ANNUAL NARRATIVE REPORT
Calendar Year 1984

IZEMBEK NATIONAL WILDLIFE REFUGE
Cold Bay, Alaska

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

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Including:

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

ANNUAL NARRATIVE REPORT
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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 L. Nunn, Assistant Refuge Manager, PFT, GS-485-11	7/13/80 - 5/27/84
3.	Michael D. Blenden, Assistant Refuge Manager, PFT, GS-485-9	8/26/84 - Present
4.	Christian P. Dau, Wildlife Biologist PFT, GS-486-11	1/30/81 - Present
5.	Alan Rogers, Maintenance Worker, PFT, WG-4749-8	8/20/81 - 3/03/84
6.	Avery J. Bates, Maintenance Worker, PFT, WG-4749-8	5/27/84 - Present
7.	Kim Schaff, Refuge Assistant (typing), PFT, GS-303-4	4/03/83 - 1/13/84
8.	Bonnie Taylor, Refuge Assistant (typing), PFT GS-303-5	2/06/84 - Present
9.	Morgan Kirk, YCC Enrollee	6/06/84 - 8/18/84
10.	Angie Taylor, YCC Enrollee	6/06/84 - 8/25/84

Review and Approvals

John Sarvis 3/25/85
Submitted By: Date

Larry L. Calvert 4/8/85

Alaska Reg. Office (R-7) Date

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INTRODUCTION

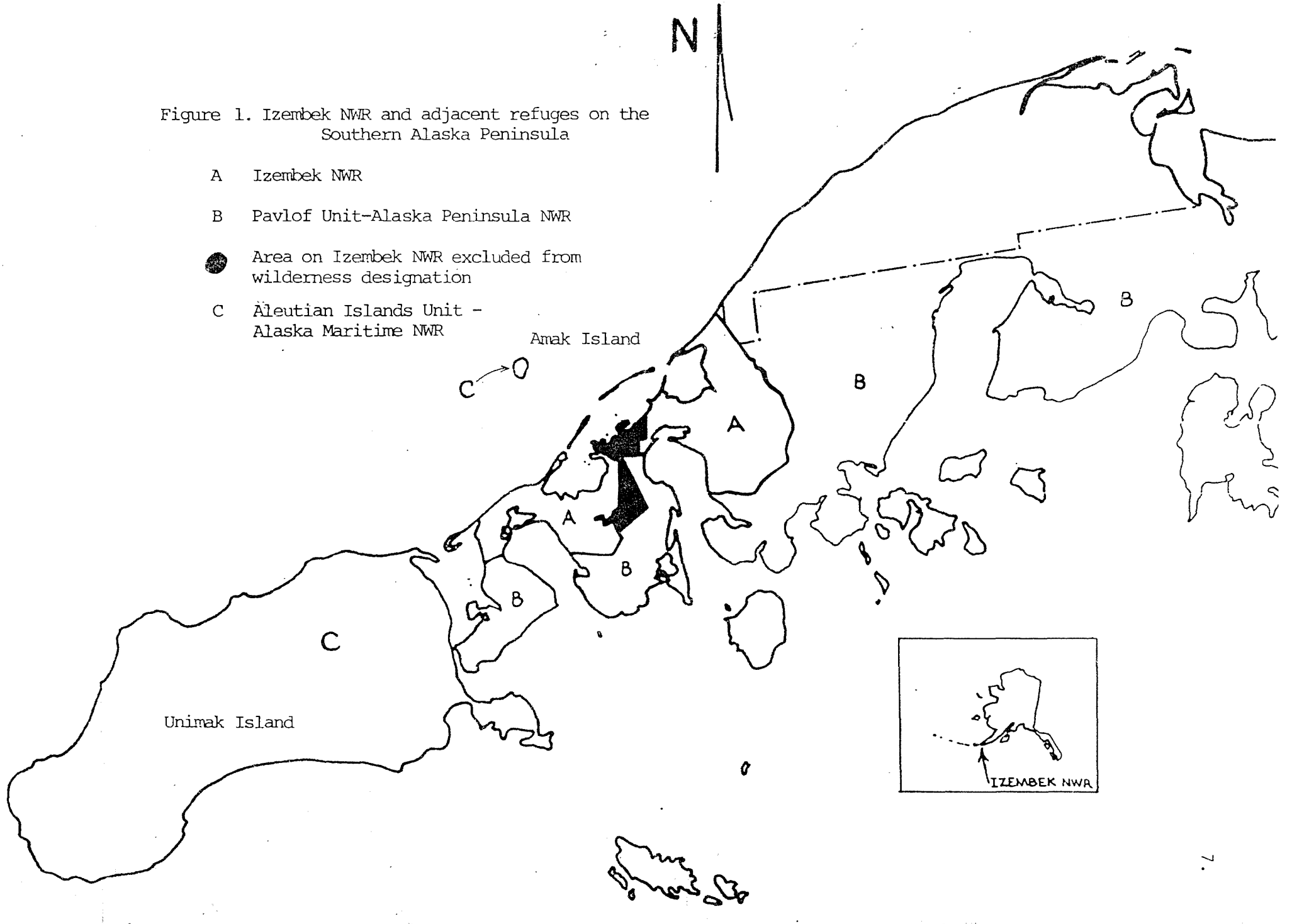
The Izembek National Wildlife Range was established in 1960 (Public Land Order 2216) with a boundary encompassing 415,300 acres dominated by wet and upland tundra. Within this area are approximately 95,000 acres of tide lands and lagoons owned by the State of Alaska. These areas have been identified 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 occur in these shallow lagoons and this resource in addition to those in adjacent fresh water and terrestrial habitats support the large numbers of migratory waterfowl which characterizes 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, sixteen 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.

The Izembek NWR lies near the western terminous of the Alaskan 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 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 increase 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 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, Unimak Pass forming a distinct and extremely important biological 'divide' before the unique Aleutian flora and fauna of the central and western islands. On December 2, 1980, the Alaska National Interest Lands Conservation Act was passed. Section 303 (1)III established the Alaska Maritime NWR with an Aleutian Islands Unit, which included the islands that formerly comprised the Aleutian Islands NWR.

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



Unimak's habitat closely resembles that of the Alaska Peninsula, although it is somewhat impoverished. 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.

The Alaska Peninsula NWR was created with the passage of the Alaska National Interest Lands Conservation Act (ANILCA) on 2 December 1980. 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. Research into the effects of these activities on black brant and other waterfowl will be begun in 1985 to provide support of our on-going goal of protecting wildlife and their habitats.

A. HIGHLIGHTS

1. Fifty brown bears were captured in the Right and Left-hand Valley areas during July and August. Twenty-six of these were tracked by radio telemetry into the denning period.

2. Two 1:63,360 scale maps of the Pavlof Unit - Alaska Peninsula NWR were flown on June 12 to evaluate tundra swan distribution and use. Total swans observed was 171.

3. The fourth annual spring aerial survey of emperor geese in southwestern Alaska was completed in cooperation with Wildlife Assistance - MBMN. The total of 71,217 birds suggests this species continues at an alarming rate of decline.

4. Tundra swans nesting on the Izembek NWR and adjacent areas of the Pavlof Unit-APNWR continue at a stable level based on our annual appraisal conducted this spring. Of 42 nests located, 32 hatched and 75 cygnets reached flight stage.

5. Productivity of the southern Alaska Peninsula Caribou herd was assessed on 24 July and again on 13 October. Percent calves dropped from 16.9 to 15.3 percent suggesting good survival of young. Large bulls currently comprize between 4 and 7 percent of the population. It appears there are fewer large bulls compared to several years ago, mainly due to the high harvest rate now occurring on this population. This herd currently consists of at least 8,000 individuals.

6. Cooperative efforts with other FWS divisions and offices, the Alaska Department of Fish and Game and others resulted in a successful October aerial survey project to enumerate geese on Izembek Lagoon. Confidence levels as good as 88% were obtained for 123,602 black brant, 41,023 Taverner's Canada geese and 4,321 emperor geese.

7. A new and larger aircraft hangar was built at what the refuge felt was an exorbitant cost to the government. That observation aside, our aircraft operation will greatly benefit from the new hangar.

8. Final public hearings on the Izembek and Alaska Peninsula NWR Comprehensive Conservation Plans were conducted in the five villages within the area.

9. Three positions were vacated and expeditiously filled during the year minimizing the impact on the remainder of the staff.

B. CLIMATIC CONDITIONS

Weather conditions influence the timing, duration and intensity of refuge programs more than any other single factor at the Izembek NWR. The area has aptly been termed the "cradle of the storms". The field worker who doesn't make use of nearly every suitable opportunity to work outdoors won't accomplish much.

Temperatures, precipitation and wind speeds in 1984 were all above normal (Table 1). Climatic conditions during our primary field season, April through August, were cooler, drier and windier in 1984 as compared to 1983 (Table 2.)

D. PLANNING

1. Master Plan; 2. Management Plan

This year saw completion of the Draft Izembek NWR Comprehensive Conservation Plan (ICCP). Preparation of this plan was mandated by passage of Alaska National Interest Lands Conservation Act (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 tentatively 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 village 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 World War II. Under the Service's preferred management alternative, this land would not be recommended for wilderness designation but development and vehicular access would be kept at current levels.

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 the villages of Cold Bay, False Pass, King Cove, Sand Point and Nelson Lagoon from 5 to 9 November. Attendance ranged from 5 to 25. Approximately 50% of the attendants at False Pass, King Cove and Nelson Lagoon were Junior High School and High School students.

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 consensus expressed contentment with the status quo and skepticism toward significant development.

Currently, both written and oral comments are being summarized and considered. Selection of management alternatives will be based, in part, on these comments.

4. Compliance with Environmental Mandates

In compliance with the National Environmental Policy Act (NEPA) Izembek NWR was involved with two environmental assessments (EA) and two EISs for activities on refuge land. During May, 1984, an EA was completed by

Table 1 . Summary of Weather Data, Cold Bay, Alaska, 1984

Month	Av. Temp. (F.)	Departure from Normal	Precipitation (inches)	Departure from Normal	Wind Speed Average (MPH)	Peak /2 (MPH)
January	31.2	2.9	2.30	-0.40	16.5	51
February	18.7	-8.8	2.82	0.55	17.2	52
March	33.7	5.1	1.56	-0.75	13.6	40
April	31.6	-1.4	1.79	-0.16	17.8	40
May	38.0	-1.5	1.20	-1.27	14.8	39
June	47.0	1.6	1.45	-0.71	16.4	43
July	49.7	-0.6	1.77	-0.73	15.5	32
August	54.7	3.5	1.48	-2.22	18.4	45
September	49.7	2.2	2.87	-0.90	17.1	40
October	40.8	1.3	3.64	-0.65	17.2	44
November	37.0	2.7	7.61	3.57	17.1	45
December	37.3	7.8	3.19	0.34	21.1	46
1984 Summary	39.1 Avg.	3.3	31.68 Total	1.02	16.9 Avg.	43 Avg.

/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 for a one minute period). Peak gusts (less than one minute duration) are much higher.

Table 2 Spring and Summer Weather Conditions, Izembek NWR - 1984 /1

Month	Avg. Temp. (F)			Precipitation (inches)			Avg. Wind Speed (MPH)		Peak Gust /2 (MPH)	
	1983	1984	Normal	1983	1984	Normal	1983	1984	1983	1984
April	36.8	31.6	33.1	3.53	1.79	1.54	17.4	17.8	55	40
May	41.7	38.0	39.5	1.59	1.20	2.19	15.3	14.8	36	39
June	48.4	47.0	45.4	1.31	1.45	1.84	11.6	16.4	25	43
July	51.6	49.7	50.1	2.71	1.77	2.22	15.0	15.5	41	32
August	52.2	54.7	51.3	4.06	1.48	3.89	14.7	18.4	37	45
Overall Average	46.1	44.2	43.9	2.64	1.54	2.34	14.8	16.6	39	40
	(-4.1% from 1983)			(-41.7% from 1983)			(+12.2% from 1983)		(+2.6% from 1983)	

/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 for a one minute period). Peak gusts (less than one minute duration) are much higher.

Nelson Lagoon, a fishing village of 75 people, was one of five villages where public meetings were held to obtain views on the draft Izembek and Alaska Peninsula Refuge Comprehensive Conservation Plans.

Blenden (11/9/84)

The Aghileen Pinnacles form part of the boundary between Izembek Refuge and the Pavlof Unit of the Alaska Peninsula Refuge.
(405)25 Sarvis (2/5/85)

refuge staff evaluating the environmental effects of construction of a Minimally Attended Radar Site (MARS) on the refuge. Construction of a facility is contingent upon removal of the 91.83 acre Grant Point radar site and return of the land to the refuge. On the basis of this contingency, the EA declared that benefits of the construction project exceeded the detrimental effects. A Special Use Permit for this construction was subsequently issued. During 1984, an EA was prepared for a project rehabilitating the road to the refuge's float plane dock on Blinn Lake. On the basis of this EA, the Regional Office prepared a Finding of No Significant Impact (FONSI). The two EISs were part of the Izembek and Alaska Peninsula CCPs.

In accordance with the Alaska Coastal Zone Management Act, the Aleutians East Coastal Resource Service Area (CRSA) was formed. The majority of Izembek NWR, Alaska Peninsula NWR and Unimak Island fall within the boundaries of the Aleutians East CRSA. During November, 1984, we submitted comments on the Aleutians East CRSA pre-Public Hearing Draft Coastal Management Plan. This is 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 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). Considerable acreage will be recommended for Wilderness on Alaska Peninsula NWR where no wilderness was designated by ANILCA.

5. Research and Investigation

Refuge Personnel

Seasonal Movements and Distribution of Brown Bear on the Izembek NWR

This telemetry project, begun in 1977, was greatly accelerated in 1984. Fifty brown bears were captured. Movements of 26 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 the Izembek NWR

Census efforts, begun in 1979, were continued in 1984 along with continued ground productivity appraisals. See Section G.8., Game Mammals, Caribou.

Ten (10) Wildlife Inventory Plans submitted to the RO over the past two years were approved in 1984.

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 1983 is summarized in Section G.3., Waterfowl, Black Brant.

Population, Size and Productivity of Emperor Geese

Emperor geese winter in the Aleutian Islands and Alaska Peninsula and use the Izembek NWR extensively during the spring and fall migration. Fall productivity surveys and periodic inventories aid in the current drafting process of a Pacific Flyway Emperor Goose Management Plan. The 1984 project results are summarized in Section G. 3., Waterfowl, Emperor Goose.

Research and Investigation

Refuge Personnel

Seasonal Movements and Population Structure of the Resident Tundra Swan Population

This project continued in 1984. Thirteen new birds were color marked and six previously banded birds were recaptured. See Section G.3., Waterfowl, Tundra Swan for complete discussion.

Distribution and Mortality of Steller's eiders banded at Izembek Lagoon

Banding efforts continued in 1984. A presentation was prepared for the Alaska Bird Conference in February 1985, on the results obtained from the birds banded so far. See Section G. 3., Waterfowl, Steller's Eider.

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 the Izembek NWR. Birds are baited to a permanent trap site near the office, captured, banded and released. All birds are aged, sexed and weighed with other observations made on physical and plumage characteristics. Banding efforts performed at Cold Bay in 1984 are summarized in Table 40 .

Other Personnel

LGL Research Associates, Ltd., conducted various fish and wildlife studies in or 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.

E. ADMINISTRATION

1. Personnel - Shown in Table 3.

Three personnel changes were made in 1984. The Refuge Assistant (typing) position vacated by Kim Shaff in January was filled on 6 February with the hiring of Bonnie Taylor. Bonnie previously worked for the Bureau of Land Management in Tok, Alaska, hence, she did not experience the shock of being a new Federal government employee.

On May 27, Avery Bates arrived to fill the maintenance worker position vacated by Alan Rogers in March, who transferred to the Alaska Peninsula NWR. Avery's training is with the Federal Aviation Administration where he was a maintenance mechanic for approximately 15 years and has a total of 28 years Federal service.

Assistant Refuge Manager Mike Nunn departed in May to take the Refuge Manager position for the Koyukuk NWR administered from Galena, Alaska. The Assistant Refuge Manager's position was filled by Michael Blenden on 26 August. Mike transferred from Lower Brule, South Dakota where he was a Wildlife Biologist with the Bureau of Indian Affairs.

Our YCC program continued in 1984 at the same level which occurred in 1983. Our two enrollees, Angela Taylor from Cold Bay and Morgan Kirk from Fresno, California were on staff from 6 June to 25 August.

2. Funding - Shown in Table 4.

3. Safety

A 30 kw Cummins generator was purchased to supply the refuge with adequate power during outages. Work on the existing switchbox and the safe wiring in of the new unit was accomplished.

Our first summer of float plane operation resulted in 1) the construction of a wooden ramp for safe tie-down of the aircraft, 2) the construction of a trailer to ferry the plane to and from the hangar and 3) numerous discussions with staff members on safe water operations.

R. M. Sarvis attended the annual OAS pilots' ground school and had his annual flight physical. He received additional float training prior to bringing the plane to Cold Bay in June and took two OAS check rides.

Bear capture operations resulted in the handling of 50 animals. Safety was discussed frequently to insure the proper handling of immobilizing drugs, animal handling, helicopter operations, field gear preparation and first aid. No accidents and the efficient completion of this phase of our study resulted.

Monthly safety meetings on various topics were held and video tapes and other materials received from the RO were used.

No lost time accidents occurred during 1984.

Table 4 . 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

/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.

Table 3 . 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	-	-	-
FY 1984	5.0 " "	-	-	2
FY 1985	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.

4. Technical Assistance

W. B. Dau drafted a species account for Pacific Flyway black brant for Wildlife Assistance (RO). This and other species accounts were requested by the Audubon Society for an upcoming publication.

A.R.M. Nunn was appointed Region 7 representative on the Uniform Committee. He attended several meetings and gathered input from Alaska personnel.

R. M. Sarvis coordinated a region wide project to standardize special conditions for all special use permits issued on Alaska refuges. Since completion of this endeavor in December, Alaska refuge managers now have a checklist of special conditions for frequently issued permits and still have flexibility to tailor permits by adding optional and original special conditions.

5. Other Items

Special Use Permits

A total of 42 Special Use Permits were issued by the Cold Bay headquarters for Izembek, Unimak Island and Pavlof Unit. Included were twelve trapping permits, eight guiding permits, six for installation of navigation towers, six for geological surveys, two for photography, two for removal of World War II debris, two for marine research and one each for bear hunting, monitoring seismic activity, construction of a Minimally Attended Radar site, and gravel removal.

F. HABITAT MANAGEMENT

1. General

Izembek National Wildlife Refuge totals 320,893 acres with 300,000 designated as Wilderness, giving additional protection to important habitats. Also, within the Refuge boundary are approximately 100,000 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 boundary of Izembek NWR encompasses the entire watershed of Izembek Lagoon. Due to the extremes in elevation, several habitat types are represented on the refuge. Headwaters of the major tributaries on the refuge originate in mountainous areas in the center of the Alaska Peninsula. Drainage from glaciers around 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 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,

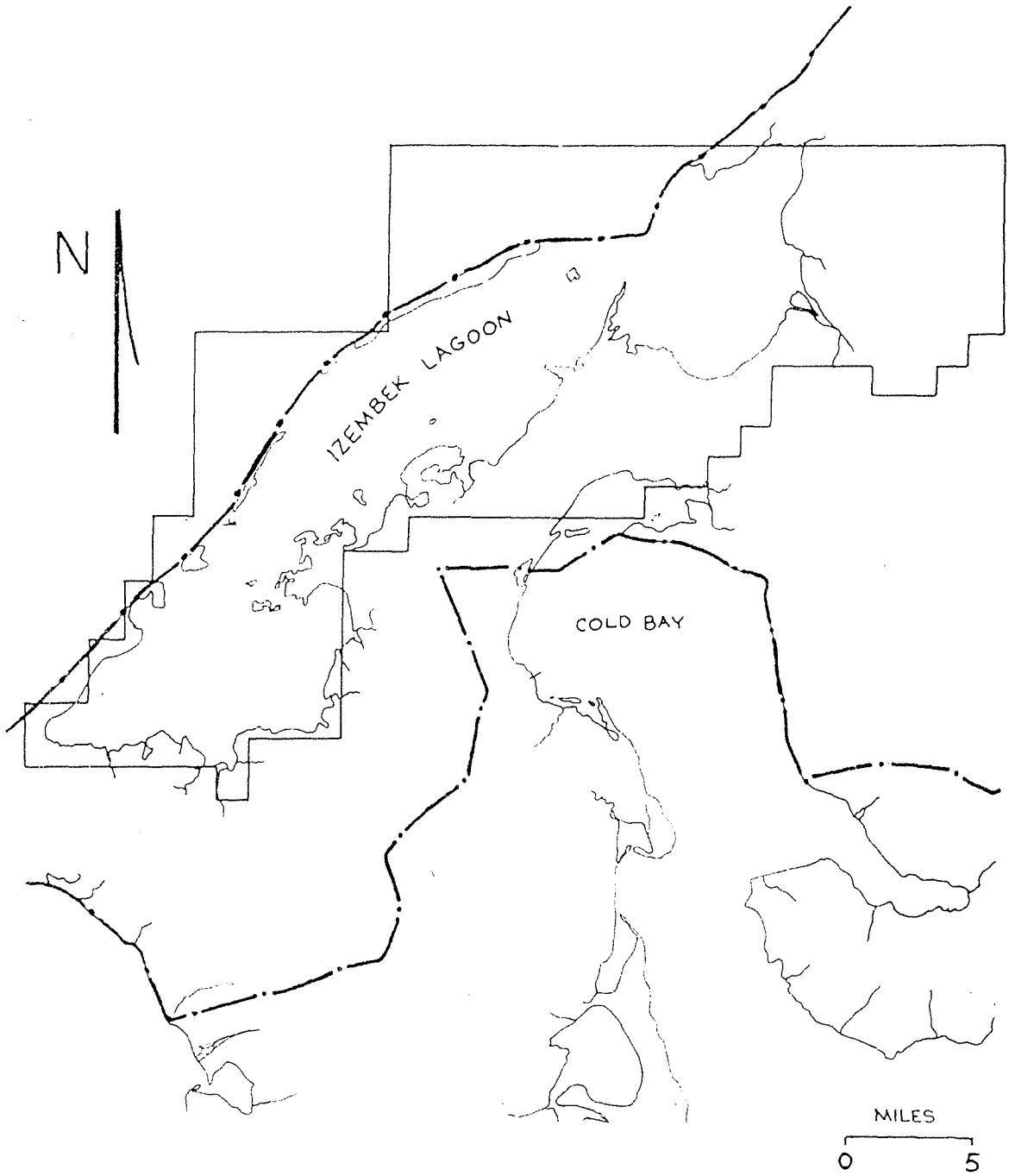


Figure 2. Boundary of Izembek State Game Refuge (———) in relation to Izembek NWR(-·——·——).

Central Izembek Lagoon with protective barrier island is accessible from Cold Bay by a road terminating near the U. S. Air Force radar site at Grant. Point. This radar site is scheduled to be removed next year.

Sarvis (7/11/84)

Several small, exposed islands (Gull Is. pictured) in Pavlof Bay (Pavlof Unit-APNWR) were considered suitable by the petroleum industry for weather monitoring equipment. We re-routed them to less valuable wildlife habitat on native lands.

Sarvis (7/11/84)

which supports a mixture of low shrub./ericaceous and graminoid tundra. Characteristic species are arctic willow and other Salix sp., crowberry Empetrum nigr um, mountain cranberry (Vaccinium vitis-idaea), bluejoint grass (Calamagrostis canadensis), white cottongrass (Eriphorum scheuchzeri), and reindeer moss (Cladonia sp.). Along many watercourses and at intermediate elevations on mountain slopes, dense bands of Sitka alders (Alnus crispa) are found.

The conveyance of 17,800 acres of Izembek NWR lands to adjacent village corporations has posed 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 ANCSA 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 trading value of these lands. A regional task force has been assigned the task of developing 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. Such projects as roads and thermal and hydroelectric developments have been mentioned as potentials. The area promises to be a hub of activities associated with offshore petroleum exploration in the Bering Sea, as well as with 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 5.

2. Wetlands

Approximately 87 percent of the Izembek NWR is characterized as true wetlands. Nearly 200,000 acres of upland tundra (61%), 22,400 acres of wet sedge and grass marsh (7%) and 60,000 acres of pond, lake and river areas (19%) make up this total. Most of these areas are protected by 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 the Izembek NWR are essential wetland habitat for up to 250,000 migratory waterfowl in the fall. Eelgrass is the most important food item covering an estimated 68 percent of Izembek Lagoon. Goose species graze heavily on the leaves of this essential food item.

Puddle duck species inhabiting Izembek Lagoon in the fall are especially fond of eelgrass seeds. The seeds are very small ($\angle$ 1mm long) and crops of shot birds are often completely packed with them. Crops from a pair of mallards shot this fall were weighed and sampled to estimate the number of eelgrass seeds. The male carried an estimated 17,500 seeds while the

Ericaceous tundra interspersed with dense growths of alders characterize the vegetational zone dividing wet meadow habitats from higher areas of sparse vegetation or snowfields. The Refuge Headquarters town of Cold Bay is in the background.

Blenden (10/2/84)

Sparsely vegetated xeric habitats are common throughout the upland areas of the refuge. Brown bears den from these areas on up to 3,000 feet.

Blenden (9/84)

Fireweed is dominate in areas of disturbed ground on the Izembek NWR. Sarvis (7/28/79)
(199)19

The yellow monkey flower is one of many colorful wildflower species on the lower Alaska Peninsula and Unimak Island.
(183)23 Sarvis (7/15/79)

Shishaldin Volcano, 50 miles to the west on Unimak Island is an impressive backdrop for Izembek Lagoon and these basking harbor seals.
(34)21 Sarvis (8/75)

Table 5 . 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	22 g land
False Pass	8,105	1,264	9,369	"
Pauloff Harbor	-	- approx.	320	"
Aleut. Corp.	-	-	96,030	14 (h) (8) /1
"	-	-	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.

female had 11,650! Considering the large numbers of waterfowl utilizing these seeds (twice a day in fall or once each tide flux) the quantities consumed are astronomical.

12. Wilderness and Special Areas

On December 2, 1980, 300,000 acres of Izembek were officially designated as Wilderness by the Alaska National Interest Lands Conservation Act. The striking geographic features and conservation of the internationally important fish and wildlife values of the area are the primary goal of the refuge.

Volcanoes 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 perfect volvanic 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 as well. Active volcanoes include Shishaldin, Pogromni, and Faris-Westdahl. Steam and/or smoke rising from the vent of Mount 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 overlain with virtually bare lava and ash. These are also drained by sizeable streams.

Cliffs ranging from steep bluffs to spectacular wave-cut promontories and sea stacks occur along the coast, except at Unimak Bight and the north side 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 was held up pending resolution of the D-2 lands issued by Congress resulting from passage of the Alaska Native Claims Settlement Act. Finally, a wilderness area of 910,000 acres was established on December 2, 1980 with passage of the Alaska National Interest Lands Conservation Act. Management of Unimak will still be the same since it has been managed as a wilderness area all along.

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

Steller's sealions can be seen hauled-out at several locations on Unimak Island and the Amak Island group.
(285)6 Sarvis (8/24/80)

Black-legged kittiwakes and red-faced cormorants nest on refuge cliffs.
(250)17 Sarvis (4/5/80)

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. A minimum of 23 species of saltwater fishes have been reported for Izembek Lagoon.

2. Endangered Species

The endangered Aleutian Canada goose (Branta canadensis leucopareia) may occur on the Izembek NWR during spring or fall migration to and 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 non-endangered or threatened Peale's race of the peregrine falcon (F.p. pealei) is a fairly common resident of the area.

3. Waterfowl

Tundra Swan

The tundra swan study continued in 1984. Tundra swans are the key nesting waterfowl species here 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.

The year began as usual, with most of the Izembek and Unimak Island resident tundra swan population wintering at Peterson Lagoon and Cape Lapin River in the Urilia Bay area of Unimak Island. Three counts were made there in early 1984 with a peak of 575 occurring on January 23 (Table 6). On February 22, 444 swans were classified at Peterson Lagoon and Cape Lapin River with 70 (16%) being juveniles. Forty-four neck collars were also observed with 25 being read. In addition, one swan was observed with a metal legband used before 1978 and another (with a newer legband) that had lost its neck collar and plastic legband.

Periodically, throughout January and February, warming trends will open portions of the lake and pond systems on the refuge. At such times, tundra swans will disperse from the protection of springs in the Peterson Lagoon area and some will appear near Cold Bay. Another hard freeze quickly concentrates them again at Peterson Lagoon.

The 1983 Y brood (9U/2F with 6 cygnets: 1F, 4F, 6F, 8F, 0F, and 2J) as reported last year, spent all winter near the mouth of the Skagit River. This was an unusual brood for two reasons, First, they have been the only family group to migrate to the Lower 48 in the six years we have been studying swans. And second, they are one of only two broods in which six cygnets survived through the winter. We received numerous observation reports from several individuals throughout the winter and toward spring

Table 6. Winter Whistling Swan Surveys of Unimak Island and Izembek NWR

Date	Immature	Adult	Total Classified	Total Observed	Neck Collars /1	Swan Location /2	Area Covered /2
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,O,P,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
6 Year Ave.	11.6 %			576 /3			

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

/2 I-Izembek NWR, U-N - 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.

migration time a Washington dairy farmer was observing them almost daily. He last saw them on April 4th and reported to us that they probably left on April 5th. Needless to say, we were anxious to document their arrival here and see if all eight would make it back. On April 18, we observed the parents (9U/2F) at Middle Marker Lake and from their actions, it appeared they had just arrived. Unfortunately, none of the cygnets were with them leaving their fate a mystery, at least for awhile. None of the six cygnets were observed all summer, leading us to believe they may have perished. Then on October 21, "0F" was observed on Koso Lake. On November 3, we were further surprised to hear that "6F" was again observed in Washington with additional sightings on November 17 and January 27, 1985. So, at least two of the cygnets still survive from this unusual brood.

