. A minus tide occurring in daylight hours is necessary so that molting flocks can be driven along exposed tide channels by small boat. Such tides occur on only three or four consecutive days during the three weeks of molt and weather often precludes boating on those days.

During the 1984 capture operation, the refuge cooperated with the Game Bird Research and Preservation Center in Salt Lake City and the Oregon Health Sciences University in Portland by obtaining blood samples from 18 adult male and female Steller's eiders. These samples were collected in the hopes of identifying whether or not geographic differences exist with respect to immunity to the fungal pathogen Aspergillus spp.. Higher rates of susceptibility to Aspergillus have been found in captivity in birds collected as eggs on the north slope of Alaska versus those captured as adults at Izembek. Males from Izembek have not contracted this disease at all, while females from the North Slope have been especially vulnerable. There was no significant difference in the percent Aspergillus antibody levels in males versus females on the basis of our 1984

collections. Comparisons of Izembek collected samples with those from breeding areas is pending.

The number of Steller's eiders on Izembek Lagoon was determined by aerial survey on 3 October. This survey by refuge staff tallied 9,887 birds, far below the average peak fall count of 33,545 birds (n=5 years). Our normal fall population consists of molting non and failed breeders and we are uncertain when other components of the population arrive. One possible explanation for a lower than normal population of Steller's eiders in October would be successful reproduction of a majority of the breeding population which would have effectively reduced the number of failed breeding females in our molting population. Another possible cause of reduced fall numbers could be a later than normal influx of breeding adult females and young of the year.

The Steller's eider will receive Alaskan prominence in 1986 as the subject of the second State of Alaska Waterfowl Hunting Stamp. Deadline for submission of drawings was mid-December and the refuge fielded a flood of inquiries all fall from artists across the country.

A flock of 10 lesser snow geese (nine adults and one young) occurred in the Outer Marker area of Izembek Lagoon in mid-October. We occasionally encounter single snow geese in our fall aerial surveys, hence, the presence of a flock was noteworthy. We observed one hatching-year white-fronted goose on 29 October at Grant Point. This bird was alone, but near a group of black brant and emperor geese. Another white-front was observed in a flock of emperor geese at Nelson Lagoon. Our occasional fall sightings of white-fronted geese, usually in flocks of emperor geese, are thought to be results of interspecific parasitic laying on the Yukon-Kuskokwim Delta.
A second occurrence of a tufted duck was documented in the Cold Bay area in 1985. This bird, an adult male, was observed feeding with a male Steller's eider at Grant Point on Izembek Lagoon on 1 May. A new bird was added to the Izembek bird list on 26 June, when a male pine grosbeak was observed along Frosty Road.

4. Marsh and Waterbirds

Subjectively, it appears that lesser sandhill cranes nested later than normal and in lower numbers in 1985. Hatching appeared to occur from seven to 10 days later than in 1984 and fewer than normal numbers of birds were noted during the August fall staging period.

No nests of red-necked grebes and only one of a common loon were observed in 1985. These species occur normally in low

Rock sandpipers are the most common shorebirds in this area. Most prefer ericaceous tundra for nesting sites. (Dau)

Lesser sandhill cranes throughout the area occur, but in low numbers compared to some other coastal locations in Alaska. This chick, less than a week old, was observed in the Left-Hand Valley area of Izembek. (Lanigan)

numbers, however, it appears late climatic conditions this year adversely affected their population sizes and productivity.

5. Shorebirds, Gulls, Terns and Allied Species

Nesting mew gulls were present in normal numbers, but experienced a reproductive failure. No young were known to have been produced from 10 active nests observed in the road system near Cold Bay. In addition, we observed no hatching-year birds in other areas of the refuge until fall when migrants from other areas began arriving. Glaucous-winged gull production was also poor with the Blinn Lake colony of approximately 40 adults apparently producing only three young. Arctic terns normally nest in low numbers on the refuge. We observed no young of this species during the summer of 1985.

The first migrating semipalmated plover was observed on 16 May 1985. This is 15 days later than their 1984 arrival and five to 10 later than arrivals documented in other years. The first rock sandpipers were seen occupying nesting territories on 29 April which is mid-way in our historical record (range 14 April to 8 May). Subjectively, it appeared that all shorebird nesting activity was delayed and that productivity was poor in 1985 as a result of the late, cool climatic conditions.

6. Raptors

No raptor species were known to nest on Izembek NWR in 1985. The gyrfalcon nest site on the Pavlof Unit (APNWR) was active and the pair fledged one young which was banded by the refuge staff on 19 July. Gyrfalcons, and to a lesser extent Peale's peregrine falcons, are normally common fall migrants in the Cold Bay area. Below normal numbers of both species observed in 1985 may also be indicative of the adverse climatic conditions in spring and early summer.

7. Other Migratory Birds

Four passerine species were banded by the refuge staff in 1985. Captures were made in a baited remotely-activated trap at the refuge headquarters. Snow buntings (n=217), McKay's snow bunting (n=4), gray-crowned rosyfinch (n=11), and lapland longspur (n=2) were the species banded (Table 3). The 20th annual Christmas bird count was conducted in the Cold Bay area on 31 December 1985 by the refuge staff and volunteers. A total of 1,774 individuals of 30 species were observed (Table 27).

Bald eagles are common year-round residents. Peak numbers on Izembek occur in winter. Several eagles are found dead near power poles each winter, the result of electrocution or collisions, problems we are working to correct.
(295)29

(Sarvis-1/24/81)

Upclose and Personal: One gyrfalcon eyrie is known to exist on the Pavlof Unit. Young produced have been banded in two of the last four years by the refuge staff. (Below, a less personal view of a feathered friend)

(Both by Blenden-7/18/85)

TABLE 27 Results of Christmas Bird Count, Cold Bay, Alaska, 31 December 1985.

Species	1985	Average No. Seen[1] (No. Years Seen)	% Change From Average
Loon spp.	1	2.0 (6)	- 50
Horned Grebe	40	13.7 (9)	+292
Red-necked Grebe	2	2.7 (7)	- 26
Pelagic Cormorant	10	14.0 (18)	- 29
Emperor Goose	307	1253.6 (20)	- 76
Black Brant	3	1596.8 (13)	- 99.8
Mallard	38	35.4 (13)	+ 7
Green-winged Teal	5	6.5 (6)	- 23
Common Eider	3	49.9 (16)	- 94
Steller's Eider	445	1176.4 (20)	- 62
Harlequin Duck	98	26.8 (19)	+266
Oldsquaw	47	262.7 (20)	- 82
Black Scoter	63	164.6 (18)	- 62
White-winged Scoter	16	19.2 (16)	- 17
Common Goldeneye	131	122.7 (19)	+ 7
Bufflehead	45	9.8 (13)	+359
Common Merganser	5	10.4 (8)	- 52
Red-Breasted Merganser	41	137.6 (18)	- 70
Bald Eagle	57	10.4 (20)	+448
Willow Ptarmigan	2	7.5 (13)	- 73
Glaucous-winged Gull	116	179.0 (20)	- 35
Common Murre	1	1.0 (4)	0
Pigeon Guillemot	18	7.5 (11)	+140
Marbled Murrelet[2]	1	1.0 (1)	0
Black-billed Magpie	1	2.3 (12)	- 57
Common Raven	219	92.9 (20)	+136
American Dipper	1	2.4 (11)	- 58
Northern Shrike	1	1.4 (14)	- 29
Snow Bunting	45	40.4 (20)	+ 11
Gray-Crowned Rosy Finch	3	64.2 (20)	- 95

Total number of species = 30
Total number of individuals = 1,774

Number of observers - 3 (J. Sarvis, M. Blenden, P. Blenden)
Observation time - 8 hours (1 hr. on foot; 7 hrs. by car)
Distance covered - 65 miles (3 on foot; 2 by car)

[1]Average 20 years of participation in the Christmas Bird Count.

[2]First observation of this species in the Christmas Bird Count. A total of 58 species have been ovserved in 19 years.

8. GAME MAMMALS

Brown Bear

The Research/Management Study designed to evaluate the distribution, habitat use and population ecology of brown bears in the Right- and Left-Hand Valley area (Figure 9) of the Izembek NWR entered its second field season in 1985. This study is designed to provide the refuge with baseline data on an area and brown bear population which we believe is critical to the maintenance of historical distribution and abundance patterns of brown bears throughout the lower Alaska Peninsula. The primary management application of the study relates to identification and hopefully, protection of critical habitats. Data on immigration patterns of bears as related to hunting pressure and the effects of various other forms of disturbance, including fixed-wing aircraft and helicopters on the activity patterns and distribution of bears is also an important goal.

Data on distribution patterns and habitat use were obtained by making 17 flights in 1985 to locate radio-collared brown bears. Twenty-six of 27 bears captured and radio-collared in the study area in the fall of 1984 wore active radio collars into 1985. During the year, this number dropped to 18 (Table 28) and in August an additional six bears captured were radio-collared (Table 29 and Figure 10). By the end of the year we were down to 24 bears under surveillance. Immobilization data on bears captured in 1985 is shown in Table 30. Bears marked with an experimental collar designed to allow for the growth of the bear were recaptured in 1985. One of these collars was removed due to wearing of the hide and the others, although no wear was detected, were reset to allow for additional growth. In none of the cases did the collars expand as was hoped suggesting that this design is inappropriate. In addition, the normal collar fasteners were replaced with a single low-grade bolt, center drilled to allow for accelerated corrosion. It was hoped that we could achieve bolt failure in a year or less which would allow the collar to drop off. The materials used (a 3/8", grade 5 cap screw center drilled with No. 5 bit) did not achieve the desired goal.

Mapping of the patterns of seasonal brown bear use as related to habitat types has presented a variety of problems to the refuge staff. Much of the Right and Left hand Valley study area is only mapped in the 1:250,000 scale by the U.S. Geological Survey. We initially used the available 1:63,360 scale maps in combination with a mosaic prepared from black and white aerial photographs exposed in the 1950s (scale 1:30,683). This combination covered approximately 70% of the study area. In 1985 we purchased new black and white aerial photographic coverage at a scale of 1:120,000 which included

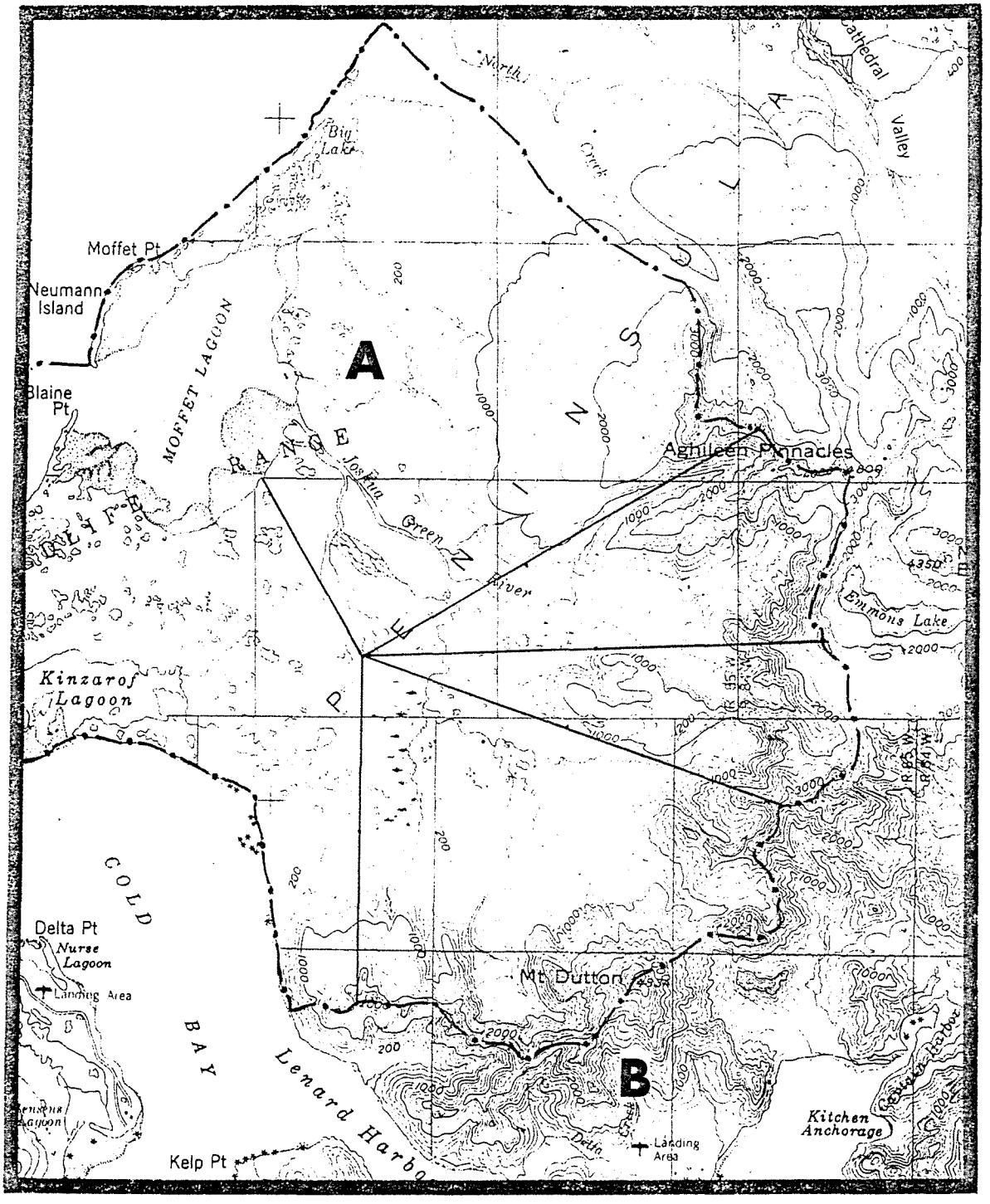


FIGURE 9 Brown bear study area, Right and Left-hand Valleys with radio quadrants. A: Izembek NWR boundary (-•-•-), B: Pavlof Unit, Alaska Peninsula NWR.

Lights Out?

Well, almost. Bears react differently to the immobilizing drug. This is as far under the drug's effect as this animal went, so collaring, measuring etc., had to be done with care.
(Lanigan)

This 1,020 pound boar, the largest thus far handled during our study, is truly an impressive animal with little in its natural environment to fear (the same bear is shown in RM Sarvis' personnel photo). (Lanigan)

Data collection and collaring are accomplished in less than 30 minutes. The last step is to sling the animal under the helicopter for weighing.
(Lanigan)

TABLE 28 Marked bears lost to the study in 1985.

Bear No.	Sex	Age	Radio Frequency	Date		Cause of loss/Remarks
				Capture (status)	Lost to study (status)	
IZ26	♀	14	164.460	31 July 1984 (♀w/2 yrl.)	6 October 1985 (single ♀)	- Shot by hunter, radio locations in 1984 (n=5) and 1985 (n=6)
IZ27	♀	11	164.470[1]	31 July 1984 (♀w/3 yrl.)	16 June 1985 (♀w3 2½yr.)	- Shed collar, radio locations in 1984 (n=9) and 1985 (n=6).
IZ33	♀	14	164.535	3 August 1984 (♀w/ 1 yrl)	10 January 1985 (♀w/1-2½yr.)	- Radio collar failed. Radio locations in 1984 (n=4) and 1985 (n=1). Identified by ear flag in 1985 (n=2)
IZ36	♀	30	164.605	4 August 1984 (single ♀)	June/July 1985 (♀w/3 COY)	- Bear died. Radio locations in 1984 (n=2) and 1985 (n=2). Carcass found Oct. 1985. Dead 3-4 months. Radio dead.
IZ47	♀	20	164.575	16 August 1984 (single ♀)	June 1985	- Shed collar. Radio locations in 1984 (n=4) and 1985 (n=5)
IZ48	♀	14	164.665	17 August 1984 (single ♀)	7 June 1985 (?)	- Shed collar. Radio locations in 1984 (n=5) and 1985 (n=4)
IZ50	♂	5	164.450	18 August 1984 (NA)	6 August 1985 (NA)	- Collar removed due to wear. Radio locations in 1984 (n=3) and 1985 (n=6).
IZ66	♀	19	164.670	20 August 1984 (single ♀)	11 July 1985 (?)	- Bear died. Radio locations in 1984 (n=3) and 1985 (n=5) Carcass eaten (dead 3-4 months)
IZ72	♀	-	164.495	16 July 1985 (single ♀)	19 July 1985 (single ♀)	- Radio collar failed. Radio locations in 1985 (n=2) Identified visually on 20 Sept.
IZ79	♂	-	none	9 August 1985 (NA)	1 October 1985 (NA)	- Shot by hunter

[1] Later recaptured and recollared.

TABLE 29 Brown bears captured on the Izembek NWR, 1985

BEAR NO.	SEX	STATUS	LOCATION	RADIO FREQUENCY/REMARKS
New Bears				
IZ72	♀	single	Cold Bay	164.495/Radio failed
IZ73	♀	single	Right-Hand Valley	164.550
IZ74	♂	-	Right-Hand Valley	No collar
IZ75	♂	-	Moffett Bay	No collar
IZ76	♀	single	Left-Hand Valley	164.470
IZ77	♂	-	Moffett Bay	164.425
IZ78	♀	w/1 COY	Right-Hand Valley	164.585
IZ79	♂	-	Right-Hand Valley	No collar/Shot 1 Oct.
IZ80	♀	single	Right-Hand Valley	164.575
Recaptures				
IZ27	♀	w/3-2½	Moffett Bay	164.510
IZ41	♂	-	Right-Hand Valley	164.655
IZ46	♀	w/2 COY	Near North Creek mouth	164.475
IZ50	♂	-	Right-Hand Valley	164.450
IZ68	♂	-	Right-Hand Valley	164.685

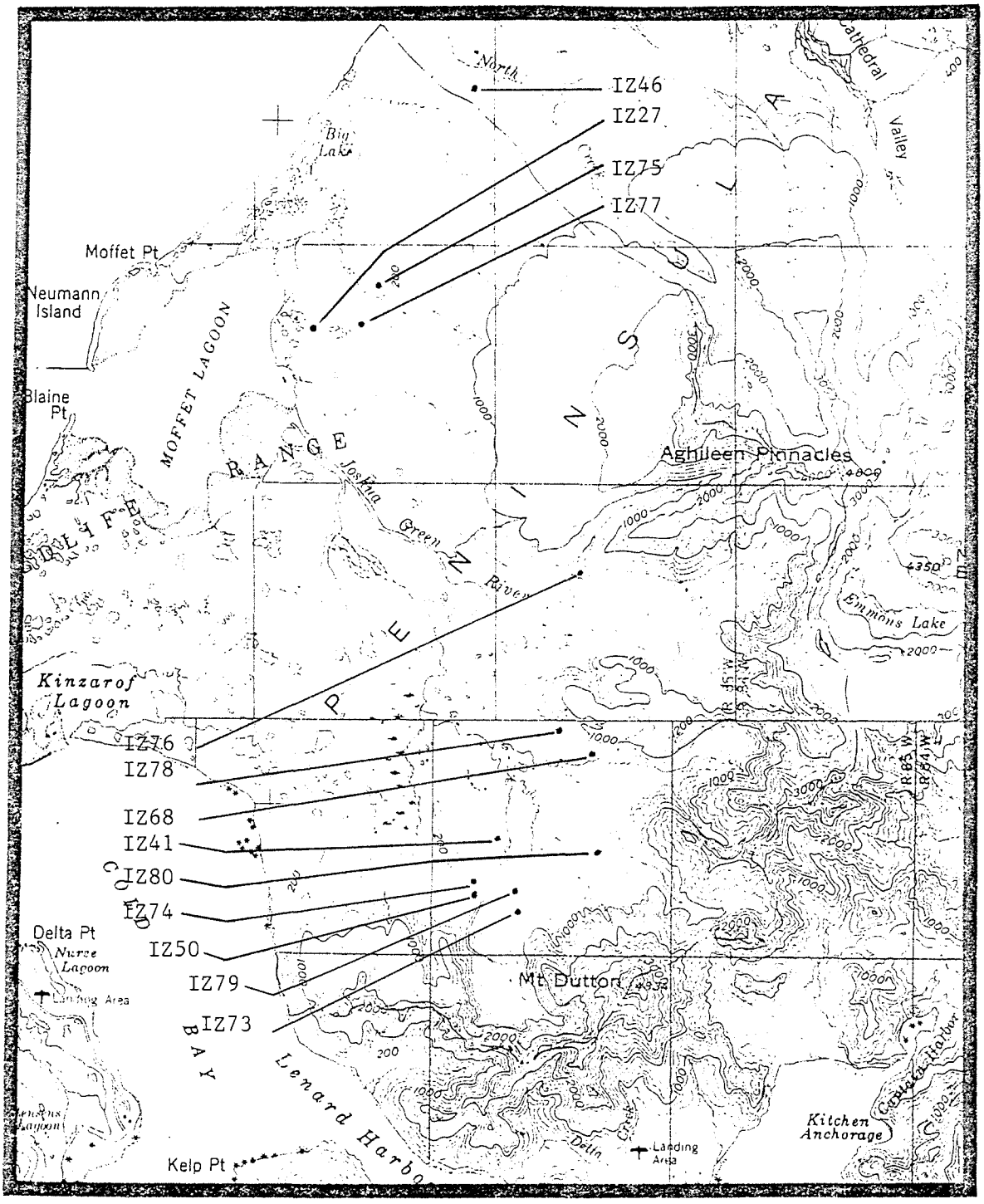


FIGURE 10 Brown bear capture locations, Izembek NWR, 1985.

*recapture

TABLE 30 Immobilization of brown bears, Izembek NWR, 1985.

Bear No.	Date	Sex	Age	Weight	Drug	Dosage	Induction Time	Remarks
IZ72	16 July	F		400	Sernylan	5cc w/3cc Sparine	8'	Head movement and rigid legs at 70 min. Head up at 84 min. Walk with difficulty at 99 min.
IZ73	8 August	F		350	"	7cc	10'45"	7cc Sparine administered.
IZ74	8 August	M		485	"	7cc	6'42"	7cc Sparine administered.
IZ75	8 August	M		585	"	7cc	7'	7cc Sparine administered.
IZ76	8 August	F		540	"	7cc	7'	7cc Sparine administered; sit down at 6'; head down at 7'.
IZ77	9 August	M		1020	"	9cc	11'30"	9cc Sparine administered; sit down at 7'; out at 11½'.
IZ78	9 August	F (w/1 COY)		398	"	6cc	12'	6cc Sparine administered; sit down at 9'; out at 12'.
IZ79	9 August	M		335	"	5cc	5'	5cc Sparine administered.
IZ80	9 August	F		670	"	6cc	22'	6cc Sparine administered; head up at 20'; down at 22'.
Recaptures								
IZ27	6 August	F (w/3-2½)	11	438	"	5cc/1cc	60'	Additional 1cc Sernylan at 48'; never completely out; process at 50-60'; 6cc Sparine administered.
IZ41	9 August	M	22	870	"	10cc	14'	10cc Sparine administered; sit down at 5'; out at 14'.
IZ46	8 August	F (w/2 COY)	7	380	"	7cc	8'	7cc Sparine administered; 45' later, 2cc Sparine.
IZ50	6 August	M	5	593	"	6cc	27'	6cc Sparine administered; sit at 17'; out at 27'.
IZ68	8 August	M	5	585	"	6cc/2.5cc	88'	7cc administered; at 60', 2.5cc Sernylan; at 103', 1cc Sernylan; process at 88', but never out enough to weigh.

Slopes of 45 degrees or greater and rocky substrates are preferred by denning brown bears. Spectacular views such as this come with the territory. (Sarvis-8/8/85)
(420)30

Darter's eye view of a brown bear - experienced helicopter pilots make this a much easier process than it appears.
(420)4 (Sarvis-8/8/85)

95% of the area. On these same photographic flights color infra-red exposures at a scale of 1:60,000 were obtained. Although the color IR coverage did not include a large amount of the study area, it was invaluable in preparing a preliminary `working' habitat map using the 1:120,000 black and white photographs (Figure 11).

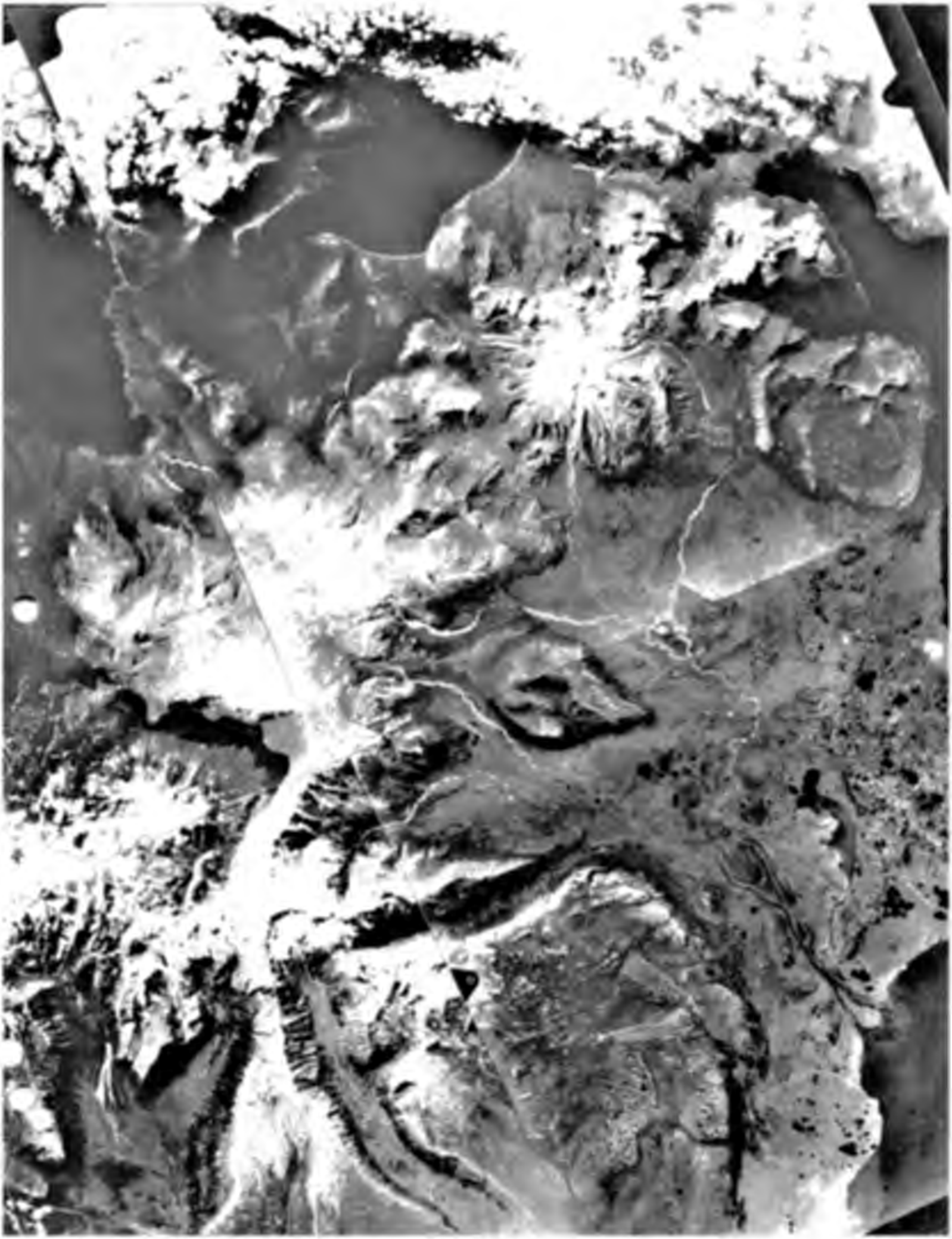
The U.S. Geological Survey has not advised us if they have a schedule for completion of the remainder of the lower Alaska Peninsula at the 1:63,360 scale. This fact is forcing us to draft our own maps from aerial photographs of various scales and vintage in an effort which will, we hope, allow us to accurately present our data.