In addition to the above brood, one other swan neck collared here migrated also. On 3/10/84, swan 7J was observed at Calispell, Washington. He was banded on 8/2/83, no other sightings occurred until the March 10 observation and the only other observation since was back here on 7/25/84, when he was recaptured, at which time it was discovered his collar was missing.

Spring break-up was slightly later this year, occurring during the latter part of March. During mid-March, swans were observed flying over the central Izembek/Cold Bay area and on a March 25 flight over SW Izembek, swans were observed in groups scattered on several lakes. The lakes were still frozen, but melting fast and some swan pairs were already occupying territories.

Nesting activities were slightly late this year with nest initiation beginning in late April and peaking in early May. The first nest (#12) hatched on June 1, the peak of hatch occurred June 7 - 10, and the last nest (#36) hatched about June 18 (Figure 3).

This year, for the first time, a nesting survey was done on June 12, in the northern half of the Alaska Peninsula between the Black Hills and Nelson Lagoon, as part of the tundra swan survey protocol developed by Waterfowl Investigations. Two 1:63,000 quadrangles were covered completely. On the Port Moller (D-5) quadrangle eight singles, four singles with a nest, 15 pairs with a nest, six pairs with a brood, 22 pairs without a nest, and 15 birds in flocks were observed for a total of 113 adult swans. On the Port Moller (D-6) quadrangle three singles, one single with a nest, one pair with a nest, four pairs with broods, 17 pairs without a nest, and ten birds in flocks were observed yielding a total of 58 adult swans. Clutch size was obtained on three nests (11 eggs; ave. 3.7) and the 10 broods observed had 34 cygnets (ave. 3.4).

The annual Izembek nesting survey was done June 7 and 8 with 222 tundra swans (42 neck collared) observed on Izembek, the Pavlof Unit (SW of Black Hills only), and adjacent areas (Table 7). The total number of swans using this area has been amazingly constant for the six years this survey has been done. This year, more nesting pairs were observed than past years, but total pairs has also been nearly constant from year to year averaging 71 (range 60 - 80). The survey was done a little late this year, so undoubtedly, some nests were missed that had already been destroyed by the time of the survey.

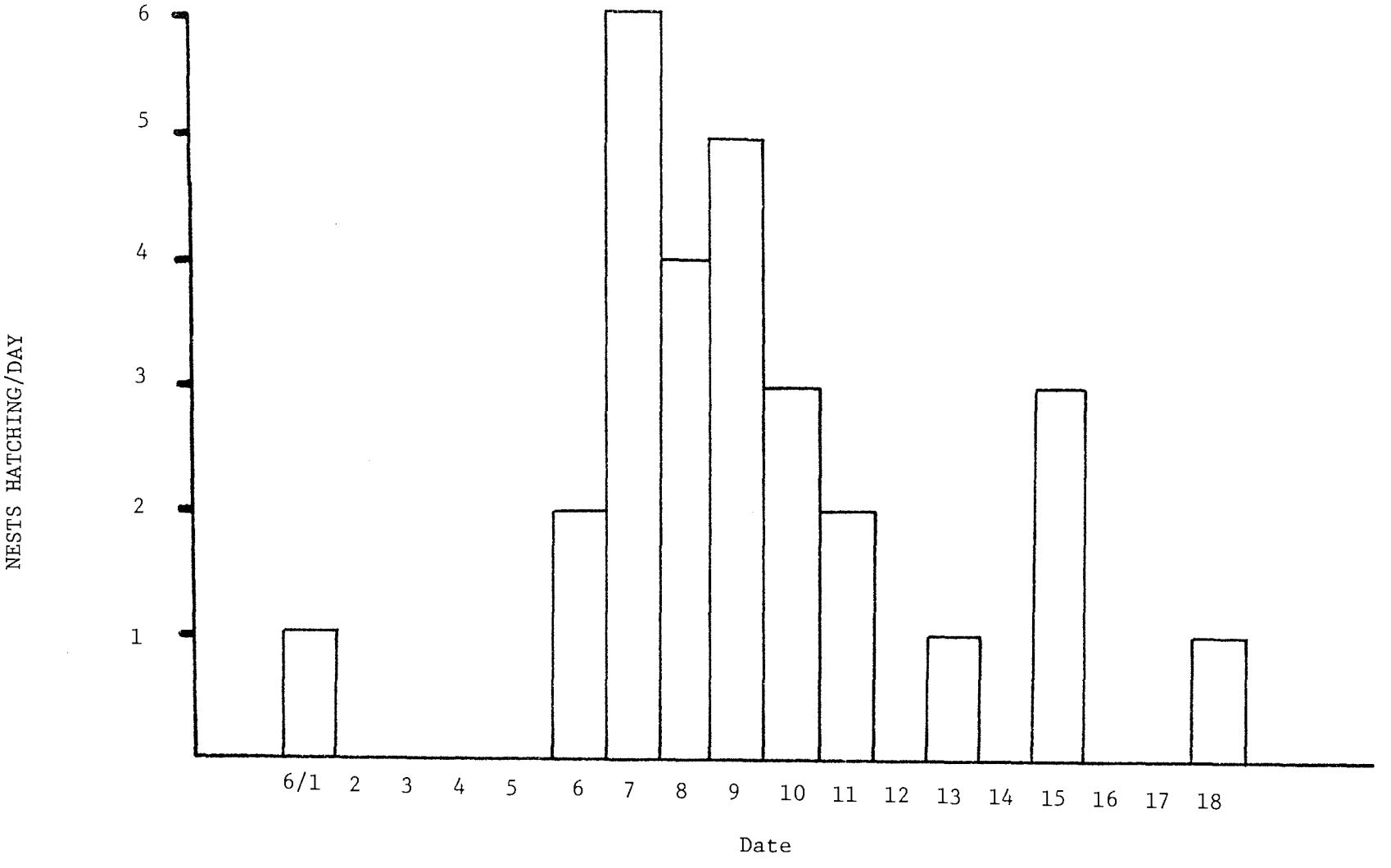


Figure 3. Hatching dates for 28 successful nests in 1984 (nests 9, 35, 36, 8, 42 are not included).

Table 7. Spring Nesting Surveys of Whistling 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. Mil.)	Density (Sq. Mi.)	No. of collared swans seen
5/8/78 /1	6 (8%)	18 (23%)	26 (33%)	28 (36%)	78	315.5	.25	N/A
4/25,28/79 /2	10 (5%)	24 (12%)	96 (47%)	75 (36%)	205	413.9	.50	12
5/14-15/80	9 (4%)	60 (26%)	84 (36%)	80 (34%)	233	413.9	.56	1
5/13,15/81	16 (8%)	58 (29%)	94 (48%)	29 (15%)	197	413.9	.48	21
6/2,6/82 /3	11 (5%)	68 (30%)	92 (41%)	55 (24%)	226	413.9	.55	23
5/31-6/1/83 /3	8 (4%)	48 (21%)	94 (41%)	77 (34%)	227	413.9	.55	37
6/7-8/84 /3	5 (2%)	78 (35%)	54 (25%)	85 (38%)	222	413.9	.54	42
Ave. Last 5 Years	10 (5%	62 (28%)	84 (38%)	65 (29%)	221	413.9	.53	31

/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.

This year, 42 nests were found (Table 8). Though a few more nests were found in 1981 and 1982 when more intensive and earlier nest searches were made, this year was probably a record year since undoubtedly a number of destroyed nests were missed because of the late survey. The nest hatching success of 76% was the best observed so far with 50% being more normal for this area. June weather was better than normal partially accounting for the increased success. In addition, since some nests were probably destroyed before being found this year, this would inflate the nest success rate. Also, many of the nests are destroyed by bears, but this year bear season was open in May. Bear hunters may have kept some bears from utilizing the lowland areas as much as normal during this time to the benefit of the tundra swans.

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 season this year (see Brown Bear section) 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 9). 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 obtained for 30 nests which contained 142 eggs for an average clutch of 4.7, similar to past years (Table 8). Of the 42 nests found, 32 (76%) hatched. The cygnets were never observed for two of the nests and 118 cygnets hatched from the remaining 30 nests. This was by far the most nests yet to hatch here, ten more than the next highest year. Average initial brood size was 3.9 again higher than most years.

Of the 32 broods, 22 (69%) containing 75 cygnets reached flight stage, the most ever recorded (Table 10). Brood survival was also the highest yet recorded with 64% of the cygnets reaching flight stage. As in past years (except 1983) cygnets perished at a higher rate within the first 10 days of hatching than later (Figure 4). This year's data are not as complete as previous years due to delays in the gear change for the refuge aircraft. We were without an airplane for nearly a month during June and early July.

With several year's data involving production by neck collared swans, we have shown that neck collars have no adverse behavioral impacts on tundra swan production. This year a record number of marked birds nested with 12 marked pairs nesting (Table 11). The female was neck collared in 11 of the 12 pairs and the male also had a collar in eight of the pairs. These marked pairs were more successful than the average for the whole population with 11 of the 12 nests hatching (92%) and a slightly larger average clutch of 5.0. We are certainly not inferring that neck collars cause better success, but the success rate certainly does show that neck collars are not a hindrance to successful breeding. The main reason these collared birds have a higher success rate is that many of them nest in the central Izembek area where, as explained before, bear numbers are low and hence nest success is better.

Table 8. Whistling Swan Production
(Izembek NWR, Pavlof Unit of Ak. Peninsula NWR & Vicinity)

Parameter	1977 /1	1978 /2	1979	1980	1981	1982	1983	1984
Nests with known clutch				17	23	22	14	30
Number eggs				82	118	105	75	142
Mean clutch				4.82	5.13	4.77	5.36	4.73
Total nests	?	14+	17+	34	47	44	28	42
No. hatched (nest hatch success)	10+	9+	7+	17(50%)	17(36%)	22(50%)	19(68%)	32(76%)
1st Obs. - #broods (cygnets)				15(51)	17(64)	22(74+) /3	19(87+) /4	30(118+) /5
Average Brood Size (at hatch)				3.4	3.8	3.4	4.6	3.9+
Last Obs. - before 9/1 No. broods (cygnets)	10(34)	9(28)	7(17)	10(22)	13(32)	9(23)	17(49)	22(75)
Average Brood Size (at flight)	3.4	3.1	2.4	2.2	2.5	2.6	2.9	3.4 /6
Dates of last observation	7/22	7/21,8/8	7/18	Various	Various	8/28,9/2	Various	Various
Egg hatching success (successful nests only)				78%	65%	85%	90%	86% /7
Success - (eggs to flight stage)				32%	33%	28%	46%	51% /7
Success - hatched to flight stage)				41%	50%	33%	51%	59% /7

/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, one brood was not discovered until it was about 50 days old; number of cygnets that hatched is unknown.

/4 In 1983, one brood was not discovered until it was about 35 days old; number of cygnets is unknown.

/5 In 1984, 6 broods were not observed close enough to their hatching date to be sure of the original number of cygnets. Number of cygnets at hatch is therefore an estimated minimum number. In addition, 2 nests hatched, but the brood was never observed.

/6 Probably high since many broods were last observed in July. Other duties prevented brood checks normally done in August.

/7 Did not use nest nos. 6, 9, 12, 30, 31, 36 and 42 in these calculations.

Table 9 . Comparison of Whistling Swan Nest Success Between the Cold Bay Road System Area and the Rest of the Refuge

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
Total	34 (83%)	7	41	56 (47%)	64	120

/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 10. Summary of 1984 Successful Whistling Swan Nests.

Nest No.	Clutch /1	Hatching Date	No. cygnets in brood (age in days) First	Intermediate Obser.	Last. Obser. /2
1	6	6/15	6(3)		0(25)
2	(4)	6/7	4(1)		4(47)
5	(2)	6/7	2(1)	1(5-11)	0(33)
6	(5+)	6/6	5(2)	3(44)	3(48)
7	(4)	6/6	4(2)		4(48)
8	2	6/10	1(5)	1(8)	0(30)
9	?	?	No Observations		
12	?	6/1	4(7)		4(95)
13	(4)	6/7	4(1)	3(5), 2(8)	2(54)
14	(6)	6/9	6(2)		6(70)
17	6	6/9	6(2)		0(3)
18	(6)	6/9	5(2)		5(72)
19	(3)	6/8	3(3)		3(88)
20	4	6/13	3(2)		3(48)
23	(5)	6/10	5(1)	5(5), 1(30)	0(40)
25 /3	5	6/11	4(4)		0(39)
26	(3)	6/8	3(3)	3(32),2(42)	2(53)
27	6	6/10	6(1)		6(69)
28 /3	5	6/8	5(3)	5(46)	4(47)
29 /5	4	6/15	2(3)		2(87)
30 /3	?	6/15	2+(1)		2(53)
31	?	6/18	3(22)		3(63)
32 /4	5	6/7	4(1)	3(4), 2(8)	2(43)
33 /5	(5)	6/8	3+(1)		3(42)
34 /5	6	6/7	5(4)		0(8)
35	5	?	3(?)		3(?)
36	?	?	No observations		
37 /5	(5)	6/9	4(2)		4(46)
38 /3	(5)	6/7	4(4)	3(8)	2+(43)
39	6	6/11	5(4)		5(44)
40 /5	5	6/9	4(6)		0(41)
42	?	?	3(?)		3(?)
32	122		118		75
Mean or %	3.8	97% of eggs hatched /6		61%-eggs to flight 64%-survived from hatch to flight	

/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 Adult male with neck collar before nesting.

/5 Both adults with neck collar before nesting.

/6 Minimum egg hatching success since more eggs may have hatched, but the cygnets died before the first brood observation.

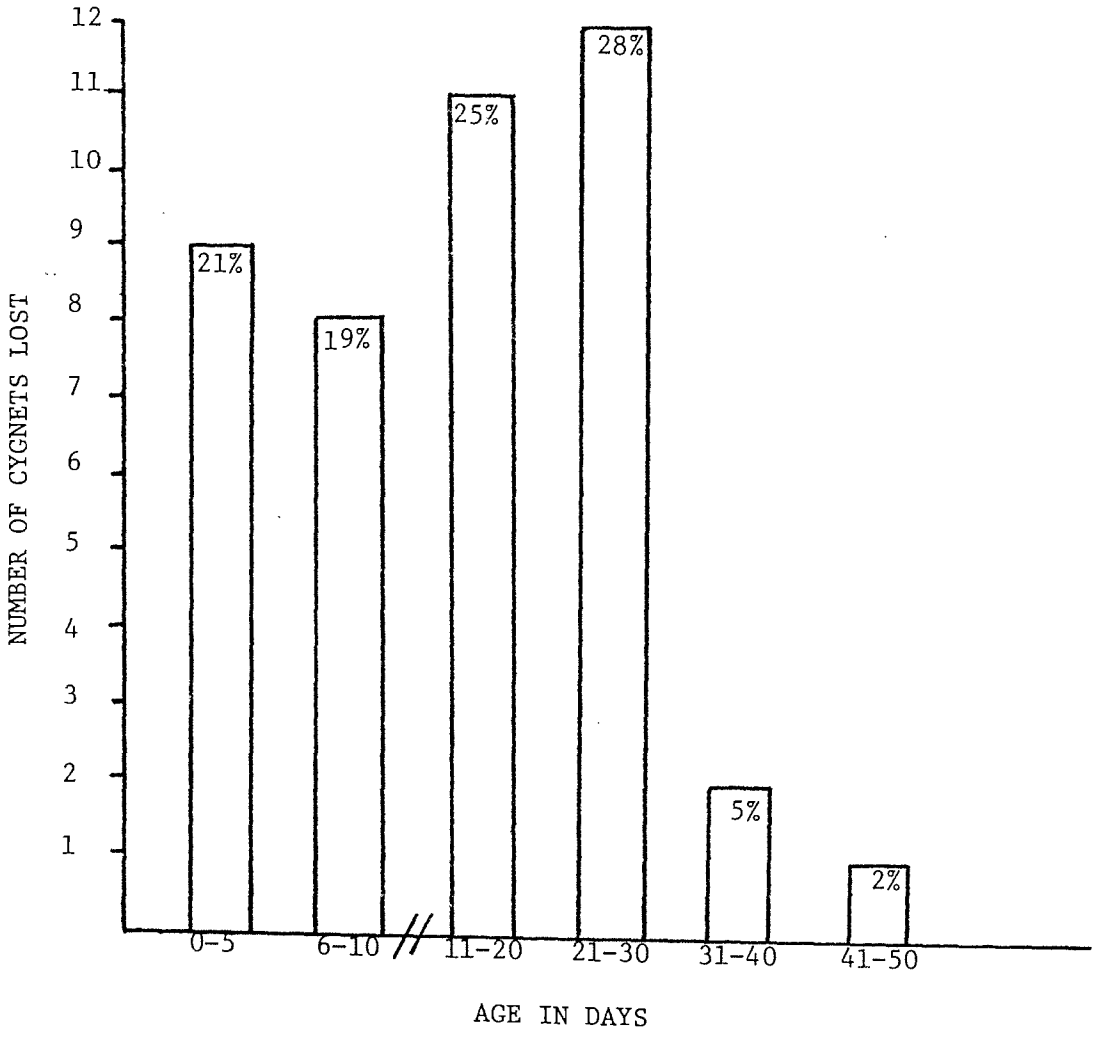


Figure 4 . Chronology of cygnet loss. /1

/1 Data in Table 10 .

Table 11 . Summary of Twelve Nests Made by Neck Collared Swan Pairs in 1984

Nest No.	Collar Number (Male/Female)	Bird Incubating Nest: Male	Bird Incubating Nest: Female	Clutch	Outcome /1 (date)	Number of Cygnets: At Hatch	Number of Cygnets: Flight
25	Uncoll./TO	0	2 (100%)	5	H(6/11)	4	0
28	Uncoll./8J	0	4 (100%)	5	H(6/8)	5	4
29	3F/4J	3 (43%)	4 (57%)	4	H(6/15)	2	2
30 /2	(61)/46	3 (43%)	4 (57%)	?	H(6/15)	3+	2
31	9U/2F	0	6 (100%)	?	H(6/18)	3+	3
32	1P/Uncoll.	2 (100%)	0	5	H(6/7)	4	2
33	9P?/4A		1 (100%)	5	H(6/8)	3+	3
34	M5/K4	0	1 (100%)	6	H(6/7)	5	0
37	3P/8C	0	1 (100%)	(5)	H(6/9)	4	4
38	Uncoll/A6	1 (50%)	1 (50%)	(5)	H(6/7)	4	2+
40	Y7/A7	0	1 (100%)	5	H(6/9)	4	0
41 /3	?/?	-	-	?	DM(6/7)	-	-
		9 (26%)	25 (74%)	45 (ave.5.0)		41	22

/1 H - Hatched; DM - Destroyed, mammalian

/2 Male had lost collar before nesting; collar replaced in Aug., 1984.

/3 Both were neck collared; collars not read before nest was destroyed.

For the 12 marked swan nests combined, the male was observed incubating nine times and the female 25 times. Although occasionally the male is on the nest more than the female (nest no. 32), normally the female does the majority of the incubating. It is interesting to note, in constrast to tundra swan males which do some incubating, 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 93 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 5 - 7 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.

The only information to date that we have obtained on breeding age here comes from three 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. The other known age individual that has nested is swan #46, who was banded in 1979 as a yearling. This bird was observed every summer since, but had its first nest in 1984 as a six year old bird. She nested at Bluebill Lake (a prime nesting territory) with an experienced male, #61, who had had broods in earlier years with two different females.

Four years in a row is the most consecutive years a swan has nested so far. We are 99% sure swan T0 nested in 1981 (stretched cloaca when banded), and we observed her on a nest in 1982, 1983, and 1984. Several other pairs or collared individuals have nested three years in a row, including swans #23/28 ('77, '78 and '79), #45/48 ('81, '82 and '83), #C9 ('81, '82, '83), K9/Y4 ('81, '82, '83), Y7/A7 ('82, '83, '84), and M5/K4 ('82, '83, '84). In addition, two others have nested three years but not consecutively. Swan #61, nested in '81, '82, and '84 with three different mates and swan #74, nested in '80 with one mate and again in '82 and '83 with a different mate. Also one other pair (#12/13) nested in '78, skipped two years and nested again in '81.

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 protect refuge wilderness habitats.

In 1984, only 13 new swans (eight cygnets) were captured and neck collared, plus six previously marked ones were recaptured (Table 12. This year for the first time, the refuge aircraft was on floats and we were looking forward to banding some previously inaccessible swan broods. Unfortunately, the weather had other ideas. The last 10 days of July, during the peak of the molt, we had nine days of solid fog making aircraft flights impossible. The aircraft is essential for spotting molting swans, shuttles of banding personnel and equipment, and spotting hiding birds that have escaped the banders. In early August the weather finally broke, but this time period was spent tranquilizing and marking bears for the brown bear study.

During banding, in addition to putting a standard FWS metal band, neck collar and color leg band on each bird, we recorded age, sex, plumage characteristics, eye color, size of bill and yellow spot on lores, wing and leg measurements. Weight and presence or absence of external parasites was also determined. We also took photos of facial pattern.

One interesting event occurred during the limited banding done this year. While doing some bear work, we inadvertently stumbled onto a swan brood of five young at Paul Hansen's Lake. We were not prepared to neck collar swans that day, but the way it happened, it appeared they would be "easy" to catch. We ran down the male (3M) and two cygnets (4M, 6M), before the rest reached the lake. Since we did not have a dipnet or banding supplies, we had to leave them. We bundled up the three we caught and flew back to Cold Bay for the net and supplies.

We returned to the lake and began attempting to net the remaining cygnets using the floatplane. The adult male was still in the back of the plane but tied in such a manner that he could see outside. When we landed at the lake, he saw his mate and began calling at her for all he was worth! That is the first time ever that a swan has called while being held for banding. His calling so close was thrilling, not to mention deafening. One wonders what he was telling his mate? Was it "save me", or "they are after you, get the ----out of here"? In any event, the wind had come up. With that extra bit of help, the female and other three cygnets were able to get airborne and escaped us. We then released the male and two cygnets and they all got back together.

This year seven (37%) of the 19 swans captured, had leeches (Theromyzon rude) in their eyes (Table 13). Over the seven years that we have checked swans for leeches, 73 (21%) out of 340 have had them in their eyes. They do not appear to be causing significant mortality, but one wonders how much the swan's forward vision is affected by the large bulge a leech causes under the nictatating membrane. Last year a number of leeches from swans' eyes were mailed to Dr. Benjamin Tuggle at the National Wildlife Health Lab in Wisconsin and they all arrived alive. We remarked about how hardy they must be "to survive swans, banders, and the U. S. Post Service so well." What an understatement that turned out to be. A year later, Dr. Tuggle called to report that some of the leeches were still alive. He had not fed them anything for the whole year, just changed their water periodically!

Our helicopter on contract for brown bear was also used in the capture of a family of swans.

Mumma (8/20/84)

Measurements of various physical characteristics have shown interesting dissimilarities between our resident tundra swans and other migratory populations.

Mumma (8/20/84)

Table 12. Summary of Whistling Swans Banded and Neck Collared in 1984 Izembek NWR

Date	Location	ASY M	ASY F	SY M	SY F	L-M	L-F	Neck Collar Numbers
7/25/84	New Record Lake	1	1	1	1			1K,3K,6K,8K
8/7/84	Swan Lake						1	1M
8/7/84	Bluebill Lake					1	1	5K,2M
8/20/84	Y Lakes					2	1	7K,9K,0K
8/20/84	Paul Hansen's Lake	1					2	3M,4M,6M
TOTALS - 1984		2	1	1	1	3	5	13
TOTALS FOR (1978 - 1984)		70	86	17	21	45	48	287

In addition, 46, 61, C7, 3F, 7J, and 5A were recaptured in 1984.

Table 13. Occurrence of Leeches in Whistling Swan Eyes, 1978-1984

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
Totals	25	19	3	4	10	12	73(21%)	267

/1
67 swans had leeches in one eye and 6 had leeches in both eyes.

After several years of extraordinary efforts to reach swan molting areas, we were this year looking forward to using the refuge airplane on floats. Unfortunately, the weather and press of other duties precluded use of the floatplane this year for banding. The floatplane will provide access to more of the Pavlof Unit, especially, which we are anxious to cover. Somewhere north of here on the Alaska Peninsula, the tundra swans all migrate to the Lower 48 to winter. Most of the swans here do not migrate. We are interested in delineating where the "dividing line" is between the resident and migratory populations. Much of the Pavlof Unit contains swans, but we have been unable to reach them because we have not had a float plane before. Hopefully, next year we will be able to band in this area. On September 10, a neck collared swan was sighted at the mouth of the Caribou River near the Pavlof Unit. To date, this is the farthest north one of our collared birds has been observed and further confirmed the need for some work in that area.

After seven years of neck collaring swans, our resightings card file is bulging. Of the 287 swans collared so far, 229 (80%) have been resighted at least once since collaring (Table 14). As of this writing, we have compiled 5,621 observations of individual swans. Each different day that a swan is observed is counted as an observation. Our need for some computer time is obvious and we are hoping to use the new refuge Data General minicomputer for this work.

The most observed individual so far is swan #61 (an adult male collared in 1980) who has been seen 129 times (Table 15). 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 in each of the three 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 (UO) in 1981, again in the Y lakes area. That year he did most of the incubating and apparently picked the nest site since it was the same as the year before. Swan #16 was last observed on 2/5/82. During the summer of 1982, Swan #61 was not observed, but we are 99% sure he did not nest, since all nests were located in 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 L.) and raised two cygnets (5K, 2H).

In contrast to swan #61, swan #23 (after raising broods with #28 in 1977, 1978, and 1979) lost his mate in early 1980, and has been observed every year since. Some of the times he was alone, and some with four different females (16, YO, F8, and 6T), yet he has never re-nested in five years. Swan #23 is one of the older swans we know of, being a minimum of 12 years old now, which may explain his failure to breed lately.

Fall and early winter this year have so far been very mild. Normally, by November, swans are concentrated at Peterson Lagoon on Unimak Island, but this year we have received little snow and freshwater has remained essentially open. By year's end, swans were still scattered throughout refuge lakes and springs, making winter counts and collar observations at Peterson Lagoon impossible.

Table 14. Summary of Neck Collared Tundra Swan Observations

Time Period	Year Collared 1978	1979	1980	1981	1982	1983	1984	Total
Prior to collaring /1	30	68	261	1,013	293	854	45	2,564
Banding thru Fall - 1978	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						3		3
Total Observations	571	138	1,162	1,477	689	1,521	63	5,621
Number Collared	27	16	37	66	52	76	13	287
No. resighted at least once	25	9	36	54	38	63	4	229
Resighting Rate	93%	56%	97%	82%	73%	83%	31%	80%

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

Table 15. Ten Most Observed Tundra Swans

Neck Collar No. /1	Sex	No. Observations
61	M	129
C9	M	114
60	F	101
12	F	100
59	M	100
74	F	97
48	F	95
45	M	94
13	M	94
16	F	84

/1 Pairing for these birds is: 61/16, C9/74, 60/59, 12/13, and 48/45.

Black Brant

Productivity within the Pacific Flyway population of black brant was measured at Izembek NWR for the 22nd consecutive year. After near average production in 1983, (i.e. 24.1% young) nesting failures again occurred resulting in 13.7% young in the population in 1984 based on a sample of 10,950 birds (Table 16). This years' annual evaluations of total production and family group size (Table 17) were conducted from 1 October to 18 October in 1984.

Fall weather conditions at Izembek NWR were unseasonably mild with temperatures above and precipitation below normal. This pattern was very opportune as a cooperative aerial survey effort was undertaken this fall with the Wildlife Assistance division. Only black brant, Canada geese and emperor geese were included in the experimental survey effort. Four survey aircraft and 14 experienced aerial surveyors participated in this project (Table 18). Twenty separate flights with from two to four observers, depending on type of aircraft, were flown from 7 to 16 October. These included 31 repetitive surveys (counting front and rear seat observers as separate surveys) conducted to test various conditions inherent in aerial surveying on Izembek Lagoon. By using experienced wildlife observers, it was possible to achieve a level of statistical confidence in our fall population counts.

Individual surveys were fed into a mini-computer directly from tape recorders without being totalled. A paper copy of each survey was printed and filed. Variables assigned to each survey included: date, aircraft type, seat position, time (starting), wind speed and direction, sky conditions and stage of the tide. On 17 and 18 October, the survey crews were presented the results of their individual and combined efforts and a discussion period followed. We could then ask questions of the computer and obtain some insight into the effects of the variables alone or in combination which reinforced several subjective impressions held by the surveyors. One valuable outcome of this effort was the assigning of confidence levels to the population totals determined for black brant (123,602 $\pm$ 12%), Canada geese (41,023 $\pm$ 13%) and emperor geese (4,321 + 18%). Thus the calculated total for all geese and brant on Izembek Lagoon and surrounding lagoons, (Kinzarof, Morzhovoi Bay, Hook Bay and St. Catherine Cove) was 168,946 $\pm$ 11%.