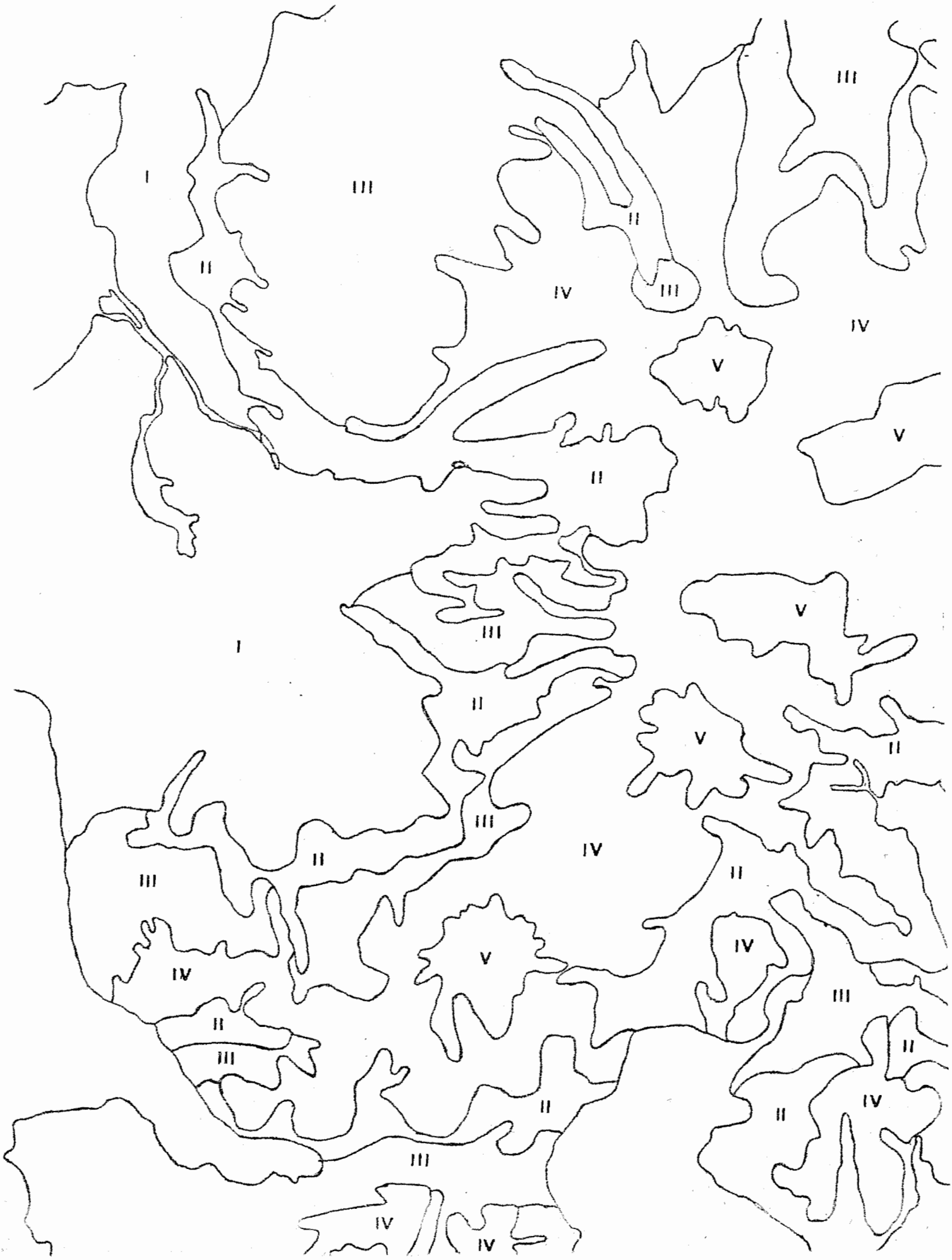
Of 24 brown bears with active radio collars during the winter of 1984/85, 23 were located and their approximate den sites were mapped. Data obtained allowed us to characterize den sites used by various components of the population (Table 31). Of seven bears collared in 1984, whose denning sites have been found in the winter of 1985/86, six (86%) returned to the same general denning area in 1985.

One bear, a young sow (IZ71) deviated significantly from this pattern by denning on Unimak Island in 1984 and in the Nurse Creek area of Left-Hand Valley in 1985 (Figure 12). This is the second bear captured at the Cold Bay dump whose range included Unimak Island. We did not precisely locate IZ71's den in 1984. The bear appeared at the False Pass garbage dump on 17 April and was our first bear sighting of 1985. IZ71 was observed until 19 April in the False Pass area. On 29 April and 3 May, a bear with identical external markings was seen near the Russell Creek Hatchery and the Cold Bay dump, respectively. On 4 May, IZ71 was radio located just west of Cold Bay. It is highly probably that the 29 April and 3 May sightings were of this bear suggesting she moved approximately 45 miles in 10 days. Our last radio location near Cold Bay was on 6 May. IZ71 was next located on 26 September in Left-Hand Valley when her signal was determined to have `crept' 1khz off frequency. She was located four additional times in 1985.

Seven radio tracking flights in the winter of 1984/85 and two such flights during the winter of 1985/86 were performed to locate denning sites. Clear and relatively calm weather is a necessary prerequisite for flights in mountainous denning areas as several subjective physical observations are recorded at each den site. Of 24 brown bears with potentially active transmitters denning in 1985/86, 11 were located on a tracking flight on 23 December. Each of these sites was more precisely characterized for elevation, location, aspect, etc. during a 30 December flight.

Denned bears showed varying degrees of den site fidelity. Although it was not possible to positively locate each

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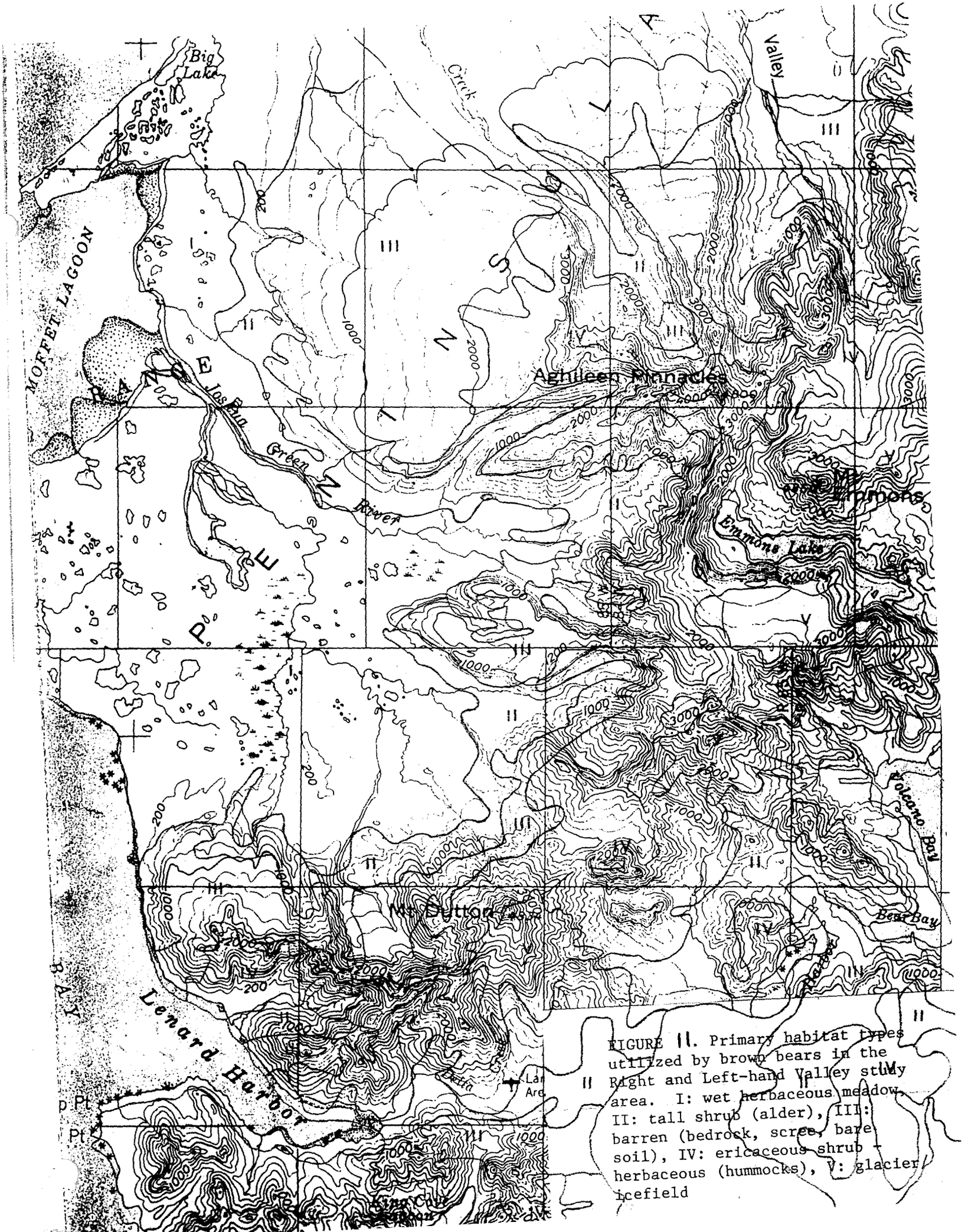


FIGURE 11. Primary habitat types utilized by brown bears in the Right and Left-hand Valley study area. I: wet herbaceous meadow, II: tall shrub (alder), III: barren (bedrock, scree, bare soil), IV: ericaceous shrub + herbaceous (hummocks), V: glacier/icefield

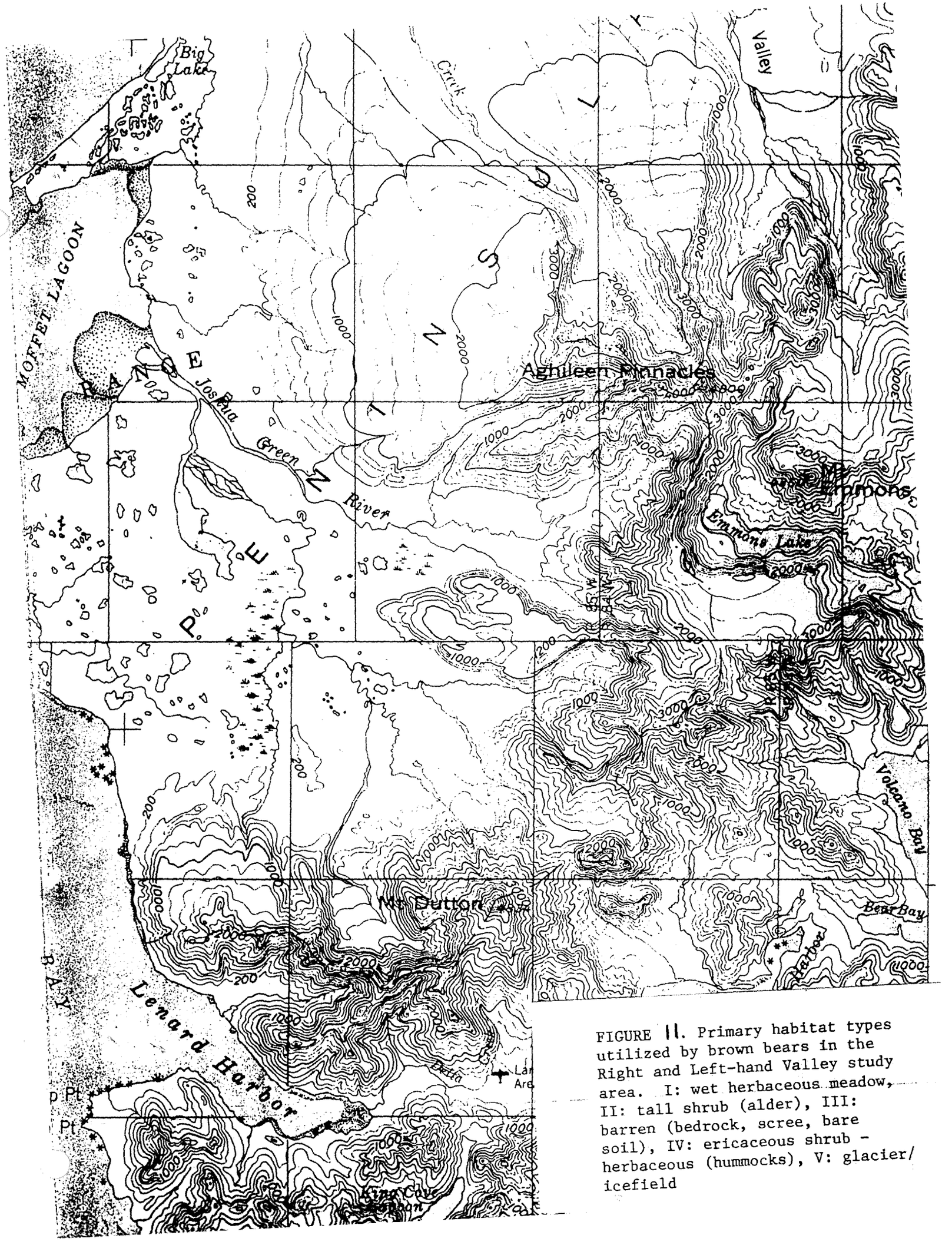


FIGURE 11. Primary habitat types utilized by brown bears in the Right and Left-hand Valley study area. I: wet herbaceous meadow, II: tall shrub (alder), III: barren (bedrock, scree, bare soil), IV: ericaceous shrub - herbaceous (hummocks), V: glacier/ icefield

TABLE 31 Den characteristics of brown bears summarized by sex and status, Izembek, NWR, 1984 and 1985.

Bear Type	No.	Den Elevation $\bar{x}$ (range) (M.)	General Aspect[1]								Slope[2]			Denning Concentrations[3]		
			N	NE	E	SE	S	SW	W	NW	1	2	3	High	Med.	Low
Males	6	585(152-976)	2	2					1	1	2		4	2	1	3
Females																
Singles[1]	15	779(549-1006)	3	1		1	2	2	2	4	1	3	11	7	3	5
W/COY	6	783(335-1067)				2		3		1			5	3	1	2
W/YRL	4	968(793-1037)	1			1			1	1		1	3	1	1	2
W/2½	3	966(884-1037)				1				2			3	2		1
TOTALS	34	784±219(1SD)	6 (18)[4]	3	0 (9)	5 (15)	2 (6)	5 (15)	4 (12)	9 (26)	3 (9)[4]	4 (12)	27 (79)	15 (44)[4]	6 (18)	13 (38)

[1]Categories are 45° spans centered on listed compass headings.

[2]Categories are 1=≤30°, 2=>30°≤45°, 3>45°

[3]Categories are High=≥3, Medium=≥1≤2, Low=0, other marked bears denning within a 1km radius of den site.

[4]Percentage of sightings.

(Blenden-9/27/85)

(Right) ARM Blenden investigates a brown bear den-site that may have been used many times and decides that a bear's life is not for him. (Left, above) A bear's eye view from the same den. Heavy, drifted snow would effectively plug this entrance throughout the denning period. (420)32 (Sarvis-8/8/85)

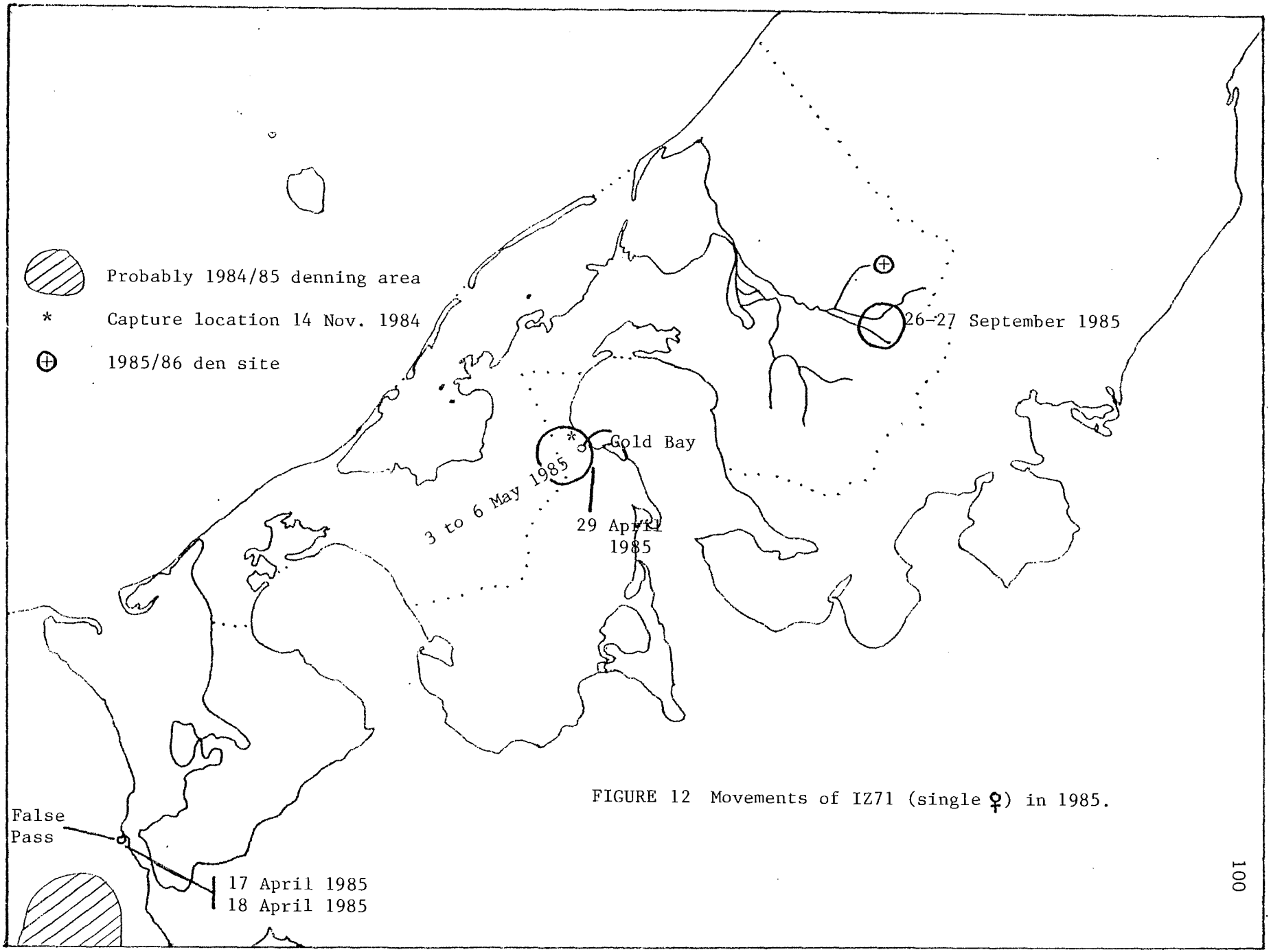


FIGURE 12 Movements of IZ71 (single ♀) in 1985.

actual den site, we felt our precision was within a 100 meter radius of each site. We were able to detect denning preferences of seven individual bears captured in 1984 and still active into the winter of 1985/86. These bears were all sows, five of which denned with young in 1984. Only one of these sows still had her cubs during pre-denning flights in 1985. Based on this small sample, Izembek brown bears exhibit a high degree of den site fidelity. The exception to the pattern, that of IZ71 whose 1984/85 and 1985/86 den sites were approximately 65 miles apart, was discussed previously. Dens of the six other bears in 1985/86 were an average of 0.86± 0.49(1SD) km from 1984/85 sites (range 0.30 to 1.68). Denning elevation and aspect were also closely correlated averaging 717± 717 meters and 823± 166 meters and 288± 50° TN and 278± 83° TN in 1984 and 1985, respectively.

A comparison of den site characteristics in relation to sex and status of bears and for all bears combined helps qualify our impression of preferred denning habitat (Table 31). Sows tend to den at higher elevations than do boars and 61% of the time, were above the average elevation for all bears. Den aspect (°TN) showed considerable variation and may be more a function of the orientation of slopes at highly preferred sites rather than some selective motivation exhibited by the bear. Slopes greater than 45 degrees were highly preferred by all bears (i.e. 79%).

All categories of bears tended to be equally divided in their tendency to den in areas of high or low concentrations (Table 32). Denning concentration or density is a subjective index based on the number of other radio-collared bears denning within a 1km radius of each den site. We believe marked bear densites should provide a rough approximation of high, medium or low concentrations of unmarked bears as well. This aspect of the study has been extremely valuable in identifying several key, high density denning areas. This information will aid us in evaluation of various forms of development and public use that are occurring or may be proposed in these areas.

Low aerial overflights were made of collared bears to attempt to determine alertness during the denning period of 1984/85. Nineteen of 23 collared bears found during the winter of 1984/85 were fitted with collars with both active and inactive modes (i.e. different pulse rates)(Table 33). When the transmitter is stationary for one hour or more a slower (inactive) pulse rate is initiated. Very little movement on the part of the bear is necessary to switch the transmitter to the faster (active) pulse rate. Ten bears varied between active and inactive mode on successive den checks and three encountered initially on inactive mode quickly switched to active mode when approached by the aircraft. These data suggest that at least some bears respond to aircraft disturbance while denned and that these

TABLE 32 Characteristics of brown bear dens located during 1984/85 and 1985/86, Izembek NWR.

Bear No.	Sex	Age	Status	Den Characteristics[1] Elevation (meters)	Aspect (^{o}TN)	Slope[2]	Index of Denning Concentration[3] High	Medium	Low	Distance From Previous Den(km)
Winter 1984/85										
IZ23[4]	F	16	W/3 COY	701	225	3			*	NA
IZ24	F	12	W/3 COY	915	225	3		*		NA
IZ26	F	13	W/2 YRL	1037	360	3			*	NA
IZ27	F	10	W/3 YRL	793	335	3	*			NA
IZ28	F	10	W/3-2½	884	315	3	*			NA
IZ29	F	15	W/1 COY	1067	135	3	*			NA
IZ33	F	13	W/1 YRL	1037	135	2			*	NA
IZ37	F	7	W/2 YRL	1006	270	3		*		NA
IZ38	F	19	W/2 COY	640	315	3	*			NA
IZ39	F	13	W/2 COY	335	135	3			*	NA
IZ40	M	11	-	152	045	1			*	NA
IZ41	M	21	-	976	360	3		*		NA
IZ46	F	6	Single[5]	976	270	3	*			NA
IZ47	F	19	Single	1006	180	3		*		NA
IZ48	F	13	Single[5]	762	360	3	*			NA
IZ49	F	14	Single[5]	549	315	3			*	NA
IZ50	M	4	-	579	360	1			*	NA
IZ51	F	6	Single[5]	854	360	1			*	NA
IZ63	F	8	W/2-2½	976	135	3	*			NA
IZ66	F	18	Single	884	270	3	*			NA
IZ67	F	4	Single	732	225	3	*			NA
IZ68	M	4	-	793	270	3	*			NA
IZ69	M	5	-	549	045	3			*	NA

[1]Den characteristics are subjective estimates of the general location obtained during aerial tracking flights.

[2]Slope evaluations 1=$\leq 30^{o}$, 2=$>30^{o} \leq 45^{o}$, 3=$>45^{o}$.

[3]Based on the number of marked bears denning within $\leq$1.6 km radius (High=$\geq$3, Medium=1-2, Low=0).

[4]Adopted 1 COY in fall 1984.

[5]Produced cubs-of-the-year in 1985.

TABLE 32 Characteristics of brown bear dens located during 1984/85 and 1985/86, Izembek NWR (cont'd).

Bear No.	Sex	Age	Status	Den Characteristics[1]			Index of Denning Concentration[3]			Distance From Previous Den(km)
				Elevation (meters)	Aspect (^{o}TN)	Slope	High	Medium	Low	
Winter 1985/86										
IZ23	F	17	Single	610	225	3			*	0.48
IZ27	F	11	W/3-2½	1037	315	3	*			1.08
IZ28	F	11	Single (prob.)	884	315	2	*			0.84
IZ38	F	20	Single	854	360	3	*			0.78
IZ49	F	15	Single	640	180 ~~315~~	3			*	1.68
IZ67	F	5	Single	915	135	3		*		0.30
IZ71	F	4	Single	732	315	2	*			NA
IZ73	F	-	Single	763	180	3		*		NA
IZ77	M	-	-	458	315	3	*			NA
IZ78	F	-	W/1 COY	1037	225	3	*			NA
IZ80	F	-	Single	519	045	2			*	NA

[1]Den characteristics are subjective estimates of the general location obtained during aerial tracking flights.

[2]Slope evaluations 1=$\leq 30^{o}$, 2=$>30^{o} \leq 45^{o}$, 3=$>45^{o}$.

[3]Based on the number of marked bears denning within $\leq$1.6 km radius (High=$\geq$3, Medium=1-2, Low=0).

[4]Adopted 1 COY in fall 1984.

[5]Produced cubs-of-the-year in 1985

TABLE 33 Index of alertness during denning for bears with bi-moded radio collars.

Bear No.	Sex	Age	Status	Number of Times Monitored in Den	Transmitter Mode		
					Active	Inactive	Audibly Switched Inactive to Active
IZ40	M	11	-	2			2
IZ41	M	21	-	2	2		
IZ68	M	4	-	2	2		
IZ69	M	5	-	3	2	1	
IZ23[1]	F	17	Single	2		2	
IZ28[1]	F	11	Single	2		1	1
IZ29	F	5	Single	2	1	1	
IZ38[1]	F	20	Single	2		2	
IZ48	F	13	Single	2	2		
IZ66	F	18	Single	3	2		1
IZ67[1]	F	4	Single	4	3	1	
IZ71	F	4	Single	2	2		
IZ78	F	NA	Single	2		1	1
IZ23[1]	F	16	W/COY	1		1	
IZ24	F	12	W/COY	2	1	1	
IZ38[1]	F	19	W/COY	2	1	1	
IZ39	F	13	W/COY	3	1	2	
IZ26	F	13	W/YRL	1		1	
IZ27[1]	F	10	W/YRL	1		1	
IZ37	F	7	W/YRL	2	1	1	
IZ27[1]	F	11	W/2½	2	1	1	
IZ28[1]	F	10	W/2½	2	1	1	
IZ63	F	8	W/2½	2	1	1	

[1]Monitored during winters of 1984/85 and 1985/86.

The dense alder zone provides essential cover for brown bears during the non-denning period.

Rock, snow and ice above the 'alder line' characterize preferred denning habitat.

(412)36
(Sarvis-7/11/85)

High densities of brown bears den in preferred habitats such as this at the 3,000' elevation on Izembek.
(420)31
(Sarvis-8/8/85)

The low marshlands of Right-Hand Valley at the base of Mt. Dutton are important habitats for brown bears during the non-denning period.
(412)38
(Sarvis-7/11/85)

and others appear to normally undergo periods of activity in the den. Of the three bears, alerted by the aircraft, one was a large boar, one a single sow and one a sow with three 2 1/2 year-old cubs.

After the bears' emergence from their dens in April and May of 1985, we attempted to determine the status of all 18 radio-collared sows. This was done to determine if single sows had produced young during the winter and to determine survival of older cubs. Three sows captured as singles in the fall of 1984 produced cubs during the winter of 1984/85. Along with an appraisal of productivity we obtained an assessment of fall to spring survival from post-denning tracking flights (Table 34). Ideally pre- and post-denning flights would provide visual evaluations of each family group and hence an evaluation of over-winter mortality only. However, we were forced to use `last sightings' in fall and `first sightings' in spring so observed mortality could not be precisely timed in each case. We compared cub survival by age to a subjective index of density of denned bears in the area used based on use by other collared bears (Table 34). Sample sizes for COY(n=4) and yearling (n=4) families were small, but suggested that COY are much more vulnerable than are yearlings. We then compared spring through fall survival of COY, yearling and 2 1/2 year-old cub families (Table 35). Sample sizes were again small but seemed to indicate mediocre survival of COY (n=3) and yearling (n=2) cubs and good survival of 2 1/2 year-old cubs (n=4) from spring through fall.

Radio tracking flights continued through the spring (n=1), summer (n=6), and fall (n=5) periods of 1985. Because of various constraints, most notably weather and the fall brown bear season, we were not able to obtain precise radio locations on bears during five of these 12 efforts. We were able to determine the general location of each bear by making omnidirectional aerial scans from a point in the western portion of the study area (Figure 9). Quadrants based on geographic features observable from this scanning point were used to locate general use areas of collared bears. Such observations are of limited value in that only sizeable movements between quadrants could be detected.

Home range polygons were prepared for each radio-collared boar to portray overall distribution patterns (Figure 13 a and b). Exact radio locations are presented for other bears in Figure 14 (a-e). Data allowing more specific analysis of distributional patterns as related to season, habitat type and food availability were collected and will be analyzed in a final report on the study. Categories used to classify habitat use by brown bears followed a format used in similar studies on the Kodiak NWR. Habitats on the Izembek NWR are not as diverse as those encountered at Kodiak, hence only selected categories were applicable (Table 36). Each

TABLE 34 Brown bear cub survival, fall 1984 versus spring 1985, Izembek NWR

Family Type	Age	Fall 1984 No. of Cubs	Spring 1985 No. of Cubs	Spring 1985 %cub survival	Overall % family survival[1]	Denning Concentrations High	Medium	Low
COY								
IZ23	16	3	1	33.3	-			*
IZ24	12	3	0	0	-		*	
IZ38	19	2	0	0	-	*		
IZ39	13	2	2	100	-			*
Average (n=4)	15±2.8 (1SD)	2.5±0.5	1.5±0.5	30	50	25%[2] (n=1)	25% (n=1)	50% (n=2)
YEARLING								
IZ26	13	2	-[4]	-[4]				*
IZ27	10	3	3	100	-	*		
IZ33	13	1	1	100	-			*
IZ37	7	2	2	100	-		*	
Average (n=4)	10.8±2.5 (1SD)	2±0.7	2±1	100	100	25% (n=1)	25% (n=1)	50% (n=2)
2½ YR OLD								
IZ28	10	3	0	NA[3]	-	*		
IZ29	5	3	1(COY)	NA[3]	-	*		
IZ63	8	2	1(3½)	NA[3]	-	*		
Average (n=3)	(1SD)		-	NA[3]	NA[3]	100% (n=3)		

[1]Percent of families in which ≥ 1 cub survived.

[2]Percentage of sows selecting each category of denning concentration (See Table 4 for definition of categories)

[3]We very seldom see 3½-year-old cubs in a family unit. Hence, an estimate of survival of 2½-year-old cubs and overall family survival

[4]Survival during this period undetermined. Not seen until as a single during fall '85.

TABLE 35 Brown bear cub survival, spring through fall 1985, Izembek, NWR

Family Type	Age	Spring No. of Cubs	Fall No. of Cubs	Fall %cub Survival	Overall % Family Survival[1]
COY					
IZ29	6	1	1	100	-
IZ46	7	2	2	100	-
IZ49	15	4	0	0	-
IZ51	7	1	NOT OBSERVED		-
IZ78	-	1	NOT OBSERVED		-
Average (n=5)	~~8.8±3.6~~ 11.3±4.3 (1SD)	1.8±1.2	1.5±0.5	67	67 (2 of 3)
YEARLING					
IZ23	17	1	0	0	-
IZ39	14	2	2	100	-
Average (n=2)	15.5±1.5 (1SD)	1.5±0.5	1±1	67	50 (1 of 2)
2½ YR OLD					
IZ26	14	Assume 2	0	0[2]	-
~~IZ~~		NOT OBSERVED			
IZ27	11	3	3	100	-
IZ33	14	1	1	100	-
IZ37	8	2	2	100	-
Average (n=4)	11±2.5 (1SD)	2±1	1.5±1	75	75

[1]Percent of families in which ≥ 1 cub survived.

[2]Assumed the mortality of IZ26's two cubs occurred during this period based on the higher rate of fall to spring survival of other yearling families (See Table) versus that observed for yearlings spring through fall.

THIS LEGEND APPLIES TO THE FOLLOWING FIGURES: 13 a-b and 14 a-3.

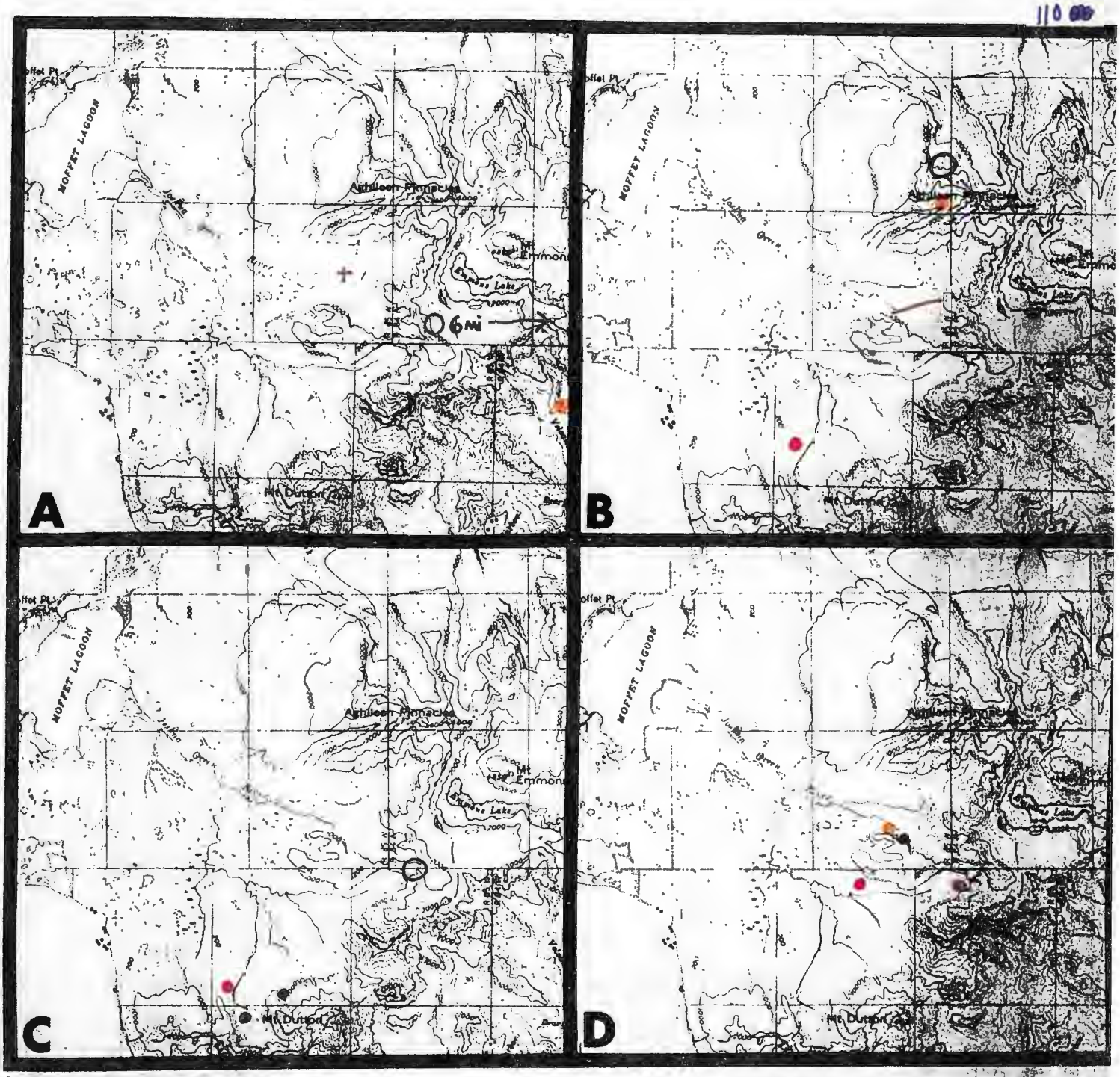
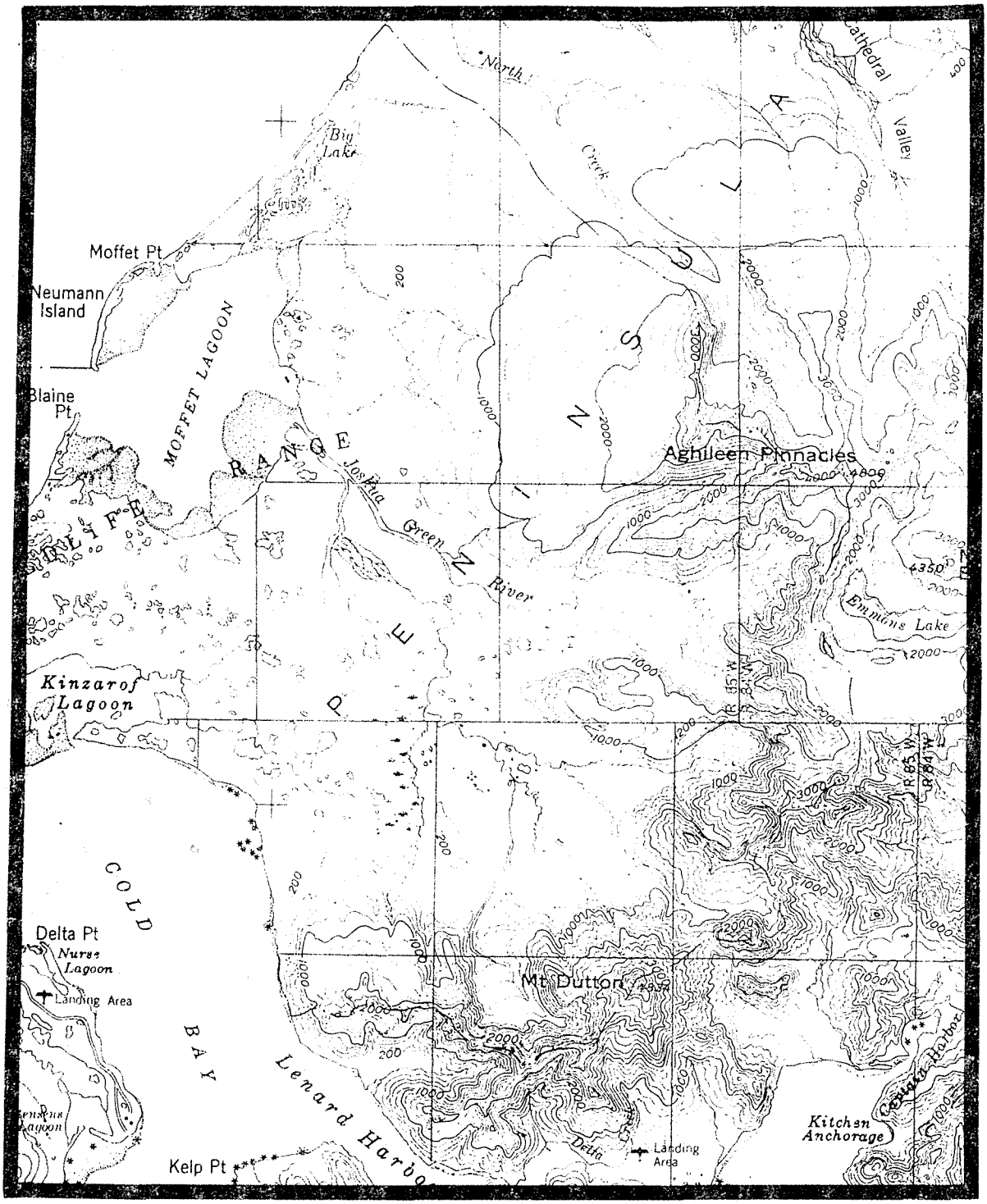


FIGURE 13a Home range polygons of male brown bears, 1985. A:IZ40, B:IZ41, C:IZ50, D:IZ68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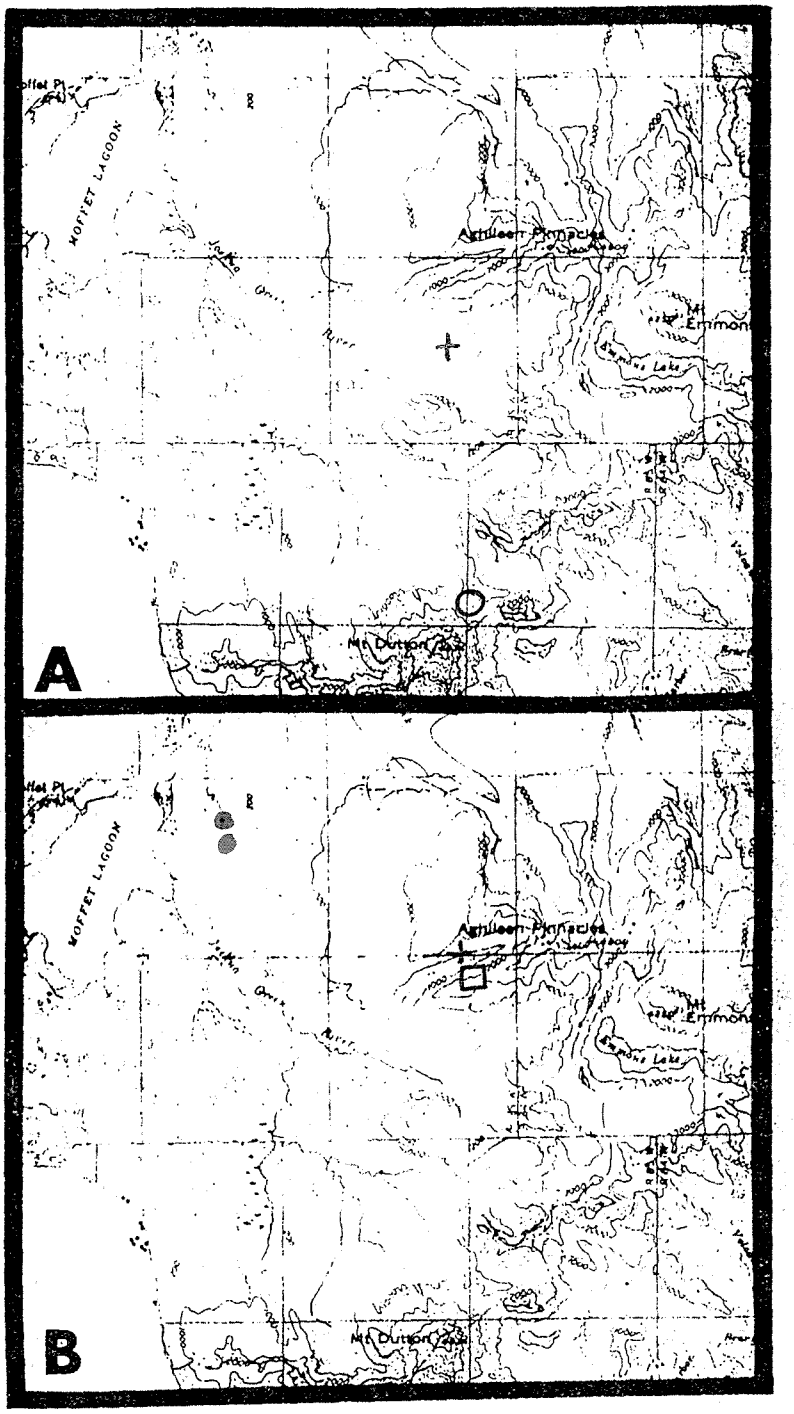
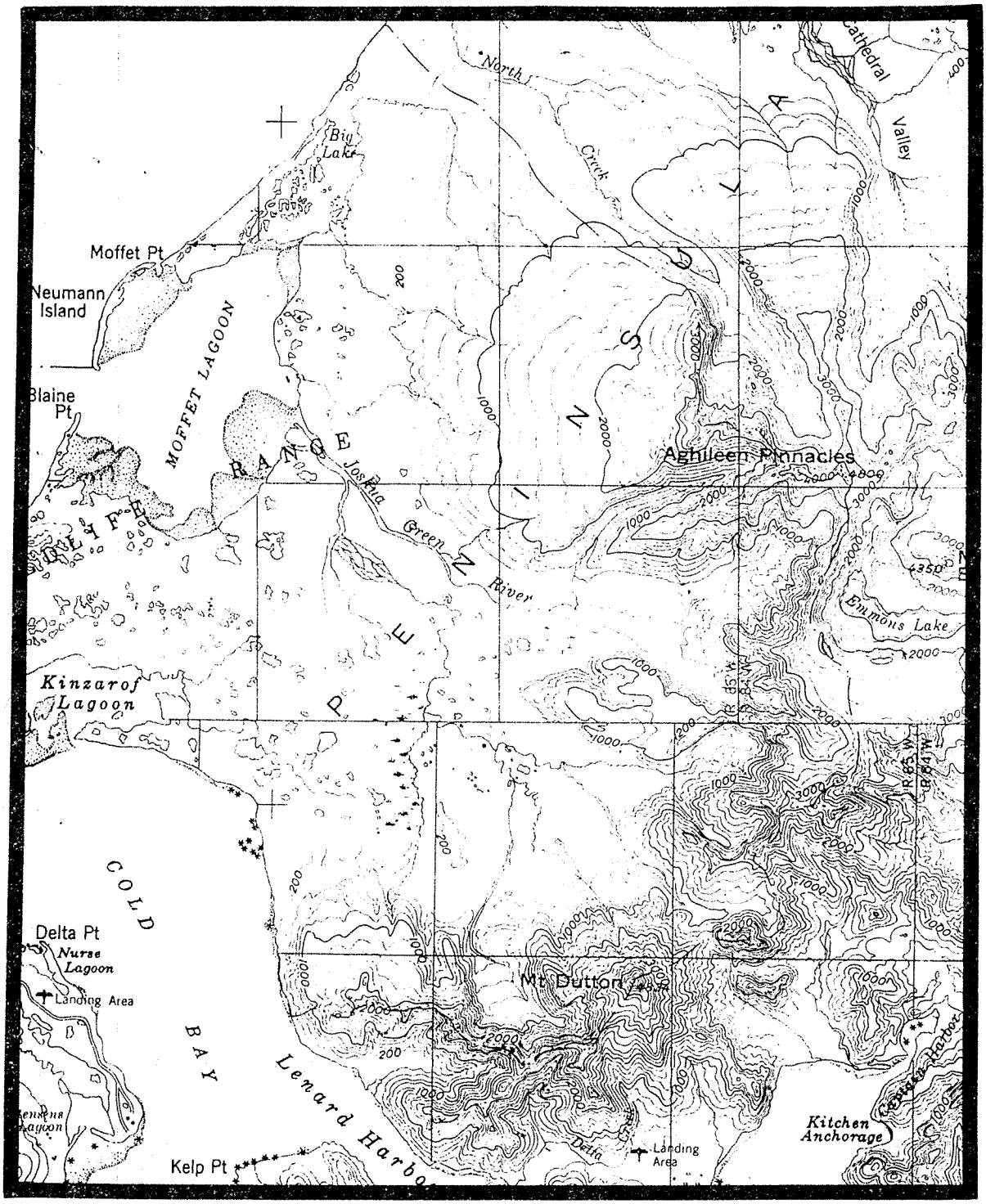
Neumann Island
Blaine Pt
MOFFET LAGOON
RANGE
Big Lake
North
Creek
Cathedral Valley
Aghileen Pinnacles
4809
Josha Green River
Emmons Lake
4350
Kinzarof Lagoon
R.85 W.
R.84 W.
COLD BAY
Delta Pt
Nurse Lagoon
Landing Area
Mt. Dutton
4959
Lenard Harbor
Kelp Pt
Delta
Landing Area
Kitchen Anchorage



(cont'd)
FIGURE 13b Home range polygons of male brown bears, 1985
A:IZ69, B:IZ77.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Neumann Island
Blaine Pt
MOFFET LAGOON
RANGE
Josefa Green River
Aghileen Pinnacles
Emmons Lake
Kinzarof Lagoon
COLD BAY
Delta Pt
Nurse Lagoon
Landing Area
Mt Dutton
Lenard Harbor
Kelp Pt
Delta
Landing Area
Kitchen Anchorage
Cathedral Valley
North Creek
R.84W.
R.83W.

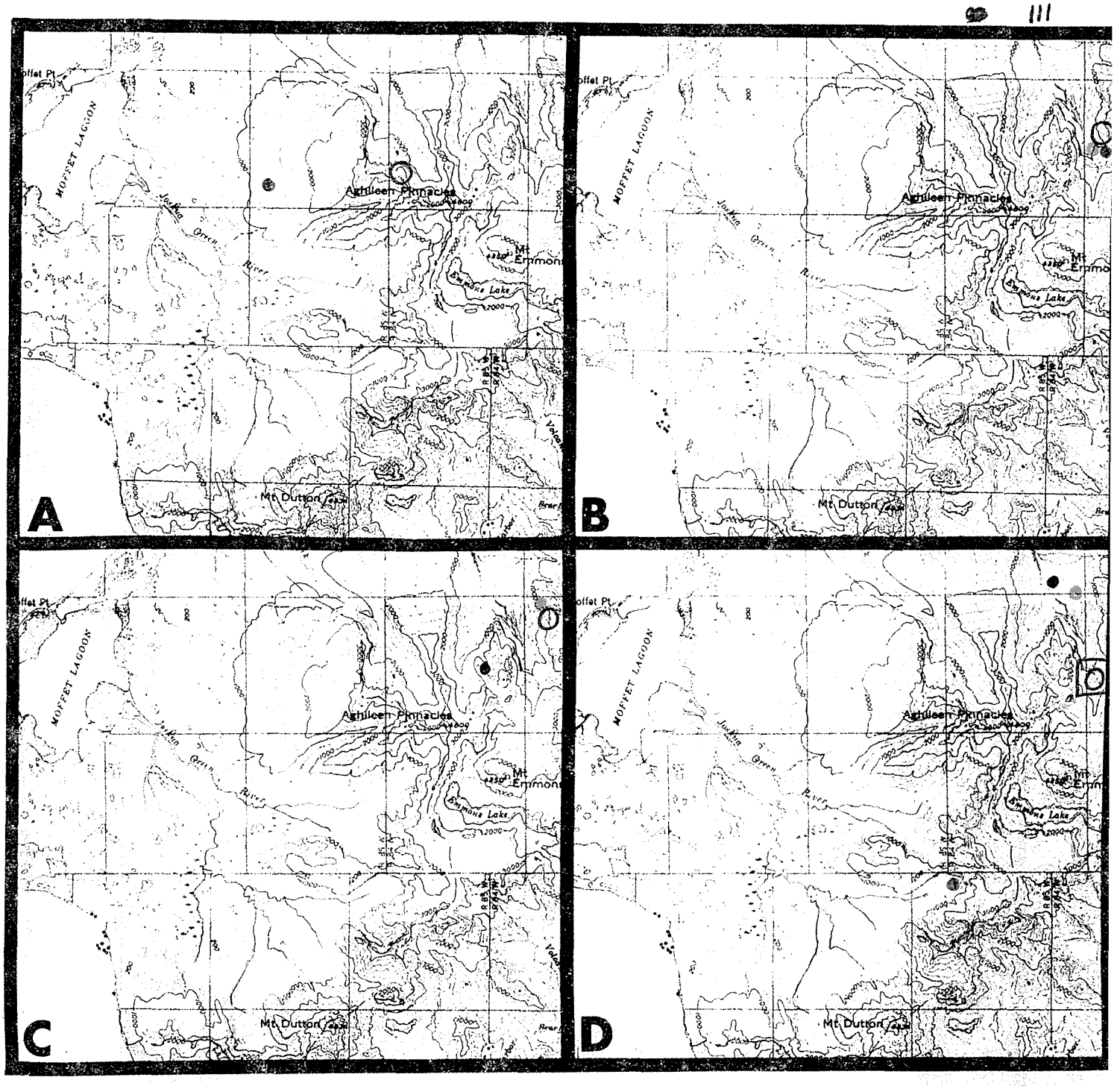
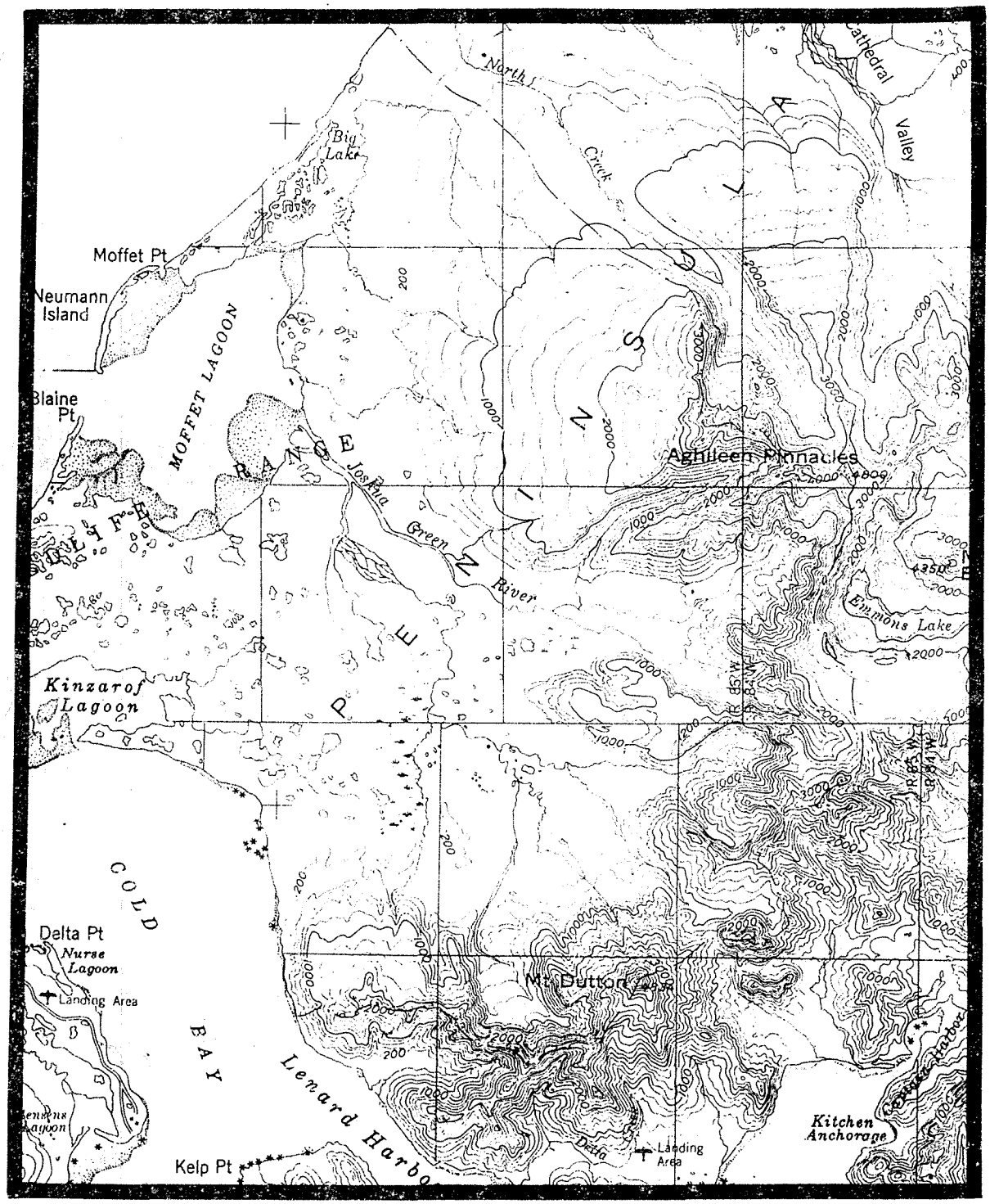