Surveys conducted during this project were complete aerial counts of Izembek Lagoon and although the initial confidence intervals obtained were encouraging and each surveyor could relate his efforts to the average counts, there was still the desire to somehow relate the obtained population indexes to an absolute total. For several years, the Izembek NWR and Wildlife Assistance staffs have experimented with 35mm, 70mm and 9 inch format photography in the hopes of determining the proper set of variables necessary to obtain aerial photo coverage of Izembek Lagoon with sufficient resolution to count birds. Black brant are shy of aircraft and fixed wing flights of greater than 3,000 feet are necessary to avoid flushing them while Canada geese and emperor geese are tolerant of flights at lower altitudes. Various film types and lens combinations were tried without obtaining the desired results.

Table 16. 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
22 Yr. $\bar{X}$	10,531	3,288	13,813	23.8

Taverner's Canada geese in the foreground and black brant in the distance accumulate on a portion of Applegate Cove. Amak Island, ten miles offshore in the Bering Sea, is in the background.

Dau (10/84)

Large helicopters servicing offshore platforms from Cold Bay cause disturbance of geese during overflights of Izembek Lagoon. We are working to route such flights around areas of waterfowl concentrations.

Dau (2/85)

Table 17. Black Brant Family Group Counts at Izembek NWR, 1972 - 1984

No. of Juveniles	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1966 - 1984 x No.	1966 - 1984 x %
1	45	26	22	36	49	13	22	26	34	18	25	19	31.7	16.3
2	95	44	66	59	77	31	64	47	38	22	40	49	59.2	29.9
3	87	19	48	78	71	29	37	57	36	25	55	70	56.4	8.3
4	70	13	31	40	29	24	17	39	27	20	26	39	33.6	17.5
5	22	2	14	19	13	10	5	7	10	4	21	10	11.4	6.1
6	5	1	5	4	1	3	0	0	8	0	6	4	2.9	1.6
7	2	0	3	1	0	0	1	1	1	0	0	1	0.8	0.4
8	1	0	0	0	0	0	0	0	0	0	0	0	0.1	.03
Total Families	327	105	189	237	240	110	146	177	154	89	173	192	196 ± 77	
Total Juveniles	938	239	543	674	603	326	361	489	431	237	515	564	534 ± 202	
Mean Family Size	2.87	2.28	2.87	2.84	2.51	2.96	2.47	2.76	2.80	2.66	2.98	2.94	2.74 ± 0.23	

Table 18. Survey aircraft and personnel involved in aerial waterfowl survey project, Izembek NWR, 1984

Personnel	Affiliation	Survey Aircraft (No. of Flights)
John Sarvis (P)	Izembek NWR	
Michael Blenden	"	
Christian Dau	"	
Michael Nunn	Koyukuk NWR	N745 (6) Piper Supercub
Bill Butler	Yukon Delta NWR	
Bruce Conant (P)	Wildlife Assistance, Juneau	N754(13) Turbine Beaver
Jack Hodges (P)	"	
Jim King /2	"	
Cal Lensink	Research, Anchorage	
Hank Hansen	USFWS - retired	
Dan Timm	Alaska Dept. of Fish and Game	
Rod King (P)	Wildlife Assistance, Fairbanks	N1055F(1) Cessna 185
Dirk Derksen	"	
Vern Berns (P)	Alaska Peninsula NWR	
John Taylor	"	N716(1) Cessna 180
Dick Sellers	Alaska Dept. of Fish and Game	

/1 (P) = Pilots who flew on this project

/2 Retired

The resulting consensus was that a test with state-of-the-art large format equipment, rather than our military surplus units, should be performed before considering the acquisition of new equipment by the Service. A combination of fortunate events resulted in a chance to perform this test in 1984.

North Pacific Aerial Surveys, an Anchorage based company, was in Cold Bay in mid-October flying an aerial photographic mission on the Alaska Peninsula and Unimak Island for another agency. They agreed to fly Izembek Lagoon on 18 October and obtained complete photographic coverage at 5,000 feet ASL with additional test flights at 3,000 feet. A total of 180 frames of 9 inch format film were exposed during less than three hours to obtain the desired coverage. Negatives and some enlarged prints have been viewed and tentatively, it looks unlikely that resolution at 5,000 ASL will be sufficient for species determination; however, birds are visible, so a total 'goose' count may be possible. Photo enlargement samples are still being obtained and analysis continues.

The declining status of the black brant population has resulted in the continuing efforts of the Izembek NWR staff to obtain improved appraisals of productivity and population size and composition (Table 19). Currently, the population is managed primarily on the basis of the annual mid-winter aerial waterfowl survey. Black brant are distributed in winter from Puget Sound in Washington to central portions of the west coast of Mexico making this survey difficult, geographically, to perform. The potential for enumerating essentially the entire Pacific Flyway population during the staging period at Izembek and adjacent lagoons exists and geographically speaking, the survey would be much easier to accomplish. If a suitable photographic inventory procedure can be developed, this potential may be realized.

Of the estimated fall total of 123,602 brant at Izembek NWR, approximately 5,000 have remained to winter in the area. Hence, we estimate that an insufficient number of birds will survive until the mid-winter survey in January to maintain the three years running average of 120,000 birds. When the population average falls below this figure, all hunting will be discontinued. For this to not occur, 117,256 or more black brant were needed on the mid-winter survey. A total of 144,685 brant were observed on this survey (Table 20).

Black brant departures from Izembek Lagoon occurred on 2, 7 and 9 November. We estimate that approximately 60,000 departed during the early evening hours of 2 November and that another 40,000 to 50,000 left during a similar period on 7 November. Migratory departures from Izembek Lagoon occur after the passage of strong low pressure systems accompanied by north to northwesterly winds of moderate velocity. Departure winds in 1984 were only somewhat favorable being of relatively low speeds. It is believed that the fall migration of most brant from Izembek Lagoon to their primary wintering areas along the west coast of Mexico takes approximately 60 hours. It was determined that approximately 90 hours elapsed from departure to arrival in 1984. A synopsis of knowledge about the fall migration of black brant and relating weather conditions based on 26 years of observations is the topic of a draft Izembek NWR report.

Table 19. Composition of the Black Brant Population
Izembek Lagoon

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

Table 20 . Black Brant Mid-winter Survey Data

Year /1	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	125,068
1977	18,100	1,110	560	143,117	162,887	130,834
1978	8,078	1,255	10	120,070	129,413	146,422
1979	6,618	1,015	135	137,550	145,318	145,873
1980	10,107	1,790	540	181,760	194,197	156,309
1981	6,451	706	485	113,402	121,044	153,520
1982	3,113	718	565	104,918	109,314	141,518
1983	7,097	930	700	124,703	133,430	121,263
1984	11,675	641	801	131,568	144,685	129,143

/1 Calendar year prior to January mid-winter survey (i.e. 1984 data represents survey done in January 1985).

Black brant population declines have largely resulted from reproductive failures, habitat erosion, and hunting on the nesting and wintering grounds. With the exception of natural phenomenon such as winter and summer storm surges, habitats essential to breeding and migrating black brant in Alaska have been inviolate. Most such areas are protected as National Wildlife Refuges; however, native populations in coastal villages are increasing rapidly as are the associated levels of harassment and mortality. This fall at Izembek NWR, it became reinforced that maintenance of pristine habitats and management of consumptive use are not the only essential elements in our goal of increasing and maintaining healthy population levels in black brant. This species is very sensitive to harassment. Our preliminary appraisals of physiological development in the fall suggest that their 6 to 8 week stay at Izembek cannot be a leisurely one if they are to obtain nutrient reserves necessary to make a 3,500 mile/60 hour non-stop migration to their wintering areas. Allowable levels of disturbance may well be lower than previously thought.

This year for the first time during the fall, two helicopter companies on contract to oil companies exploring offshore tracts in the St. George Basin were active in the Cold Bay area (Figure 5). Up to seven large helicopters were in service and up to six flights per day occurred to the three offshore platforms in operation. A map showing what we tentatively believe to be acceptable flight corridors around Izembek Lagoon and adjacent lagoons and bays important to waterfowl was prepared for the OCS lease permitting agency (USDI-Minerals Management Service) (Figure 6). This map became a part of each company's exploration permit. Deviations from these permits occurred throughout September and early October when peak goose and brant populations were present.

After cordial discussions, more cordial discussions, demands, newspaper articles and a barrage of phone calls and memoranda, the controversy was solved and our flight corridors were adhered to (Appendix 1). A meeting will be held January 15, 1985, with all involved parties in Anchorage to hopefully clarify the permit stipulations and come to an agreement for future activities. Is the problem solved? Possibly, if we knew the physiological requirements black brant face and what effects our 'acceptable flight corridors' may have. Additionally, it seems evident that Cold Bay will be the crew change and supply terminal for offshore platforms of which we had three in 1984. With a minimum of one flight per day for each platform and once a week three flights a day per company (crew change) one can envision the situation that will likely arise if full development and a dramatic increase in the number of platforms occurs in a year or two.

In coordination with the Research Division (Anchorage) the Izembek NWR is hoping to initiate field work necessary to provide an index of the physiological needs and resulting time budget requirements of the black brant population during the fall staging period. These are essential data necessary for proper management of black brant and the Izembek NWR; however, as is so often the case, it will be very difficult not to be steamrollered by the oil industry and placed in a mitigation mode. To maintain stability of the refuge and its resources, we would like to see oil related activities elsewhere such as Dutch Harbor which is closer to the St. George Basin lease area.

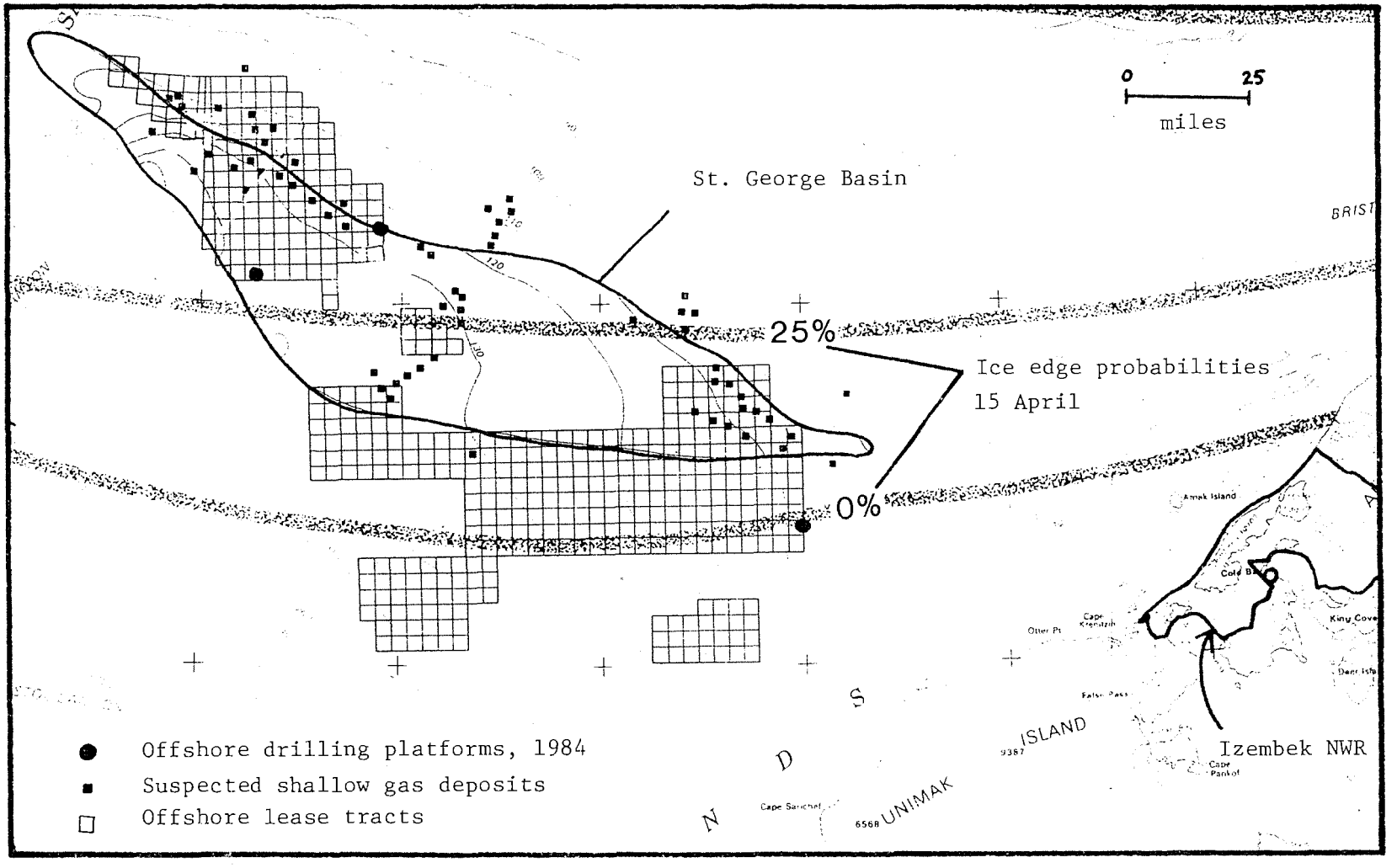


Figure 5 . Location of petroleum leasing areas within the St. George Basin in relation to the air support base at Cold Bay (0).

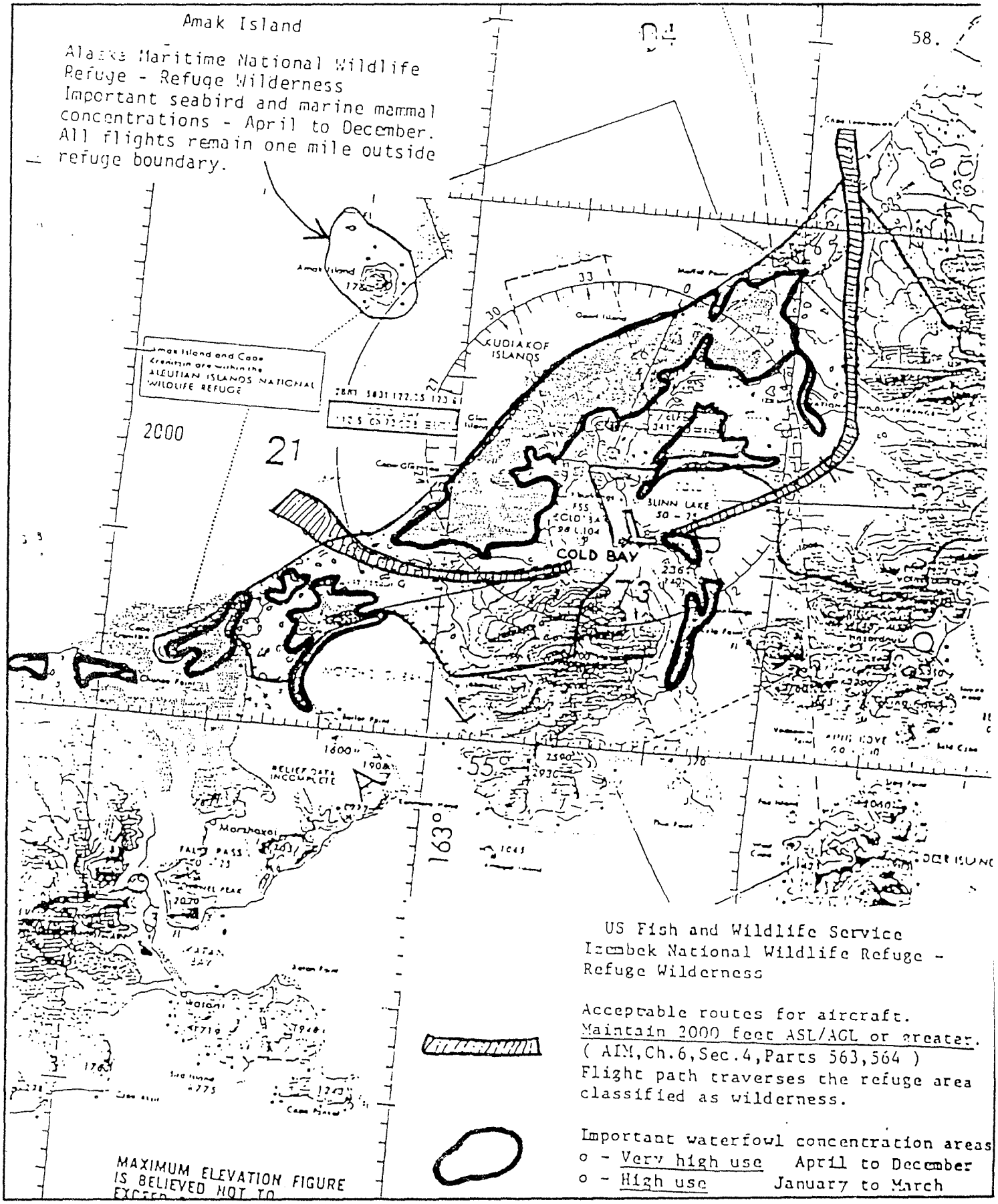


Figure 6 . Aircraft routing procedures attached to exploration permits issued to oil companies operating in the St. George Basin lease area.

ANC Times - 10/10/84

Black geese in flutter over copters

by Mark Baumgartner
Times Business Writer

Helicopter flights in support of Bering Sea oil exploration continue to periodically harrass the threatened Pacific Black Brant goose population now feeding at Izembek Lagoon, a federal wildlife official says, despite his complaints and repeated assurances from the pilots that the errant flights will cease.

"They're still going across the lagoon" on occasion, contrary to permit stipulations the oil companies accepted to get offshore drilling rights to the St. George Basin, said John Sarvis, manager of the Izembek National Wildlife Refuge.

Sarvis said for the past month he has been asking oil company representatives and the helicopter pilots they hired not to fly over the lagoon when weather permits a detour between Cold Bay and offshore drilling rigs. But as recently as Saturday he observed an unnecessary flight over the lagoon, part of the Izembek National Wildlife Refuge, he said.

"Every time I call back, they say they understand (the permit stipulations). They're trying to

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Official complains

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comply, but it's still not 100 percent," Sarvis said.

"It's not a big problem. There's been a couple of mistakes, but there's been so many pilots" that it's difficult to keep everyone aware of the stipulations, he said.

"They're not arguing (with the stipulations) or trying to avoid them," he said. Nonetheless, Sarvis said he points out each "mistake" because of its potential consequences to the brant, whose population is at its lowest point in 20 years.

Sarvis and other wildlife biologists say they are concerned that the helicopter disturbance may prevent some birds from successfully making the 50-hour nonstop migration to Mexico in early November.

The wildlife refuge is located on the Alaska Peninsula, near Cold Bay. The entire black brant population, estimated at 120,000 birds, is feeding on the eelgrass beds of Izembek Lagoon, Sarvis said.

A spokesman for one of the helicopter companies involved says he's puzzled by Sarvis' statements.

"Since this came to our attention a month ago I'm pretty sure things are going along as (Sarvis) requested," said Wilbur O'Brien, of ERA Helicopters.

O'Brien said ERA, along with the other companies involved in the Bering Sea oil exploration, take seriously the committment to not disturb the geese. There are times, however, when bad weather dictates safety precautions and return flights to Cold Bay over the lagoon, O'Brien said.

Sarvis said he has urged pilots on outgoing flights to make a detour around the lagoon before picking up a flight plan to the oil rigs.

Each of the three oil companies exploring St. George Basin requires a minimum of 10 flights a week between Cold Bay and the offshore oil rigs, he said.

The helicopter flights began in summer, he said, but didn't conflict with geese until early September, when the birds started arriving in the lagoon from Siberia, Canada, and western Alaska.

Black brant are sensitive to helicopter noise, he said. When one passes overhead, nearly all of the birds will get up into the air and fly around for 10-15 minutes, he said.

Sarvis said the problem points out the need to make lease stipulations more explicit. They also need more prominence in the government permits guiding exploration and development, he said.

The ability of stipulations to protect wildlife and environmental features has been debated. Sarvis said stipulations can have "teeth" if they're properly written. Critics, like Harold Sparck, say stipulations can't substitute for deletions of sensitive areas to guarantee oil and gas activities don't cause disturbancs.

Sparck is director of Nunam Kitlutsisti, a conservation group which advises the village council presidents of 56 Yukon-Kuskokwim communities. The brant now feeding at Izembek Lagoon are a valued food source to delta residents, he said.

Preliminary accounts from western Alaska indicated that brant reproduction was extremely low this summer, Sarvis said. A population census is under way at Izembek Lagoon, as is a production count. From early indications it appears that just 13 percent of the brant population are young birds born this summer, he said.

Sarvis said he's puzzled why the helicopter flights haven't been rerouted to avoid passing over the lagoon. The recommended detour would add "a couple of minutes" flying time to trips between Cold Bay and St. George exploration rigs operated by Chevron U.S.A., ARCO Alaska, and Exxon, he said.

ANC Times - 9/21/84

Helicopters annoy geese in refuge

by Mark Baumgartner
Times Business Writer

Helicopters servicing oil drilling rigs in the St. George Basin have been disturbing the threatened geese population of a national wildlife refuge in violation of federal oil and gas lease agreements, officials said Thursday.

"It's a drastic situation," said John Sarvis, manager of the Izembek National Wildlife Refuge near Cold Bay.

Cold Bay, on the Alaska Peninsula, is a staging area for three oil companies doing exploratory work in the basin 400 miles southwest of Anchorage.

Sarvis said the helicopters have been flying directly over Izembek Lagoon since exploration work began this summer. For the past month, the flights have been disturbing the geese feeding there, especially the Pacific black brant. The brant population is at its lowest point in at least 20 years, he said.

Sarvis said he more than once has reminded the oil companies — Exxon, Arco, and Chevron — about lease stipulations they signed guaranteeing that aircraft would avoid the lagoon during September and October, when the brant are fattening up and gaining strength for their nonstop migration to Mexico.

Arco and Chevron field em-

See Migrating, page A-8

Migrating geese

Continued from page A-1

ployees in Cold Bay told Sarvis they were not informed by their superiors of the stipulations regarding flights over Izembek Lagoon, Sarvis said. Arco and Chevron contract with ERA helicopters.

Exxon field workers said they had received word of the lease agreement, he said. Although Exxon workers passed the information to Air Logistics pilots, their flights have continued directly over Izembek Lagoon, he said.

Sarvis said he received oil and helicopter company assurances as recently as Thursday afternoon that the disturbances would halt.

"I hope they start tomorrow (Friday) flying around the lagoon," he said. "I'm not badmouthing the companies. I expect they'll cooperate," Sarvis said.

To avoid the lagoon requires a five- or six-mile detour, Sarvis said.

Izembek Lagoon is a state wildlife refuge within the national refuge, and state and federal wildlife officials share jurisdiction and management of the waterfowl feeding there, Sarvis said. The world's largest eel grass beds are in the lagoon, he said, an important food source to the brant and to emperor geese.

Virtually all of the estimated 120,000 to 140,000 Pacific brant remaining in existence will be in Izembek Lagoon by late October, about the time they rise en masse for their 50-hour migration, Sarvis said.

Helicopter traffic has continually disturbed the geese since they began arriving in the lagoon in late August from nesting grounds on the Yukon-Kuskokwin Delta, Canada and the Soviet Union, he said.

Three days a week, crew changes on the oil rigs mean six to eight helicopter flights pass over the lagoon each day, he said. During the rest of the week, he said, an average of four helicopters fly over the lagoon daily.

The flights disrupt the brants' feeding. At the sound of the helicopters, the birds rise into the air and fly around for up to 10 minutes, Sarvis said. Sarvis said it's impossible to know how much damage is done by the disturbance, or whether the resulting energy loss jeopardizes any birds' chances of successfully making the long migration.

Sarvis outlined the situation in a Sept. 14 letter to Anchorage officials of the Minerals Management Service, the division of the U.S. Interior Department responsible for enforcing oil and gas lease provisions.

"Action was taken right away to correct" the problem, said Barry Boudreaux, the service's director of field operations.

An MMS official on Wednesday notified the oil companies of Sarvis' complaint, and reminded them of the lease stipulations, said agency spokeswoman Robin Casey.

The MMS have reinforced the message in a letter to the oil companies and the two helicopter companies, she said.

Arco Alaska executive Tom Wilkinson this morning said that the lease violations were unintentional, and that steps have been taken to guarantee they won't continue.

This desire is unlikely, as our airport facilities and landing aids allow safer year-round operations.

Canada Goose

Banding activities for Canada geese were curtailed in 1984 due to our intensified aerial survey project in October.

Canada geese continued to be the number one goose species in the hunters' bag at the Izembek NWR (i.e. 80% of goose take). Immatures predominated in this harvest occurring in a ratio of 1.4:1 over adults (Table 21).

Emperor Goose

The emperor goose population exhibited below average productivity in 1984 based on appraisals conducted on the Izembek NWR. Percent juveniles in the population was 22.4 based on a sample of 3,548 individuals (Table 22). As in previous years, a combination of aerial photographic analysis and ground counts were performed. Aerial photographic missions directed primarily toward the Nelson Lagoon area northeast of the refuge were performed on 10 and 25 September. Comparisons of these two efforts suggest that either birds were being stockpiled into larger groups or, if the migration is a continual passage with little staging, that later migrants occur in somewhat larger flocks (Table 23).

Production and family group counts were conducted from 10 September to 2 October in 1984. Low nesting success was reported on the Yukon-Kuskokwim Delta with 60.3 percent of observed nests (n=141) hatching one or more eggs. Our later assessment of low productivity based on fall counts reconfirmed the poor prognosis. Family group counts at Izembek revealed an average of 2.8 juveniles/family (n=79). In comparison to an average clutch of 5.5 $\pm$ 0.2 (n=36), survival of young appears low while in fact family group size was only 0.1 percent below the long term average (Table 22).

Emperor geese in the Izembek NWR area numbered 4321 $\pm$ 18 percent based on our intensive aerial survey project in October. Two counts performed by R.M. Sarvis and W.B. Dau in early and mid-October totalled 3,494 and 2,288 birds, respectively ($\bar{x}$ 2,891 birds). The concensus of opinion based on spring survey data is that the emperor goose population continues to decline. In addition, it is the subjective opinion of people familiar with the Izembek NWR area, that the distribution of emperor geese in the area has changed and that numbers of fall staging and wintering birds has greatly declined. This may be a result of either an overall population decline or increased hunting pressure and other forms of harrassment in the local area. The emperor goose was the most common goose species in the Izembek NWR harvest in the 1960's and now they vie with brant for being the least numerous (see H. PUBLIC USE, 8. Hunting).

Eight collared juvenile emperor geese from the Yukon-Kuskokwim Delta were observed on the 10 September aerial survey in groupings of 1, 3 and 4. The only collar read this fall was A56 on an adult emperor goose observed on 6 October. An additional four collared birds were reported taken by hunters; two in the Nelson Lagoon area (60A, 55, 75) and two at Izembek (includes 6[illegible]).

Table 21. Age Ratio of Canada Geese in Hunters' Bags, Izembek NWR

Year	Canada Geese Harvested			Adult: Immature Ratio in Harvest
	Adults (%)	Immatures (%)	Total	
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
TOTAL	542 (47.4)	601 (52.6)	1143	1:00:1.1

Table 22. Emperor Goose Productivity Counts

Izembek NWR, 1966 - 1983

Year	Adults	Juveniles	Total	% Juveniles	No. of Families	Family Group Size
1966	699	265	964	27.0	132	2.5
1967	1457	585	2042	28.0	66	3.3
1968	1195	585	1780	33.0	40	2.8
1969	4149	2980	7129	41.8	161	3.3
1970	9722	4933	14655	33.5	383	2.9
1971	8142	3458	11600	29.8	480	2.7
1972	4680	2270	6950	32.7	210	3.1
1973	--	--	--	--	--	--
1974	2025	377	2402	15.7	50	2.6
1975	744	405	1149	35.2	51	2.9
1976	1023	324	2247	14.4	207	2.7
1977	996	683	1679	40.7	108	2.8
1978	1395	495	1890	26.2	62	3.0
1979	841	113	954	11.8	53	3.3
1980	1777	586	2363	24.8	40	2.3
1981	1067	495	1562	31.7	181	3.2
1982	1653	140	1793	7.8	32	2.7
1983	1058	393	1451	27.1	192	3.2
1984	2753	795	3548	22.4	79	2.8
18 Year Average (± 1SD)				26.9 ± 9.5		2.9 ± 0.3

Table 23. Temporal comparisons of aerial composition counts of emperor geese in Moffett and Nelson Lagoons, 1984

Date	No. Flocks	Average Flock Size [1]	Flocks	Total Birds	% Juveniles
10 September	64	12.7± 19.1	100	796	32.0
25 September	59	33.2± 119.7	800	2302	18.9

[1] Mean ± 1SD.

The fourth annual spring emperor goose survey in southwestern Alaska was completed by two aerial survey crews from 28 to 30 April, 1984. On 4 May, additional coverage of the south side of the Alaska Peninsula was obtained. An adjusted total of 71,217 emperor geese were observed. Favorable weather conditions allowed coverage of the coastline and estuarine areas from Kuskokwim Bay to Izembek Lagoon from 28 to 29 April. The area from Izembek Lagoon west to Unimak Island was surveyed on 30 April. The survey results suggest an overall population decline of 10 percent (7,938 geese) from the 1983 spring population of 79,155. This probably resulted from poor production the past two years and continued harvest pressure in spring and summer and to a lesser extent in fall.

The 1984 survey was accomplished by two teams flying in Cessna 180 and 185 Service aircraft. Survey altitude was often dictated by weather conditions, however, from 250 to 300 feet AGL was maintained when possible to facilitate species identification. The coastline, bays, lagoons and estuaries along the survey route were included in the coverage, and all birds and marine mammals observed were recorded. Sea ice forecast charts issued by the National Weather Service were consulted and these data were compared to actual field conditions observed to document the ice conditions encountered in 1984.