FIGURE 14a Home range polygons of single female brown bears, 1985.
A:IZ47, B:IZ48, C:IZ66, D:IZ67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Cathedral Valley
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Josephine Creek
Green River
Emmons Lake
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COLD BAY
Delta Pt
Nurse Lagoon
Landing Area
Mt Dutton
Lenard Harbor
Kelp Pt
Kitchen Anchorage
Landing Area

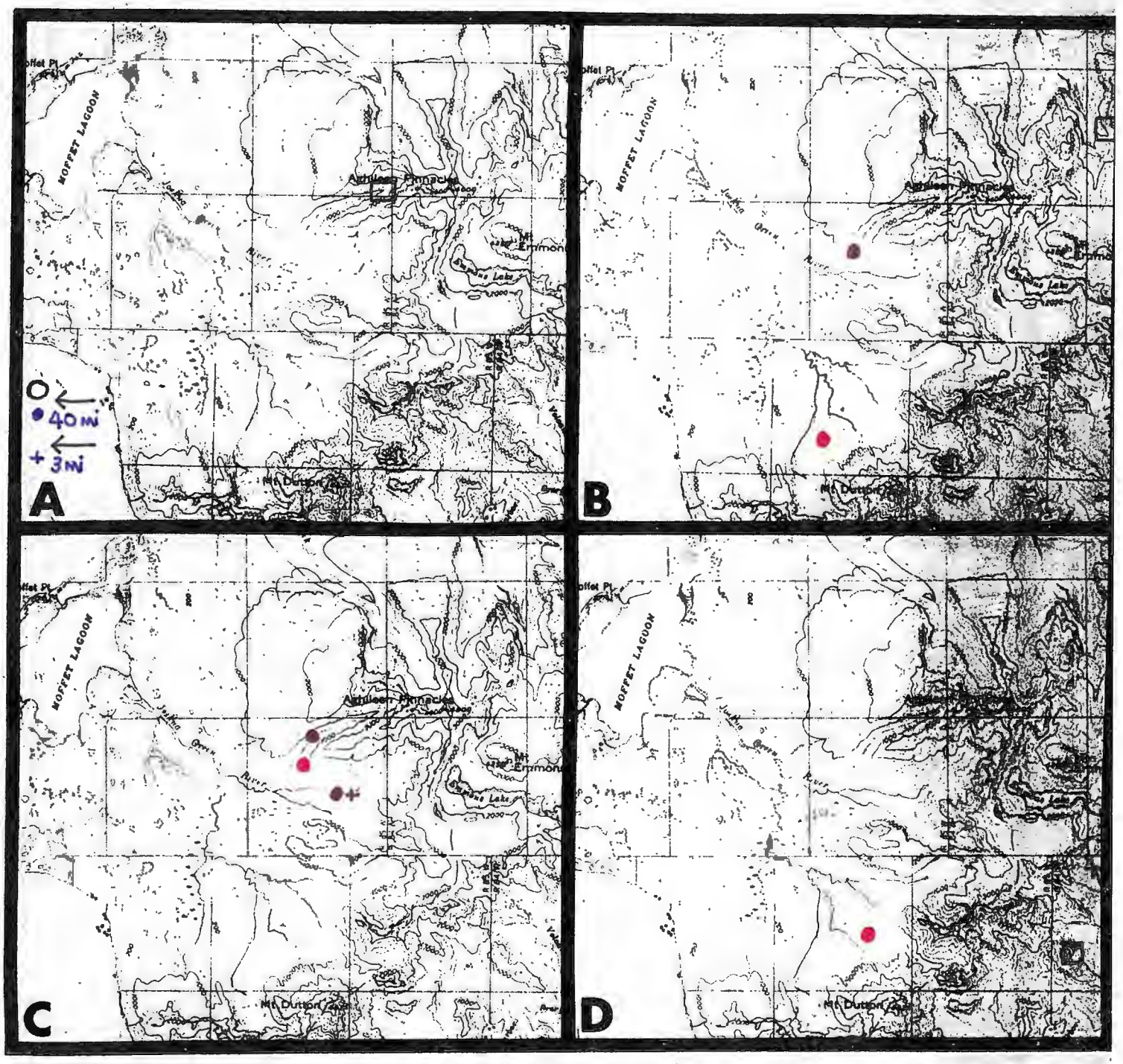

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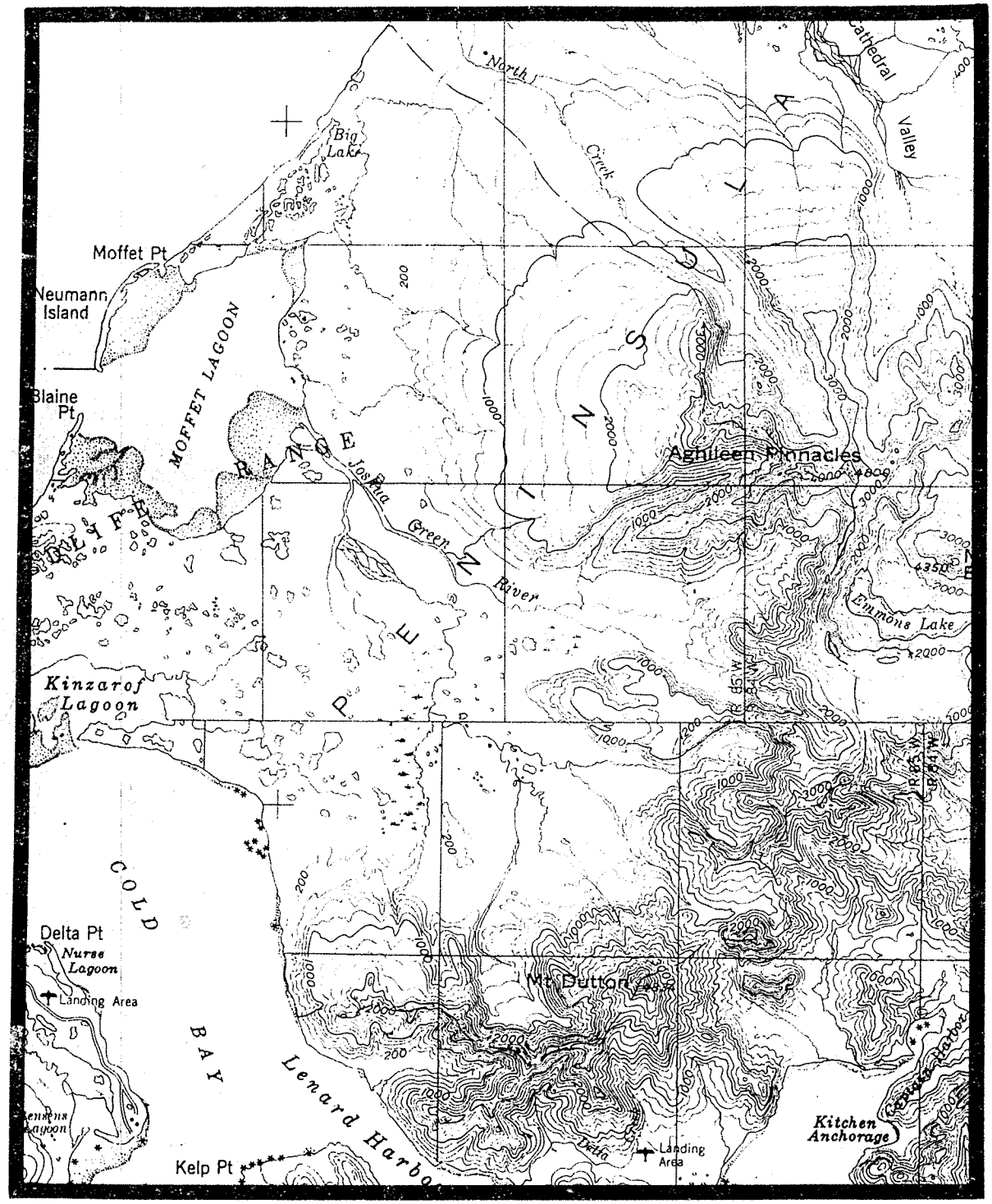
FIGURE 14a Home range polygons of single female brown bears, 1985. A:IZ71, B:IZ73, C:IZ76, D:IZ80.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Blaine Pt
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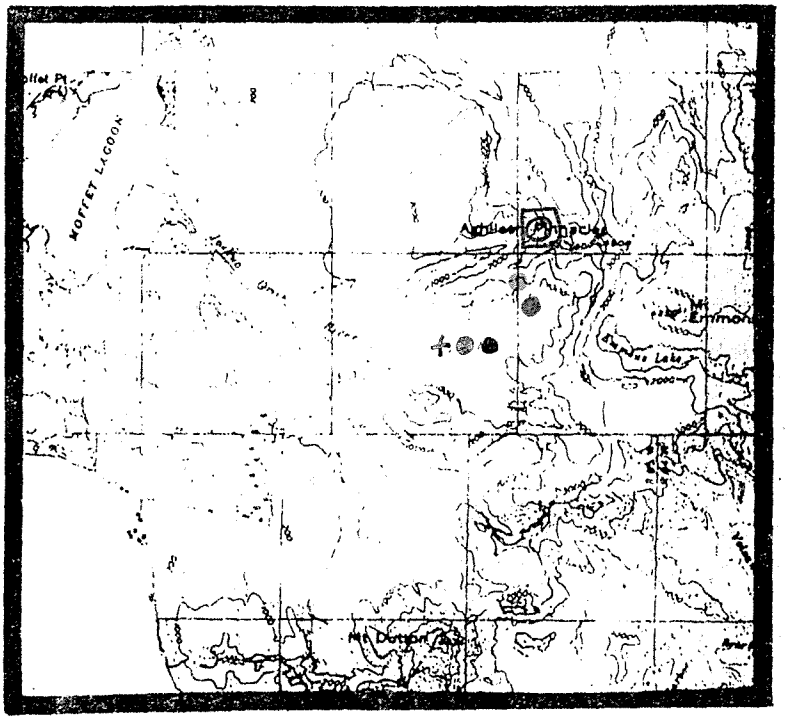
Big Lake
North Circle
Cathedral Valley
Agnilcen Pinnacles
Josephine Green River
Emmons Lake
Kinzarof Lagoon
COLD BAY
Delta Pt
Nurse Lagoon
Landing Area
Mt Dutton
Lenard Harbor
Kelp Pt
Kitchen Anchorage
Landing Area



(continued)
FIGURE 14a Home range polygons of single female brown bears, 1985. IZ28.

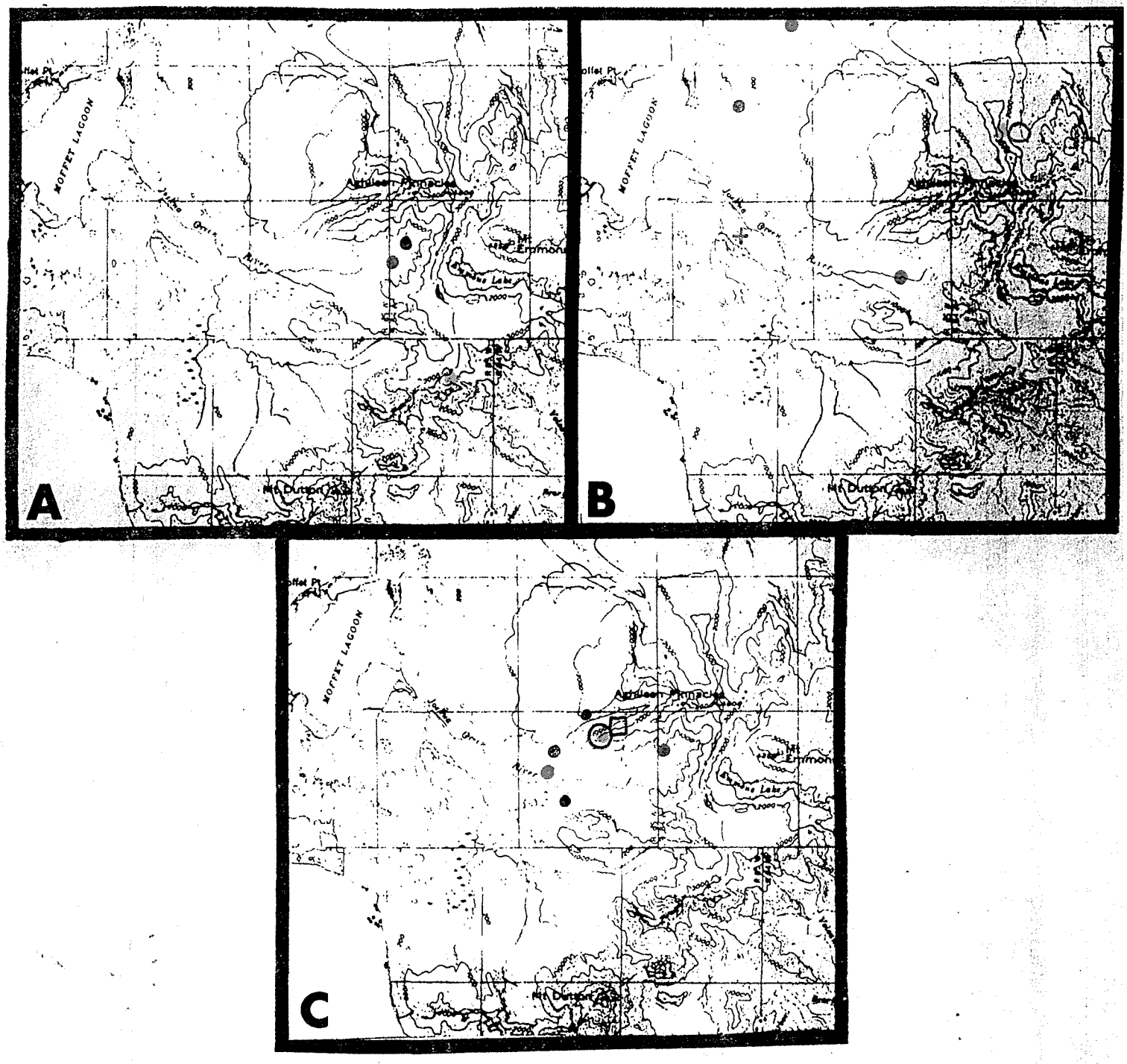
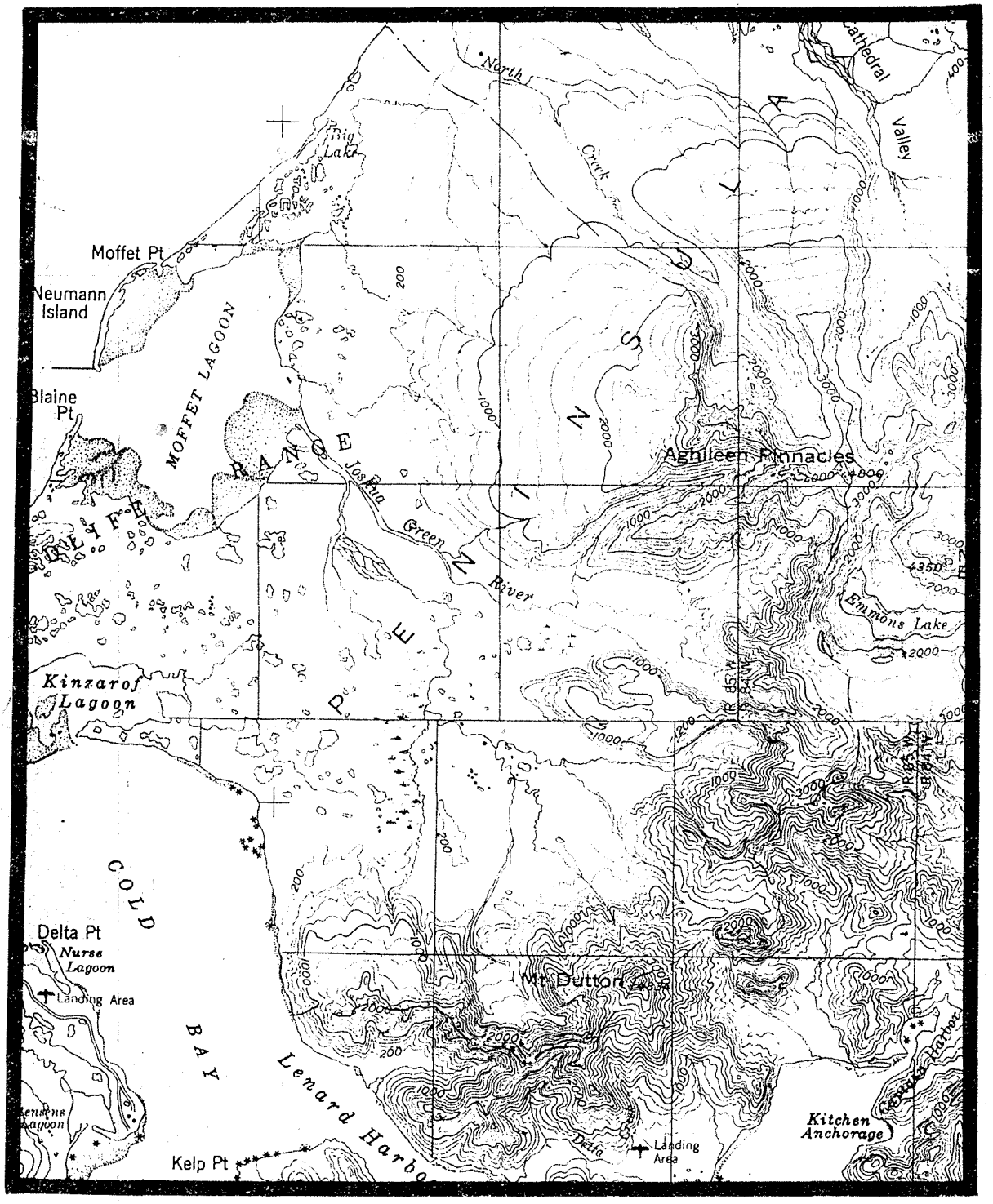


FIGURE 14b Home range polygons of female brown bears with cubs-of-the-year (COY), 1985 —A:IZ36, B:IZ46, C:IZ49.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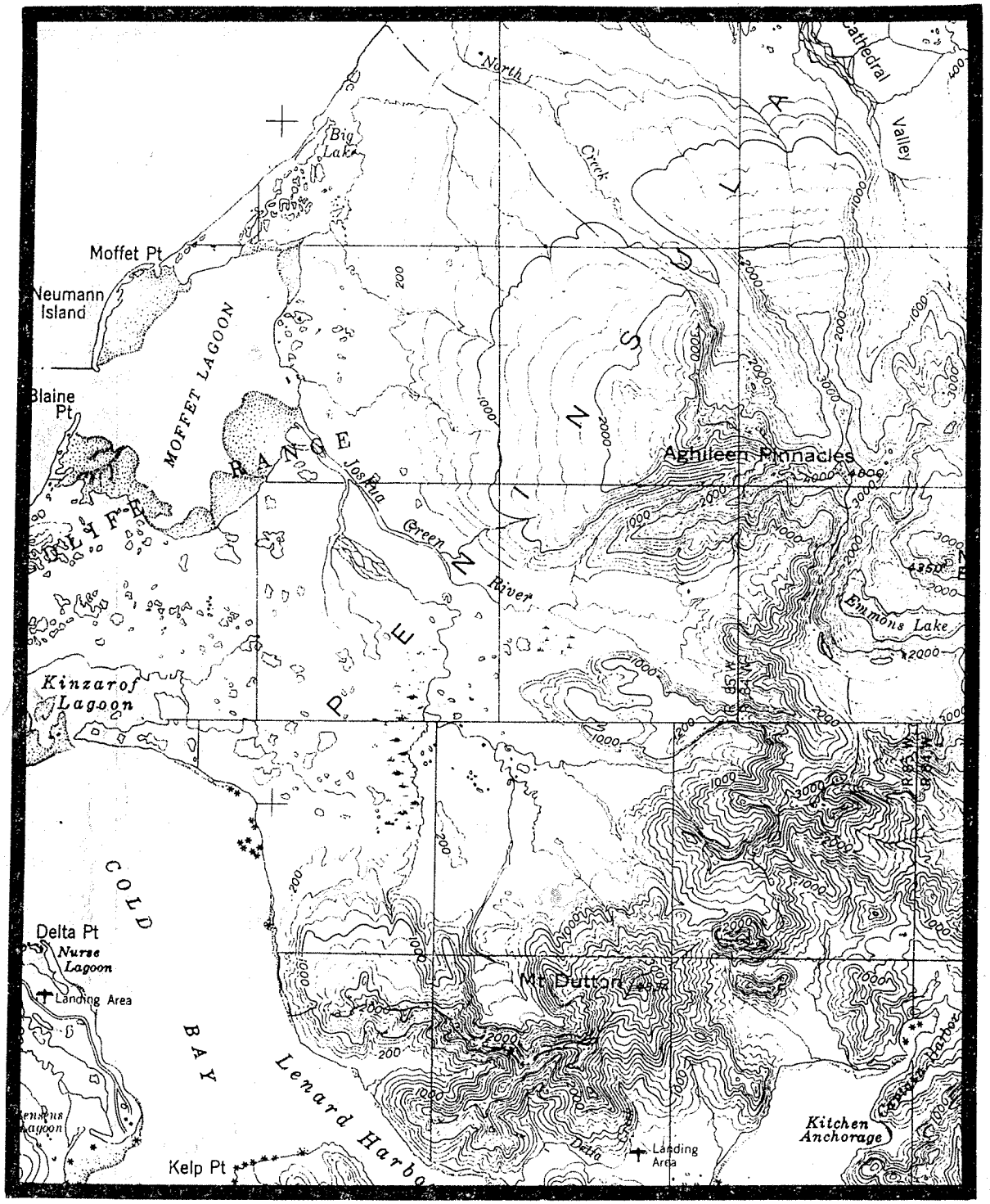
Blaine Pt
MOFFET LAGOON
RANGE
Big Lake
North Creek
Cathedral Valley
Aghileen Pinnacles
Josefina Green River
Emmons Lake
Kinzarof Lagoon
COLD BAY
Delta Pt
Nurse Lagoon
Landing Area
Mt. Dutton
Lenard Harbor
Kelp Pt
Delta
Landing Area
Kitchen Anchorage


Moffet Pt
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Blaine Pt
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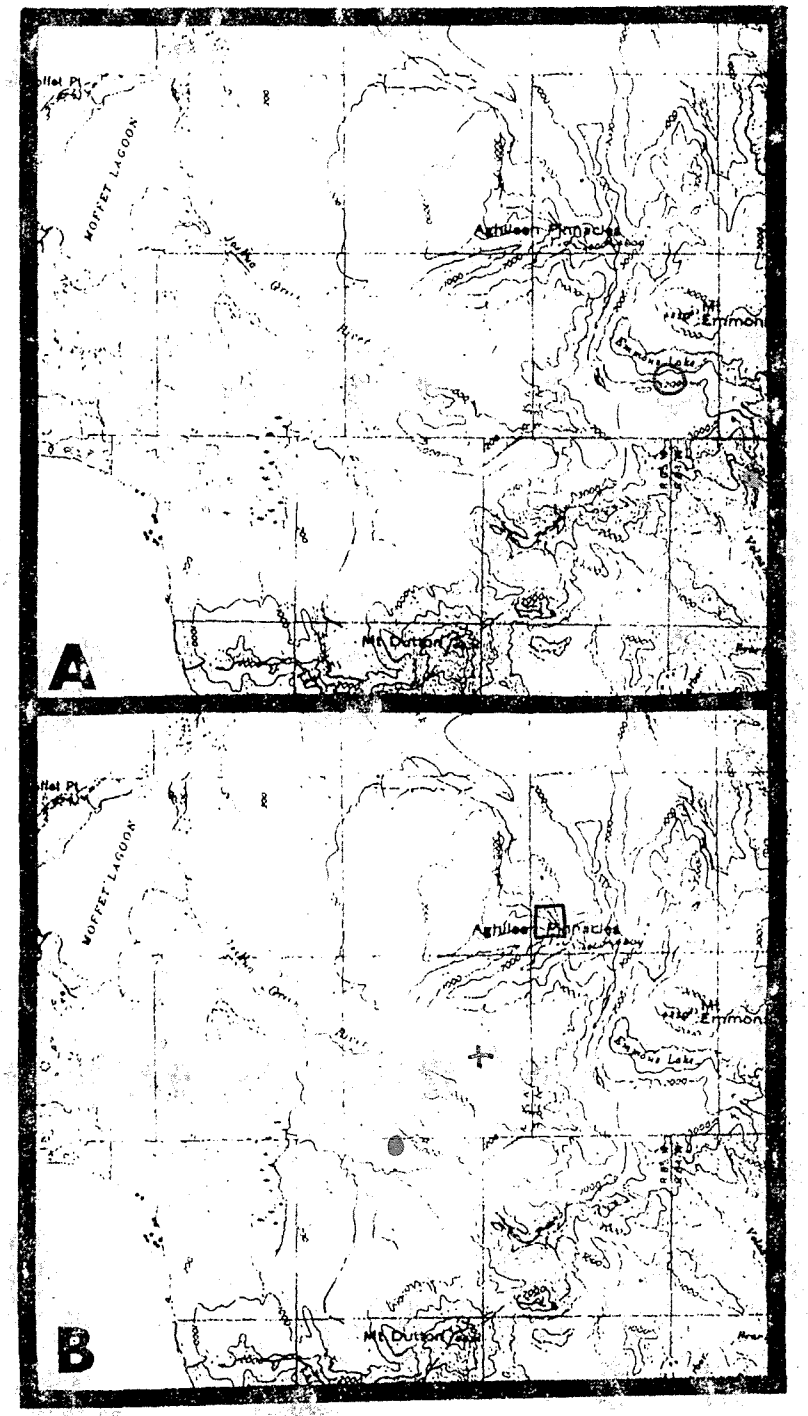
RANGE
Big Lake
North Creek
Valley
Aghileen Pinnacles
Josefina
Green River
Emmons Lake
Kinzarof Lagoon
COLD BAY
Delta Pt
Nurse Lagoon
Landing Area
Mt Dutton
Lenard Harbor
Kelp Pt
Delta
Landing Area
Kitchen Anchorage



(cont'd)
FIGURE 14b Home range polygons of female brown bears with cubs-of-the-year (COY), 1985. A:IZ51, B:IZ78.

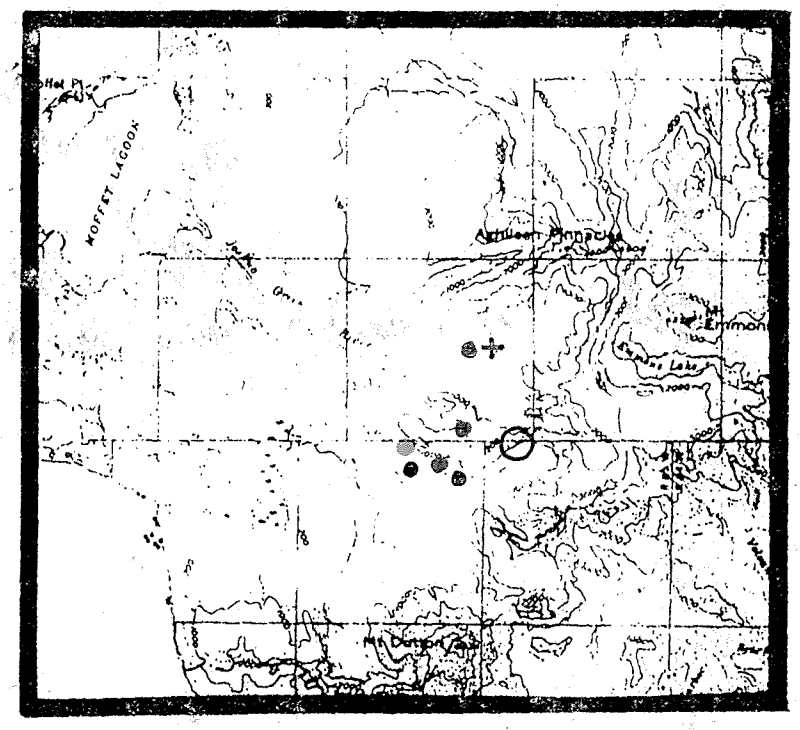
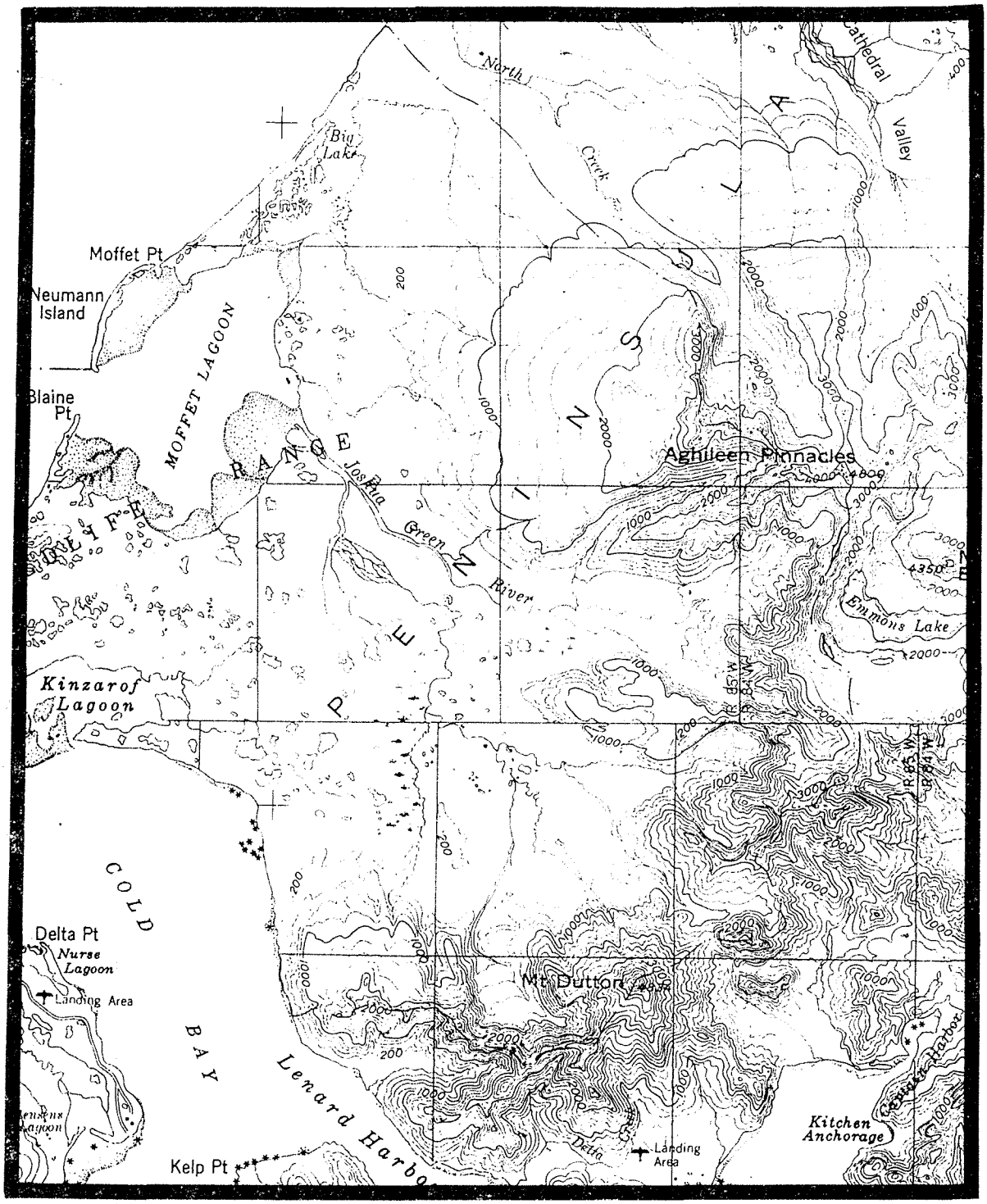


FIGURE14c Home range polygon of a female brown bear with yearlings (IZ39), 1985.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Neumann Island
Blaine Pt
MOFFET LAGOON
Big Lake
North
Creek
Cathedral Valley
Aghileen Pinnacles
Josephine Green River
Emmons Lake
Kinzarof Lagoon
COLD BAY
Delta Pt
Nurse Lagoon
Landing Area
Mt Dutton
Lenard Harbor
Kelp Pt
Delta
Landing Area
Kitchen Anchorage
Cutter Harbor

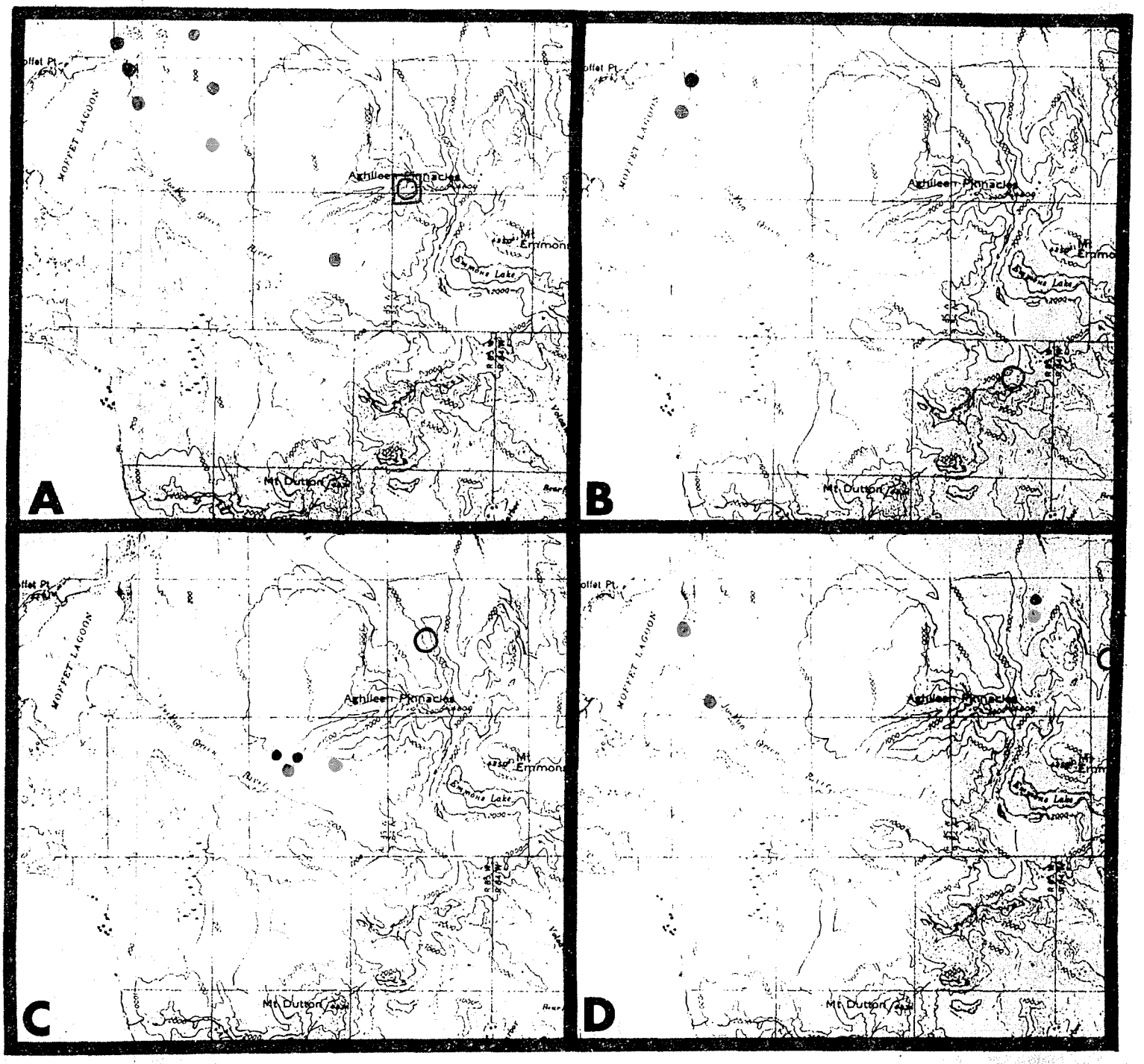
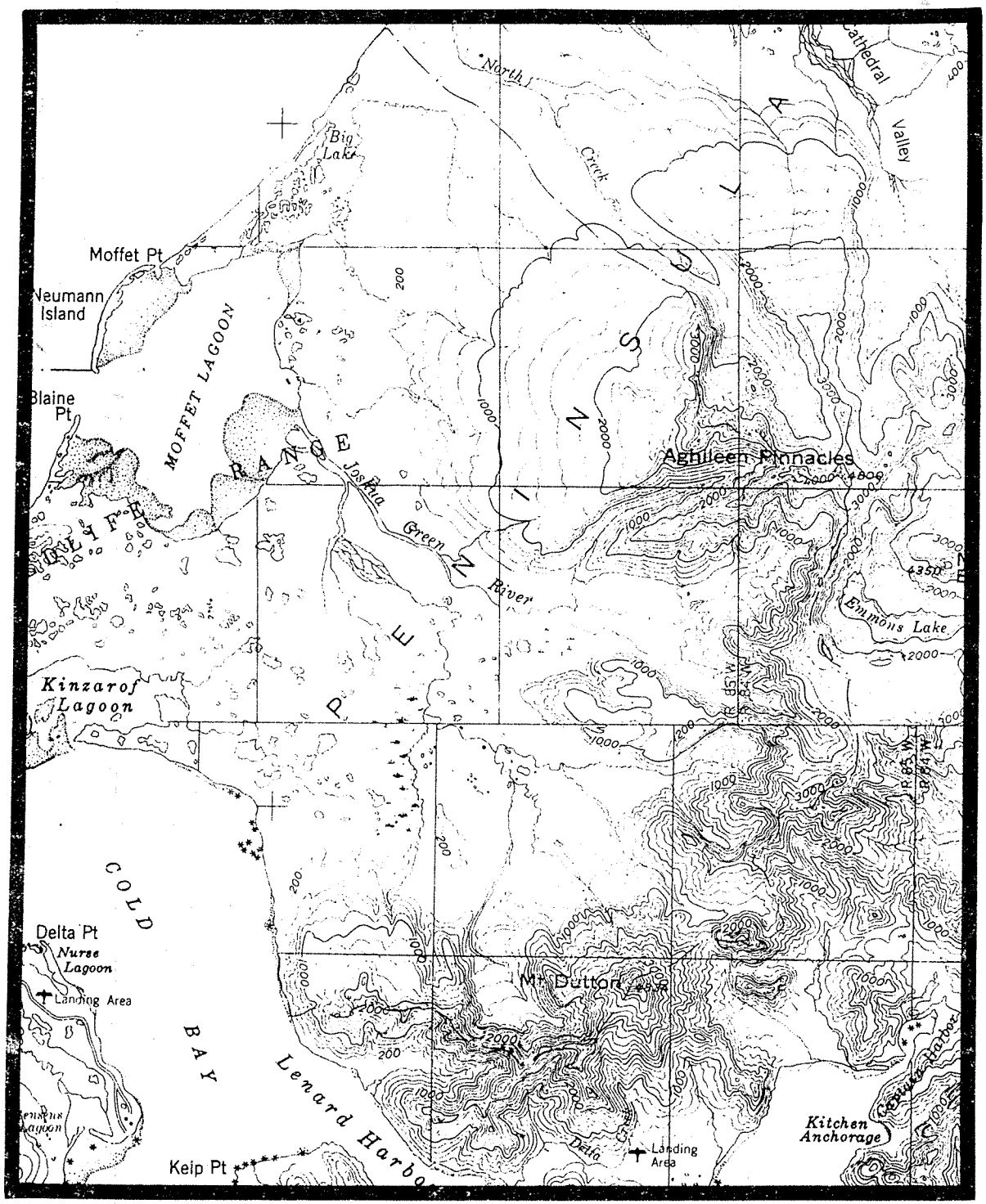


FIGURE 14d Home range polygons of female brown bears with 2½ year-old cubs, 1985. A:IZ27, B:IZ33, C:IZ37, D:IZ63.


Big Lake
Moffet Pt
Neumann Island
Blaine Pt
MOFFET LAGOON
RANGE
Joshua Green River
Aghileen Pinnacles
Emmons Lake
Kinzarof Lagoon
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Delta Pt
Nurse Lagoon
Landing Area
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Lenard Harbor
Kitchen Anchorage
Keip Pt
Delta
Landing Area
Cathedral Valley
North Creek

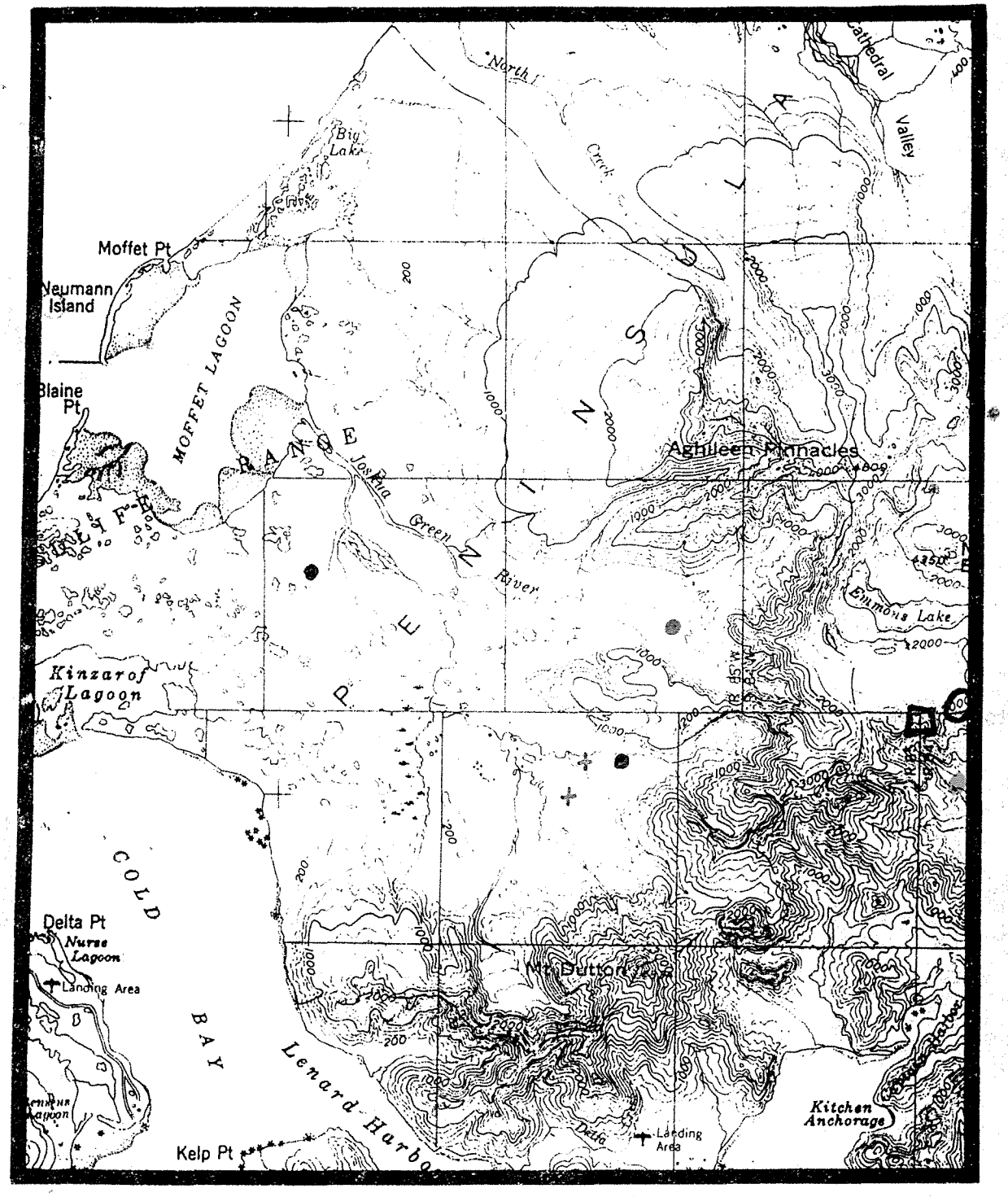

Figure 14e. 1985 observation locations of female brown bear, IZ23. On June 6 (●) she was observed with one yearling, on 7/11 and 7/17 (●) no cub was present, but was accompanied by a boar, on 9/26 (●) and 10/3 and 10/10 (+) her signal was pinpointed but she was not observed.

TABLE 36 Habitat categories used to classify habitat use by brown bear, Izembek NWR.[1]

Code	Habitat Type
Lowland	(Sea level to base of foothills)
130	Tall Shrub ($\geq$1.5 m), closed ($\geq$50% crown cover)
140	Tall Shrub ($\geq$1.5 m), open (25-75% crown cover)
150	Low Shrub ($<$1.5 m) - Herbaceous ($\geq$25% shrub cover)
160	Ericaceous Shrub - Herbaceous (hummocks)
180	Wet Herbaceous Meadow (marsh, $<$25% shrub cover)
190	Herbaceous Aquatic Marine (Intertidal areas)
Midland	(Base of foothills to upper limit of alder (Alnus crispa) zone)
220	Barren ($<$25% bedrock, scree, bare soil)
230	Tall Shrub ($\geq$1.5 m), closed ($\geq$75% corwn cover)
250	Low Shrub ($<$1.5 m) - Herbaceous ($\geq$25% shrub cover)
260	Ericaceous Shrub - Herbaceous (hummocks)
280	Wet Herbaceous Meadow (marsh, $<$25% shrub cover)
Upland	(Above upper limit of alder zone)
320	Barren ($\geq$25% bedrock, scree, bare soil)
360	Ericaceous Shrub - Herbaceous (hummocks)

[1]Habitat types and codes follow a portion of those used in brown bear studies on the Kodiak NWR (See Barnes, V.G. Jr.(1985) PROGRESS REPORT, Brown Bear Studies - 1984, Research Division, USFWS, unpublished report 38p.)

observation of a radio-collared bear was coded to habitat type to determine seasonal use patterns. These data were combined by population cohorts in Table 37 to show preliminary patterns. Considerable individual variation and small sample sizes within cohorts suggest that animals particularly in this study, are best dealt with separately to most accurately portray variability in habitat use.

Numerous radio locations obtained during aerial tracking flights do not correspond to actual sightings of the bear or bears in the den or family groups. Obviously this was the case during the denning period, but it also occurred often when animals were occupying `day-beds' within the alder (Alnus crispa) zone. Most bears are primarily nocturnal and crepuscular in relation to activities such as movements and feeding. This fact presents an obvious problem in projects such as ours which rely on data collected primarily from diurnal aerial surveys. Fortunately, the determination of seasonal patterns of habitat use, which is a primary goal of our study, can be determined from such surveys. Daily activity rhythms are nevertheless of considerable importance to us as an index of visibility which can help qualify our annual survey efforts. This topic is also predominant in conversations with campers, photographers and most notably bear hunters and guides. The concensus of the refuge staff is that evolution has graced some guides with near perfect night vision as evidenced by their self-proclaimed knowledge of age and sex-related nocturnal activity patterns of brown bears.

We had a unique opportunity this fall to collect some objective data on nocturnal and crepuscular activity patterns of marked and unmarked bears. On 26 September 15 of 24 of our bears with active radios were in the Left-Hand Valley area. At 2030 hours (sunset was at 2040 hours) that evening we entered the area by helicopter at approximately 1500 feet AGL. It dropped off WB Dau on the northside of the valley and RM Sarvis and ARM Blenden on the southside of the valley. Both drop-offs were along ridges at approximately the 1,000 foot level thereby providing a good vantage point for viewing bears and receiving radio signals. The helicopter was at each site for less than five minutes before departing the area in an effort to minimize its disturbance. No bears were observed out in the open when we arrived in the area.

After each camp was established radio frequencies were monitored using scanner/receivers and hand-held antennas. A compass heading representing the `strongest direction' (i.e. loudest signal) for each frequency was recorded. Points of intersection of compass headings were assumed to be the approximate locations of the individual animals. The signals obtained did indicate whether or not moderate

TABLE 37 Temporal distribution of brown bear sightings by habitat type, Izembek NWR, 1984 and 1985.[1] [3]

NUMBER OF SIGHTINGS OF MARKED BEARS BY SEASON AND HABITAT TYPE

	April-June						July-September										October-November						December-March[2]			
Bear Type[3] (n)	130	140	180	220	230	320	130	140	150	160	180	190	230	250	260	320	130	140	180	220	230	320	130	140	220	320
Males (6)	1	1		1			5	3	1		6		2	1			1			1			1		2 (1)	6 (4)
Females (single) (19)		3	1				3	8	3	2	17		5	1		2	1	1		1						18 (14)
Females (w/COY) (11)						3	4	2	2	1	17	2	2		1	1			1							6 (6)
Females (w/YRL) (7)		1						2		7	12	2	5			1			1			1				6 (4)
Females (2/2½-yr.olds) (7)					3			2	3	3	10	3	6	1							1					3 (3)
All Bears[1]	1	5	1	1	3	3	12 (8%)	17 (11%)	9 (6%)	13 (9%)	62 (42%)	7 (5%)	20 (14%)	3 (2%)	1 (1%)	4 (3%)	2	1	1	1	2	1	1		2	39 (89%)

[1]Some females appeared in different categories due to loss or production of cubs and the changing ages of cubs (i.e. 1984 vs 1985). Total marked individuals was 36 during the period.

[2]Number of dens in parentheses.

[3]See Table 36 for explanation of Habitat Type Codes.

movements were occurring so the goal of beginning to qualify nocturnal and crepuscular activity patterns was achieved.

This radio location process was repeated eight times at approximately 1.5 hour intervals over the 11.5 hours that we were on-site. We were picked up by the helicopter the following morning at 0930 hours. The two camps were in contact with each other via FM radio throughout the night thus allowing preliminary analysis in the field. Of the 15 bears monitored, two were boars, eight were single sows, two were sows with cubs-of-the-year, one was a sow with yearlings and two were sows with 2 1/2 year-old cubs. Distribution patterns of single bears (n=10) and sows with families (n=5) were analyzed in two blocks of time (i.e. 2130 hours-0530 hours and 0530 hours to 0800 hours) in Figures 15 a and b; and 16 a and b, respectively.

The use areas portrayed based on this experiment provide only a gross appraisal of movements and habitat use. A third camp would have allowed more precise triangulation of signals.

It appears that singles as well as family groups were active during most of the nocturnal period and as suspected most activity appeared to be concentrated on drainages along the valley floor. Springs adjacent to Left-Hand River and the river itself contained numerous spawning salmon at the time hence these areas were the primary attractant to foraging bears. The alder zones along each side of the valley are approximately 2.5 miles apart, hence food and cover are in close proximity to each other. Bear `highways' leading to feeding areas from the alders are obvious indices of directional movement patterns.

The night of 26 September was partially cloudy with periods of good moonlight. The south camp hoped to capitalize on this fact by utilizing a night vision telescope. Unfortunately, illumination and magnification were not sufficient to see bears even though the river course and springs could easily be detected.

Ocular viewing was begun at first light (approximately 0815 hours) with a count of the area. A total of 30 bears were visible from the south camp while 11 different bears were visible from the north camp. Although some of our collared bears were probably in the viewing area, distances involved precluded making positive identification. Of the 41 bears observed, 26 were singles, and five were sows with a total of 10 yearlings.