This survey was initiated from Bethel, Alaska on 28 April and from King Salmon, Alaska on 30 April. Numbers of emperor geese by survey segment are presented in Table 24, and a mapped distribution of observations is shown in Figure 7.

Vern Berns (pilot/observer) and Randy Arment (pilot/observer), Alaska Peninsula NWR, surveyed the south side of the Alaska Peninsula west to Cold Bay on 30 April. Including an adjusted total from similar coverage on 4 May, 4,249 emperor geese (6% of the total) were found present in these segments.

Rod King (pilot/observer), Migratory Bird Management - North, and Chris Dau (observer), Izembek NWR completed survey segments from Bethel to Naknek on 28 April observing a total of 92 emperor geese (0.1% of the total). On 29 April, the north side of the Alaska Peninsula from Naknek to Moffett Point was surveyed with most birds being in the Port Heiden to Seal Islands lagoon areas.

The total for the 29 April survey along the north side of the Alaska Peninsula was 63,239 emperor geese (88.8% of the total observed). Izembek Lagoon and coastline and estuarine areas west to Unimak Island were surveyed on 30 April with a total of 3,086 emperor geese observed (4.3% of the total).

Climatic conditions in April of 1984 were mild with light and rapidly deteriorating ice conditions from Kuskokwim Bay south into Bristol Bay. Important estuaries along the north side of the Alaska Peninsula were also rapidly becoming ice free during this period.

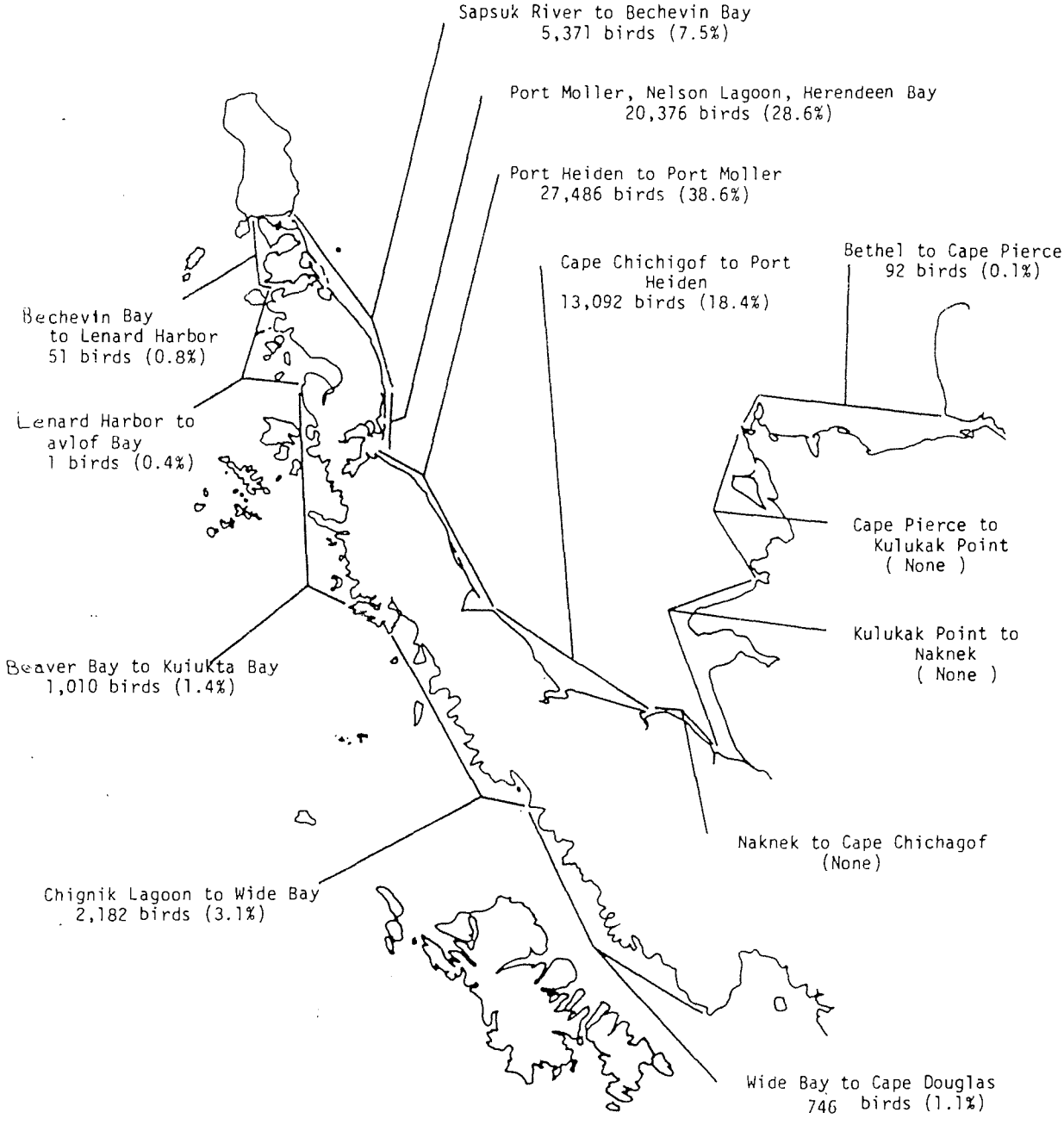
TABLE 24. Summary of emperor goose sightings by survey area, 28 - 30 April, 4 May 1984

Date	Location	Number of emperor geese	Observers
28 April	Bethel to Kwigillingok (mouth of Kuskokwim R.)	0	R. King/Dau
"	Eek Island to Quinhagak	0	"
"	Quinhagak to Jacksmith Bay	0	"
"	Jacksmith Bay to Carter Bay	8	"
"	Carter Bay	15	"
"	Carter Bay to Platinum	0	"
"	Platinum to Security Cove (incl. Chagvan Bay)	49	"
"	Security Cove to Cape Pierce (incl. Nanvak Bay)	20	"
"	Cape Pierce to Asigyugpak Spit	0	"
"	Asigyugpak Spit to Tongue Point	0	"
"	Tongue Point to Kulukak Point	0	"
"	Kulukak Point to Dillingham	0	"
"	Dillingham to Nakeen	0	"
29 April	Nakeen to Cape Chichagof	0	"
"	Cape Chicagof to Goose Point (incl. Egegik Bay)	280	"
"	Goose Point to Cape Menshikof (incl. Ugashik Bay)	2,140	"
"	Cape Menshikof to Port Heiden (incl. Cinder River Estuary and Hook Lagoon)	10,672	"
"	Port Heiden to Base of Strogonof Point (incl. Port Heiden)	16,363	"
"	Base of Strogonof Point to Ilnik (incl. Seal Islands Lagoon)	11,123	"
"	Ilnik to Port Moller (village)	0	"
"	Port Moller (village) to Point Divide	0	"
"	Herendeen Bay	0	"
"	Point Divide to Sapsuk River mount (incl. Nelson Lagoon, Mud Bay and Kudobin, Deer and unnamed sand islands)	20,376	"
"	Sapsuk River mouth to Moffett Point	0	"
"	Moffett Point to Strawberry Point (incl. Moffett Bay)	2,285	"
30 April	Strawberry Point to Cape Krenitzin (incl. Izembek Lagoon and Applegate Cove)	3,086	"
"	Cape Krenitzin to Chunak Point (incl. Hook Bay, St. Catherine's Cove and Hot Springs Bay)	1	"
"	Boiler Point to Littlejohn Lagoon (incl. Little, Middle, Big and Littlejohn Lagoons)	285	"
"	Littlejohn Lagoon to Delta Point, (incl. Old Man's, Mortensen's and Norse Lagoons)	0	"
"	Cold Bay (village) to Lenard Harbor (incl. Kinzarof Lagoon)	265	"
"	Lenard Harbor	0	"
"	Lenard Harbor to Indian Head	0	Berns/Arment
"	Indian Head to Volcano Bay	0	"
"	Volcano Bay	60	"
"	Arch Point to Jackson Lagoon	230	"
"	Jackson Lagoon to Canoe Bay	0	"
"	Canoe Bay	0	"
"	Canoe Bay to Dorenoi Bay	10	"
"	Dorenoi Bay to Mitrofania	495	"
"	Mitrofania to Chignik Lagoon	100	"
"	Chignik Lagoon to Base of Cape Kumlium	0	"
"	Base of Cape Kumlium to Cape Kilokak	360	"
"	Cape Kilokak to Hartman Island	140	"
"	Hartman Island to Coal Point (incl. Wide Bay)	610	"
	28 to 30 April Total	68,973	
	OVERALL TOTAL /1	71,217	

/1

NOTE: On 4 May, 4,249 emperor geese were observed by King/Dau from Cold Bay to Cape Douglas. The additional 2,244 birds observed 4 May versus 30 April are included in this total. See Appendix for segment totals.

Figure 7. Percentage distribution of emperor geese seen by survey area, 28 to 30 April, 4 May 1984.



The population decline from 79,155 to 71,217 emperor geese (down 10%) based on a comparison of the spring aerial surveys of 1983 and 1984 continues an alarming trend and points out the need for a quantitative analysis of mortality factors affecting emperor geese. Also of value would be a more complete appraisal of migratory behavior in late April and early May to support our subjective opinions that essentially the entire population is included in the survey area during this time period. Soviet biologists in Kamchatka and the Commander Islands report few emperor geese during migrating periods, hence most birds migrating to nesting areas in the USSR are assumed to follow coastal Alaskan routes.

Steller's Eider

Steller's eiders were counted in only one of the 31 October aerial surveys of Izembek and adjacent lagoons due to our emphasis on goose species. On 9 October it was estimated that approximately 73,500 Steller's eiders were present on Izembek and adjacent lagoons. This is comparable to some other fall counts suggesting with addition of breeding females and young, our wintering population may again approach 90,000 birds.

After a two year gap, our fall banding program for Steller's eiders was again performed. A new banding location in central Izembek Lagoon was selected and on 12 September, 324 birds from a flock of over 1000 were captured. This effort served a dual function in that the suitability of a new banding site was determined and an appraisal of inter-lagoon mixing of birds was obtained. Through the recapture of banded birds, we hope that sampling at various lagoon sites will suggest the degree of fidelity molting birds show for specific localities. The 1984 effort was only an initial effort; however, no recaptures of previously banded birds and the sighting of only one 1980 nasal saddled bird tentatively suggests not much interchange of birds takes place.

Of the 324 birds captured, 198 were adult males and 126 were adult females. Blood samples (2 ml) were taken from 18 birds of each sex to aid in research on aspirgillosis being conducted at the Oregon Health Sciences University in Portland. Steller's eiders in captivity contract aspirgillosis at what are thought to be abnormally high rates and it is hoped that serum from wild unaffected birds may allow the development of an antidotal serum.

In recent years, Steller's eiders have essentially abandoned the Yukon-Kuskokwim Delta during the nesting period. The reasons for this decline or distributional shift and an overall appraisal of the species throughout its range is the subject of an investigation by Research (RO) and refuge personnel. The necessary Soviet input has been solicited from biological contacts maintained by the refuge.

WB Dau prepared an analysis of the information obtained to date on the 6,980 Steller's eiders banded at Izembek Lagoon since 1961. A presentation of these data was made in February, 1985 at the Alaska Bird Conference in Anchorage. The title and a short summary follows:

Temporal and Spatial Distribution of Recoveries of Steller's Eiders (Polysticta stelleri) Banded on the Izembek National Wildlife Refuge

Christian P. Dau, John E. Sarvis (USFWS, Cold Bay) and Robert D. Jones, Jr. (USFWS, Retired)

A fall molt migration of Steller's eiders to Izembek Lagoon from their primary nesting grounds in the Soviet Arctic occurs each July and August. Molting flocks in Izembek Lagoon consist of adult males and failed and non-breeding adult females. The presence of subadult birds has not been documented. A total of 6,980 molt migrants have been captured on Izembek Lagoon during September banding operations first begun in 1961. Of 127 direct and indirect recoveries received to date, 68 (53.5%) have been during the summer in potential breeding areas. Of these, 66 (97.1%) are from the Soviet Arctic and 2 (2.9%) are from Alaska. A total of 405 recaptures of birds banded on Izembek Lagoon have been made within the same ten minute block of banding. Fifty-four Steller's eiders have been recovered at or near Izembek Lagoon. Overall percent recovery rates for males and females are 2.1 and 1.6, respectively.

4. Marsh and Waterbirds

The first recorded nesting of red-necked grebes on the Izembek NWR was in 1982. This species has specific nesting habitat requirements, namely emergent vegetation most commonly dominated by mares' tail (Hippurus spp.). Only one nest was observed in 1984, that containing three eggs and located on 8 June.

No lesser sandhill crane nests were located in 1984; however, nesting behavior (i.e. displacement postures) was commonly observed suggesting birds were with nests or young.

5. Shorebirds, Gulls, Terns and Allied Species

Mew gulls, glaucous-winged gulls and arctic terns are the most common larids on the Izembek NWR. Glaucous-winged gulls were common in northerly migrating flocks on 11 April with lesser numbers seen through 18 April. Nesting activities of mew gulls are first observed in May. The Aleutian tern is a suspected nester on one island in Izembek Lagoon and is seen occasionally on the refuge in spring and summer. Larry Hood (LE-RO) reported 50-60 Aleutian terns at Chunak Point, Unimak Island on 14 May. Rock sandpipers are common nesters in upland and drier meadow areas of the refuge. Although rock sandpipers sometimes occur as winter residents associated with beaches, their appearance in preferred nesting areas does not occur until late March or early April. Nuptual activities occur in April and May with nest initiation in mid to late May.

Semipalmated plovers nest commonly on and along gravel surfaced roads on the refuge. The first sighting in 1984, was on 1 May. First courting flights were observed on 25 May. Hatching dates were determined to be in mid-June.

6. Raptors

The first documented nesting record of a bald eagle on the Izembek NWR was made on 18 May 1984. This nest was located in a rocky palisade area along the east side of Cold Bay.

On 15 May 1984, the second sighting of an osprey was made. This was a single bird which overflew the refuge headquarters. The only other sighting was in the summer of 1983.

7. Other Migratory Birds

The first documented sighting of an adult white-fronted goose was made on 18 October 1984. This bird was in a large flock of Taverner's Canada geese. Juvenile white-fronts have been seen several times in various falls and may be the results of inter-specific nest parasitism. These juveniles have been seen in association with both Canada and emperor geese.

Three passerine species were banded by the refuge staff in 1984. All banding was accomplished at a baited trap adjacent to the refuge office. Gray-crowned rosy finch (n=23), lapland longspur (n=17) and snow bunting (n=2) were the species handled (Table 25). Six recaptures of gray-crowned rosy finches and two of lapland longspurs were all birds originally banded by us.

The 19th annual Christmas Bird Count was conducted on 24 December by ARM Blenden, WB Dau and volunteer, Peggy Blenden. A total of 8,602 individuals of 34 species were observed (Table 26).

8. Game Mammals

Brown Bear

A new phase in evaluation of the ecology of brown bears on Izembek NWR was begun in 1984. Cold Bay is rapidly becoming a base of activities and staging area for exploration and development of offshore oil lease areas. In 1984, this translated into as many as one thousand industry related people per month moving through Cold Bay going to or from one of three offshore drilling platforms. During peak periods up to 5 flights per day, with large helicopters, were performed to move personnel and supplies.

The refuge staff feel that oil related activities will probably increase at a rate faster that we will be able to handle. By handle, we mean direct the oil industry concerning those activities which will impact the refuge. We have had to embark on a mad dash to supplement our baseline data to try to provide the necessary muscle to continue to preserve the integrity of the area.

The ecology of brown bear on the Izembek NWR and adjacent areas of the Lower Alaska Peninsula is a topic where baseline data necessary for proper management are incomplete. The Right and Left Hand Valley areas of Cold Bay are

Table 25. Passerine Banding, Izembek NWR, 1984

Species	No. Banded			No. Recaptured		
	AHY			AHY		
	M	F	Total	M	F	Total
Gray-crowned rosy finch	19	4	23	3	3	6
Snow Bunting	2	0	2	0	0	0
Lapland Longspur	16	1	17	2	0	0

Table 26 . Results of Christmas Bird Count, Cold Bay, Alaska, 24 December 1984

Species	1984	Average No. Seen /1 (No. Years Seen)	% Change From Average
Arctic Loon	1	0.3 (2)	+233
Common Loon	5	0.9 (4)	+456
Horned Grebe	5	4.4 (8)	+14
Red-necked Grebe	3	0.9 (6)	+233
Pelagic Cormorant	13	17.8 (17)	-27
Emperor Goose	1760	1303.4 (19)	+35
Black Brant	4700	1092.4 (12)	+330
Mallard	45	22.2 (11)	+103
Gadwall /2	5	0.3 (1)	+1567
Common Eider	1	41.9 (15)	-98
Steller's Eider	1646	1214.4 (19)	+36
Harlequin Duck	50	21.9 (18)	+128
Oldsquaw	42	274.1 (19)	-85
Black Scoter	61	155.8 (17)	-61
White-winged Scoter	21	15.3 (15)	+37
American Goldeneye	61	115.8 (18)	-47
Bufflehead	1	4.3 (12)	-77
Common Merganser	7	4.1 (7)	+71
Red-breasted Merganser	45	128.2 (17)	-65
Bald Eagle	16	8.0 (19)	+100
Gyrfalcon	3	0.7 (9)	+329
Willow Ptarmigan	2	5.1 (12)	-61
Glaucous-winged Gull	22	182.3 (19)	-88
Common Murre	1	0.2 (4)	+400
Pigeon Guillemot	4	3.4 (10)	+18
Horned Puffin /2	1	0.1 (1)	+900
Alcid spp. /2	5	0.3 (1)	+1567
Black-billed Magpie	5	1.4 (11)	+257
Common Raven	31	86.2 (19)	-64
American Dipper	2	1.3 (10)	+54
Northern Shrike	2	1.0 (13)	+100
McKay's Bunting	2	0.5 (7)	+300
Snow Bunting	33	40.2 (19)	-18
Gray-crowned Rosy Finch	1	67.4 (19)	-99

Total number of species = 34
Total number of individuals = 8602

Number of observers - 3 (C. Dau, M. Blenden, P. Blenden)
Observation Time - 7.25 hours (2 hrs. on foot; 5.25 hrs. by car)
Distance Covered - 69 Miles (3 miles on foot; 66 by car)

/1 Average 19 years of participation in the Christmas bird count.
/2 First observation of this species on the Christmas bird count. A total of 57 species have been observed in 19 years.

believed to be an essential core natal area for the lower Alaska Peninsula so a three-year study to qualify this assumption and to provide an insight into productivity of animals using this area was begun in 1984 (Figure 8). A Research/Management Study Proposal was submitted in April and the initial capture phase of the project was begun in late July. We have learned over the years that research projects in bush Alaska are inherently limited by available manpower and funding. We've adopted the philosophy of trying to obtain the greatest quantity and quality of data for the dollar spent. In outside (State of Alaska) and internal (FWS) review of our research proposal known biases and probable data limitations induced by the above mentioned inherent problem were abundantly pointed out. However, a few knowledgeable field biologists also stressed the importance of forging ahead on the attainable goals mindful of biases affecting certain ancillary aspects of the project.

This project will be performed by the Izembek NWR staff with supplemental assistance from the Alaska Department of Fish and Game area biologists in King Salmon. The latter's participation will be on unscheduled, opportunistic basis due to their heavy schedule in the remainder of the Game Management Units they are responsible for. Dick Sellers, the area biologist, and his assistant, Mark McNay, assisted in capture operations from 3 - 6 August, and with their aircraft they assisted in a radio tracking flight on 6 August. Their cooperation is appreciated and the refuge will continue to utilize ADF&G personnel in our field investigations whenever the opportunity presents itself.

A total of 50 bears were captured during nine days of operation (Table 27, Figure 9). A Bell 206B Jet Ranger on charter from ERA Helicopters was used for capture activities on 30 and 31 July and 3 and 4 August. Immobilizing drugs in darts fired from a CAPCHUR gun were used (Table 28). Darting was done from the right-rear seat of the four place helicopter. A total of 22 bears were captured in 17.2 hours of flight time during this portion of the capture period. One fatility occurred, that being an adult sow which suffered a punctured lung, apparently when an improperly positioned dart broke a rib.

On 16 August, the first flight with a contract Bell 206B belonging to Kenai Air Service was made. Capture operations continued daily through 20 August and after 29.7 hours (5 days) an additional 28 bears had been processed, at which time capture operations were terminated (Table 27). The success of this phase of the operation was due to a large extent to the availability of two pilots experienced in this type of wildlife work.

Phencyclidine hydrocloride (Sernylan) was used to immobilize all but four of the 50 bears captured in the study area. This drug, in powdered form, was obtained through the Research Division to supplement a small supply on hand. Sernylan was administered at dosages of 100 mg per 100 pounds of weight. Sparine (promazine HCL) was then administered to immobilized animals in equal quantity to help prevent convulsions.

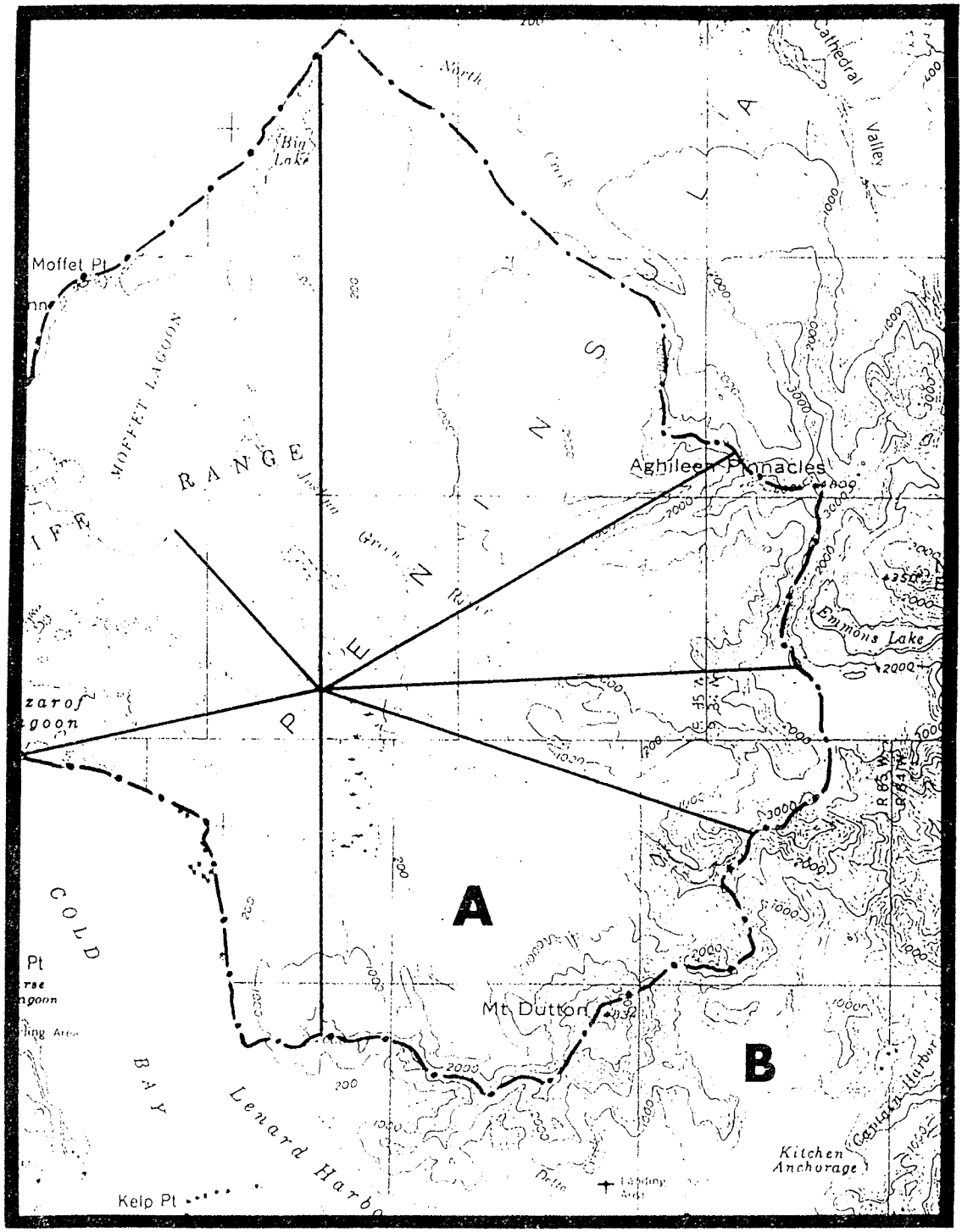


Figure 8 . Brown Bear study area, Right and Left-hand Valleys, with radio quadrats. A: Izembek NWR (-.-boundary), B: Pavlof Unit, Alaska Peninsula NWR.

Bears were forced out of and away from dense alders prior to darting.

Dau (8/84)

Captured bears were suspended under the helicopter for weighing.
(400)20

Sarvis (7/30/84)

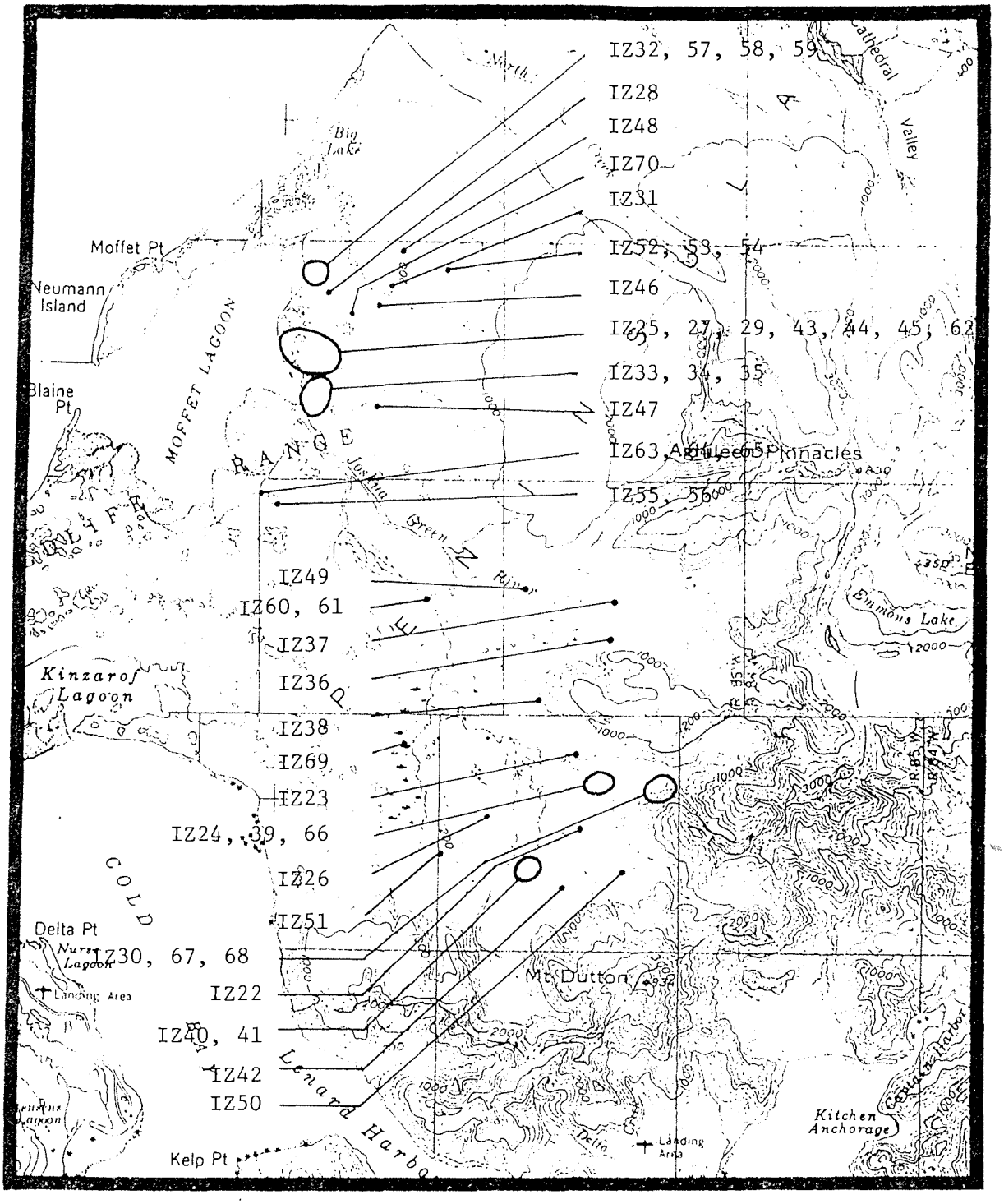


Figure 9. Brown bear capture locations, Izembek NWR, 1984.

(Note: IZ71 was captured 14 November at Cold Bay Dump.)

Brown bear capture and processing was most efficiently done with coordination of contract and refuge aircraft.
Mumma (8/84)

Tattooing of one of the two 800 pound plus boars captured.
Dau (8/84)

Table 27. Age, sex and status of brown bears captured on the Izembek NWR, 1984

	Female						Male		
	Sows W/			Single			Single		
	COY	Yearling	2.5 Yr. Old	Sows	Yearling	2.5 Yr. Old	Male	Yearling	2.5 Yr. Old
No. captured	6	5	4	10	7	9	5	1	3
No. radio collared	4	5	3	10	-	-	5	-	-

Brown bear families separated during capture operations were reunited prior to processing.