Many of the bears observed at first light were in transit toward the alder zone and by the time we were picked up by the helicopter (i.e. approximately 0930 hours) no bears were in view. As we made all our observations from within small,

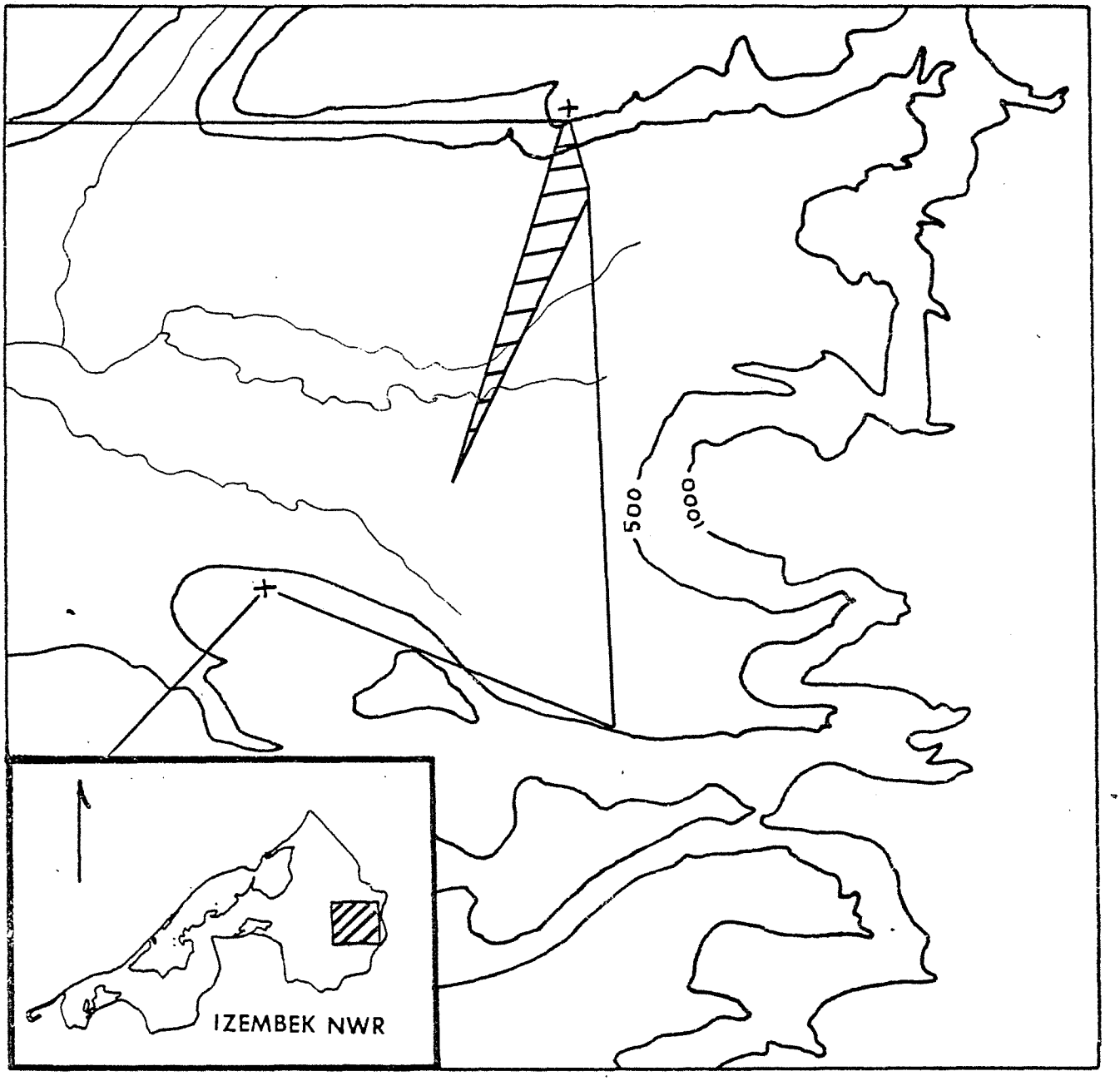

FIGURE 15a. Composite distribution polygon of five female brown bears in family groups (COY(2), YRL(1), 2½(2)) monitored from 0530 to 0800 hours in Left-hand Valley, 26-27 September 1985. area used by three of five bears.

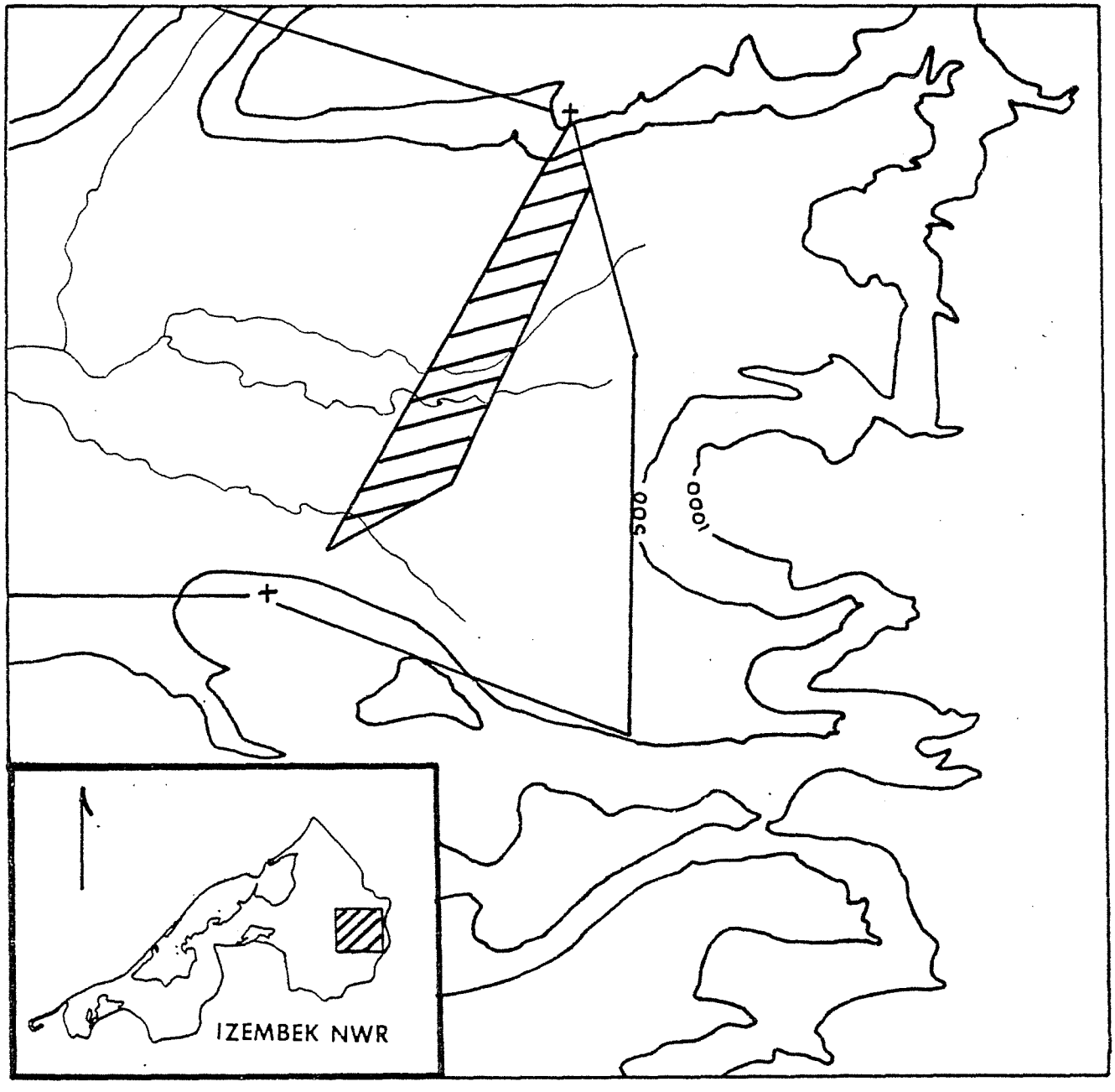

FIGURE 15b Composite distribution polygon of five female brown bears in family groups (COY(2), YRL(1), 2½ (2)) monitored from 2130 to 0530 hours in Left-hand Valley, 26-27 September 1985. area used by all five families.

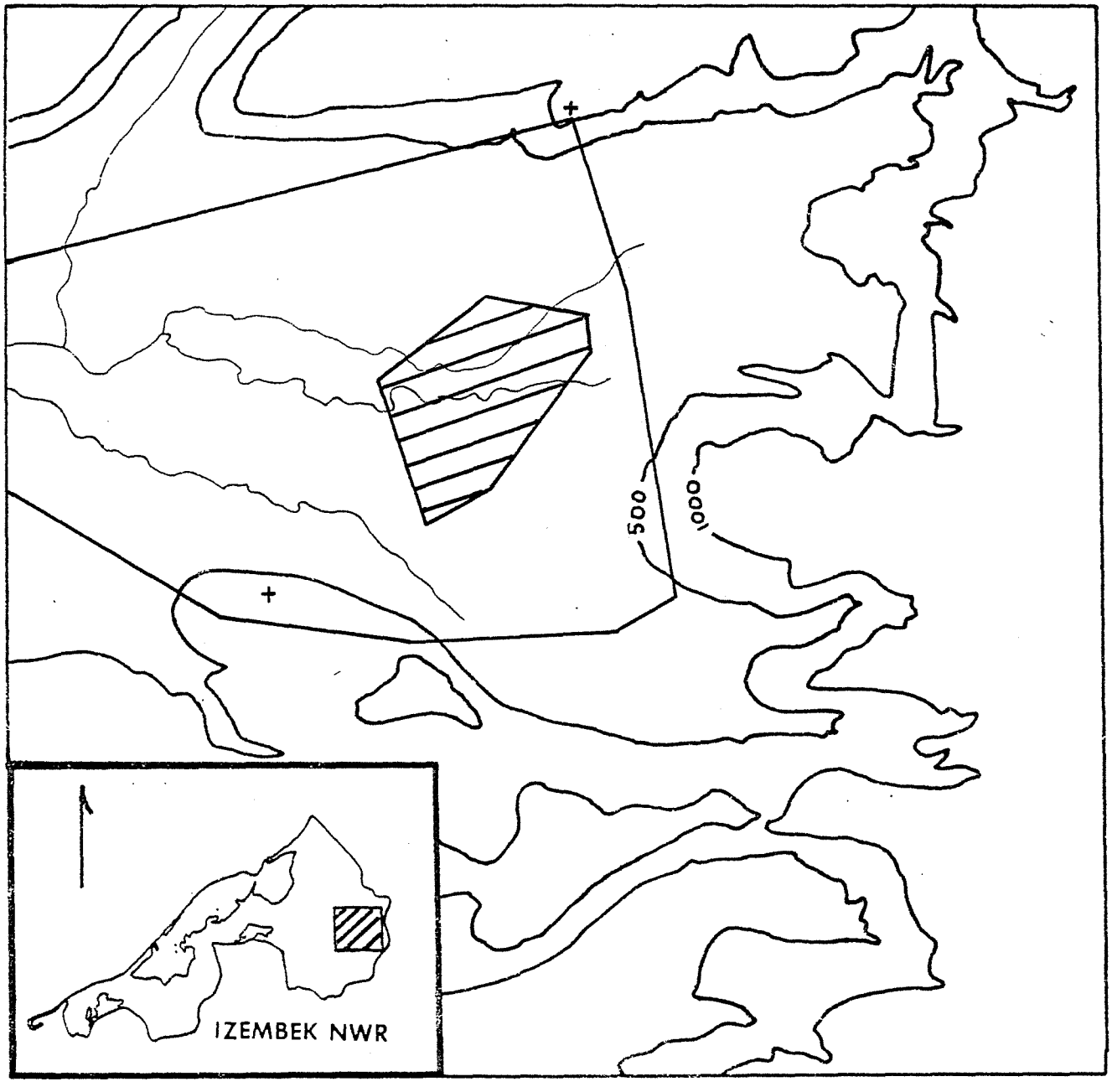

FIGURE 16a Composite distribution polygon of 10 single brown bears (2 ♂, 6 ♀) monitored from 0530 to 0800 hours in Left-hand Valley, 26-27 September 1985. ▨ area used all or in part by eight of these bears.

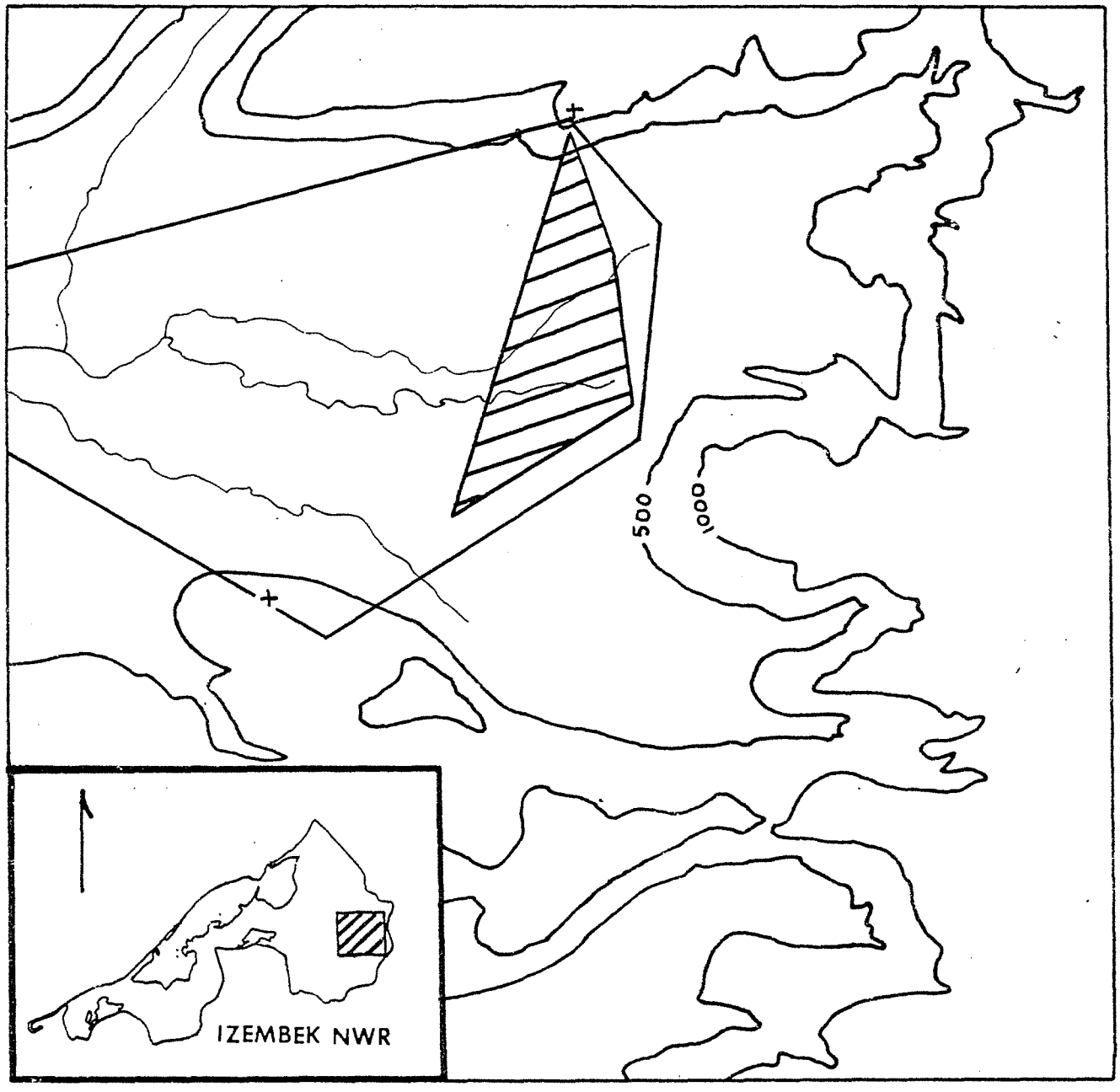

FIGURE 16b Composite distribution polygon of 10 single brown bears (2♂, 6♀) monitored from 2130 to 0530 hours in Left-hand Valley, 26-27 September 1985. ▨ area used all or in part by seven of these bears.

inconspicuous tents at or above 900 feet above the valley floor, we feel we were not seen by the bears and it is unlikely that we were scented. Hence, we feel the bears monitored and observed were exhibiting normal behavior. Bears observed were visible for a maximum of two hours in the morning before moving into the alders. We estimate that we had one hour of visibility on the previous evening after being dropped off and no bears were seen from either camp, hence amount of time for aerial surveying viewing or hunting in the Left-Hand Valley area is quite limited if the goal is to see fair numbers of bears.

We hoped to perform this evaluation of nocturnal behavior soon after our annual fall survey and well prior to the 1 October opening of the brown bear hunting season. The helicopter contracted for use on several Service projects was delayed making 26 September the first suitable date. The project was completed expeditiously with as little disturbance as possible however our presence was noted by an assistant bear guide boating up Left-Hand River on 27 September, four days prior to the opening of the hunting season. By the opening day of the hunting season eight hunters and two guides were camped in this confined area. Hunting success was felt to be mediocre with five bears being taken. Everyone complained that they saw fewer bears than they expected. The concensus of opinion was that our helicopter activity on 26 and 27 September was the reason for their poor success. Some hunters and/or guides voiced their concerns to the refuge staff via tongue lashings while one hunter vented his emotion through correspondence to Assistant Secretary Horn, Director Janzen and Regional Director Gilmore. By December, the dust had begun to settle leaving a considerable paper trail as a reminder that sometimes biological data collection carries a price.

In reality, the number of radio-collared bears in Left-Hand Valley increased from 15 on 26 September to 17 in the first 10 days of October with legal bears increasing in number from 10 to 12 (Table 38). Hence we contend that we had essentially no effect on the number of bears moving into or out of the area and subjectively feel we had little or no effect on activity patterns as we were out of the area four days prior to the start of the hunting season. We feel that the presence of four camps and a total of 10 hunters (including two guides) in this confined area did significantly alter bear activity patterns. We made an attempt to explain this fact to the people concerned along with our belief that a minimal presence of refuge personnel in the area was necessary for law enforcement and biological purposes. Receptiveness was variable.

One marked bear, a small boar, was shot by a hunter in Left-Hand Valley and one radio-collared sow was shot by a hunter in Right-Hand Valley. The carcass of another

TABLE 38 Change in number and composition of brown bears using Left-Hand Valley before and during the hunting season, 1985.

Males	Females			
	Singles	W/COYs	W/YRLs	W/2½
26-27 September[1]				
IZ68 IZ77	IZ23 IZ28 IZ38 IZ49 IZ63 IZ71 IZ73 IZ76	IZ29 IZ46 IZ48	IZ39	IZ27
2	8	3	1	1
3-10 October[2]				
IZ40 IZ41 IZ68 IZ69 IZ77	IZ28 IZ35 IZ38 IZ49 IZ63 IZ71 IZ76	IZ29 IZ46 IZ51 IZ78	IZ39	
5 (+150%	7 (-12.5%)	4 (+33%)	1 (0)	0 (-100%)
Overall change in number of legal bears +20%		Overall change in numbers of adult bears +13.3%		

[1]Ground tracking evening of 26 Sept. to morning of 27 Sept.

[2]Composite of two aerial surveys (i.e. 3 and 10 Oct.).

radio-collared bear which apparently died in spring or early summer was found by another hunter. This bear was a 30-year-old sow captured in 1984 which had three cubs-of-the-year this spring.

The climatically late spring and summer of 1985 altered the late summer and fall activity patterns of brown bear on the Izembek NWR. Movements between foraging areas where spawning salmon are abundant and dense alder zones which provide cover during diurnal hours characterize these periods. Cooler than normal water temperatures in the Bering Sea and near-shore areas of the North Pacific delayed the migration of salmon into spawning areas such as our Right and Left-Hand Valley study area by approximately two weeks. Normally spawning salmon are abundant in this area by mid-July with a corresponding dense population of bears through October. We delayed our annual fall aerial survey in an attempt to correct for these conditions to increase comparability to previous years' data. This year's count of 82 bears in the Moffett Bay and Right and Left-Hand Valley areas was 6.8% below the nine-year average of 88± 29 (ISD) bears (range 37 to 137). Comparison of these survey data also suggest that fewer than normal numbers of single (i.e. legal) bears were present while greater than normal numbers of family groups were seen (Table 39). These data further subdivided by survey units suggest that the Left-Hand Valley area contained 22.7% more bears than normal while numbers in Right-Hand Valley and Moffett Bay were 18.8% and 19.4% below normal (Table 40).

In addition to the normal survey procedure, all radio-collared bears sighted were noted. These were collared bears located without the aid of the radio receiver. After completion of the survey, the area was scanned with the radio receiver to determine the number of bears with active collars which were in the survey area. Of 15 radioed bears in the area, five were observed on the survey. This ratio was used to determine an estimate of the number of unmarked bears in the area as follows:

$$\frac{(\text{survey total} + 1)(\text{marked bears present} + 1)}{(\text{marked bears seen} + 1)} = \text{est. total bears in survey area}$$

$$\frac{(82+1)(15+1)}{(5+1)} = \frac{1328}{6} = 221 \text{ bears}$$

One other collared bear was observed during the survey, but was not included in the calculation as it's collar had an inactive radio. Four single uncollared bears with ear-flags were also observed. We have no accurate estimate of the number of ear-flagged bears available to be seen as several have lost their marks. In addition, there are possibly

TABLE 39 Brown bear survey totals for the 1985 survey area versus previous years.

YEAR	NO. SINGLES	NUMBER OF FAMILIES				SINGLES/FAMILY RATIO	TOTAL BEARS
		COY	YRL	2½	TOTAL		
1976	26	8	6		14	1.86	82
1977	24	8	9		17	1.41	77
1978	18	3	4		7	2.57	37
1979	28	10	8	1	19	1.47	86
1980	29	6	9		15	1.93	78
1981	53	5	6		11	4.82	92
1982	70	9	6		15	4.67	123
1983	69	8	13		21	3.29	137
1985	33	9	3	5	17	1.94	82
X(SD)	39(20)	7(2)	7(3)	0.7(2)	15(4)	2.66(1.31)	88(29)

TABLE 40 Comparison of Brown Bear Population Composition Data for Sub-Units of the 1985 Survey Area.

YEAR	SOWS W/ COY	SOWS W/ YRL	SOWS W/ 2½	SINGLE BEARS SMALL	SINGLE BEARS MEDIUM	SINGLE BEARS LARGE	TOTAL
			MOFFETT AREA				
1976	2 W/4	1 W/3			7	2	19
1977[1]	5 W12	3 W/6		8	2		36
1978	2 W/3	3 W/4		1	5		18
1979	4 W/11	5 W/6	1 W/3	3	15	1	49
1980	2 W/7	4 W/8		3	9	2	35
1981	2 W/5	3 W/7		8	14	2	41
1982		4 W/9		9	14		36
1983	5 W/10	1 W/3		7	32	7	65
1985	1 W/2	1 W/1	3 W/5		11	5	29
							36±15 (1SD)
			RIGHT-HAND VALLEY				
1976	6 W/19	4 W/13		6	5	2	55
1977[1]	3 W/7	6 W/11		7	7		41
1978				1	3		4
1979	3 W/8	2 W/2		1	3		19
1980	3 W/7	3 W/5		7	3	1	29
1981	1 W/2	1 W/2		6	8	2	22
1982	9 W/22	2 W/7		22	17	5	84
1983		2 W/6		3	2	1	14
1985	2 W/5	2 W/4	1 W/3	6	2	1	26
							32±26 (1SD)
			LEFT-HAND VALLEY				
1976		1 W/3			4		8
1977[1]	DATA COMBINED WITH RIGHT-HAND VALLEY						
1978	1 W/3	1 W/2		5	2	1	15
1979	3 W/7	1 W/2		2	2	1	18
1980	1 W/3	2 W/4		1	2	1	14
1981	2 W/6	2 W/6		1	9	3	29
1982				2	1		3
1983	3 W/8	10W/20		6	10	1	58
1985	6 W/11		1 W/1	4	2	2	27
							22±17 (1SD)

[1]Twenty-four single bears of unrecorded size prorated to small, medium and large categories.

three other bears with inactive collars which could possibly have been in the area. Hence, our best, least biased estimate of population size was determined on the basis of sightings of bears with active collars seen versus those in the area but not seen.

Comparisons of our 1985 brown bear survey data with that of other years suggests that several, often uncontrollable biases come into play. Some of these potential biases are:

1. The number of bears observed in 1985 may be lower than during previous years due to the capture oriented aerial harassment from 8 to 10 August 1985. Lower numbers could also be due to displacement from the area or more rapid movement to cover when an aircraft is heard. At least one bear (sow with one cub-of-the-year) radioed in 1984 moved into the survey area after the 1985 capture operation and two bears (two sows each with two 2 1/2 year-old cubs) either departed the survey area after the capture operations or have radios which have gone inactive.

2. Previous surveys (1977-1983) were flown approximately two hours earlier in the morning with the exception of 1976 and 1977 surveys which were flown in the evening. Subjectively, the 1985 survey may have missed bears active earlier in the day.

3. Annual variation in productivity and the percent composition of various population components exist.

4. High annual variability in the number of single bears observed occurs and may be a function of poor cub-of-the-year survival, immigration of young or single adult bears from outside the area or good survival of individual cohorts allowing for input of numerous young bears.

5. The same pilot, but four different observers were used over the years.

As anticipated, our bear study will answer questions while raising others. Collection of some types of data bias others. Subjectively, we feel that intensive capture and tracking flights may result in more study bears in cover or rapidly taking to cover and hence, fewer seen on aerial surveys.

Unimak Island - Brown bear

Brown bear hunting on Unimak Island in the spring of 1985 (10-25 May) was regulated in the normal fashion. Drawing permits were issued by the Alaska Department of Fish and

Game with the stipulation that hunters check in and check out through the Izembek refuge office in Cold Bay.

Of seven permits issued to hunters, three were actually used. The three hunters participating in the hunt took two bears with each hunter spending an average of three days on the island (Table 41). One archery hunter from Anchorage took a large boar with a sealing certificate skull measurement of 27 1/4 inches placing it well up in the Pope and Young archery record book.

The process by which brown bear permits for Unimak Island are issued to hunters changed for the fall 1985 season. This hunt changed from a drawing, where applications are made to the ADF&G through the mail, to a registration hunt where applicants must appear on a first-come-first served basis at the Izembek NWR office to obtain permits. This change was brought about due to legal actions being considered by the Alaska Board of Game on the general topic of game allocation on the basis of race or local residence (i.e. "subsistence").

Procedures for hunts across the state were affected often against the views of the ADF&G and the USF&WS. In this process, the brown bear found itself a "subsistence" animal even though there is scanty evidence at best that the meat or hides were historically important to coastal indians or Aleuts. The meat has certainly not been used by anyone in recent times.

Six registration permits were issued on 25 September for the period 1-10 October. We had previously received approximately 40 telephone calls from interested hunters outside the Cold Bay area including two inquiries from False Pass on Unimak Island. Two Anchorage hunters arrived in Cold Bay on 23 September and camped outside the Izembek NWR office. They were joined by two Dutch Harbor hunters on the afternoon of 24 September and two Cold Bay hunters later that same evening. Only those six hunters appeared at the office on 25 September to apply for permits.

Five of the six permittees took brown bears, hunting from one to six days (x=2.4 days). Three boars and two sows were taken. Hunters were grouped in twos in the Cape Sarichef, Urilia Bay and Swanson Lagoon areas. Hunters reported seeing four to 27 bears (x=10.7) during their hunts. Three hunters each shot one wolf and two hunters took four caribou each.

The registration process went smoothly, however, the perceived purpose of giving local "supposed subsistence" users an advantage in obtaining permits was not satisfactorily achieved. Two False Pass residents inquired about permits but complained that the

TABLE 41 Brown Bear Hunter Numbers and Success Unimak Island, 1975-1985.

	Permits Issued	Hunters Active	# Bears Known Taken
CY 1975	20	9	6
CY 1976	18	10[1]	4
CY 1977	15	10[1]	7
CY 1978	15	3[1]	1
CY 1979	15	8[2]	7
CY 1980	15	6	3
CY 1981	15	5	3
CY 1982	15	7[1]	4
CY 1983	15	10[1]	6
CY 1984	15	4	1
Spring 1985	7	3	2
Fall 1985[3]	6	6	5

[1]One permittee failed to return questionnaire, unknown if active.

[2]Three permittees failed to return questionnaire, unknown if active. One additional hunter was lost at sea on his return flight to Anchorage, not known if he took a bear.

[3]Changed to a registration hunt with permits issued on a first-come first-served basis at the refuge office.

"first-come-first-served" permit process put an undue financial burden on them in that permits were issued in Cold Bay. They felt they would have a more equitable opportunity to obtain a permit via the previously used drawing process.

We and the Alaska Department of Fish and Game strongly urged the Board of Game to re-adopt the drawing permit process for brown bear hunting on Unimak Island. No one to our knowledge, has ever taken a brown bear in this area for eating (or making clothing) and it should not be considered a subsistence animal. Therefore, for this type hunt (trophy/sport) everyone should have an equal chance of obtaining a permit. Return to a drawing hunt would eliminate the financial burden placed on local hunters, primarily those who live on Unimak Island, who are required to appear in Cold Bay to qualify for a permit. Also this would reduce administrative requirements for both the Alaska Department of Fish and Game and the U.S. Fish and Wildlife Service.