Mumma (8/85)

Table 28. Immobilization of Brown Bears, Izembek NWR, 1984

Bear	Date	Sex	Age	Wt.	Drug	Dosage	Induction Time	Remarks
IZ22	7/30	F	2.5 (Est.)	310	Sernylan (P)	6cc	5 Min.	6.5cc Sparine administered (4cc w/Sernylan and 2.5cc when immobilized)
IZ23	"	F	Ad w/2COY	435	"	5cc	8 Min.	5cc Sparine administered (2cc w/Sernylan and 3cc when immobilized).
IZ24	"	F	Ad w/3COY	485	"	6cc	8 Min.	6cc Sparine administered when immobilized.
IZ25	7/31	F	2.5 (Est.)	245	"	3cc (No Eff) 5cc	3.5 Min.	8cc Sparine administered (2cc w/5cc injection of Sernylan and 6cc when immobilized)
IZ26	"	F	Ad w/2YLR	535	"	5cc	6 Min.	5cc Sparine administered (2cc w/Sernylan and 3cc when immobilized)
IZ27	"	F	Ad w/2YLR	470	"	5cc	6.75 Min.	5cc Sparine administered (2cc w/Sernylan and 3cc when immobilized)
IZ28	"	F	Ad w/3-2.5	510	"	5cc	18 Min.	7cc Sparine administered (2cc w/Sernylan and 5cc when immobilized). Animal was not completely immobile.
IZ29	"	F	Ad w/3-2.5	555	"	5cc	14 Min.	7cc Sparine administered (2cc W/Sernylan and 5cc when immobilized.
IZ29	8/4	F	"	"	Sernylan (L)	10cc	12 Min.	Caught to replace lost collar, 10 cc Sparine administered when immobilized.

Table 28. (Cont'd.)

Bear	Date	Sex	Age	Wt.	Drug	Dosage	Induction Time	Remarks
IZ30	8/3	F	Ad	595	Sernylan (P)	5cc,3cc, 2cc(10 tot)	45 Min.	8cc Sparine administered (See w/5cc Sernylan, 3cc w/3cc Sernylan)
IZ31	"	F	3.5(Est.)	300	"	8cc	5 Min.	7cc Sparine administered (2cc w/Sernylan and 5cc when immobile)
IZ32	"	F	Ad W/2COY	620	"	8cc	5 Min.	8cc Sparine administered (2cc w/Sernylan and 6cc when immobile)
IZ33	"	F	Ad W/1YRL	515	"	5cc	12 Min.	2cc Sparine administered w/Sernylan
IZ34	"	F	Ad W/2YRL	510	"	5cc,4cc	30 Min.	4cc Sparine administered, 2cc w/each of Sernylan injections
IZ35	"	F	Ad W/2-2.5	520	"	6cc,6cc (12 tot.)	16 Min.	10cc Sparine administered when immobilized. Later found dead at capture site, apparently did not recover from drugging
IZ36	8/4	F	Ad	560	"	5cc	6 Min.	5cc Sparine administered when immobilized
IZ37	"	F	Ad W/2YRL	500	"	5cc	15 Min.	5cc Sparine administered when immobilized
IZ38	"	F	Ad W/2COY	575		5cc	10 Min.	5cc Sparine administered when immobilized
IZ39	"	F	Ad W/2COY	575	"	5cc	23 Min.	5cc Sparine administered when immobilized
IZ40	"	M	Ad	820	"	5cc,4cc (9 Tot.)	25 Min.	Sparine administered when immobilized

Table 28. (Cont'd.)

Bear	Date	Sex	Age	Wt.	Drug	Dosage	Induction Time	Remarks
IZ41	8/4	M	Ad	810	Sernylan	9cc	12 Min.	Sparine administered when immobilized
IZ42	"	F	2.5	285	Sernylan (L)	3cc	8 Min.	5cc Sparine administered when immobilized.
IZ43	8/16	F	YRL	145	"	3cc	5 Min.	3cc Sparine administered when immobilized
IZ44	8/16	F	YRL	163	"	2cc	4 Min.	2cc Sparine administered when immobilized
IZ45	8/16	F	YRL	153	"	2cc	4 Min.	2cc Sparine administered when immobilized
IZ46	"	F	Ad	423	"	3cc	20 Min.	3cc Sparine administered when immobilized
IZ47	"	F	Ad	600 (est.)	"	6cc,2cc,2cc	50 Min.	6cc Sparine administered w/2cc Sernylan. Bear not completely immobile.
IZ48	8/17	F	Ad	640	"	7cc,2cc	35 Min.	7cc Sparine administered w/2cc Sernylan
IZ49	"	F	Ad	608	"	7cc	25 Min.	7cc Sparine administered when immobilized
IZ50	8/18	M	4 (est.)	435	"	7cc	21 Min.	7cc Sparine administered when immobilized
IZ51	"	F	Ad	435	"	7cc	12 Min.	7cc Sparine administered when immobilized.
IZ52	"	M	2.5	213	"	3cc	23 Min.	3cc Sparine administered when immobilized
IZ53	"	M	2.5	247	"	3cc	16 Min.	3cc Sparine administered when immobilized

Table 28. (Cont'd.)

Bear	Date	Sex	Age	Wt	Drug	Dosage	Induction Time	Remarks
IZ54	8/18	F	2.5	203	"	3cc	16 Min.	3cc Sparine administered when immobilized
IZ55	8/18	M	YRL	213	"	2cc	10 Min.	2cc Sparine administered when immobilized
IZ56	"	F	YRL	178	"	2cc	5 Min.	2cc Sparine administered when immobilized
IZ57	"	M	2.5	390	"	3.5cc	10 Min.	3.5cc Sparine administered when immobilized
IZ58	"	F	2.5	302	"	3.5cc	13 Min.	3.5cc Sparine administered when immobilized
IZ59	"	F	2.5	274	"	3.5cc	10 Min.	3.5cc Sparine administered when immobilized
IZ60	"	F	YRL	70	"	2cc	8 Min.	2cc Sparine administered when immobilized
IZ61	"	F	YRL	70	"	2cc	10 Min.	2cc Sparine administered when immobilized
IZ62	8/19	F	YRL	130	"	2cc,1cc	29 Min.	3cc Sparine administered when immobilized. Bear could still move head.
IZ63	"	F	Ad W/2-2.5	500(est.)	"	6cc	10 Min.	6cc Sparine administered when immobilized
IZ64	"	F	2.5	136	"	3cc,2cc	31 Min.	3cc Sparine administered when immobilized
IZ65	"	F	2.5	121	"	3cc,2cc,2cc, 2cc	29 Min.	3cc Sparine administered when immobilized. 3cc and 2cc darts sprayed on, hit and bounced out, respectively

Table 28. (Cont'd.)

Bear	Date	Sex	Age	Wt.	Drug	Dosage	Induction Time	Remarks
IZ66	8/20	F	Ad.	658	M99	4cc	14 Min.	4cc M.50/50 administered after processing
IZ67	8/20	F	Ad.	460	"	7cc,2cc	10 Min.	Jumped up and ran 1 hr. 36 min. after immobilization. No. M50/50 used
IZ68	8/20	M	Ad.	493	M99	7cc,2cc	57 Min.	9cc M50/50 administered after processing
IZ69	8/20	M	Ad.	488	"	10cc,2cc	19 Min.	12cc M50/50 administered after processing
IZ70	8/20	F	2.5	175	Sernylan (L)	3cc,2cc	24 Min.	5cc Sparine administered when immobilized
IZ71	11/14	F	Ad.	460	"	4cc,2cc,2cc, 2cc	70 Min.	11cc Sparine administered when immobilized. Bear not completely immobile (i.e. tense w/head movement)

When the supply of Sernylan was exhausted, we were forced to complete capture operations with M99 (Etorphine). This drug and its antagonist M50/50 (Diprenorphine) were also administered in dosages of 100 mg per 100 pounds of weight. Both immobilizing drugs used are highly toxic to humans, so numerous precautions were taken to insure safe operations. One individual was responsible for drug handling and administering to help insure familiarity with proper procedures. All personnel were informed of first aid procedures in case of accidental injections.

All immobilized bears were weighed by slinging them ón a net stretcher beneath the helicopter. A premolar was extracted from all but known age bears (i.e. cubs) for later aging by cementum layers. A series of physical measurements were taken completing the processing of each animal (Table 29). Single adult females weighed more than their counterparts with cub-of-the-year, yearlings or 2-1/2 year old cubs but other measurements were comparable (Table 30). Reactions of each bear captured to the drugging operation were recorded in the form of immobilization times and via incidental notes on such parameters as location of injection, rectal temperature, rate of breathing, and presence and duration of any convulsive responses. Each bear processed was marked with numbered plastic ear tags and colored reinforced streamers to aid in individual recognition.

One important element in this study was the determination of seasonal distribution of adult bears captured in the Right and Left-hand Valley study area especially the degree of dispersal into adjoining areas. Preliminary plans were to radio collar ten each of adult males, adult females in family groups and single adult females. Attempts would also be made to capture yearlings and 2-1/2 year old cubs with marked females. Only five adult males were captured and fitted with Telonics (5B configuration) radio collars. Neck girth in adult male brown bears can exceed skull girth hence this type of marking is not always possible. The five animals captured had neck girths averaging 30.4 $\pm$ 5.9 (Range 39 to 25) inches and due to other physical parameters, we believe we may be able to keep radio collars on these animals throughout all or most of the three year study period. Two large males, one weighing 810 and the other 820 pounds and having neck girths of 39 and 34 inches, respectively, were the largest animals processed. Three other males averaging 472 $\pm$ 32 pounds with neck girths of 25, 27 and 27 inches were probably still in their growth phase and experimental collars allowing neck growth were used. These experimental collars also employed corrosive, purposely weakened fasteners which will provide "break-away" capabilities (Figure 10). The design features of the fastening mechanism should cause increased wear on the collar material allowing collar expansions at 1/2 inch increments. Recapture of bears with experimental collars will be necessary to monitor rate of wear and the overall suitability of this collar modification.

Of nine families of cubs in the yearling and 2.5 year old cohorts, eight were relocated and cubs were captured by following the marked sow. This was, of necessity, a well coordinated procedure involving the location of the sow by radio tracking with the refuge supercub followed by the forced flushing of the family group from seclusion with the capture helicopter. This accomplished, the burden fell to the helicopter pilot and gunner to follow and immobilize

Table 29 . Physical characteristics of brown bears captured on the Izembek NWR, 1984

	No.	No.	Weight /2	Chest Girth	Neck Girth	Overall Length	Shoulder to Tip of Claw	Skull Length	Skull Width	Front Pad Length	Front Pad Width	Read Pad Length	Read Pad Width	Eye Width	Snout Length	Canine Length
Female																
Adult With Cubs	15		520 (46)	60.3 (3.3)	29.6 (1.8)	81.4 (4.0)	47.3 (3.0)	15.3 (0.6)	9.3 (0.4)	7.4 (1.1)	6.2 (0.4)	10.5 (0.5)	5.8 (0.4)	3.7 (0.5)	6.8 (0.6)	1.5 (0.1)
Adult W/O Cubs	10		540 (90)	59.0 (6.7)	29.5 (3.1)	80.0 (5.5)	48.0 (4.1)	14.5 (2.2)	8.5 (1.1)	7.6 (1.6)	6.0 (0.5)	10.1 (1.0)	5.9 (0.6)	3.5 (0.4)	6.5 (0.4)	1.4 (0.1)
3.5 Yr. Old (Est.)	1		300	47.0	24.0	65.0	45.0	13.6	7.4	7	5.8	10	5	4	6.3	-
2.5 Yr. Old	9		228 (72)	44.7 (9.0)	23.6 (3.5)	66.3 (7.9)	39.9 (2.9)	12.2 (1.1)	6.8 (0.5)	6.1 (1.2)	5.2 (0.7)	8.9 (0.9)	4.9 (0.6)	2.8 (0.4)	5.3 (0.8)	1.1 (0.2)
Yearling	7		130 (44)	38.7 (3.9)	19.7 (0.7)	53.0 (3.2)	34.0 (1.2)	10.6 (0.3)	5.6 (0.5)	5.5 (0.1)	4.6 (0.3)	7.8 (0.3)	4.3 (0.3)	2.8 (0.3)	4.7 (0.3)	0.7 (0.2)
Male																
Adult	5		609 (189)	58.6 (6.9)	30.4 (5.9)	85.9 (6.2)	51.0 (5.5)	16.1 (1.1)	9.3 (1.5)	7.6 (0.7)	6.8 (0.7)	11.6 (0.7)	6.2 (0.5)	4.1 (0.6)	7.8 (1.3)	1.6 (0.2)
2.5	3		283 (94)	45.0 (6.6)	26.2 (2.9)	70.0 (11.5)	44.0 (7.1)	13.0 (1.7)	7.3 (1.0)	7.0 (2.1)	5.5 (0.7)	10.0 (2.1)	5.5 (0.7)	-	-	-
Yearling	1		213	42	25	56	35.5	11	6.3	7	5	8	4	-	-	-

/1 Measurements in inches

/2 Weights in pounds

Table 30. Physical characteristics in relation to reproductive status of adult female brown bears, Izembek NWR, 1984

	Single Female	Female W/COY	Female W/Yearlings	Female w/2.5 Yr. Olds
No.	10	6	5	4
Weight (± 1SD)	544 (90)	531 (70)	506 (24)	521 (24)
O/A Length (± 1SD)	80.0 (5.5)	81.8 (4.9)	81.5 (4.1)	80.6 (3.6)
Chest Girth (± 1SD)	59.0 (6.7)	60.3 (2.4)	58.6 (3.4)	62.3 (3.9)
Neck Girth (+ 1SD)	29.5 (3.1)	30.6 (1.6)	29.0 (1.7)	28.8 (1.9)
Age (± 1SD)	/1	/1	/1	/1

/1 Tooth sectioning not completed.

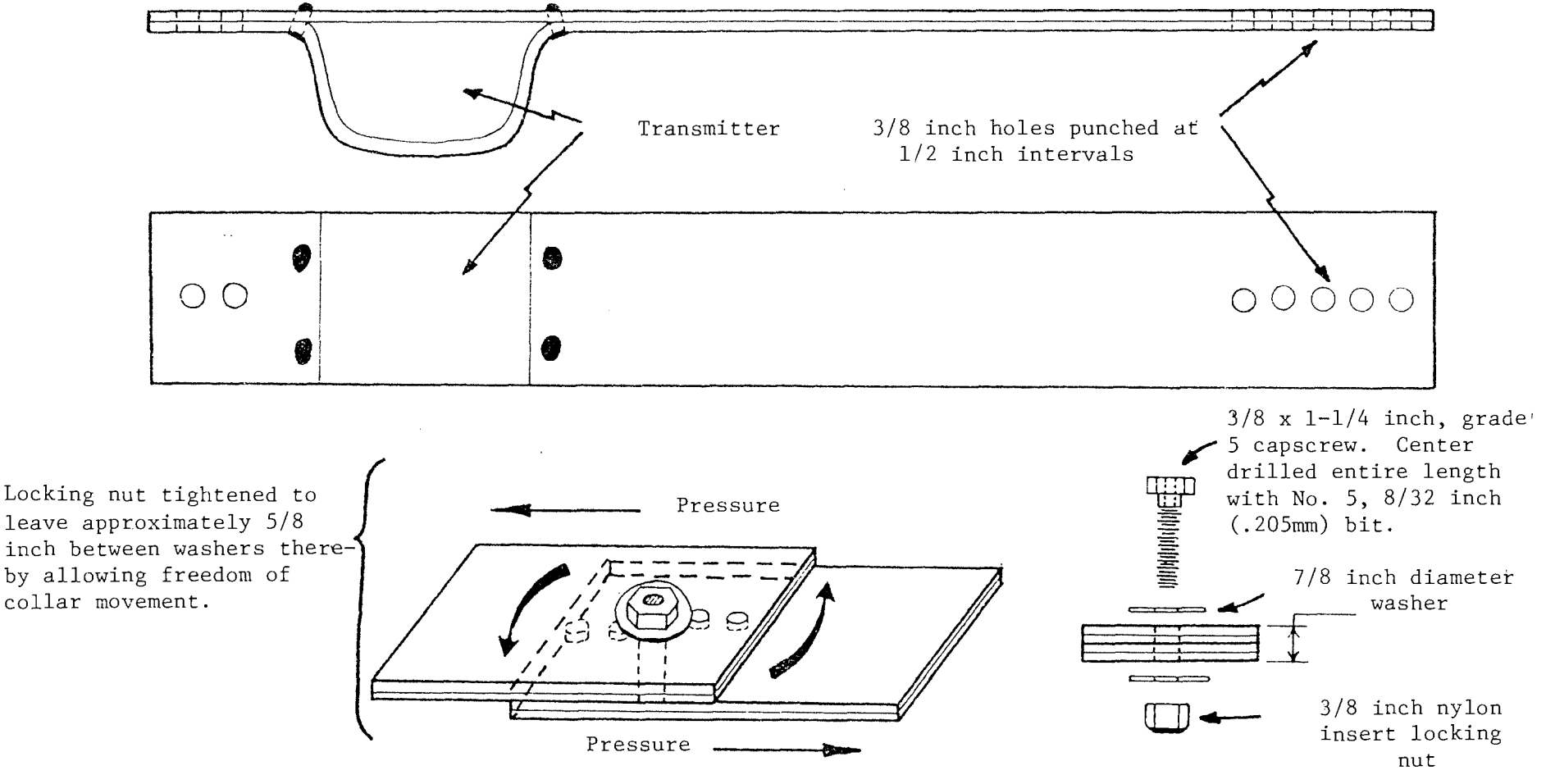


Figure 10. Radio collar experimentally altered to allow for expansion and eventual loss. (NOTE: Figure not drawn to scale.)

the cubs. This was no simple matter as they often were very erratic in their movements. The refuge supercub allowed the staff to keep track of the sow and remainder of the family while the immobilization process continued and when one cub was down, the aircraft switched roles so the helicopter crew could complete the capture of the remainder of the cubs. Sows were not recaptured in this process and they invariably took refuge in nearby dense growths of alders. When all members of a family were immobilized, a processing location was selected. Cubs were ferried to this spot on the skid platforms of the helicopter and after processing, the crews departed the area allowing the female to relocate her family.

No attempt was made to handle cubs-of-the-year (COY) after marking their attending sows. These cubs appeared to be in the 30 to 50 pound range, hence capture by hand, a technique used elsewhere on smaller cubs, was deemed inappropriate. Their size and mobility made them a very difficult target and these and other factors resulted in our decision to not attempt capture using drugs.

A total of 20 cubs under the age of three years of age were captured. Four (20%) were males and 16 (80%) were females. Comparable percentages were found for both the 1.5 and 2.5 year old cohorts (Table 31). This pattern differs quite markedly from data available on other populations of coastal and interior brown bears (Table 32). Sample sizes of 1.5 and 2.5 year cohorts available from the refuge study will be inadequate to make definitive conclusions on the factors causing this disparity in sex ratio. Other studies on Alaskan brown bears indicate that males may become self-sufficient earlier and be better able to survive on their own than are females. This opinion is based on the capture of young less than three years old not associated with family groups in the Black Lake area. Our 1984 capture operations included five single young bears (i.e. four estimated to be 2-1/2 years old; one estimated to be 3-1/2 years old) all of which were females. Our sample size is admittedly small, however, it may be indicative of a very different pattern of survival favoring females assuming comparable sex ratios are present at birth.

Largely subjective data suggests that unattended cubs of the year (COY) have essentially no probability of survival. The unfortunate loss of an attending sow due to capture operations provided the opportunity to make observations suggesting survival may be higher than previously thought. Three COY were involved in this incident occurring on 31 July. The cubs stayed within 300-400 yards of the dead sow while measurements were taken and an examination made. The helicopter crew then departed the area. The three cubs were later seen feeding together along a creek approximately three miles away on 3 and 4 August. Although we believed these cubs were not weaned, they were at least partially capable of foraging on their own. These cubs were seen again on 10 September still within a three mile radius of their original location and appeared approximately double in size.

We are encouraged that these cubs could survive for this length of time in an area of high bear density. We hope for an opportunity to see if they will survive the winter, either as a group or through adoption by another sow. Adoption of COYs by other lactating sows apparently can occur as evidenced by preliminary data from this study. A sow (IZ23) with two COY was captured

Table 31. Sex ratio of cubs and single young bears captured on the Izembek NWR, 1984

Age	No.	No. Males %	No. Females %	Sex ratio (♂:♀)
Yearling (1.5 Yr.)	8	1 (12.5)	7 (87.5)	1:7
2.5 Year (in family group)	12	3 (25.0)	9 (75.0)	1:3
2.5 to 3.5 year (singles)/1	5	----	5 (100.0)	0:5

/1 Four were estimated to be 2.5 year olds, and one 3.5 year old.

Table 32. Sex ratios of brown bears up to three years of age at various study areas in Alaska.

Location	No. Males (%)	No. Females (%)	Sex ratio (♂:♀)
Western Brooks Range /1	12 (34.3)	23 (65.7)	1:1.92
North Central Alaska Range /2	12 (63.2)	7 (36.8)	1:0.58
Black Lake, Alaska Peninsula /3	67 (51.2)	64 (48.8)	1:0.96
Izembek NWR, Alaska Peninsula /4	4 (80.0)	16 (80.0)	1:3.00

/1 Reynolds, H.V. and J. L. Hechtel, 1983. Grizzly bear population biology in the western Brooks Range, Alaska. 6th Int. Conference on Bear Research and Management.

/2 _____ and _____. Population structure, reproductive biology, and management patterns of grizzly bears in the Northcentral Alaska Range. Fed. Aid in Wildl. Rest. Rep. Proj. W-22-2. Job 4.16R. Juneau 30p.

/3 Modafferi, R.D., 1984. Review of Alaska Peninsula brown bear investigators. Fed. Aid in Wildl. Rest. Proj. W-17-10,W-17-11,W-21-1,W-21-2 and W-22-1. Job 4.12R.43p.

/4 This study

on 30 July and resighted with her two cubs on 31 July and 6 August. On 10 September, she was relocated again, this time with three COY, two of comparable size and one approximately 1/3 smaller. As this group ran from the plane, the smaller cub fell behind, and upon sensing this, the sow stopped and waited for it to catch up.

Capture operations apparently caused the break-up of a family group of yearlings and possibly mortality of the young. Sow (IZ37) with two yearlings was captured on 4 August. She was relocated but not seen in dense alders on 6 August. On 18 August, we flushed her from dense alders with the helicopter but no young were seen. Three subsequent re-locations were made on 10 and 19 September and 8 November; however, no visual contact was made. It appears IZ37 may have lost her cubs sometime between her capture and 18 August. Data collected by the Alaska Department of Fish and Game at McNeil River suggested that 23 percent of the family groups observed dissolved before the young were 1.5 years old (i.e. yearlings). Hence there is the possibility that IZ37's a family unit dissolved.

Another sow (IZ35) which had two 2-1/2 year old cubs failed to recover from the drugging operation on 3 August. This sow responded normally when injected, was processed without incident and thought to be in stable condition when the crew departed the capture site. Her undisturbed carcass was found later at the same location. No observations made during capture suggest the cause of this unfortunate adverse reaction. One unattended 2-1/2 year old cub (IZ70) was captured in this general area on 20 August and we believe this may be one of IZ35's cubs.

Eight attempts were made through the end of the year to obtain radio locations of collared bears. When it was not possible to obtain precise radio locations, signals were assigned to quadrats within the study area (Figure 8). Location of signals by quadrat were made by performing circling flights at approximately 1,000 - 1,500 feet AGL near the center of the study area. This activity at least allowed determinations of presence or absence within the study area prior to denning.

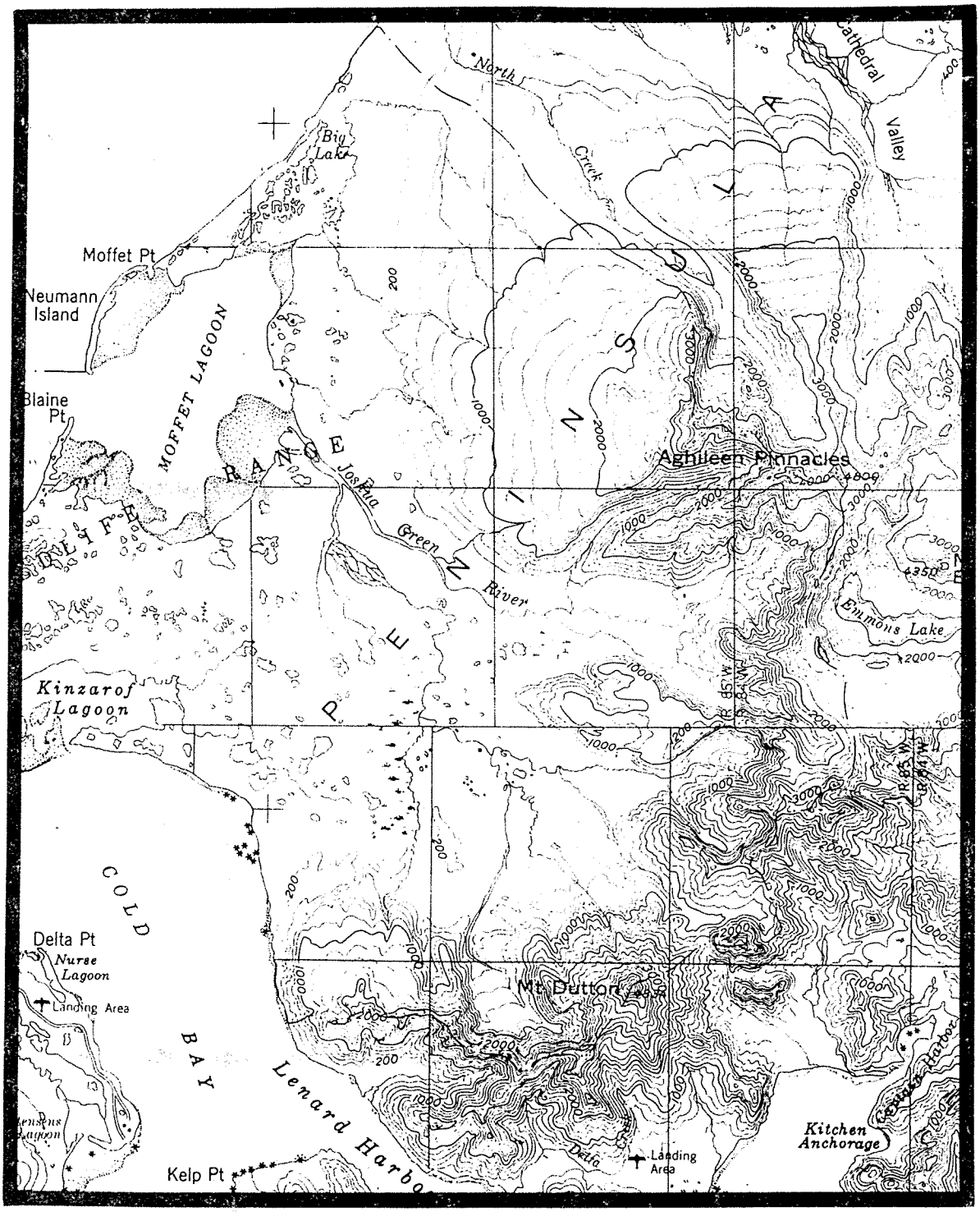
Of the 26 collared bears involved presently in the study, 21 carry transmitters with active as well as inactive modes. Inactive modes (i.e. 45 to 50 pulses per minute) are initiated when the collar has been immobile (or very nearly so) for one hour. This allows a savings in the rate of battery depletion realized when in active mode (i.e. 70 - 75 pulses per minute). This capability also informs us of possible losses or mortalities.

Radio tracking flights were made with the refuge supercub in August (n=3), September (n=3), November (n=1) and December (n=1). Radio locations by sex and reproductive status (of females) are shown in Figures 11-15.

A new regulatory decision regarding the Cold Bay road system brown bear permit area was made in 1984. Registration permits would only be issued if there was an identified "problem bear". Previously permits for the 10 May - 30 June spring and 7-31 October fall seasons were issued by the Izembek refuge at a rate of ten per week on a first come/first served basis.

Brown bears den throughout the mountainous areas surrounding Aghileen Pinnacles. Several radio collared bears denned in the area at the extreme right.
(65)22 Sarvis (9/28/76)

Five radio collared brown bears denned at the head of Nurse Creek canyon.
405(37) Sarvis(2/5/85)


Moffet Pt
Neumann Island
Blaine Pt
MOFFET LAGOON
RANGE
Big Lake
North
Creek
Cathedral
Valley
SIENNA
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
Cathedral Harbor

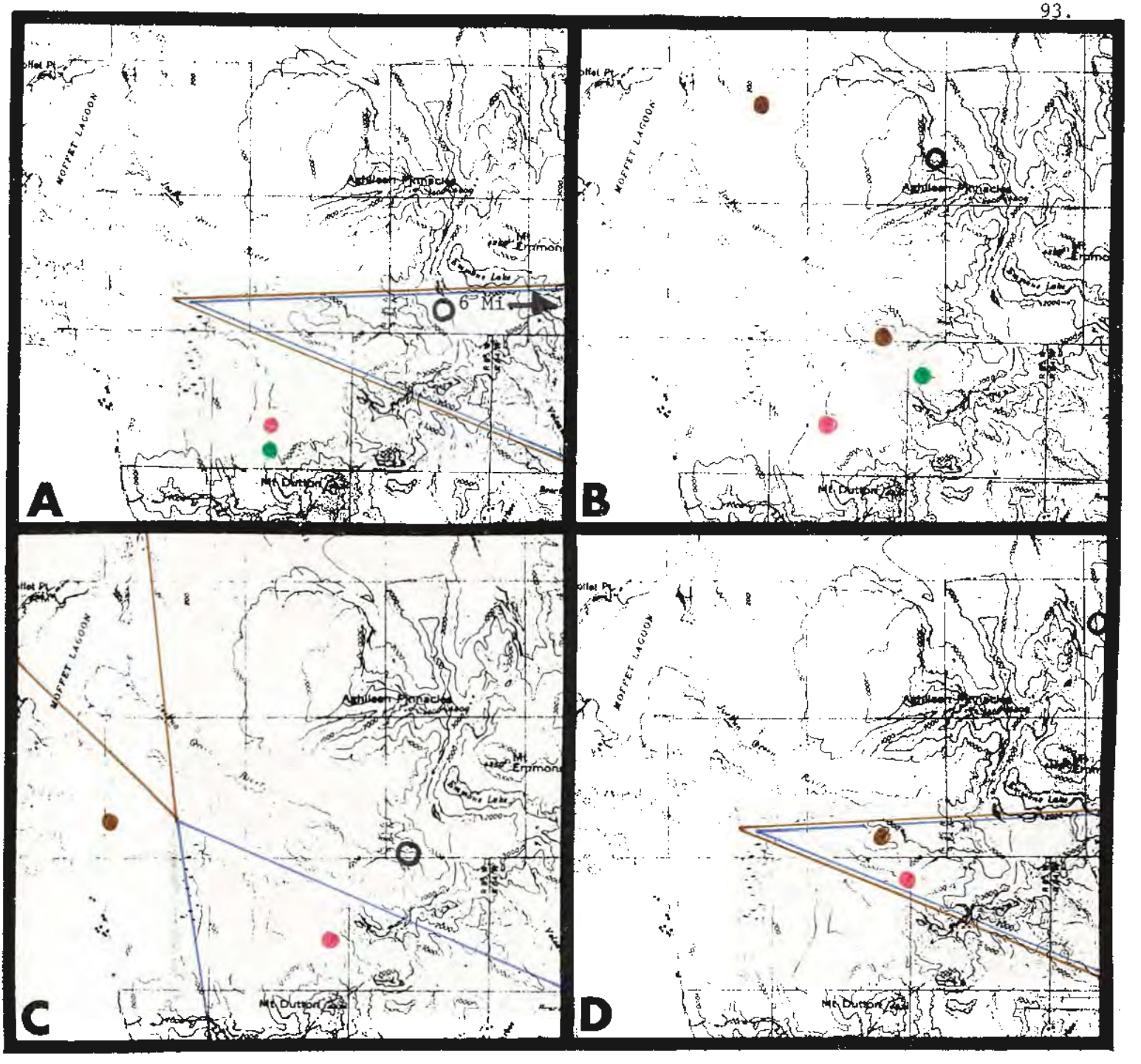
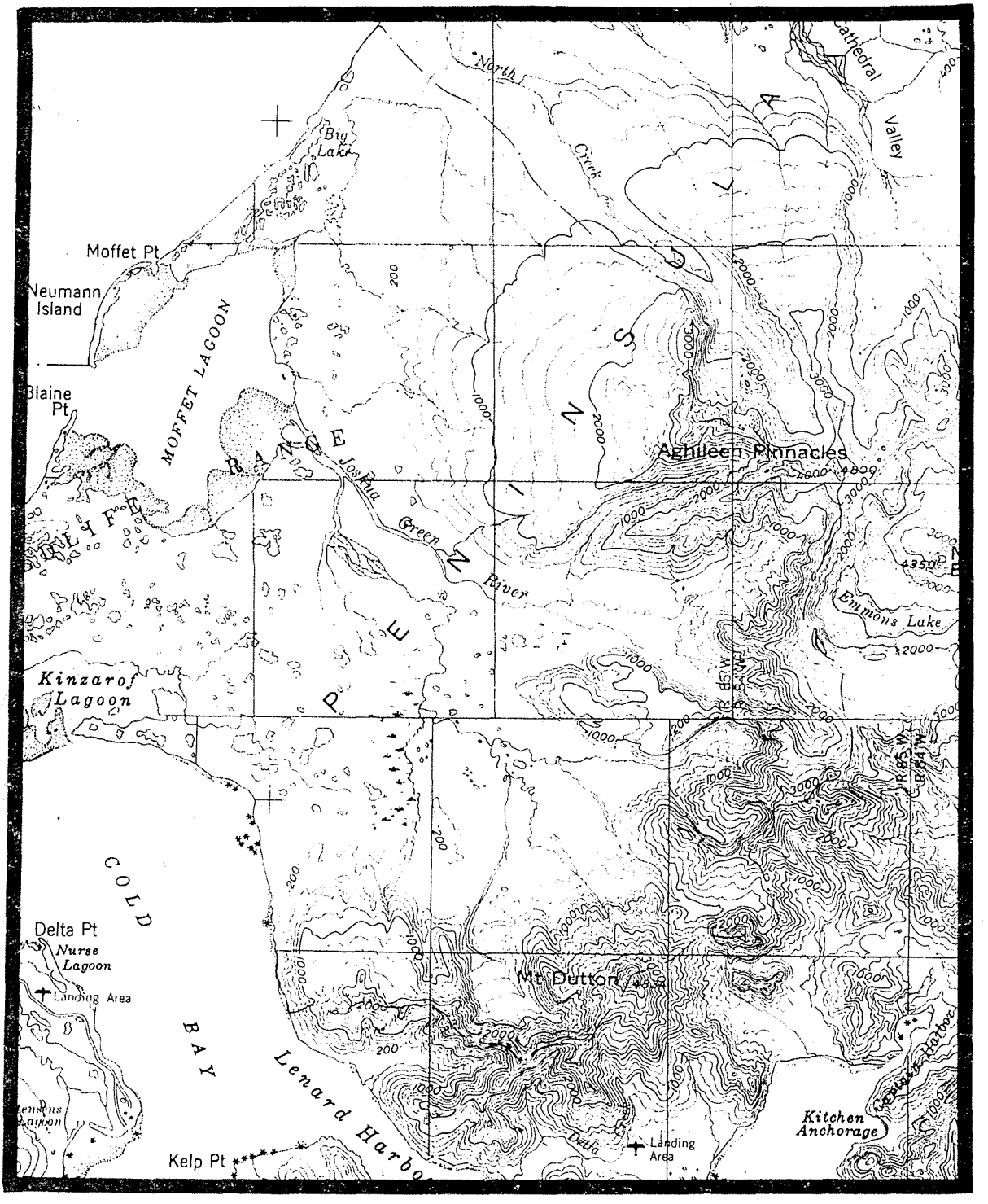


Figure 11. Radio locations of adult male brown bears. A:IZ40; B:IZ41; C:IZ50; D:IZ68. Capture site, August locations, September locations, November locations. = quadrat where present when precise location was not obtained. = Den Site.


Moffet Pt
Neumann Island
Blaine Pt
MOFFET LAGOON
RANGE
Big Lake
North
Creek
Cathedral Valley
SIERRA
Agnileen 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
R.85 W.
R.84 W.

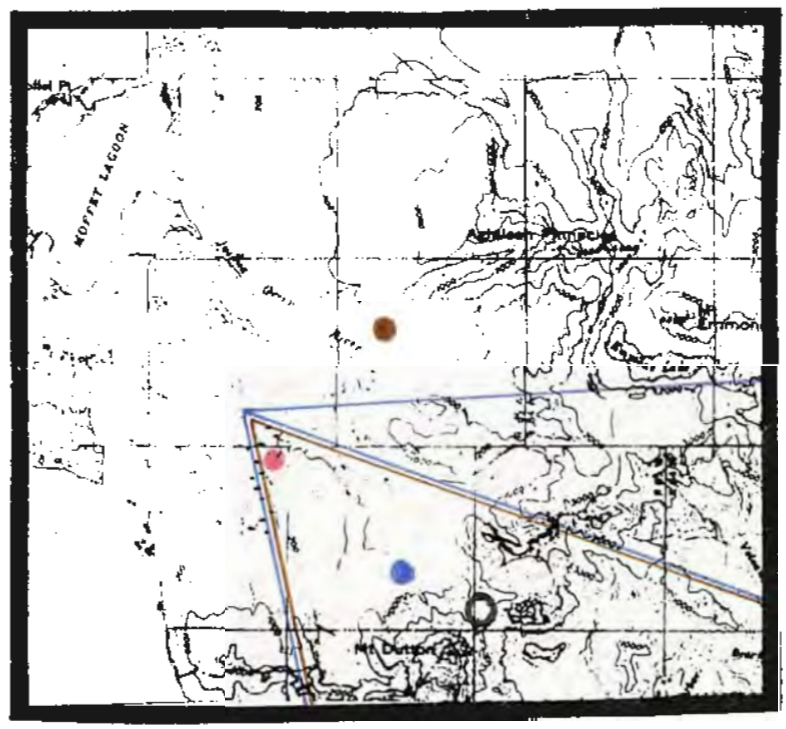
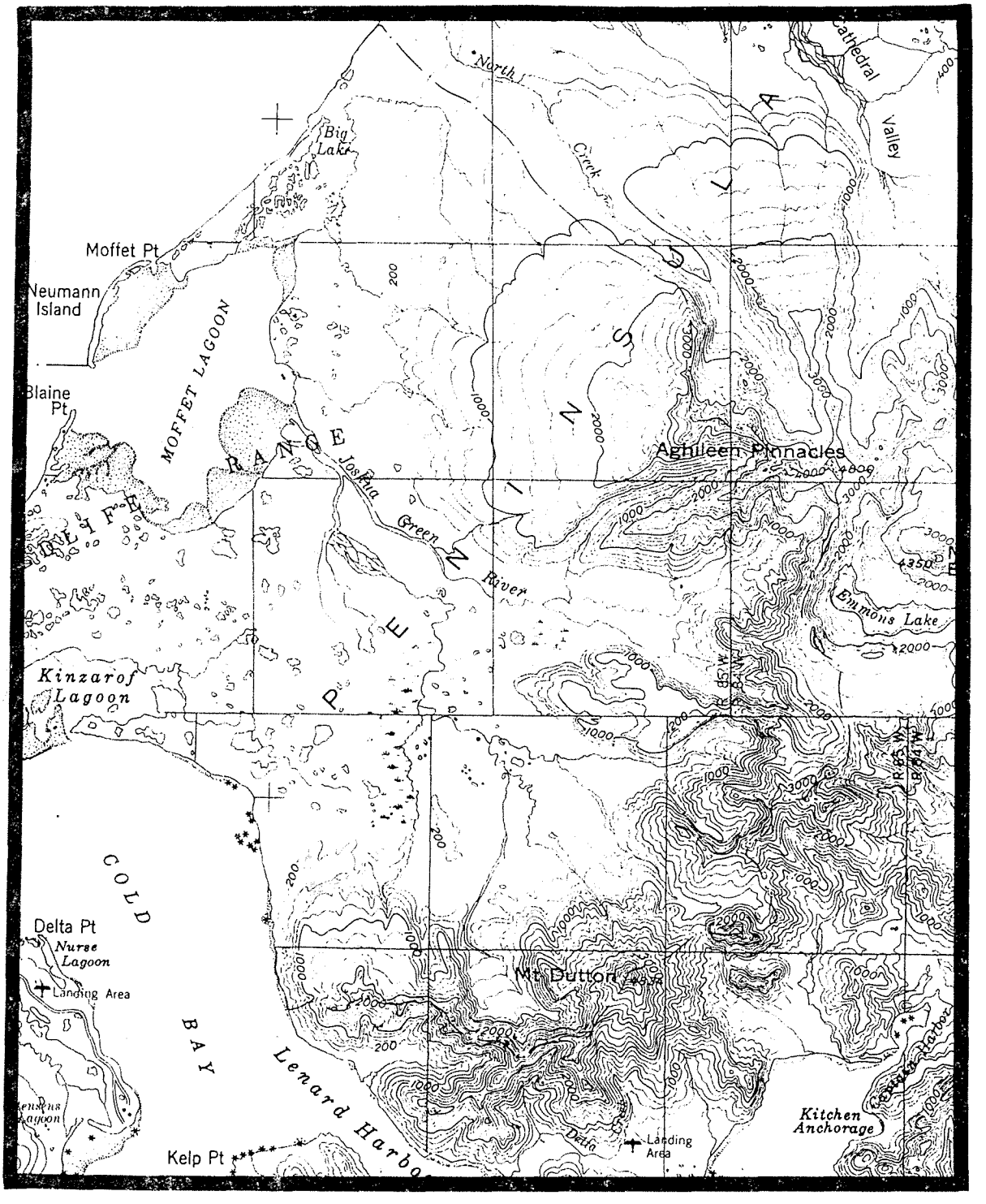


Figure 11 . (Cont'd.) Radio location of adult male brown bears (continued). A:IZ69 ● Capture site, ● August location, ● September location, ● November location, △= quadrat where present when precise location was not obtained. ○= Den Site.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Blaine Pt
MOFFET LAGOON
Big Lake
North Creek
Cathedral Valley
Aghileen Pinnacles
Joshua Green River
Emmons Lake
Kinzarof Lagoon
COLD BAY
Delta Pt
Nurse Lagoon
Landing Area
Mt Dutton
Lenard Harbor
Kelp Pt
Kitchen Anchorage
Landing Area

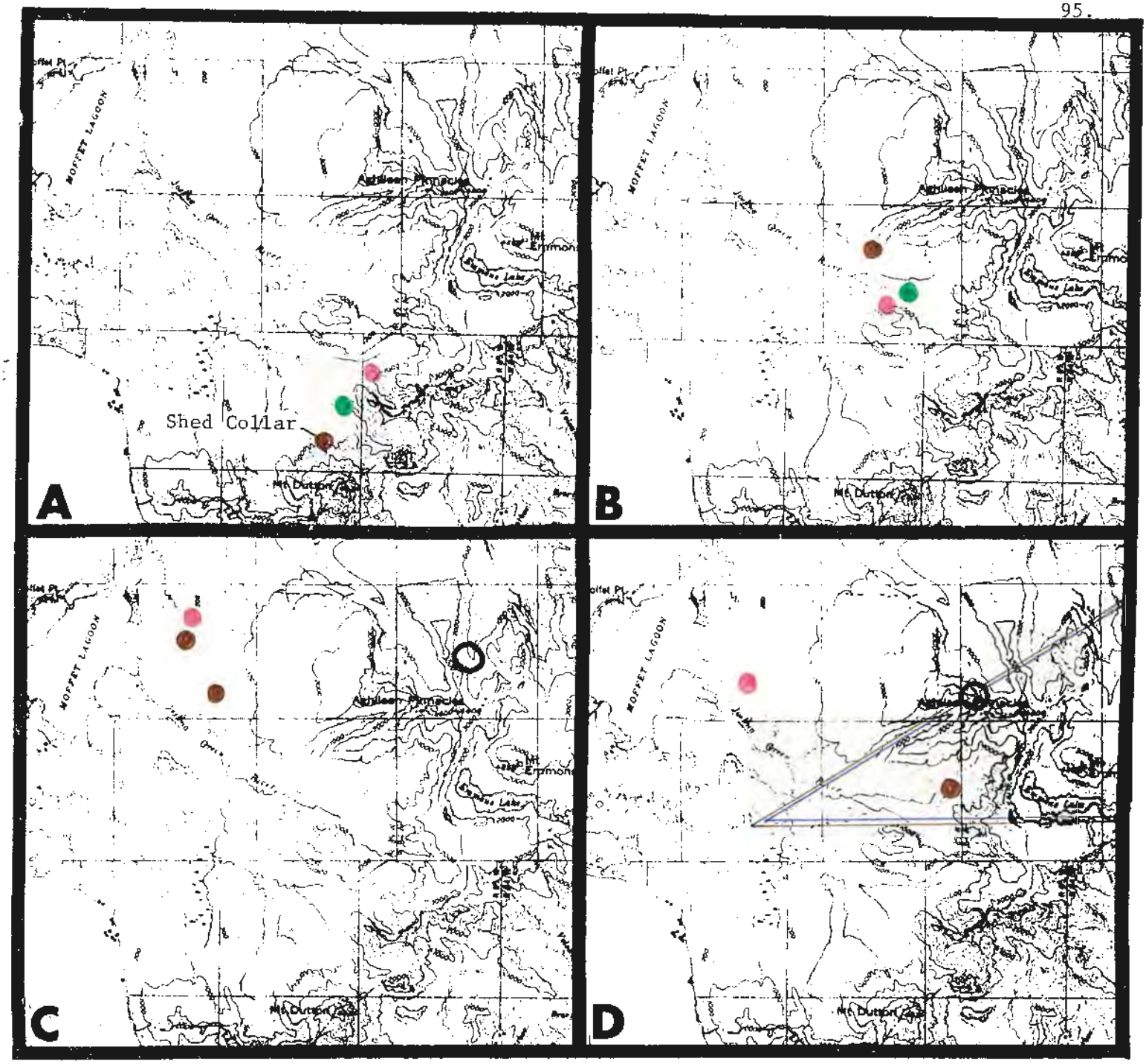
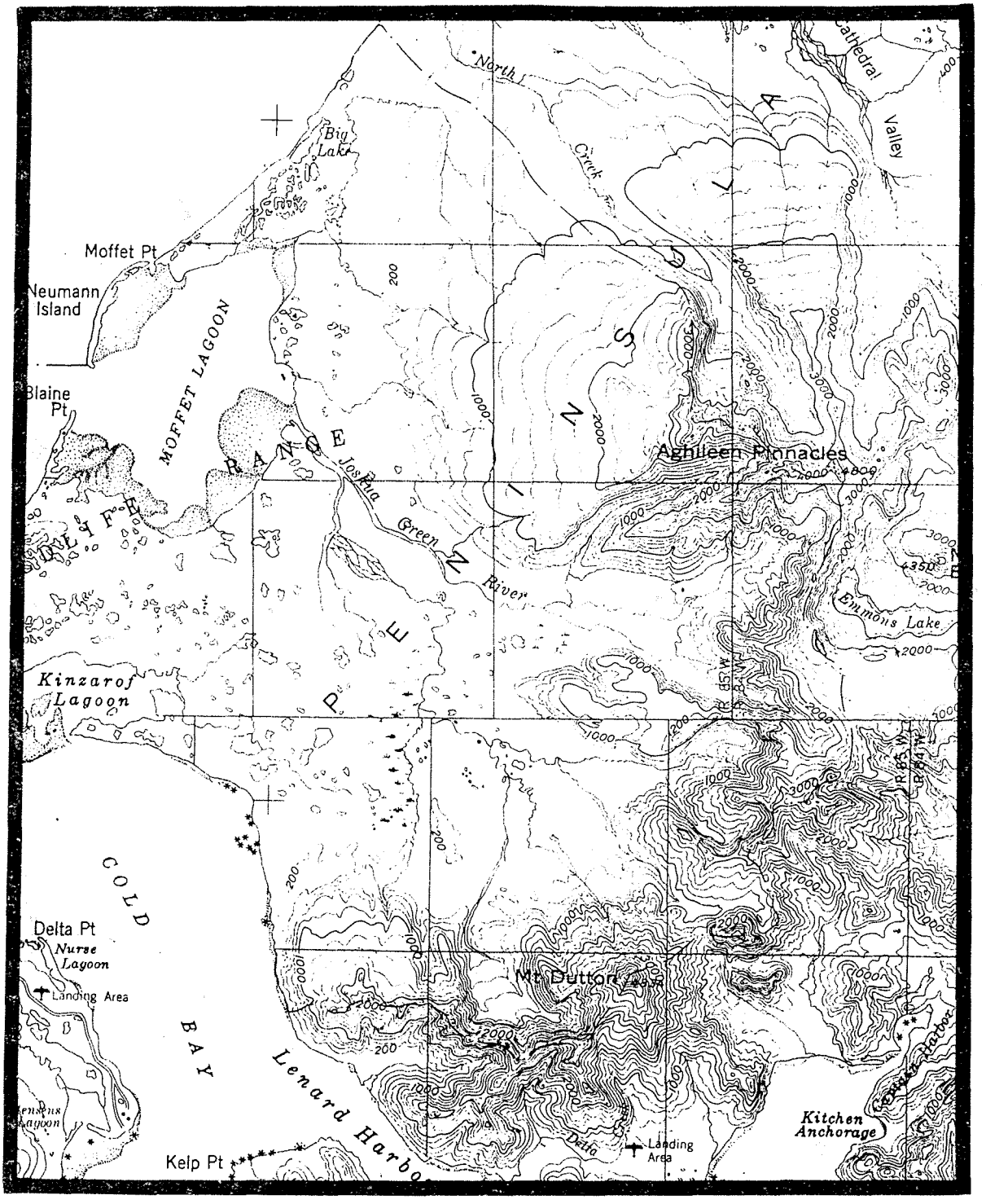


Figure 12. Radio locations of single adult female brown bears, A:IZ30; B:IZ36; C:IZ46; D:IZ47; capture site, August locations, September locations, November locations. = quadrat where present when precise location was not obtained. = den site.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Neumann Island
Blaine Pt
MOFFET LAGOON
RANGE
Big Lake
North Creek
Cathedral Valley
Aghileen Pinnacles
Josena
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

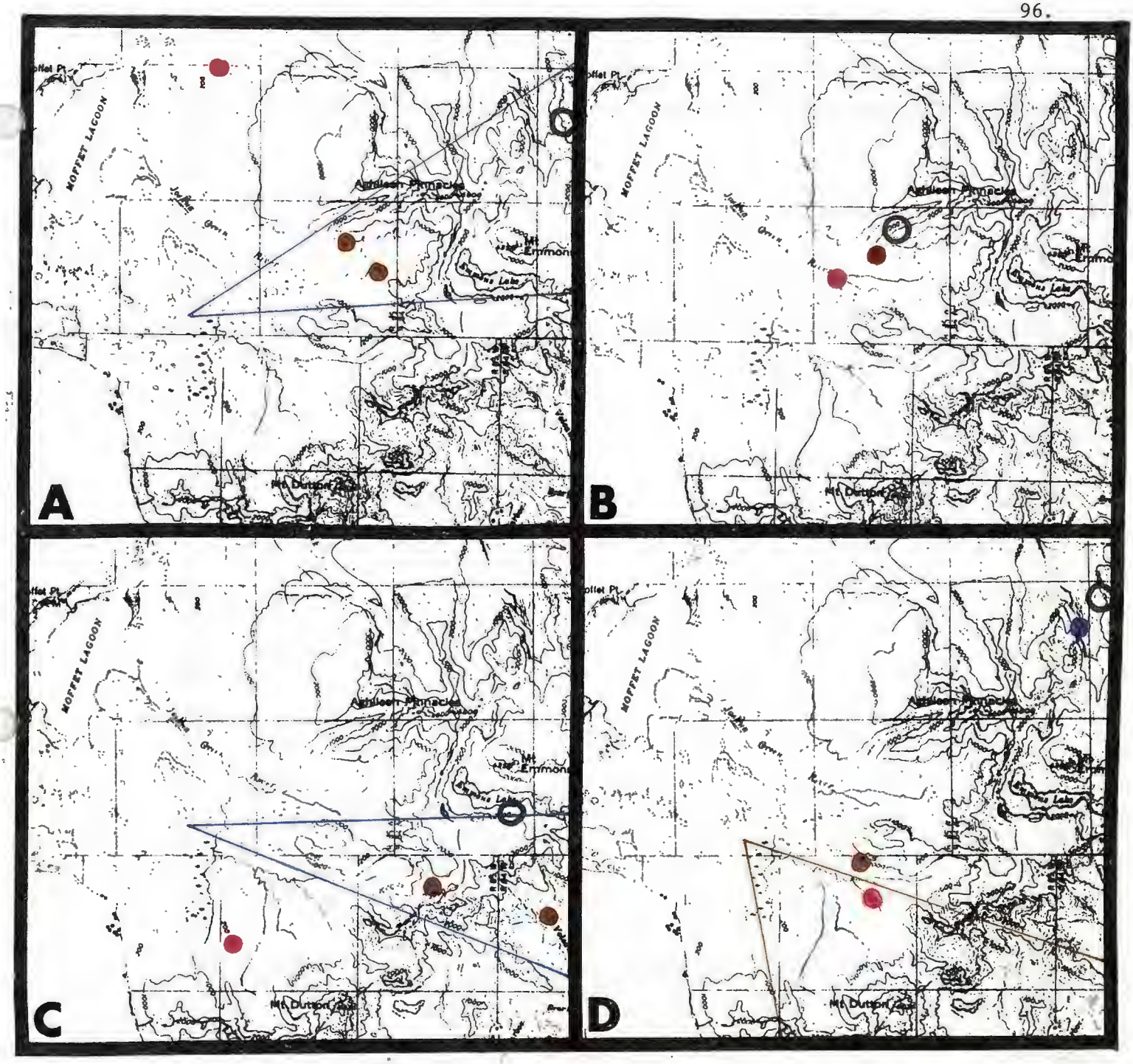
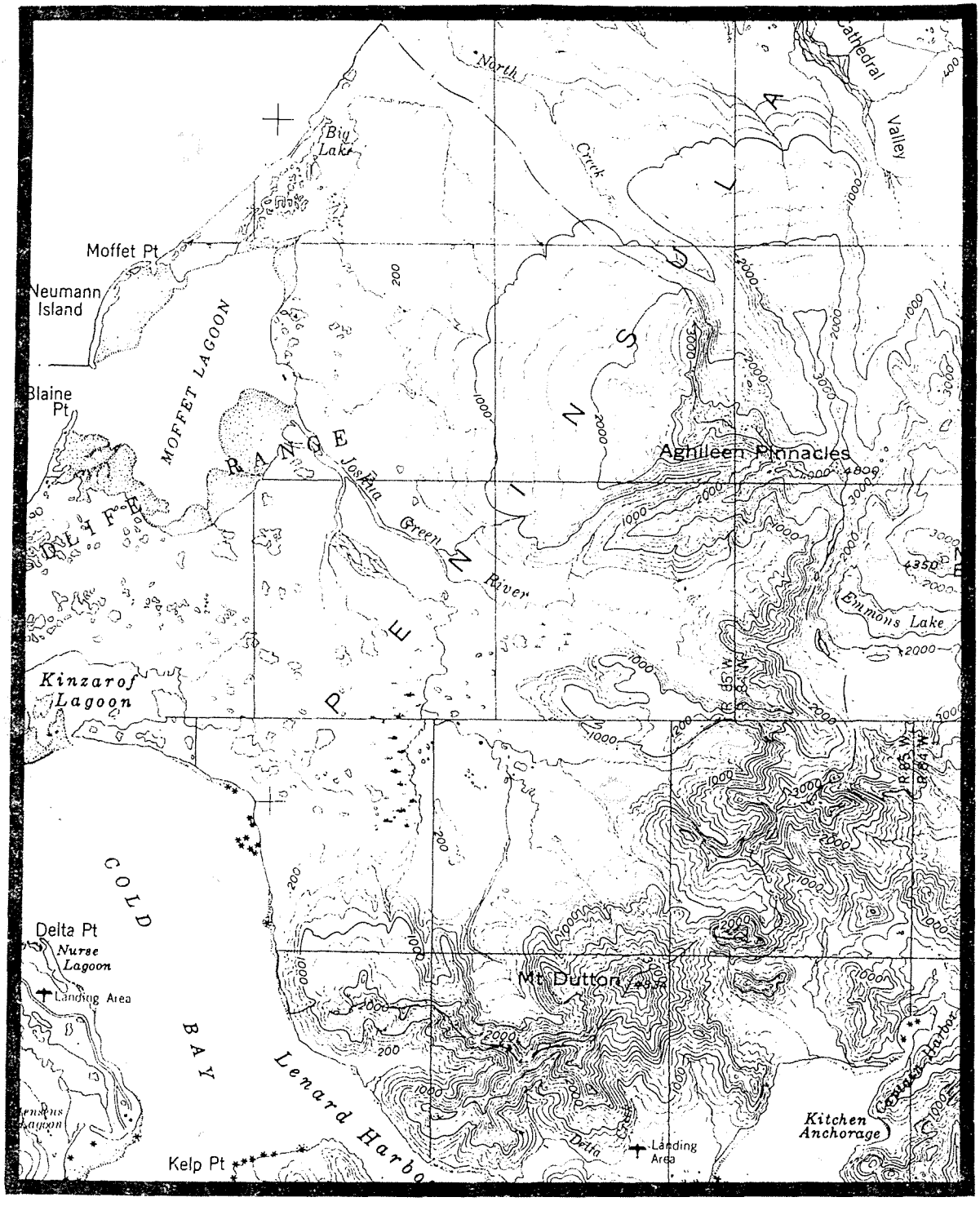


Figure 12. (Cont'd.) Radio locations of single adult female brown bears, A:IZ48; B:IZ49; C:IZ51; D:IZ66 ● capture site, ● August locations, ● September locations, ● November locations. △ = quadrat where present when precise location was not obtained. ○ = den site.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Blaine Pt
MOFFET LAGOON
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
R.85 W.
R.84 W.