2. Caribou

The southern Alaska Peninsula caribou herd ranges from Port Moller south to the tip of the Alaska Peninsula, occurring seasonally on portions of Izembek NWR (Figure 17). Rugged terrain in the Port Moller area separates the southern from the larger northern Alaska Peninsula caribou herd. The southern herd is estimated to consist of at least 7,500 animals. Recent population estimates have ranged from 5,844 in November 1979 to 10,200 during the fall of 1983.

The primary calving ground for the southern Alaska Peninsula herd is in the Black Hills area, southwest of Nelson Lagoon. Arrival on the calving grounds occurs in mid-May. Departure from calving to the wintering grounds, from Moffett Bay to the southwest tip of the Alaska Peninsula, is during the latter part of July. Arrival in the Cold Bay area and road system which dissects the wintering area, usually comes with the first snows in mid-to late October.

Surveys of this caribou herd have been conducted sporadically since 1949. However, systematic surveys conducted on a regular basis have only been attempted by the Izembek NWR staff since 1978. Since that time, efforts have been directed toward obtaining herd composition ratios and total population estimates. Composition counts are most confidently performed by observers on the ground with the aid of spotting scopes. These counts have been accomplished by observing herds as they cross the Cold Bay road system in the fall. During the summer, herds are spotted from the

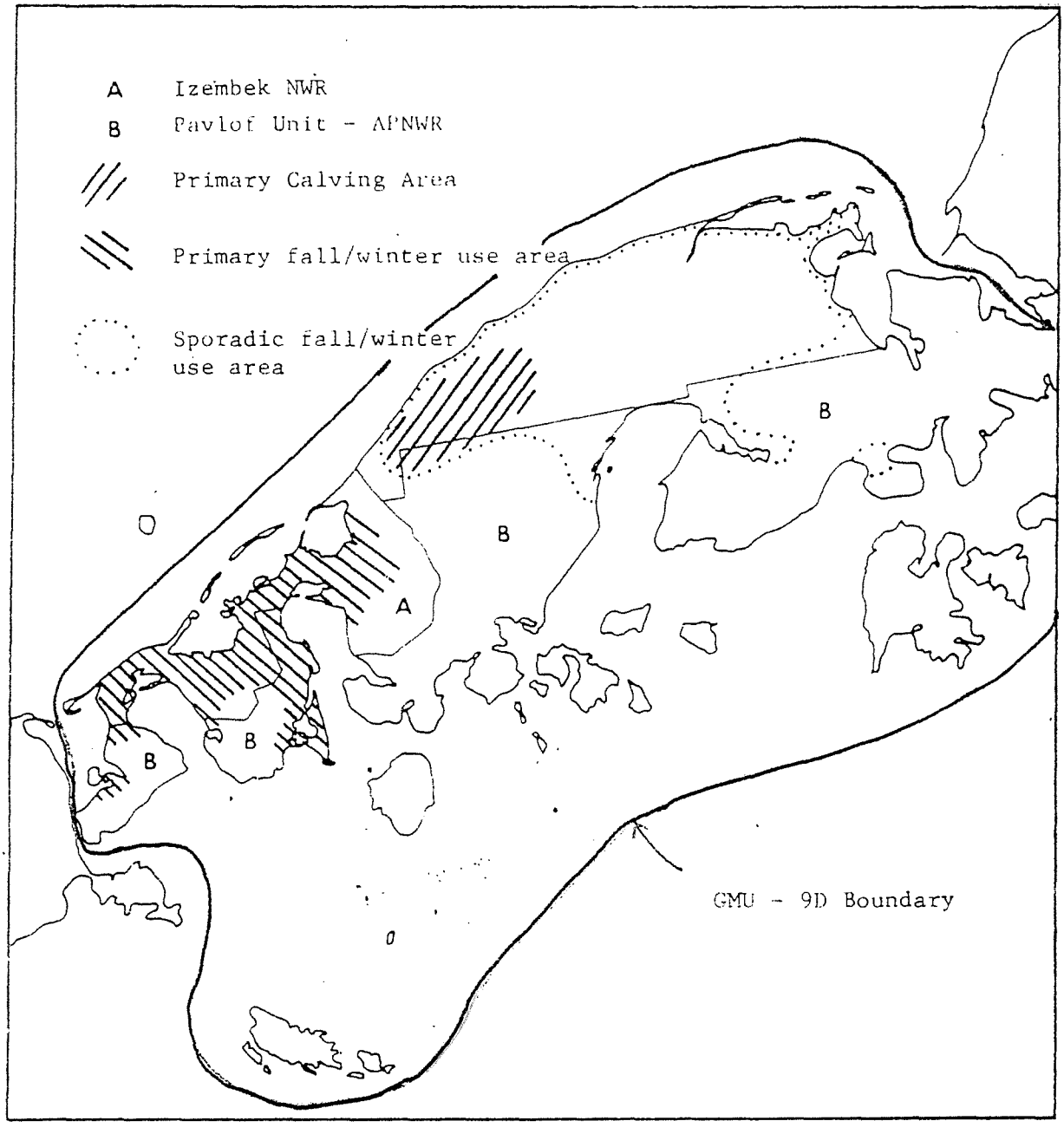

Figure 17. Seasonal distribution of the southern Alaska Peninsula caribou herd, Game Management Unit (GMU) - 9D.

TABLE 42 Caribou Harvest Statistics, Southern Alaska Peninsula Herd

	Local Hunters[1]					Non-local Assists (Hunters)[2]				
		Animals Taken					Animals Taken			
	No.	♂	♀	Unk.	Take/Pers.	No.	♂	♀	Unk.	Take/Pers.
1981-82	20	28	13	0	2.1	9	9	0	8	
1982-83	15	24	10	0	2.3	9	-	-	22	2.4
1983-84	15	12	9	0	1.4	3	3	4	-	2.3
1984-85	14	16	5	4	1.8	5	1	1	4	1.0
% change 1984-85 versus 1983-84	-6.7		+19.1		+28.6	+67.7		-14.3		-56.5

Data Reported on ADF&G Harvest Survey

	Local Hunters			Non-local Hunters		
		Animals Taken			Animals Taken	
	No.	Total	Take/Pers.	No.	Total	Take/Pers.
1981-82	35	92	2.6	152	332	2.2
1982-83	31	74	2.4	149	350	2.4
1983-84	20	38	1.9	80	174	2.2
1984-85[3]	Total Hunters = 176			Total animals taken = 388 (2.2 animals/hunter)		
%Change 1984-85 versus 1983-84		+76			+92	(+4.8)

[1]Based on a sampling of 10 households in Cold Bay in 1981-82, nine households in 1982-83 and 10 households in 1983-84 (i.e. approximately 20% of total households sampled each year).

[2]Hunters assisted by sample households (normally hunters from out of town who stayed in the households in Cold Bay).

[3]Includes resident and non-resident hunters.

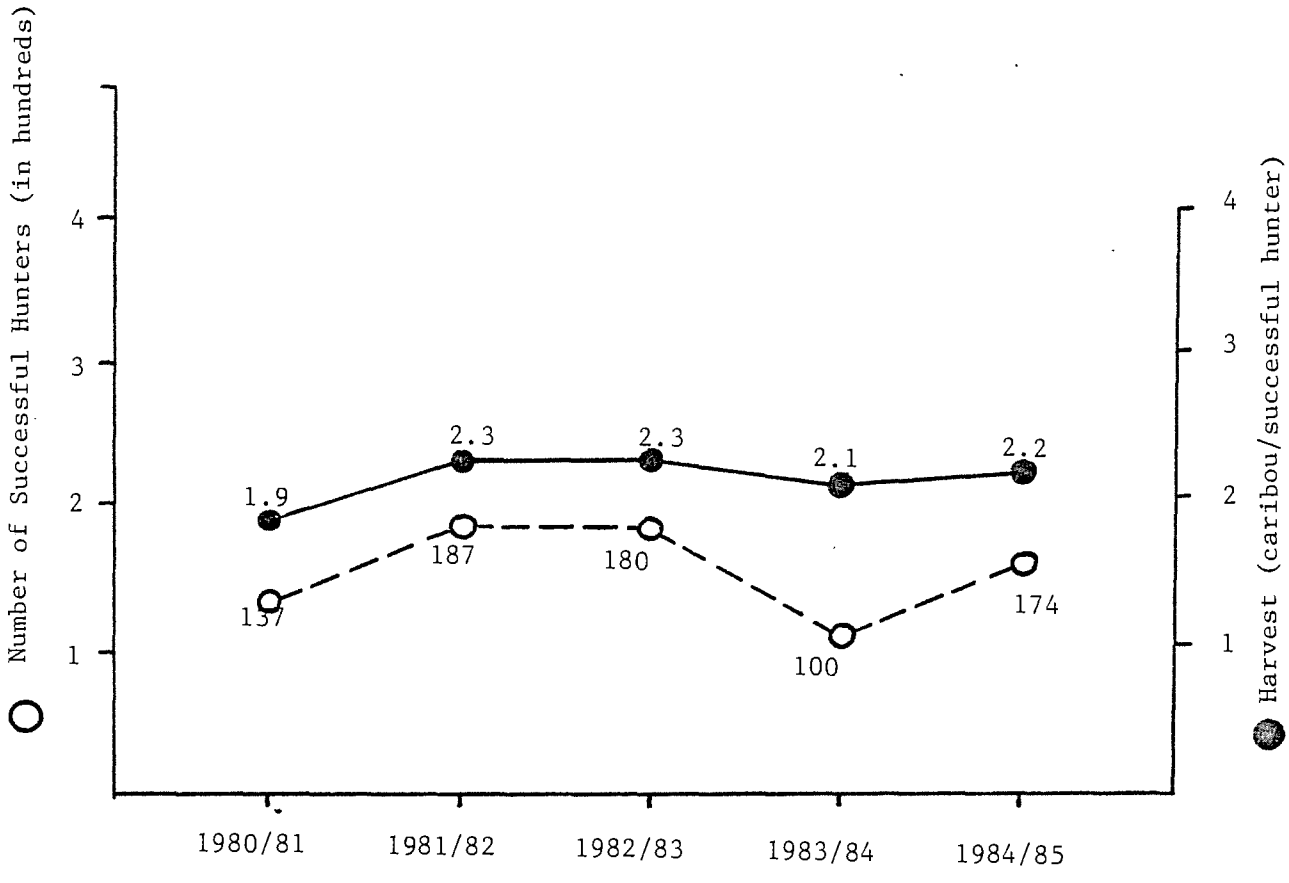

FIGURE 18 Numbers of Successful Hunters and Take/Hunter in Game Management Unit 9D (i.e. Southern Alaska Peninsula Caribou Herd as reported to ADF&G), 1980/81 - 1984/85.

air. After landing near accessible herds, observers hike to suitable observations points. Comparison of summer and fall composition counts provide an indicator of calf mortality during the summer. Total population estimates have only been accomplished sporadically during past years because of the improbability of having suitable flying and snow cover conditions simultaneously. A combination of aerial photography with a hand held 35mm camera and estimation of herd size from observers has proven relatively accurate.

Survey efforts yielded mixed success during 1985. A total population census was attempted on January 21-24. Sporadic snow cover and frequent snow showers resulted in the observation of only 480 animals within the wintering area. It was also probable the herd had split up into smaller dispersed groups. An estimated 4,044 animals were seen on a July 1 post-calving aerial survey of the area between Cathedral River and Black Hills. A sample of 2,333 of these animals indicated 128 (5.5%) were calves. Again, several thousand animals were probably not seen during the survey. During the period October 24-31, 1,460 caribou were classified as they moved through the Cold Bay area. As in the past, adult bulls and calves could be distinguished, other animals comprising the adult cow and subadult bull and cow categories were not distinguishable. This classification technique indicated 9.4% of the herd were calves, 11.9% were adult bulls and 78.7% were "other animals". Since a higher percentage of calves were seen in the fall than summer, we believe our July 1 aerial post-calving assessment did not provide a representative index of production.

Harvest information has been derived primarily from ADF&G's mandatory hunter reports and from a refuge telephone survey of Cold Bay residences and field bag checks. These data provide estimates of total harvest, harvest sex ratios, hunter success, harvest reporting rate and distribution of harvest over the refuge and throughout the season.

Results of ADF&G's harvest survey and our telephone survey indicate the 1985 harvest was higher than occurred during 1984 (Table 42). ADF&G hunter report card data indicates 388 animals were taken in 1985, compared to 202 in 1984. Based on ADF&G's survey, the number of caribou taken per hunter was 2.2 during the 1984/85 season. (Figure 18).

Due to a change in ADF&G's data tabulation procedures we were unable to determine a reporting rate for their hunter surveys. This rate has held at approximately 75% based on previous years' evaluations. Application of this rate to that which was actually reported indicates a total harvest of 517 animals.

A portion of the southern Alaska Peninsula caribou herd adjacent to the Cold Bay road system. These conditions are ideal for aerial photographic counts. (3,333 animals were observed in January 1986 by the refuge staff.)
(Blenden-November 1985)

The large bull component of the herd is lower than in years past. Surveys conducted in 1981 indicated approximately 29% of the herd were large bulls. In 1982, this figure dropped to 14.7%. The large bull component dropped to 4.5% in 1983 and 5.4% in 1984. A sample of approximately 3,000 animals in 1985 indicated 11.9% were large bulls. Admittedly these statistics were derived on the basis of largely subjective judgements of what constitutes a large bull. The refuge staff does feel however, that this reflects a trend in the composition of this herd away from the "trophy bull" component. At this time, it appears that one cause is much higher selective harvest pressure on bulls.

Comparison of calf production between the two Alaska Peninsula herds continues to indicate lower production in the southern herd. Production counts during 1981 through 1984 show calves comprised 10.3, 13.1, 16.6, and 16.2 percent respectively in the southern herd. In contrast, ADF&G personnel estimate calf percentages to be 25.3, 26.6, 28.5 and 28.5 for the period 1981 through 1984 for the northern herd. Although production in the southern herd seems to be fairly constant and the southern herd seems to be maintaining itself or increasing, the disparity between the two herds continues to be a point of concern.

9. Marine Mammals

In May 1985, the Izembek NWR office was designated the Regional Response Center for the Alaska Marine Mammal Stranding Network administered by the National Marine Fisheries Service (NOAA). We are responsible for reporting and/or investigating reports of strandings from Castle Cape and Port Moller west to Unimak Pass. Comments were supplied to NOAA on procedures for reporting marine mammal strandings and on the data sheet to be filled out for each report.

Sightings of marine mammals were recorded during the 12-16 May aerial emperor goose survey along the Alaska Peninsula. Along the north side of the Alaska Peninsula from Ugashik Bay to Bechevin Bay, a total of 15 gray whales, 146 sea otters, 1595 harbor seals and one walrus were observed. Walrus were absent from the Cape Seniavin area during the survey and on an earlier flight on 3 April. Along the south side of the Alaska Peninsula, from Bechevin Bay to Cape Chiniak, totals were four gray whales, 261 sea otters, 73 harbor seals and three sea lions.

Migrating gray whales were first noted this spring when a large adult was observed April 9 (1985) off Peterson Lagoon on Unimak Island.

10. Other Resident Wildlife

Five cases of rabies were reported and investigated in 1985. In two of these cases, specimens were sent to the State of Alaska, Virology-Rabies Unit in Fairbanks for confirmation. All of the cases occurred from January to March.

11. Fisheries Resources

The Izembek NWR, in cooperation with the King Salmon Fisheries Resources field office, initiated preliminary field investigations in 1985. Fisheries Biologist Steve Lanigan and volunteer Ed Leung performed the work with assistance from the refuge staff as needed. The preliminary objectives were as follows:

1. Determine adult and juvenile anadromous and resident fish species, distributions and movements associated with Izembek NWR streams.

2. Determine the physical and hydrological characteristics of Izembek NWR streams.

3. Determine age and condition factor of resident and anadromous fish in Izembek NWR.

Izembek NWR is known to have streams containing all five species of Pacific salmon and anadromous rainbow trout (steelhead). However, little is known about the actual biology of the salmonid populations. Refuge streams have had aerial surveys and escapement counts of adult salmon at spawning areas conducted by ADF&G, but only one stream (Russell Creek) has had any type of ground based fishery investigation. Baseline data collected during the 1985 field season will identify juvenile and adult fish distributions, as well as adult salmonid population, age and sex structures. This information will allow refuge management plans to be developed that fully utilize the fishery resources present on Izembek NWR, but still provide for adequate protection of the fishery. Also, the mandates of habitat assessment by ANILCA necessitate a basic inventory of stream fish distributions.

One phase of this initial inventory process involved the mapping of all tributaries on the refuge including those passing through or terminating in shallow lakes or ponds. Red salmon spawn abundantly in lakes with access to the sea and as a result, these waterbodies are rich in nutrients. This factor equates to abundant stands of aquatic vegetation which makes these areas especially attractive to waterbirds and furbearers.

Shallow spawning streams and rivers make these chum salmon vulnerable to a variety of predators. (Lanigan-8/9/85)

Michael and Peggy Blenden assist Fisheries Biologist Steve Lanigan in the removal of otoliths from spawned-out chum salmon. (Lanigan-8/9/85)

This mapping task involved the use of various types and scales of aerial photography of the area. It was a tedious chore, which Steve Lanigan performed meticulously. He received an award for this effort at a Regional Fisheries Resources Workshop held this winter. This map will be of tremendous use in other refuge studies such as our project on tundra swans.

Steve Lanigan also performed Izembek NWR Fisheries Management Plan scoping sessions with the Commercial Fish, Sport Fish, FRED and Game divisions of the ADF&G and with the Izembek refuge staff. These and future cooperative efforts will enable us to prepare a fisheries management plan responsive to various forms of public use and development.

Salmon runs in various streams on Izembek NWR, and the Pavlof Unit of the Alaska Peninsula NWR are annually monitored by ADF&G biologists of the Commercial Fish Division. Commercial catch and escapement data for these areas are presented in Tables 43 and 44.

ADF&G - FRED Division constructed the $4 million Russell Creek Hatchery near Cold Bay in 1979. At full capacity, the facility will be able to rear up to 50 million salmon annually. FRED has been plagued by recent legislative uncertainties with respect to funding which has left the future for personnel and facilities in doubt. In addition, it appears the facility has yet to have reared stock return to the Russell Creek system (Table 45).

14. Scientific Collections

Fewer than five bald eagles were reported to or found by the refuge staff in 1985. Some were in an advanced state of decomposition hence necropsies were fruitless on some individuals. Wings and tails were preserved and sent to the Law Enforcement Division in the Anchorage Regional Office.

Dead eagles are routinely found near power lines, hence electrocution is a likely cause of death even though no obvious burns were found on feet or feathers. A maximum of 33 power poles on the refuge offer potentials for electrocution due to line configurations. At present, we are evaluating the potential of mounting perches on these poles since in this treeless area these poles are preferred by the eagles.

A small sample of black brant taken during the legal hunting season was made available to Research personnel involved in the behavior/disturbance work on Izembek Lagoon (see G. Wildlife, 3. Waterfowl, Black Brant) These specimens will

WB Dau, Volunteer Ed Leung and Fisheries Biologist Steve Lanigan electro-shock Frosty Creek on Izembek to determine species composition. (Blenden-6/21/85)

Chum salmon are the most common spawners on Izembek and are very popular to brown bears. The well worn bear highways along Left-Hand River attest to the importance of this wilderness habitat. (Lanigan-8/9/85)

TABLE 43 Commercial salmon catch and escapement, vicinity of Izembek NWR, 1969-1985

(Data supplied by Alaska Department of Fish and Game, Division of Commercial Fisheries, Kodiak)

Pink (Humpy) salmon (in thousands)

Year	Cold Bay & Morzhovoi* Catch	Cold Bay & Morzhovoi* Escape	Izembek & Moffett Catch	Izembek & Moffett Escape
1969	0.2	20.3	0	2.3
1970	1.5	43.9	0	0
1971	3.6	4.5	0	0.1
1972	0	5.7	0	0
1973	0	4.6	0	0
1974	0	9.9	0	0
1975	0	8.3	0	0.1
1976	0.8	55.8	0.1	0
1977	0	21.7	0	0.2
1978	6.0	157.7	2.2	0
1979	0.03	19.2	0.01	0
1980	126.1	127.1	0	0
1981	8.5	17.5	0	0
1982[1]	136.9	319.7	0	0.2
1983	13.8	31.2	0	0
1984	139.7	236.7	0.1	0
1985	5.3	15.6	0	0

Chum (Dog) salmon (in thousands)

Year	Cold Bay & Morzhovoi* Catch	Cold Bay & Morzhovoi* Escape	Izembek & Moffett Catch	Izembek & Moffett Escape
1969	0	24.6	4.5	94.4
1970	1.8	43.5	10.0	53.4
1971	0.5	54.3	36.3	54.8
1972	0	51.0	57.9	72.7
1973	0.7	30.4	96.6	70.3
1974	0	30.9	11.2	70.6
1975	0	17.7	3.4	77.6
1976	2.9	38.7	40.8	123.3
1977	0	139.1	20.3	368.3
1978	5.9	102.2	81.4	119.0
1979	4.6	27.4	17.8	178.0
1980	43.3	64.4	282.6	365.2
1981	27.0	48.5	296.4	235.0
1982[1]	103.6	103.6	57.5	166.4
1983	58.9	62.5	154.8	173.3
1984	145.5	123.4	102.7	427.5
1985	87.4	94.4	126.6	194.7

*Much of the Cold Bay/Morzhovoi runs occur off refuge.

[1]Includes Inner Cold Bay, Lenard Harbor, Sandy Cove-Mortensen's Lagoon, Morzhovoi Bay-Isanotski Strait.

TABLE 43 Commercial salmon catch and escapement, vicinity of Izembek NWR, 1969-1985 (Cont'd)

(Data supplied by Alaska Department of Fish and Game, Division of Commercial Fisheries, Kodiak)

Red (Sockeye) salmon (in thousands)

Year	Cold Bay & Morzhovoi* Catch	Cold Bay & Morzhovoi* Escape	Izembek & Moffett Catch	Izembek & Moffett Escape
1969	2.2	7.5	6.1	14.0
1970	1.0	3.3	3.1	7.5
1971	1.1	2.3	6.9	3.5
1972	0	2.5	0.8	4.8
1973	0.2	3.3	1.2	2.0
1974	0	27.3	4.7	3.7
1975	0.5	15.6	1.5	13.6
1976	1.4	27.3	20.4	15.3
1977	12.5	28.7	3.1	26.1
1978	1.0	24.7	15.5	23.0
1979	0	8.5	10.8	8.4
1980	15.7	6.1	34.2	11.2
1981	8.9	7.0	30.9	12.0
1982[1]	19.8	17.0	24.5	21.2
1983	13.8	18.2	15.2	18.5
1984	59.3	14.1	4.7	19.1
1985	30.8	7.1	6.2	17.2

King (Chinook) salmon (in thousands)

Year	Cold Bay & Morzhovoi* Catch	Cold Bay & Morzhovoi* Escape	Izembek & Moffett Catch	Izembek & Moffett Escape
1969	0	0	0	6.9
1970	0	0	0	2.1
1971	0	0	0	0.2
1972	0	0	0	0.2
1973	0	0	0	0.7
1974	0	0	0	0
1975	0	0	0	0
1976	0	0	0	0
1977	0	0	0	0
1978	0	0	0	0
1979	0.002	0	0	0
1980	0	0	0	0
1981	0	0	0	0
1982	0	0	0	0
1983	0	0	0	0
1984	0	0	0	0
1985	0	0	0	0

[1]Includes Inner Cold Bay, Lenard Harbor, Sandy Cove-Mortensen's Lagoon

TABLE 43 Commercial salmon catch and escapement, vicinity of Izembek NWR, 1969-1985 (cont'd)

Coho (Silver) salmon (in thousands)**

Year	Cold Bay & Morzhorvoi* Catch	Izembek & Moffett Catch
1969	0	0
1970	0	0
1971	0	0
1972	0	0
1973	0	0.2
1974	0	0
1975	0	0
1976	0	0
1977	0	0
1978	1.3	0
1979	7.0	0
1980	16.4	0
1981	13.1	0
1982[1]	1.4	0
1983	0.7	0
1984	0.6	0
1985	1.9	0

*Much of the Cold Bay-Morzhovoi runs occur off refuge

**Coho escapement data is incomplete. Some surveys are done but they are rarely peak counts. Fishing effort is usually very light on Alaska Peninsula coho. (per comm. Arnold R. Shaul, ADF&G, Comm. Fish Div., Kodiak).

[1]Includes Inner Cold Bay, Lenard Harbor, Sandy Cove-Mortensen's Lagoon.

TABLE 44 Catch and escapement data for salmon in the Hoodoo (Sapsuk) Lake/Caribou River Drainage.

(Data supplied by Arnold Shaul, Commercial Fisheries Division, Alaska Department of Fish and Game Kodiak, Alaska).

Year		Species					
		Red	Silver	Chum	King	Pink	Total
1982	Catch	229,100	170,700	21,300	13,500	100	434,700
	Escapement	180,000	-	29,000	7,000	-	216,000
1983	Catch	192,900	64,000	14,000	12,100	0	283,000
	Escapement	128,800	13,000[1]	14,000	12,500	0	168,300
1984	Catch	118,800	113,300	78,400	7,800	100	318,400
	Escapement	251,000	41,000[1]	49,000	6,300	-	338,300
1985	Catch	706,300	88,200	6,600	10,900	0	812,000
	Escapement	318,500	18,100	13,000	3,200	0	352,800

[1]Sapsuk River only.

TABLE 45 Management Data, Russell Creek Hatchery, 1981-1985

(Data for 1983 and 1984 supplied by Arnold Shaul, Fisheries Biologist, Commercial Fisheries Division, ADF&G, Kodiak, AK)

	SPECIES									
	Chum Salmon					Pink Salmon				
	1981	1982	1983	1984	1985	1981	1982	1983	1984	1985
No. adults taken for egging	7,160	5,502	7,200	9,700	-	-	-	-	-	-
Aerial assessment of stream pop. (i.e. escapement)	30,263	40,800	17,200[1]	55,000	64,800	1,500	60,000	Trace[2]	94,000	Trace
Estimated commercial harvest	15,891	25,000	1,700	25,655	42,600	4,929	5,000	100	20,144	4,000
No. fish fin clipped	100,000	-	-	-	-	-	-	-	-	-
Total run (approx.)	53,300	71,300	18,900	-	NA	6,400	65,000	100+	-	NA

[1]Included hatchery take.

[2]No fish seen, however, stream condition was "murky".

aid in the evaluation of the seasonal nutrient qualities of eelgrass and the fitness of brant during the fall staging period.

16. Marking and Banding

Mammals

See Section G. Wildlife 8. Game Mammals, Brown Bear for a discussion of marking activities in 1985.

Birds

Birds banded under the Refuge Master Banding Permit 20826 are summarized in Table 3. Refer to the appropriate sections in G. WILDLIFE, 3. Waterfowl, Tundra Swans for specific discussion of marking involved in that project.

H. PUBLIC USE

1. General

The majority of public use for the refuge comes from residents of Cold Bay and visiting waterfowl, caribou and bear hunters. Although residents of King Cove (20 miles southeast) and False Pass (35 miles west) villages do use the refuge, it is typically limited to a small amount of caribou and waterfowl hunting.

The population of Cold Bay, although largely transient, returned to the pre-1984 level of approximately 200 individuals in 1985 with the temporary relocation of offshore oil support facilities to the Pribilof Islands. As stated previously, we expect this pattern to be temporary, as another offshore lease sale (North Aleutian Basin - Sale 92) is scheduled to occur in 1986. As this area is adjacent to the refuge, it is highly likely that helicopters and support personnel will return. In 1984, this influx amounted to a 30-person (15%) increase.

The population status and structure of Cold Bay in 1986 and the near future may change drastically. Not only do we anticipate more and permanent offshore oil related supported facilities, but also the U.S. Coast Guard is planning to build a 130-person search and rescue base adjacent to the airfield. This latter facility would be a helicopter base with C-130 support and daily training flights. Hence, the next few years show great potential for increases in aircraft activities, specifically large helicopters, which will accelerate our concern over disturbance of spring and fall staging waterfowl. In addition, a potential near doubling of the population will affect the intensity of various forms of public use of the refuge.

In general, the refuge staff feels that public use activities in 1985 were comparable to levels in recent years even though a decline in population size occurred. Caribou and waterfowl hunting seasons are the refuge's most intensive periods of public use. In alternate regulatory years, the Alaska Peninsula is open to brown bear hunting, so we had a fall 1985 hunt and will have a spring 1986 hunt as well. Bear hunting significantly increases the number of visitors to the area and typically these users engage in other forms of outdoor, consumptive activities as well.

The refuge has taken a low key approach to its interpretive program. Due to Cold Bay's small population, and the predictable patterns of refuge users, refuge staff are able

Hiking and mountaineering opportunities are impressive on Izembek. Here RM Sarvis, ARM Blenden and Peggy Blenden are enroute to the summit of Frosty Peak in early summer. Caldera rim is in background; summit not shown. (Blenden)

(Left) Cold Bay residents engaging in a subsistence fishery for red salmon at Mortensen Lagoon on the Pavlof Unit of the Alaska Peninsula NWR. The Alaska Department of Fish and Game issues permits for this activity. (Blenden-7/20/85)

(Below) Sport fishing for salmon from July through September is a very popular activity on Pavlof Unit (APNWR) near Cold Bay. (Blenden-late August 1985)

to make personal contact with a very high percentage of users and visitors. In addition to the small visitor display at refuge headquarters, information is presented to the public in several locations around town. Plans are being prepared to expand these displays in 1986.

6. Interpretive Exhibits/Demonstrations

The visitor displays in the lobby of refuge headquarters exhibit mounted specimens of several species of migratory waterfowl found on the refuge. Also displayed is information regarding public use and the results of ongoing waterfowl surveys on the refuge. The blackboard installed in the lobby in 1983, displays current information on production and population surveys being conducted by refuge staff on black brant, Canada geese, emperor geese and tundra swans.

Preparations were begun in 1985 to expand the office interpretive displays with exhibits involving a wolf and red fox, two prominent furbearers on the refuge. In addition, we hope to install a large relief map of the area from Port Moller to Unimak Pass displaying the three refuge areas we administer (i.e. Izembek NWR, Unimak Island-Alaska Maritime NWR and the Pavlof Unit-Alaska Peninsula NWR).

We hope our expanded visitor contact efforts will lead to greater public awareness of the refuge areas of the lower Alaska Peninsula for local residents as well as other visitors.

8. Hunting

Izembek Lagoon and adjoining wetlands are well known for excellent waterfowl hunting. During the fall, large numbers of black brant, emperor geese, Canada geese and several species of ducks are found in areas accessible to the hunter. In addition to the large concentrations of waterfowl, hunters are attracted by the lack of competition and the wilderness setting. The character of the hunting experience changes during the "charter" weekend. Normally, we can expect up to 70 hunters to be involved in this three-day hunting expedition organized by an Anchorage resident. The refuge prepares an annual letter which is distributed to each hunter through the charter organizer, which outlines regulations, shooting hours, tides, camping tips and advice on coping with Cold Bay's notorious weather and bears. This year the charter was cancelled, due we expect, to the numerous reports concerning the depressed populations of geese and the poor production in 1985. Cancellation occurred despite the typical fall propaganda shown on the following pages (seasick geese? come on!).

Larry Nowy-Meier, Fairbanks, Alaska

Waterfowlers find goose heaven on earth at Cold Bay

Huge flocks fill the sky to a wave-capped horizon

Story and photos
by CHRISTOPHER BATON
Correspondent

Barren tundra, up to 60 mph winds blowing rain and sleet sideways, and miles of lumpy mats of eelgrass dot the coastal waters. Certainly, this description of Alaska's 62,000-acre Izembek National Wildlife Refuge at Cold Bay would draw few, if any, tourists to view such "sights." But add several hundred thousand geese and ducks that find this isolated refuge "home" during autumn, and waterfowlers will be willing to disregard the lack of scenery in order to experience a type of hunting where a bag of geese is often the heavy for a hunter to carry.

Located adjacent to the village of Cold Bay, approximately 500 miles southwest of Anchorage, on the tip of the Alaska Peninsula, this area may well be North America's goose hunting hotspot.

At first, Cold Bay appears to be a lesson in contrast. Disembarking from a turbo-prop Electra, which is the only means by which to reach the village, most people are immediately shocked by the barrenness of the land.

Instead of grainfields and huge impoundments typical of good hunting locations in Alaska and the Lower 48, the observer gazes upon miles of low, rolling tundra, with the largest trees being scrubby alders outlining creeks coursing through the area. A few mountains jut their icy peaks into the typically gray skies, and a short distance away an active volcano puffs a cloud of smoke every 20 minutes. Several renovated buildings and bunkers left over from World War II, a fish and wildlife office, aircraft support facilities and a handful of private residences make up Cold Bay village.

Leading across the tundra like a winding snake is the main "highway," a two-lane gravel road to Izembek Lagoon. Yet despite what this area may lack in modern architecture and roads, it more than compensates for when the observer reaches the end of the road and begins to hear the incessant din of not thousands, but hundreds of thousands of geese, soon to be complemented by the sight of countless flocks of birds traveling across a wave-capped horizon.

According to Izembek Refuge Assistant Manager Mike Nunn, the entire population of Pacific black brant arrives at Izembek Lagoon each autumn from their nesting areas off Alaska's Yukon-Kuskokwim Delta and Arctic coast of Alaska, Canada and Siberia. Here they will stay until early November, feeding on the largest eelgrass beds in the world. In other words, what a field of shucked corn is to Canada geese, eelgrass is to Cold Bay's goose population.

Secondly, waterfowling's premier bird, the emperor goose, is found here in healthy numbers. The species is considered by many to be the most elegant goose species in the world. The bird sports a body of light gray feathers, each outlined in black, a white crown and nape and bright orange-yellow feet. Other than its beauty, what makes the emperor so coveted is that its range is virtually limited to a narrow strip of the peninsula that includes Cold Bay. No wonder the emperor was chosen for Alaska's first duck stamp!

In addition, spectacular concentrations of lesser Canadas and a variety of sea and game ducks are also attracted to the eelgrass beds, which are protected from the heavy breakers of the Bering Sea by a natural reef, resulting in an ideal resting and feeding area for the birds. But best of all, at any given time, not more than a handful of hunters is scattered throughout the refuge. It is commonplace to hear the incessant cackling of geese throughout the day rather than the popping of shotguns, yet find out at day's end that everyone shot a quota of geese.

Indeed, that is some impressive talk, but not the kicker. The bag limit is up to 10 geese per day (which includes a combined total harvest of six snow, Canada, and white-fronted geese, two black brant per day and two emperors per day), 15 sea ducks (including harlequin, old squaw and scoters) and eight game ducks. While conservation measures, along with the "unwillingness" of most hunters to backpack a full bag limit of geese one to three miles, deter many from harvesting a full bag of geese and ducks, the opportunity for unsurpassed shooting enhanced by a mixed bag of geese and waterfowl most widely elsewhere on the lower Pacific flyway makes a trip to Cold Bay an experience of a lifetime.

And, if anyone knows about the super waterfowling possibilities at Cold Bay, it is Ron Ozmina, owner and operator of Alaska Goose Guides, an outfit specializing in guided excursions to Cold Bay. Ozmina has hunted Cold Bay's goose populations more times than he can remember. Many consider him to be one of the major pioneers in figuring out the logistics of hunting Cold Bay geese, and he has been quite successful at it. His clients come from all over the country, and many are repeat customers.

"I have one guy who has booked trips to Cold Bay for the past 11 years. After the first time, it becomes a traditional thing for many hunters."

At first, Cold Bay may seem like a shortcut to the rewards of goose hunting without going through the trials and tribulations many hunters experience elsewhere in the state, such as waiting hours to spot a single geese, working with large decoy spreads, and the prerequisite of using a call to goose-talkin' perfection. However, Ozmina recommends differently.

"Because first-timers are unfamiliar with flyways, hunting techniques and dangers of hunting the area, I always recommend a charter or guided experience first. For instance, it seldom snows at Cold Bay, but sleet and rain can freeze you to the bone. Careless hunters can become stranded on tidal mud flats, and brown bear roam the beaches. And don't expect to see the sun much, if at all, during your stay. There isn't much time for complaining when the weather is bad, because this is when goose hunting is the finest."

Ozmina explains that one week out of the month the tide becomes high enough to flow over the reef, with swells that converge upon the rafting geese. Very windy days and subsequent large waves will do the same. The extra water not only prevents the birds from reaching the eelgrass they so dearly love, but it also makes them seasick. So they mass migrate to protected bays, inland lakes and protected shorelines.

Shooting at this time is fast and furious for several hours, or until tides change and allow the geese to return to their feeding grounds. "Other excellent times are at first light and toward late afternoon. To those that stick it out, full limits are [illegible]

Ormina also says that each species has its particular habits. While it is almost certain that hunters can bag all three species from one location, such as Outer Marker or the

Island, specialization is called for when numbers of individual species are desired.

"For instance, brant almost always fly over water, staying away from shoreline. However, the trick to taking brant here is to build a blind out of eelgrass on one of the points sticking out into the lagoon, or use a boat blind. You must hunt open water if you want brant, or when the wind is blowing, hunt along the protected sides of points. Just have your gun ready when they take to air, because the sky just becomes black with birds.

"... ser Canadas and emper...

Because of the number of geese in the area, many hunters are fooled into believing the geese will be easy to knock down. Not so. Since the eelgrass diet is one of the most nutritional foods available, the birds built a heavy layer of fat, up to an inch thick, under their plummage, which makes an effective "shot-proof vest."

...ors are a different story. Shell or silhouettes dekes placed on washed-up beds of eelgrass are extremely effective, especially for emperors. They are a curious and relatively unhunted species. They'll spot the decoys from several hundred yards out and fly to within range for a closer look. In fact, their curiosity is so great that white, plastic trash bags filled with eelgrass have been effective in drawing emperors into shooting range. However, I now use emperor half shells and have experienced super success," Ozima stated.

While Ormina prefers shooting over d... ...oys, many of his hunters have ... great success by just lying o... in the tundra along major flyway... between inland resting

areas ... of the eelgrass feeding ground. He recommends hunters should ... "Applegate" for lesser Canad... the "Site" for lesser Canad... and emperors, and the "Outer ...arker" for all species.

...ecause of the number of geese in the area, many hunters are fooled into believing the geese will be easy to knock down. Not so. Since the eelgrass diet is one of the most nutritional foods available, the birds built a heavy layer of fat, up to an inch thick, under their plummage, which makes an effective "shot-proof vest."

Twelve-gauge magnum shells, 2¾- or 3-inch in BBs and No. 2s are best. Guns must be plugged to hold no more than three shells. You should take at least four boxes of shells if you are a good shooter, and a box of low-base 7½s for cripples and ptarmigan shooting, which happens to be excellent.

There are a few precautions hunters should take when hunting Cold Bay geese. There is a good population of brown bear in the area and it always seems some hunters end up shooting at the bears. All it will do is make them angry, and possibly instigate a confrontation. So don't shoot at the bears.

Pleas... pick up empty shotgun hulls and trash. With the good shooting it's not uncommon to litter the ...round with hulls. Try to make it ... wilderness experience for the nex... guy who uses the area.

And most of all, cooperate with any fish and wildlife biologist asking to see your birds. The only way biologists collect data on Cold Bay geese is through hunters providing birds for examination and inspection.

With prime waterfowling areas diminishing in the United States and Canada, it's good to know a place ... that Cold Bay is more than just a dream. It's reality. Experience it soon.

Chri... ...ilice Ram is an avid hunter and author ... he book "Hot to hunt Alaska's Trophy ...ertlak"

A TYPICAL ARTICLE ABOUT WATERFOWL HUNTING AT IZEMBEK. SINCE GOOSE TAKE/HUNTER FOR 'CHARTER' PARTICIPANTS HAS AVERAGED 3.3 FOR THREE DAYS OF HUNTING (n=7 years), WE FIND SUCH ALLURING ARTICLES MISREPRESENTATIONS

Eelgrass is the main forage food that the Cold Bay geese eat, and is reponsible for putting layers of fat on the birds in preparation for their journey south.

The refuge staff's law enforcement and bag checking activities were comparable to previous years' efforts during non-charter periods. Intensive bag checking activities normally undertaken during the charter weekend were, of course, unnecessary due to the 1985 cancellation. Waterfowl bag check data for this fall is presented in Table 46.

The majority of staging black brant and Canada geese remained in the area until the first of November, a little longer than normal. This gave the waterfowl hunter more opportunities. However, approximately six more inches of rain fell during the September-October period which effectively dampened many an outing except for the most daring nimrods.

Caribou started arriving at wintering grounds in the Cold Bay area on 24 October; soon it seemed every caribou hunter in Cold Bay was out hunting. The herd began to enter the Cold Bay road system on 25 October. Near normal harvest levels occurred in early November as the herd passed through the road system. Harvest levels then declined as the animals remained in areas relatively inaccessible from the road system. Hunter success was good in December when moderate to heavy snowfall concentrated the herd in the road system. By year's end the refuge staff had field checked 119 harvested caribou (65 hunters) in comparison to 56 animals for the same period in 1984. (See: G. WILDLIFE, 8. Game Mammals, Caribou).

Brown bear hunting on the Alaska Peninsula was open from 1 to 21 October 1985. This activity is discussed more fully in Section G. WILDLIFE, 8. Game Mammals, Brown Bear. Non-resident and resident hunters alike who participate in fall brown bear hunts in the Izembek area also tend to take advantage of other hunting opportunities which coincide with that season (primarily caribou, waterfowl and ptarmigan).

9. Fishing

Sport fishing is very popular during the summer and early fall. Primary species sought are silver, chum and pink salmon; and Dolly Varden trout. Saltwater fishing is also popular with Pacific cod, starry flounder and halibut making up the majority of the harvest.

10. Trapping

Trapping is permitted under state regulations with a trapping permit issued by the refuge also required. Izembek and Unimak Island (Alaska Maritime NWR) were refuge lands specifically mentioned in ANILCA for which trapping permits

TABLE 46

Summary of Waterfowl Bag Check Data, Izembek NWR, 1985

(Harvest by Age/Sex)

Species	Adult			Immature			Unknown	Crippled	/1 Total	% of Harvest
	M	F	U	M	F	U	U			
Emperor Goose	-	-	3	1	1	1	4	2	10	8.7
Black Brant	6	-	9	2	5	2	24	3	48	41.7
Tav. Canada	16	6	1	5	1	5	23	8	57	49.6
Goose Total								13	115	
Pintail	1	2	-	-	-	-	3	1	6	17.6
Mallard	2	-	-	-	1	-	-	2	3	8.8
G-W Teal	1	-	-	-	1	-	10	1	12	35.3
A. Wigeon	2	-	-	1	2	-	2	-	7	20.6
Shoveler	-	-	-	-	-	-	1	-	1	2.9
King Eider	-	-	-	-	1	-	-	-	1	2.9
Steller's Eider	1	1	-	-	-	-	-	1	2	5.9
R-B Merganser	1	1	-	-	-	-	-	-	2	5.9
Duck Total								/2 7	34	
Total Birds	30	10	13	9	12	8	67	20	149	

	Hunters Checked	Ducks	Emperors	Canadas	Brant
Charter Weekend (canceled)	-	-	-	-	-
Non-Charter Days	57	34	10	57	48

* Estimate 90% of charter hunters checked and 10% of all others.

Species	Est. Charter Wknd. Bag	Est. Other Bag	Est. Cripples /3 (%)	Est. Totals
Ducks	Canceled	34/.1 = 340	119 (35.0)	459
Emperor	Canceled	10/.1 = 100	20 (20.0)	120
Canada	Canceled	57/.1 = 570	80 (14.0)	650
Brant	Canceled	48/.1 = 480	30 (06.3)	510

/1 Total excluding cripples
/2 Two ducks of unknown species were reported crippled
/3 Percent crippling rate per goose species and ducks as a group

are required. Fourteen trappers received permits in the 1985-86 season, 10 on Izembek and four on Unimak Island. Several other local residents trapped in areas of the adjacent Pavlof Unit of the Alaska Peninsula NWR where trapping permits are not required. This year's harvest data (for '85/'86 season) are not yet available and will be reported next year. The reported catches for the last four seasons are shown in Table 47.

11. Wildlife Observation

Most wildlife observation on the refuge is incidental to other activities. There are rare days when the weather is good and most of the town turns out to drive refuge roads and view wildlife.

17. Law Enforcement

The law enforcement effort in 1985 consisted of highly visible patrols during peak hunting periods, investigation of complaints received from the public, and routine surveillance of hunters in the field. Most activity occurred in October during the waterfowl, caribou and brown bear hunting seasons. Bob Mumford and Jim Low, state Fish and Wildlife Protection officers from Sand Point and Dutch Harbor, respectively, provided much appreciated assistance to the refuge staff during this fall period. Their assistance gave the refuge staff more freedom to concentrate on bag checking, wildlife surveys and surveillance of big game guiding activities on the refuge.

Two brown bears were taken in defense of life and property in 1985 in the village of False Pass on Unimak Island. Typically, the hides and skulls of such animals taken in villages are not turned over to the State of Alaska as required by law. The refuge staff heard of these cases quite late and status of the remains could not be determined.

18. Youth Programs

Izembek NWR continued its YCC program at the level established in 1983. Two enrollees, Randolf Belisle and Jeff Wilson of Cold Bay were on staff from 10 June through 30 August assisting on numerous maintenance and biological projects.

TABLE 47 Results of Permit Trapping Program, Izembek NWR

	1981/82 (15)	1982/83 (21)	1983/84 (17)	1984/85 (16) [1]
Red Fox	94	74	82	51
Land Otter	8	18	25	3
Mink	3	6	32	34
Wolverine	4	1	1	0
Wolf	0	0	0	0

[1] Number of trappers

The red fox is the most common furbearer in the area. (Sarvis)

I. EQUIPMENT AND FACILITIES

1. New Construction

Planning was initiated and materials were purchased in 1985 for the construction of a building to house our emergency generator. This construction will be done in 1986 and will consolidate and simplify the high voltage line and switching problems we have put up with as a result of 1979/80 BLHP construction.

2. Rehabilitation

The YCC staff prepared and seeded the areas around the refuge bunkhouse and HF radio antenna. Very little vegetation had appeared in these areas since they were originally disturbed in 1979/80. A nearly continuous growth of ryegrass was the result and this ground protection should eliminate much of the dust and mud problems previously encountered.

3. Major Maintenance

Our new aircraft hangar was not problem free in 1985. Regional office engineering and contracting effectively doubled the total cost of the project by setting a high bid range. Some of the design specifications in the bid were inadequate for the project, hence, cost overruns occurred. So additional problems are a frustration. Major leaks in the building occurred along all wall bases due to the lack of any type of gasket. Engineering (RO) failed to include this in its design, so the refuge was forced to order and install the necessary materials.

The biofold doors on the hangar have presented several problems. We have experienced electrical switching failures and have at times, been unable to raise the door. At other times, we have not been able to stop the door by releasing the remote raise button and were therefore, forced to stand by the switch to press the stop button. The door is designed to automatically stop when in the fully raised position. Ours doesn't. In three instances one or more cables holding the door snapped. Another time, a pully shaft broke off. We are negotiating with the door manufacturer to correct this potentially dangerous situation.

A surplus FAA Navigation Aid building was placed adjacent to our float plane ramp at Blinn Lake. It will be used for storage of equipment and fueling operation.
(413)5 (Sarvis-7/12/85)

We initially had problems with the fueling set up at the hangar which continually allowed the system to lose its prime. We have a procedure in place to work around the problem. Efficiency wise, the system is far superior to our previous hand-pumping technique.

Power to residence four has presented problems since the structure was accepted in 1980. A second replacement of the underground power line was required in late October when failure resulted in 220V passing through 120V lines in one half of the breaker panel and the house due to a faulty neutral line. Damage to electrical equipment in the house was thankfully only moderate. The new line is an armored-three strand cable that should solve the problem.

In 1985 the state of Alaska evaluated bridges along the Cold Bay road system. Two bridges along Frosty Road, west of Cold Bay, were closed by the state until the owner (USFWS) could repair them. These bridges are wooden structures constructed during WWII and sporadically maintained since that time. The refuge staff with YCC support, removed the Second Frosty Road bridge and replaced it with new treated stringers and planking. Materials were hauled to the third bridge location for repair work planned for 1986.

Second bridge on Frosty Road prior to removal of rotting timbers. (Blenden-June 1985)

Treated stringers and planking were placed to make the bridge sturdy and safe. (Dau-June 1985)

J. OTHER ITEMS

1. Cooperative Programs

The Izembek NWR staff continuously works to maintain a good working rapport with the ADF&G . We have provided aid to and been aided by field staff of the FRED and Commercial Fish Divisions. Most of our work concerns game matters, so we coordinate most closely with that division stationed in King Salmon. Area biologist Dick Sellers and his assistant Mark McNay have cooperated in our brown bear project and in 1985, we were given the opportunity to assist in their caribou telemetry work near Port Heiden. We will be capturing caribou with their assistance in 1986, so the training was much appreciated.

The refuge staff has performed the Annual Christmas Bird Count in cooperation with the National Audubon Society since 1963. Since 1983, we have also participated in the Spring Breeding Bird Survey, first in cooperation with the ADF&G Non-Game program, and now with the USFWS Office of Migratory Bird Management.

4. Credits

John Sarvis wrote Section G.3., Tundra Swan and reviewed and edited the remainder of the report.

Mike Blenden wrote Sections E, ADMINISTRATION and G.8, Caribou.

Chris Dau wrote the remainder of the report.

Annette Alexander handled word processing and assembly of the report.

K. FEEDBACK

The Izembek NWR staff continued to monitor the level of additional paperwork responsibilities placed upon us from within as well as outside the Fish and Wildlife Service (Table 48). We began this annual analysis in 1983 by maintaining a reporting deadlines list on which all incoming requirements are logged in and out. The reporting requirements summarized below are additional to identified responsibilities in the AWP, and those in other routine areas such as payroll, energy, activities and outputs. Although subjectively we would not have guessed it, additional reporting requirements actually decreased from the 1984 level [i.e. 1984 n=73, 1985 n=64 (-12%)].

We would like to think that this was a conscious effort by Refuges (RO) and the Central Office, both of which made fewer requests. Other Regional Office divisions combined to show only a small increase over last year's level (i.e. 8%).

We believe that most resource related inquiries are best answered at the field level or by Regional Office personnel knowledgeable about specific areas. This latter category to a large degree, is a vanishing breed. Increased personnel mobility into and out of the Service doesn't help the problem. In addition, Regional Office personnel are probably as encumbered as field offices with unannounced reporting requirements. This detracts from their ability to offer expertise concerning field programs, problems or the general geographic areas themselves. To some extent, growth is sacrificing the Service's identity as an efficient, dedicated and knowledgeable group of resource professionals. Our capabilities and performance as effective resource managers are not always proportionately linked to funding or FTEs.

Most of the Izembek NWR and Unimak Island was designated as wilderness with the passage of the ANILCA. The identification of the importance of these areas was the result of years of study. Subjectively, the public may feel that this extra congressional step will assure the Service's ability to maintain the integrity of these wild lands in various conservation units which was an essential step, however, it also eliminated longstanding and accepted special regulations on pre-ANILCA refuges. The result on Izembek and Unimak Island was that even with the long-awaited wilderness designation, we are far less able to apply controls to among other things, commercial forms of public use such as big game guiding and fishing. The Service is also vacillating on its approach to existing

TABLE 48 Non-Annual Work Plan Reporting Responsibilities Assigned to Izembek NWR During 1985.[1]

Requesting Office	No. Received (%)	$\bar{x}$ Reporting Period (Days ± 1SD)	$\bar{x}$ Izembek NWR Turnover Time (Days ± 1SD)	$\bar{x}$ Days Ahead Of Deadline	Type of Report	
					Resource (%)	Non-Resource (%)
Refuges(RO)	4(6)					
Regional Office	52(81)					
Central Office	2(3)	22.7±14.8	11.3±12.9	11.3±11.9	27 (42)	37 (58)
Other Agency	6(10)					
TOTAL	64					

[1]Reporting with a deadline. Many written and verbal requests are also received by the refuge staff with an estimated 75% of these being non-resource oriented.

cabins and worse yet, on its policy concerning new structures. Wilderness or non-wilderness seems to have little bearing. There appears to be virtually no more conservative policies on Wilderness versus non-wilderness lands with no distinctions in aircraft use, structures allowed, etc.

We have managed lower Alaska Peninsula refuge areas as defacto wilderness since establishment (Unimak Island - 1913, Izembek - 1960) and have largely prevented activities adverse to wildlife and their habitats. Special refuge regulations have been a prime mover in this effort. Now after ANILCA we can re-apply for Special Regulations, however, we must show resource problems, the same types we've avoided all these years by conservative management practices. We hope to re-establish our special regulations for Unimak and Izembek, but if unsuccessful because the problems and/or damages have not yet occurred, who or what will benefit- certainly not the resources under our charge. We would be forced into what seems to be the management trend for the 1980s (i.e. reactionary and brush-fire, rather than farsighted and conservative). Our philosophy is that it is better to manage conservatively even if this is viewed by some as over-restrictive, rather than be saddled with drastic problems, (try Arctic geese for an example). Once a more liberal precedent has been set it is so much harder to retract or recover than to "err" on the conservative side.

Another potential dilemma exists with respect to the U.s. Air Force minimally attended radar (MAR) site at Grant Point on Izembek NWR. The USAF saw the need to build a new, modernized MAR site at a new location on the refuge. This new facility would require only three to five people and would occupy approximately 8.3 acres of land in comparison to the old 91 acre/100 person facility at Grant Point. The deciding compatibility factor resulting in allowing the new construction was the USAF's acceptance of a permit condition that it return the 91 acre site to the refuge after removing the structures. The new MAR site is in operation and we continue to hear rumblings that the USAF is not excited about complying with their permit relative to removing the Grant Point facility. Other potential uses are being discussed usually without Service input. As for the refuge, we are periodically asking for status reports and funding updates to firmly establish our desire that the USAF comply with its permit. Grant Point has presented a continual `bird strike' problem due to its proximity to Izembek Lagoon. In addition, it is our only vehicular access point to the lagoon. We hope to provide refuge visitors with a scenic panorama unaffected by a visual eyesore. We hope to achieve permit compliance by the USAF, without foot dragging, in 1986 and suspect we will need Regional and possibly Central Office support and pressure to obtain it.