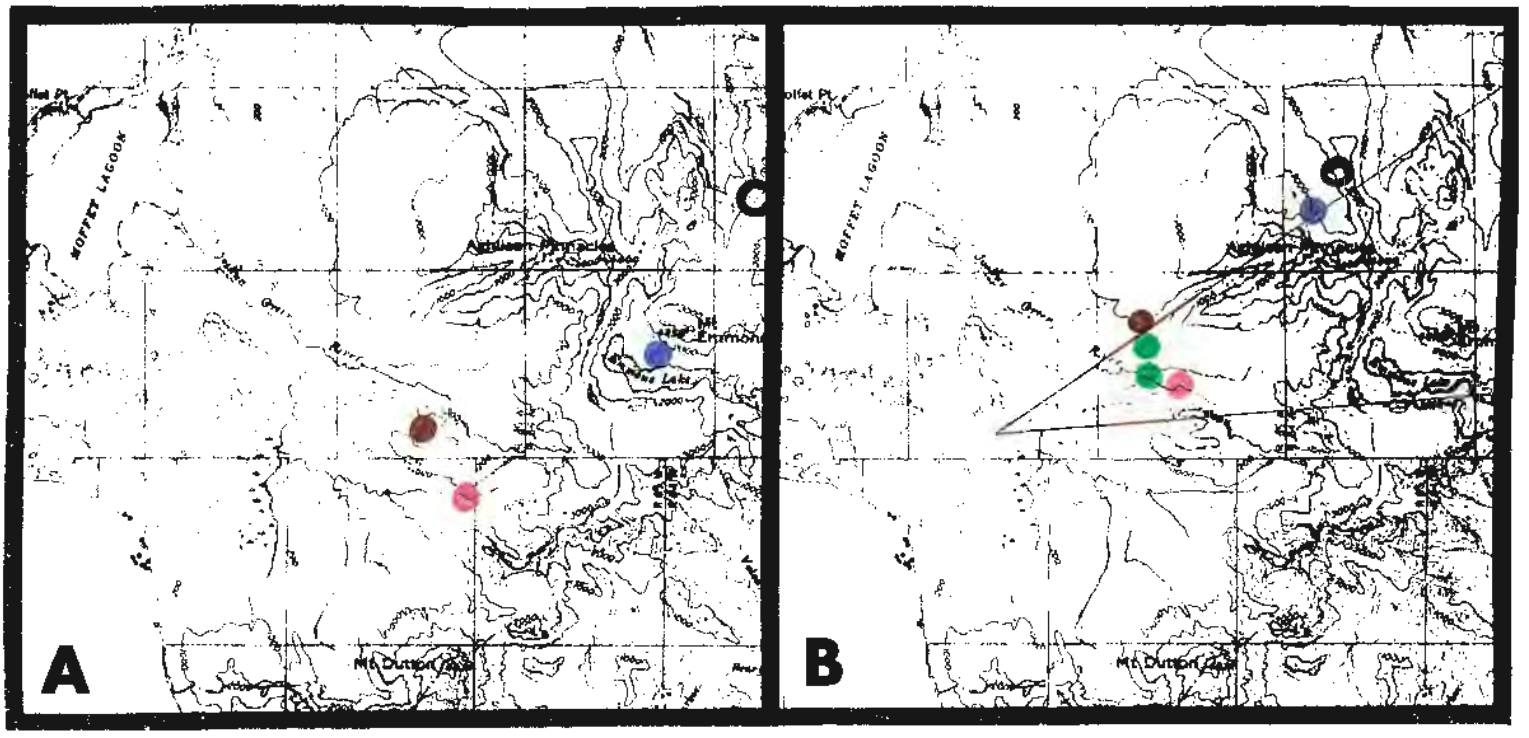
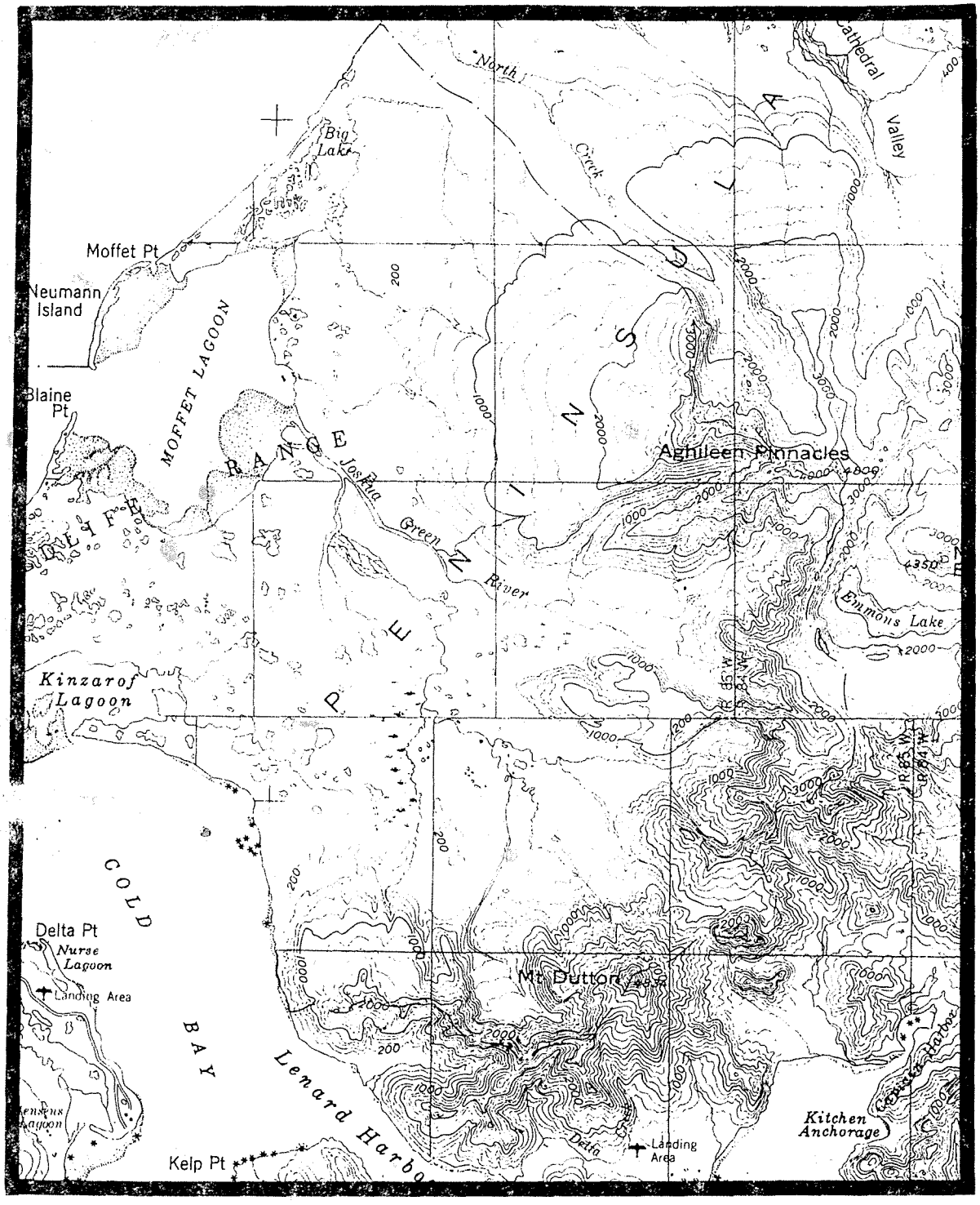


Figure 12. (Cont'd.) Radio locations of single adult female brown bears, A:IZ67; B:IZ37 (♀ which lost her two yearling cubs). ● capture site, ● August locations, ● September locations, ● November locations. △ = quadrat where present when precise location was not obtained. ○ = den site.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Blaine Pt
MOFFET LAGOON
Big Lake
North Creek
Cathedral Valley
Aghileen Pinnacles
Josephine Creek
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
R.83W.
R.84W.

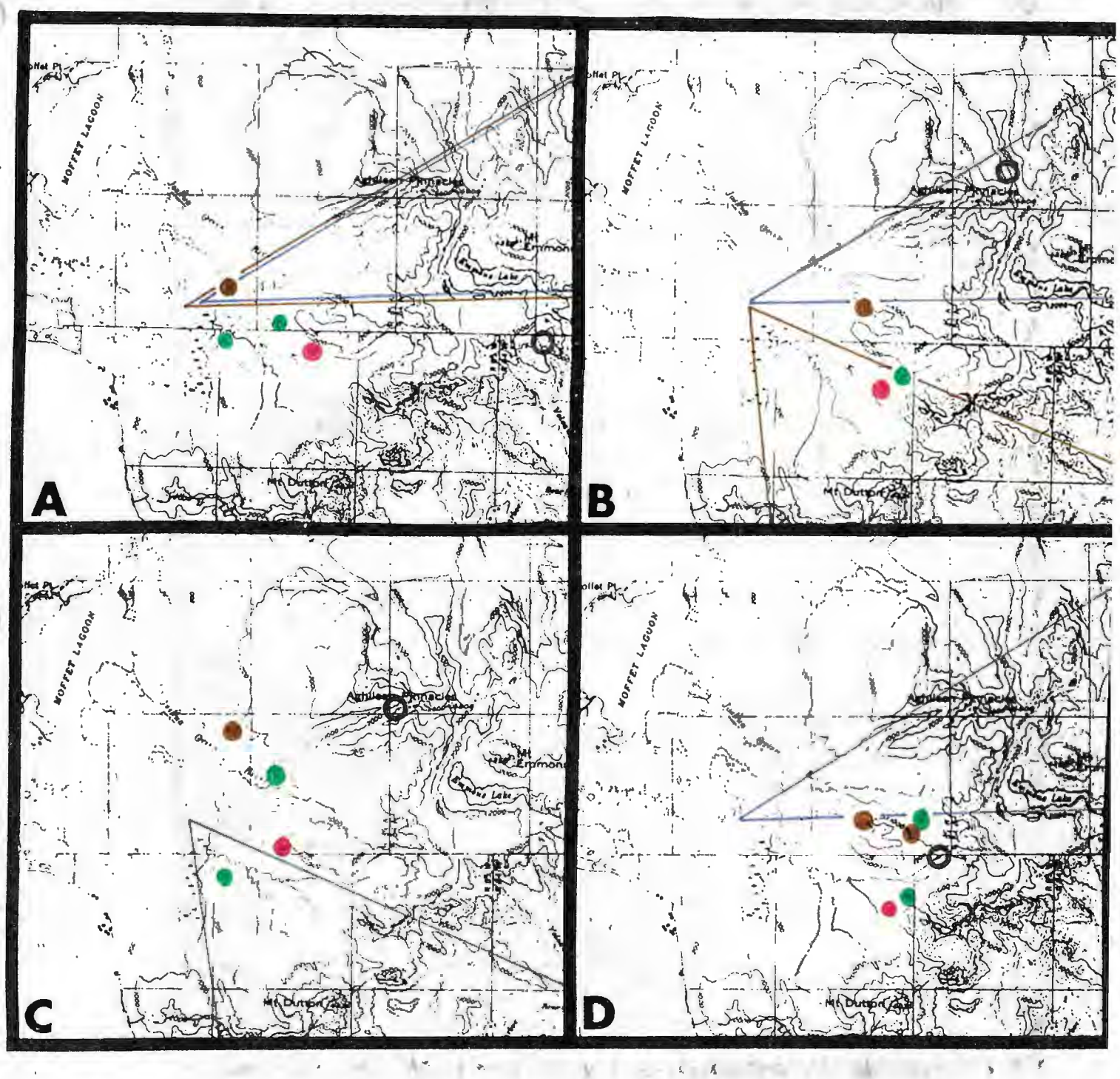
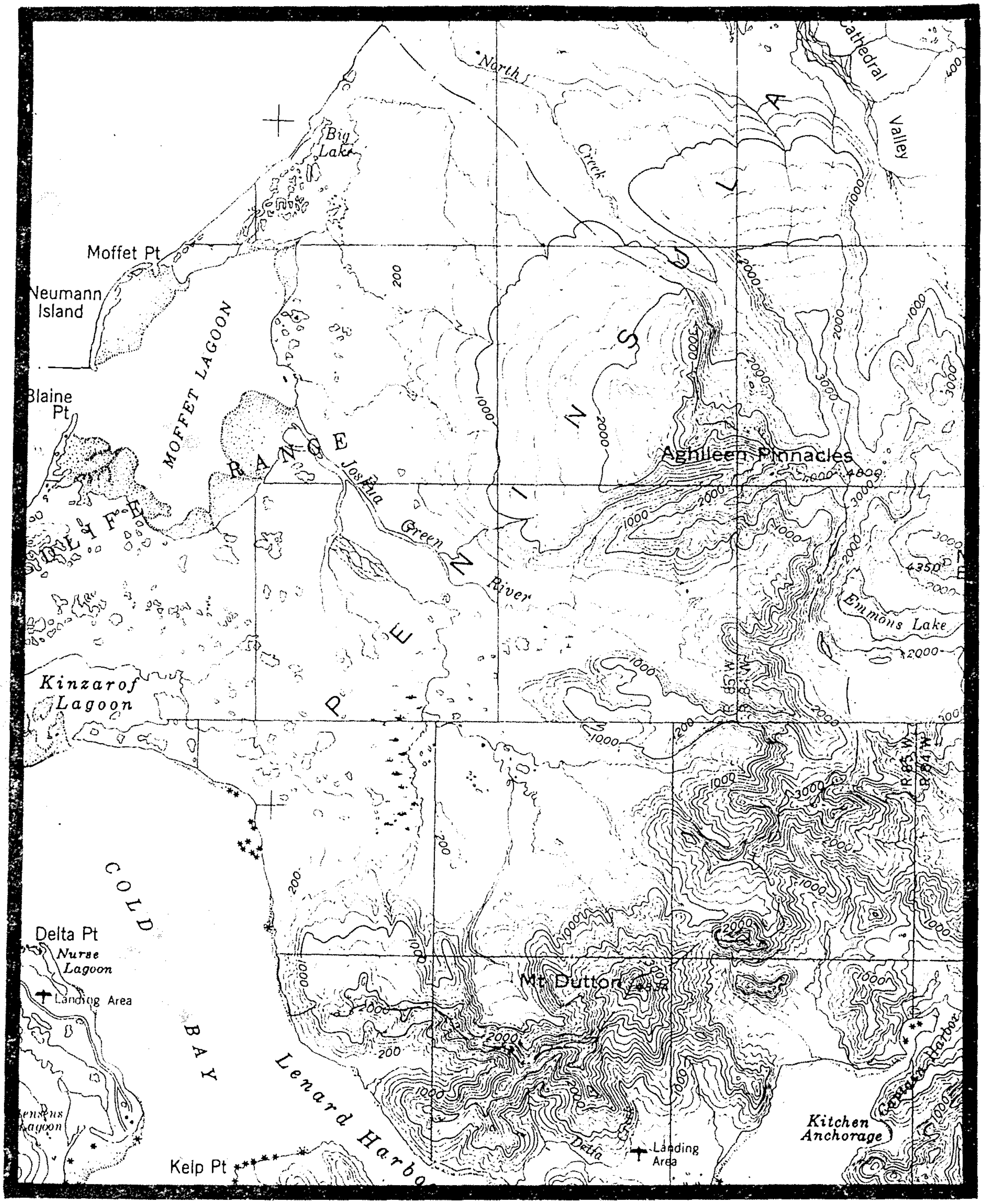


Figure 13. Radio locations of female brown bears with cubs of the year (COY). A: IZ23 w/2COY; B: IZ24 w/3COY; C: IZ38 W/2COY; D: IZ39 W/2COY. ● Capture Site, ● August locations, ● September locations, ● November locations. ◺ = quadrat where present when precise location was not obtained. ◎ = Den Site.


Cathedral
Valley
North
Creek
Big Lake
Moffet Pt
Neumann Island
Blaine Pt
MOFFET LAGOON
RANGE
P E N I N S U L A
Joshua Green River
Aghileen Pinnacles
Emmons Lake
Kinzarof Lagoon
COLD BAY
Delta Pt
Nurse Lagoon
Landing Area
Mt Dutton
Lenard Harbor
Kelp Pt
Kitchen Anchorage
Delta

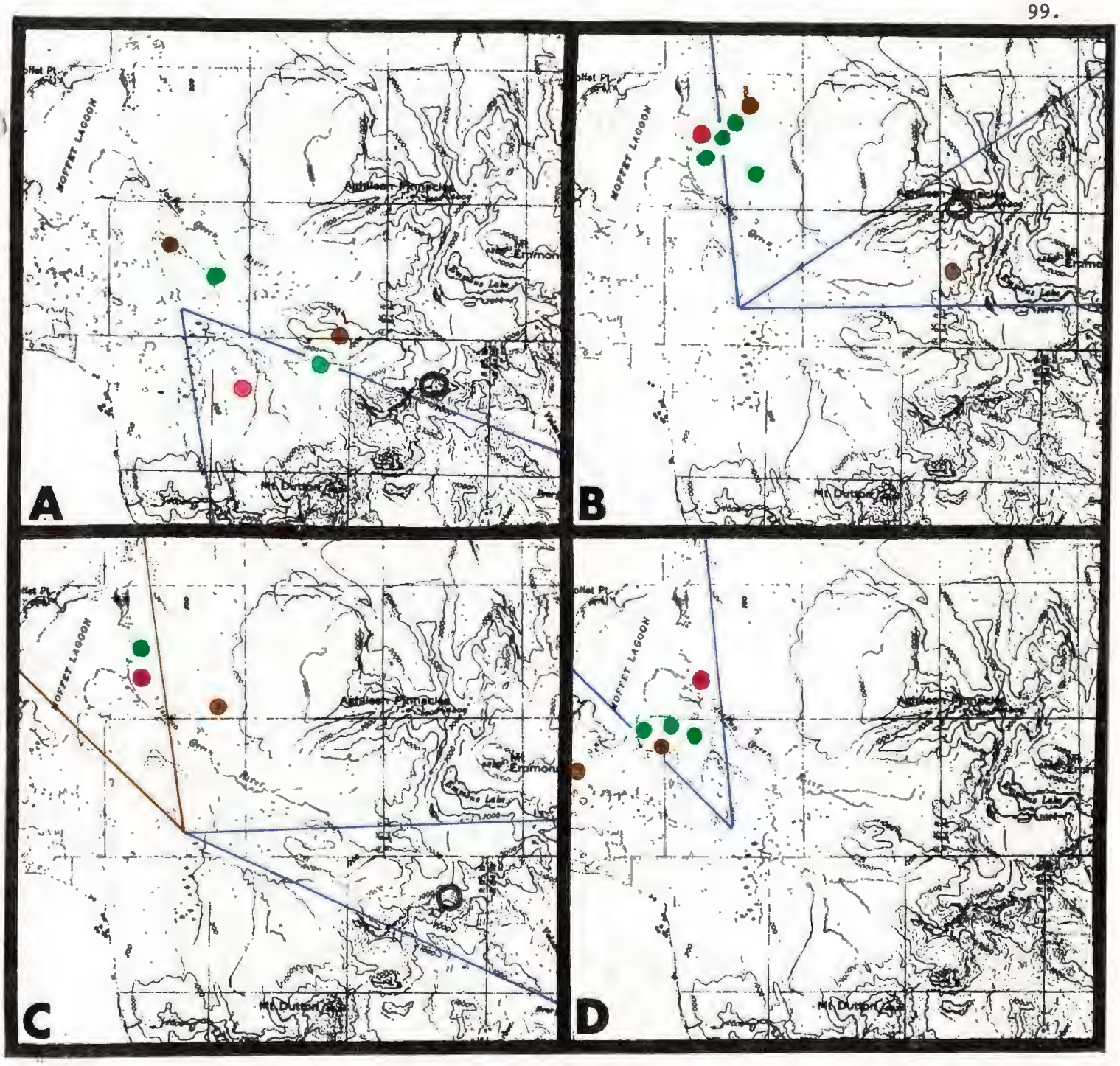
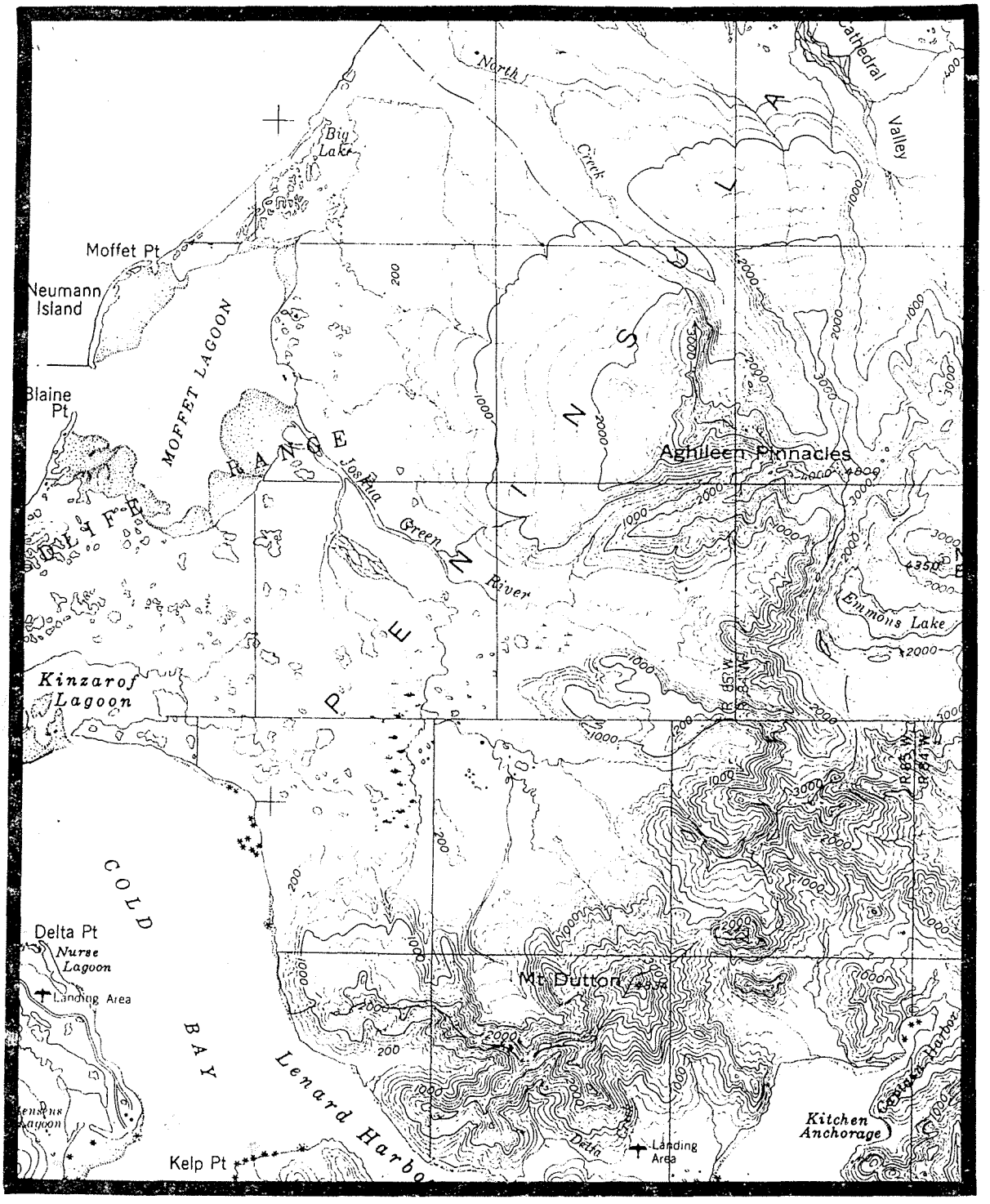


Figure 14. Radio locations of female brown bears with yearlings. A: IZ26 W/2YRL; B: IZ27 W/3YRL; C: IZ33 W/1YRL; D: IZ34 W/2YRL. ● Capture Site, ● August locations, ● September locations, ● November locations. ▲ = quadrat where present when precise location was not obtained. ○ = Den Site.
NOTE: IZ37 W/2YRL apparently lost her cubs after capture and is shown in Figure .


Moffet Pt
Neumann Island
Blaine Pt
MOFFET LAGOON
BEACH
SPIT
Big Lake
North Creek
Cathedral Valley
Aghileen Pinnacles
Green River
Emmons Lake
Kinzarof Lagoon
COLD BAY
Delta Pt
Nurse Lagoon
Landing Area
Mt. Dutton
Lenard Harbor
Kitchen Anchorage
Kelp Pt
Landing Area

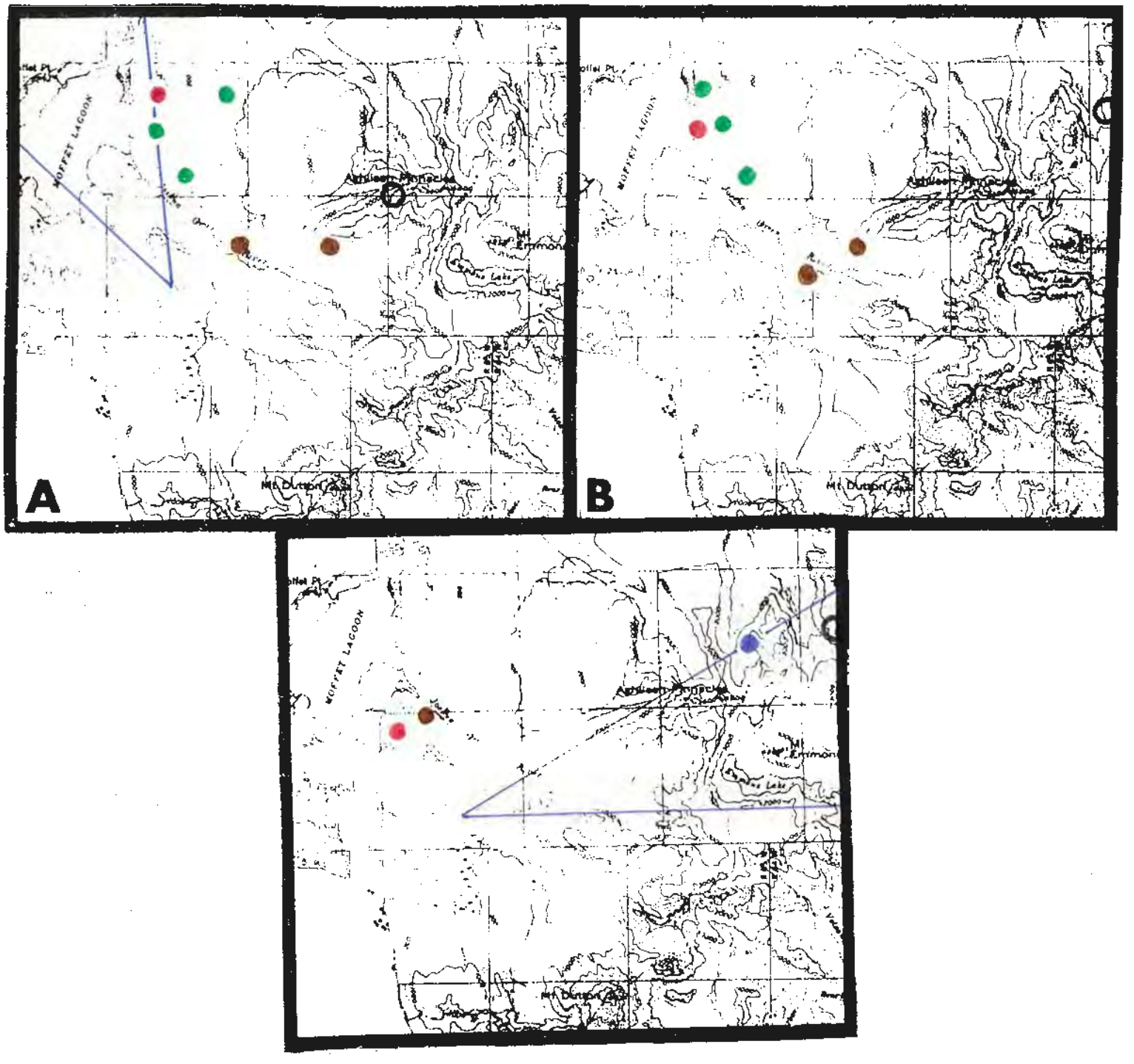


Figure 15. Radio locations of female brown bears with 2½ year old cubs. A: IZ28 W/3-2.5; B: IZ29 W/3-2.5; C IZ63 W/2 - 2.5. ● Capture site, ● August locations, ● September locations, ● November locations. ▲ Quadrat where present if precise location was not obtained. ○ = Den site.

Remains of a bear guide's cabin dismantled in 1983 removed by the refuge staff in 1984.

Blenden (9/18/84)

A helicopter was required to haul the cabin's contents and remains back to Cold Bay for disposal.

Blenden (9/18/84)

Also, each season would close by emergency order when two bears were harvested. Small, sub-adult bears, most often tagged subjects part of our refuge study, were commonly taken in this hunt.

The spring, 1984 road hunt, was the last of the annual hunts in this area prior to adopting the "problem bear" clause. Seven hunters participated in the hunt and a small male bear weighing 295 pounds was taken on 28 June, two days prior to the end of the season. We feel that such animals, if they don't become habituated to people and hence become a nuisance, are certainly not trophies and should remain in the population.

Brown bear permit hunts on Unimak Island continue on an annual basis with both spring and fall seasons. Fifteen permits are issued by the Alaska Department of Fish and Game each year (seven in spring and eight in fall). Only four of the 15 permittees actually hunted and only one bear, a female, was taken during the fall hunt (Table 33).

The Alaska Peninsula, including the Izembek NWR and Pavlof Unit - Alaska Peninsula NWR, are open to brown bear hunting on alternate seasons every other regulatory year. The season was open 10 - 25 May 1984. Seven bears were known to have been harvested from Izembek NWR (Right and Left-hand Valleys). The refuge staff sealed 16 other bears taken from or adjacent to the Pavlof Unit - APNWR. Several record book size bears were sealed, some of which came from Right and Left-hand Valleys.

Caribou

The southern Alaska Peninsula caribou herd ranges south of Port Moller, occurring seasonally on portions of Izembek NWR (Figure 16). Rugged terrain in the Port Moller area separates the southern from the larger northern Alaska Peninsula caribou herd. During 1984, this herd was estimated to contain at least 7,500 animals. Recent reliable population estimates range from 10,200 in the fall of 1983 to 5,844 during November, 1979.

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

Izembek NWR staff have conducted surveys of this caribou herd since 1949. However, systematic surveys conducted on a regular basis have only been attempted 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 intercepting herds as they cross the Cold Bay road system in the fall and in summer by spotting herds from the air, then landing close by and hiking to a suitable observation point. Comparison of summer and fall composition counts provides

Table 33 . Brown Bear Hunter Humbers and Success
Unimak Island, 1970 - 1984

	Permits Issued	Hunters Active	# Bears Known Taken
Fall 1970 - Spring 1971	15	8	4
Fall 1971 - Spring 1972	15	10	4
Fall 1972 - Spring 1973	16	8	5
Fall 1973 - Spring 1974	20	10	3
Fall 1974	10	3-9 /1	3
CY 1975	20	9	6
CY 1976	18	10 /2	4
CY 1977	15	10 /2	7
CY 1978	15	3 /2	1
CY 1979	15	8 /3	7
CY 1980	15	6	3
CY 1981	15	5	3
CY 1982	15	7 /2	4
CY 1983	15	10 /2	6
CY 1984	15	4	1

/1 It is not clear whether a 'no' answer in fall of 1974 records means 'did not hunt' or 'hunted but was not successful'.

/2 One permittee failed to return questionnaire, unknown if active.

/3 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.

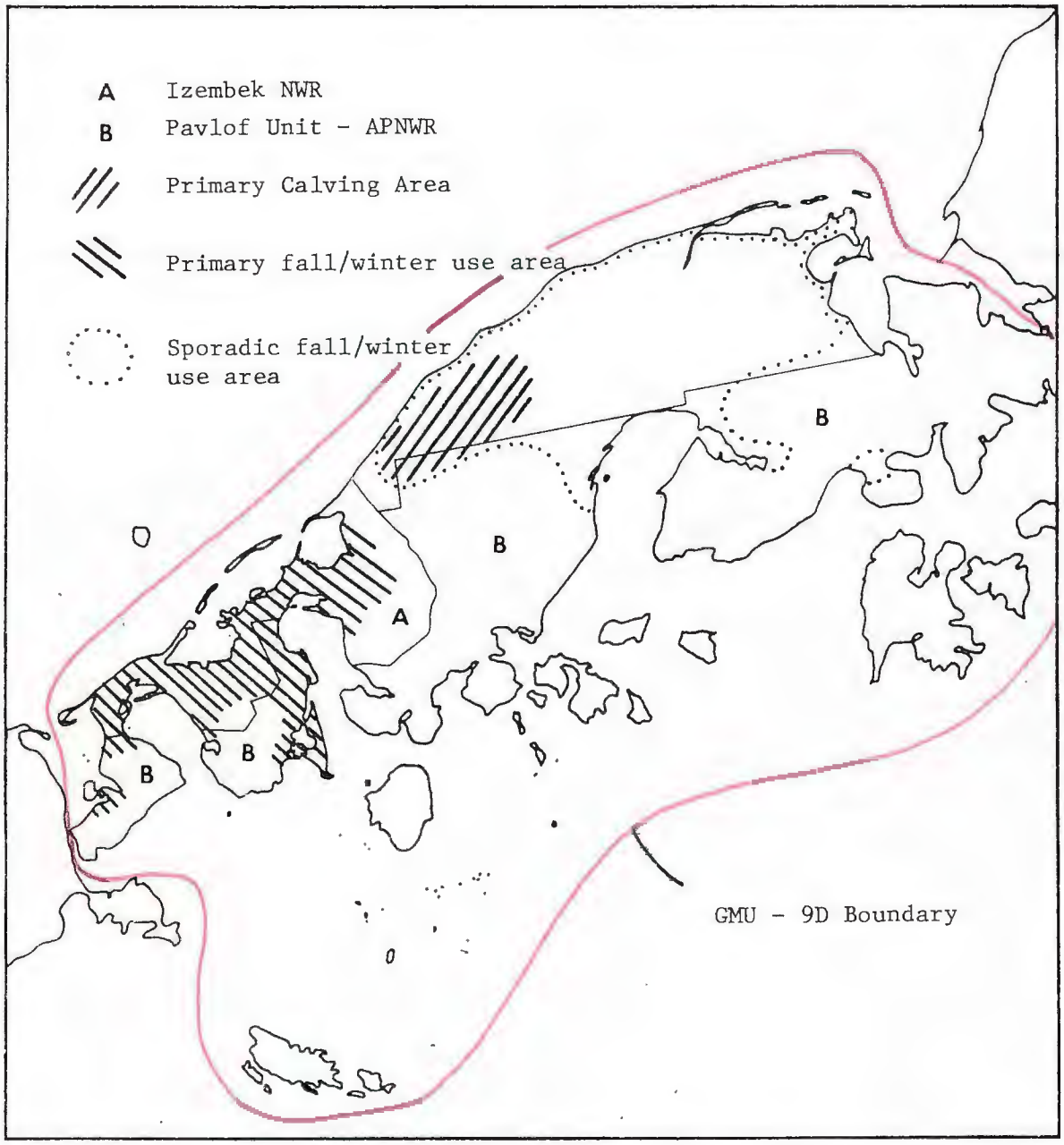


Figure 16. Seasonal distribution of the southern Alaska Peninsula caribou herd, Game Management Unit (GMU) - 9D.

an indicator of summer calf mortality. Total population estimates have only been done sporadically during past years because of the improbability of suitable flying and snow cover conditions occurring simultaneously. A combination of aerial photography with a hand held 35mm camera and estimation of herd size from the observers has proven relatively accurate, but certainly not infallible.

Analysis of survey information has illustrated two factors concerning this herd. Productivity defined as percentage of the herd comprised by calves, seems much lower for the southern herd as compared to the northern Alaska Peninsula herd. Secondly, the percentage of the population comprised of bulls with large antlers has dropped from a 29% average in 1981 to 5% in both 1983 and 1984.

Harvest information has been derived primarily from Alaska Department of Fish and Game's mandatory hunter reports and from the refuge staff telephone sample of Cold Bay residences and bag checks. These data provide estimates of total harvest by local and non-local hunters, harvest sex ratios, hunter effort and harvest reporting rate and distribution of harvest over the refuge and through the season.

Survey efforts during 1984 were limited to two ground productivity counts, one on 24 July and the other on 13 October. Results from these counts are very similar to those in years past suggesting relatively static rates of production. The 24 July (n=2389) and 13 October (n=1700) samples indicated 16.9% and 15.3% of the herd was comprised of calves (Table 34). Production counts during 1981, 1982, and 1983 indicated calf production was approximately 10.3, 13.1 and 16.6 respectively. In contrast, calf production of the northern Alaska Peninsula herd has been estimated by the Alaska Department of Fish and Game to be 25.3, 26.6 and 28.5 for the years 1981-1983 (Alaska Department of Fish and Game). Although the southern herd appears to be stable, if not increasing, the disparity in production between the two herds continues to be a point of concern.

That portion of the herd composed of large bulls has apparently dropped during the past three years. Surveys conducted during 1981 indicated approximately 29% of the herd was composed of large bulls (n=2,671). In 1982, this figure dropped to 14.7% (n=1,527) and 45% (n=1,596). The average figure for 1984 was 5.4% (n=3,956). Admittedly, these statistics were derived on the basis of largely subjective judgements but refuge staff do feel they reflect a trend in the composition of this herd away from the "trophy" component. At this time, it appears that one cause of this occurrence is higher selective harvest pressure on bulls which is occurring as part of the larger harvests of the last several years.

Results of our telephone survey and ADF&G's harvest survey indicate the 1983-1984 caribou harvest was noticeably less than that of 1982-1983 (Table 35). Cold Bay residents harvested approximately 38% fewer caribou than during the 1982-1983 season while they assisted non-locals in the take of about 68% fewer animals. Based on ADF&G's survey, the number of caribou taken per hunter (local and non-local combined) was 2.1 down from a rate of 2.4 the previous season (Figure 17).

Table 34. Caribou Productivity Data, Southern Alaska Peninsula Herd, 1984.

Date	Survey Type	Animals Observed	No. Sampled	No. Calves (%)	No. Large Bulls (%)
24 July 1984	Ground	7,500	2,389	403 (16.9)	90 (3.8)
13 October 1984	Ground	1,700	1,566	239 (15.3)	108 (6.9)

An estimated 7,500 caribou were found in one herd during the post-calving period. Calves comprised 16.9 percent of 2,389 animals sampled and 3.8% were large bulls.
(399)37 Sarvis (7/24/84)

This post-calving aggregation of caribou on the Pavlof Unit-APNWR dramatically displays the sociable nature of the species.
Dau (7/24/84)

Table 35 . 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
% change 1983-84 versus 1982-83	0		-38.2		-39.1	-67		-68.2		-4.2

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
% Change 1983-84 (versus 1982-83)	-29	-51	-21	-54	-50	-8

/1 Based on a sampling of ten (10) households in Cold Bay in 1981-82, nine (9) households in 1982-83 and ten (10) houseoulds 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.

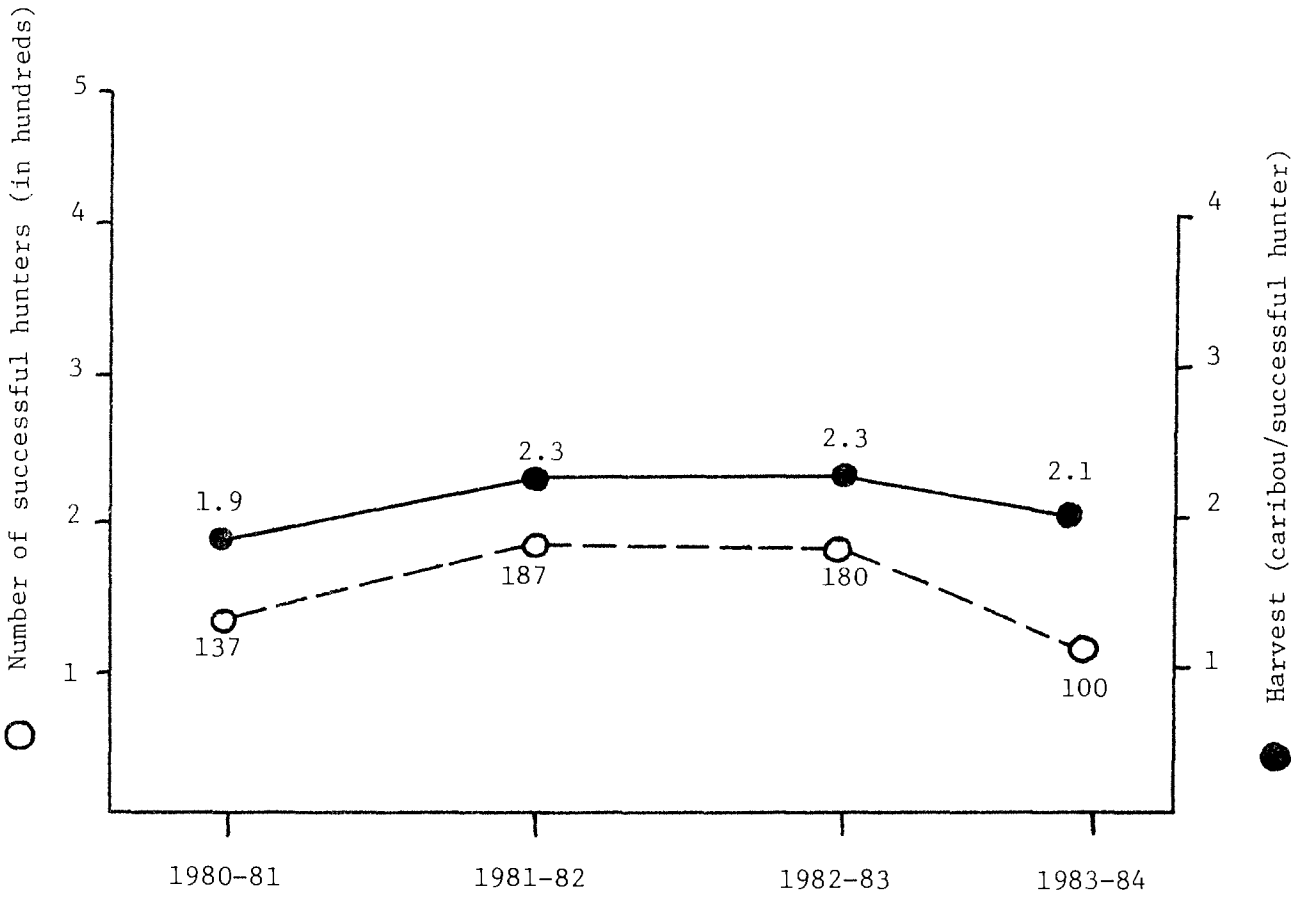


Figure 17. Numbers of Successful Hunters and Take/Hunter in Game Management Unit 9D (i.e. Southern Alaska Peninsula Caribou Herd as reported to ADF&G).

Results from our telephone survey indicate a reporting rate of approximately 75% on ADF&G's hunter survey. If this is still the case, the adjusted total harvest for Game Management Unit 9D was 283 caribou or about 16% of the 1983 recruitment.

It appears harvest may drop again for the 1984-1985 season. By the end of 1984, only 56 caribou had been reported taken according to refuge staff bag checks. By the same time last year, 214 animals were recorded taken in the Cold Bay area.

9. Marine Mammals

Sightings of marine mammals were recorded during the 28 April - 4 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 115 gray whales, 525 sea otters (519 in Izembek Lagoon), one sealion and 5,294 harbor seals were observed. Walrus were observed hauled-out at Cape Seniavin, near Port Moller, in a herd estimated to number 625 animals. Along the south side of the Alaska Peninsula from Bechevin Bay to Wide Bay, totals were one gray whale, 438 sea otter, 29 sealions and 185 harbor seals.

The unidentified dolphin found dead along the Cold Bay shoreline in 1983 was identified by the U. S. National Museum as a spotted dolphin (Stenella attenuata). This is a new range extension for this species common to tropical waters of the Pacific and Atlantic Oceans. Normal distribution in the Pacific Ocean is to 40 N. latitude (i.e. northern Japan and Hawaiian Islands).

10. Other Resident Wildlife

Rabies in our local red fox population is giving the impression of being on a three year cycle. After numerous positive cases in 1982 and one in 1983, we documented a single positive individual on 20 March 1984. As of this writing, several positive specimens have occurred in 1985.

The least weasel (Mustela rixosa) is an uncommon resident species on the Izembek NWR. In 1984, a single animal was seen on 6 November, this being the first documented sighting since 1978.

11. Fishing Resources

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 36, 37 and 38.

Russell Creek Hatchery

The State of Alaska (ADF&G - Fisheries Rehabilitation, Enhancement and Development (FRED) Division) constructed this 4 million dollar facility near Cold Bay in 1979. At full capacity, the facility will be able to rear up to 50 million salmon annually. The ADF&G (FRED Division) has been

Sleeping sow and her yearling cub on a Unimak Island Beach. Bears patrol the beaches frequently for carcasses and other food items.
(213)21 Sarvis (8/20/79)

The short-tailed weasel is common in rocky areas and around areas of habitation along the Alaska Peninsula.
(138)3 Sarvis (11/12/78)

Table 36 . Chum and Pink Salmon Escapement, Russell Creek 1978 - 1984 /1

Year	Chum Salmon	Pink Salmon
1978	50,000	50,000
1979	15,100	3,000
1980	36,240	39,680
1981	30,263	1,500
1982	40,800	60,000 (est.)
1983	10,000	Trace /2
1984	55,000	94,000
Avg. Even Year	45,500	60,900
Avg. Odd Year	18,500	1,500

/1 Data supplied by Marlin Bricker, Fisheries Biologist, Fisheries Rehabilitation and Enhancement Division, Alaska Department of Fish and Game, Cold Bay, Alaska through 1982. Hatchery staff 1983. Arnold Shaul, Commercial Fisheries Division, Alaska Department of Fish and Game, Kodiak, Alaska, 1984.

/2 No fish seen. Stream conditions "murky".

Table 37. Commercial salmon catch and escapement, vicinity of Izembek NWR, 1969-1984

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

	Pink (Humpy) Salmon (in thousands)					Chum (Dog) Salmon (in thousands)			
	Cold Bay & Morzhovoi*		Izembek & Moffett			Cold Bay & Morzhovoi		Izembek & Moffett	
Year	Catch	Escape	Catch	Escape	Year	Catch	Escape	Catch	Escape
1969	0.2	20.3	0	2.3	1969	0	24.6	4.5	94.4
1970	1.5	43.9	0	0	1970	1.8	43.5	10.0	53.4
1971	3.6	4.5	0	0.1	1971	0.5	54.3	36.3	54.8
1972	0	5.7	0	0	1972	0	51.0	57.9	72.7
1973	0	4.6	0	0	1973	0.7	30.4	96.6	70.3
1974	0	9.9	0	0	1974	0	30.9	11.2	70.6
1975	0	8.3	0	0.1	1975	0	17.7	3.4	77.6
1976	0.8	55.8	0.1	0	1976	2.9	38.7	40.8	123.3
1977	0	21.7	0	0.2	1977	0	139.1	20.3	368.3
1978	6.0	157.7	2.2	0	1978	5.9	102.2	81.4	119.0
1979	0.03	19.2	0.01	0	1979	4.6	27.4	17.8	178.0
1980	126.1	127.1	0	0	1980	43.3	64.4	282.6	365.2
1981	8.5	17.5	0	0	1981	27.0	48.5	296.4	235.0
1982/1	136.9	319.7	0	0.2	1982/1	103.6	103.6	57.5	166.4
1983	13.8	31.2	0	0	1983	58.9	62.5	154.8	173.3
1984	139.7	236.7	0.1	0	1984	145.5	123.4	102.7	427.5

* 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 37. Commercial salmon catch and escapement, vicinity of Izembek NWR, 1969-1984 (Cont'd.)

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

	Red (Sockeye) Salmon (in thousands)					King (Chinook) Salmon (in thousands)			
	Cold Bay & Morzhovoi		Izembek & Moffett			Cold Bay & Morzhovoi		Izembek & Moffett	
Year	Catch	Escape	Catch	Escape	Year	Catch	Escape	Catch	Escape
1969	2.2	7.5	6.1	14.0	1969	0	0	0	6.9
1970	1.0	3.3	3.1	7.5	1970	0	0	0	2.1
1971	1.1	2.3	6.9	3.5	1971	0	0	0	0.2
1972	0	2.5	0.8	4.8	1972	0	0	0	0.2
1973	0.2	3.3	1.2	2.0	1973	0	0	0	0.7
1974	0	27.3	4.7	3.7	1974	0	0	0	0
1975	0.5	15.6	1.5	13.6	1975	0	0	0	0
1976	1.4	27.3	20.4	15.3	1976	0	0	0	0
1977	12.5	28.7	3.1	26.1	1977	0	0	0	0
1978	1.0	24.7	15.5	23.0	1978	0	0	0	0
1979	0	8.5	10.8	8.4	1979	.002	0	0	0
1980	15.7	6.1	34.2	11.2	1980	0	0	0	0
1981	8.9	7.0	30.9	12.0	1981	0	0	0	0
1982 /1	19.8	17.0	24.5	21.2	1982/1	0	0	0	0
1983	13.8	18.2	15.2	18.5	1983	0	0	0	0
1984	59.3	14.1	4.7	19.1	1984	0	0	0	0

* Much of the Cold Bay-Morzhovoi run occurs off-refuge

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

Table 37 . Commercial salmon catch and escapement, vicinity of Izembek NWR, 1969 - 1984 (Cont'd)

Coho (Silver) Salmon ** (in thousands)

Year	Cold Bay & Morzhovoi* 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	1.4	0
1983	0.7	0
1984	0.6	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, A.D.F. & G., Comm. Fish Div., Kodiak).

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

Table 38. Catch and escapement data for salmon in the Hoodoo (Sapsuk) Lake/Caribou River Drainage

Year		Species					Total
		Red	Silver	Chum	King	Pink	
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 /2	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 /2	49,000	6,300	-	338,300

/1 Data supplied by Arnold Shaul, Commercial Fisheries Division, Alaska Department of Fish and Game, Kodiak, Alaska

/2 Sapsuk River only.

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 39).

14. Scientific Collection

Blood samples were collected from 36 Steller's eiders (18 males, 18 females) to perform serological studies directed toward development of an antidote for Aspirgillosis (See: G. WILDLIFE, 3. Waterfowl, (Steller's Eider).

Three bald eagle carcasses were salvaged; however, necropsy results were not conclusive as to cause of death. Appropriate parts were sent to the Law Enforcement Division in Anchorage.

Less than ten specimens of various birds and mammals were salvaged by the refuge for preparation as museum skins or display mounts.

16. Marking and Banding

Mammals

See Section G. WILDLIFE 8. Game Mammals, Brown Bear for a discussion of marking activities in 1984.

Birds

Birds banded under the Refuge Master Banding Permit 20826 are summarized in Table 40. Refer to the appropriate sections in G. WILDLIFE for further discussions of specific projects.

Table 39 . Management Data, Russell Creek Hatchery, 1981 - 1984

	SPECIES							
	Chum Salmon				Pink Salmon			
	1981	1982	1983	1984	1981	1982	1983	1984
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 /2	55,000	1,500	60,000 est.	Trace /3	94,000
Estimated commercial harvest	15,891	25,000	1,700	25,655	4,929	5,000	100	20,144
No. fish fin clipped	100,000	-	-	-	-	-	-	-
Total run (approx.)	53,300	71,300	18,900	-	6,400	65,000 est.	100+	-

/1 Data for 1983 & 1984 supplied by Arnold Shaul, Fisheries Biologist, Commercial Fisheries Division, Alaska Department of Fish and Game, Kodiak, Alaska

/2 Included hatchery take.

/3 No fish seen, however, stream condition was "murky".

Table 40. Birds Banded at Izembek NWR, 1977 - 1984

Species	Year								
	1977	1978	1979	1980	1981	1982	1983	1984	Total
Gyrfalcon	-	-	-	-	2	1	-	-	3
Pelagic Cormorant	-	-	1	-	-	-	-	-	1
Tundra Swan	4	27	16	38	66	52	115 /1	13	331
Canada Goose	109	143	-	66	45	-	55	-	418
Pintail	-	98	-	5	-	-	-	-	103
Greater Scaup	-	-	-	5	-	-	-	-	5
Steller's Eider	1045	502	516	941	869	-	-	324	4197
Rock Sandpiper	-	-	12	-	-	-	-	-	12
Dunlin	-	-	2	-	-	-	-	-	2
Lapland Longspur	4	-	-	-	7	-	-	17	28
Snow Bunting	15	33	105	19	33	6	38	2	251
McKay's Bunting	-	7	8	1	-	-	-	-	16
Common Raven	-	-	1	-	1	-	-	-	2
Gray-crowned Rosy Finch	50	40	113	147	67	58	26	23	524
Savannah Sparrow	-	2	-	2	4	-	-	-	8
Song Sparrow	-	-	-	3	-	-	-	-	3
	1227	852	774	1227	1093	117	234	379	5904

/1 Includes 39 tundra swan banded on Izembek banding permit by the Alaska Peninsula NWR.

A. PUBLIC USE

1. General

The majority of public use for the refuge comes from residents of Cold Bay and visiting waterfowl and caribou hunters. Although residents of the adjoining village of King Cove and False Pass do use the refuge, it is typically limited to a small amount of caribou and waterfowl hunting.

The population of Cold Bay increased somewhat over the 1983 level. An estimated 230 people live and work in the town as compared to 200 in 1983. Increased oil exploration and construction projects largely account for this increase. Seven different oil companies stationed support personnel in Cold Bay during the year. Two helicopter companies also maintained bases of operation in Cold Bay to provide transportation to and from oil rigs.

In general, refuge staff feel public use increased at a rate proportionate to the population increase from the 1983 level. Greater participation was noted in both consumptive and non-consumptive activities. Caribou and waterfowl hunting seasons still remain the refuge's most intensive periods of public use.

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 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.

6. Interpretive Exhibits/Demonstrations

The visitor display in the lobby of refuge headquarters exhibits mounted specimens of several species found on the refuge. It also displays information aiding public use and 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.

Refuge staff were involved with several public programs and meetings that dealt with management of the refuge. W. B. Dau presented a program to the Cold Bay public school showing a profile of the work done on the refuge. R. M. Sarvis made presentations on management of the refuge to groups such as the Aleutians East Coastal Resource Service Area, public hearings on refuge Comprehensive Plans and local helicopter companies.

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

Excellent waterfowl hunting opportunities lure man and dog to Izembek each fall.
(10)14 Sarvis (10/74)

Cross-country skiing is an occasional form of winter recreation at Izembek available to local residents and visitors.
Blenden (11-25-84)

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. This year was no exception. Approximately 70 hunters chartered a Lockheed Electra from Reeve Aleutian Airways and came out from Anchorage for a three day weekend of waterfowl hunting. 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. Refuge personnel spent all three days in the field, meeting hunters, answering questions and doing bag (Table 41) and license checks.

The majority of staging black brant and Canada geese remained in the area until the first week of November, a little longer than normal. This and the unusually nice weather gave the waterfowl hunter many opportunities. Some interest was diverted from waterfowl hunting by the early arrival of caribou into the Cold Bay area.

Caribou started arriving at wintering grounds in the Cold Bay area on the afternoon of October 12. By the morning of the 13th, it seemed every caribou hunter in Cold Bay was out hunting. By early January, the majority of the herd had moved out of the area back toward their calving grounds near the Black Hills, terminating most hunting activities at an early date. Refuge staff had only checked 56 animals by years end, compared to 214 by the end of 1983.

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. Salt water 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 and a trapping permit issued by the refuge is also required. Izembek and Unimak Island(Alaska Maritime NWR) were refuge lands specifically mentioned in ANILCA for which trapping permits are required. Sixteen trappers received permits in the 1984-85 season, eleven 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 84/85 season) are not yet available and will be reported next year. The reported catches for the last four seasons are shown in Table 42.

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.

Table 41 . Summary of Waterfowl Bag Check Data
Izembek NWR, 1984

(Harvest by Age/Sex)

Species	Adult M	Adult F	Adult U	Immature M	Immature F	Immature U	Unk. U	Crippled	Total /1	% of Harvest
Emperor Goose	3	2	9	1	1	-	1	3	20	10.0
Black Brant	6	3	2	3	2	2	-	2	20	10.0
Tav. Canada	16	25	2	25	24	7	51	10	160	79.6
Lesser Snow Goose	-	-	-	1	-	-	-	-	1	0.5
Goose Total								29 /2	201	
Pintail	1	8	-	4	9	-	10	-	32	54.2
Mallard	3	4	-	-	-	-		-	7	11.9
G-W Teal	4	2	-	-	-	-	3	-	9	15.3
E. Wigeon	1	-	-	-	-	-	-	-	1	1.7
Gadwall	3	2	-	-	-	-	3	-	8	13.6
Steller's Eider	-	2	-	-	-	-	-	-	2	3.4
Duck Total								2 /2	59	
Total Birds	37	48	13	34	36	9	68	31	260	

	Hunters Checked	Ducks	Emperors	Canadas	Brant
Charter Weekend	114	58	12	135	14
Non-Charter Days	20	1	5	15	4

* Estimate 90% of Charter hunters checked and 10% of all others

	Est. Charter Weekend Bag	Est. Other Bag	Est. Cripples	Est. Totals
Ducks	58/.9 = 64	1/.1 = 10	3 (3.4%)	77
Emperor	12/.9 = 13	5/.1 = 50	13 (20.0%)	76
Canada	135/.9 = 150	15/.1 = 150	200 (66.7%)	500
Brant	14/.9 = 16	4/.1 = 40	8 (13.3%)	64

/1 Total excluding cripples
/2 Two ducks of unknown species were reported crippled

Junior anglers are a welcome component of the Cold Bay sporting community.

Dau (8/84)

Table 42. Results of Permit Trapping Program, Izembek NWR

	1980-81 (15 Trappers)	1981-82 (15 Trappers)	1982-83 (21 Trappers)	1983-84 (17 Trappers)
Red Fox	90	94	74	82
Land Otter	7	8	18	25
Mink	7	3	6	32
Wolverine	2	4	1	1
Wolf	3	0	0	0

Small glass fishing floats and other flotsam litter the Bering Sea beach of the Izembek NWR, making it a beachcomber's paradise.
(15)3 Sarvis (5/75)

Beachcombing----Alaska style. Walrus wash up periodically and are usually found and the ivory retrieved using small planes.
(404)35 Sarvis (12/2/84)

13. Camping

Camping is not an important activity on the refuge. Excluding guided hunters, probably less than 20 campers use the area a year and most of these are involved in hunting or fishing activities.

17. Law Enforcement

The law enforcement effort in 1984 consisted of highly visible patrols during peak hunting periods, investigation of complaints received from the public, and routine surveillance of hunters in the field (Table 43). Most activity occurred in October during the waterfowl and caribou season. During this period, Bob Mumford, trooper for the State of Alaska, Mike Nunn of the Koyukuk NWR, and Roger Parker, L.E., Anchorage, assisted refuge staff in patrol and bag checks. Jim Low, State Fish and Wildlife Protection, Dutch Harbor, assisted refuge personnel in two citations. Their assistance was much appreciated and it gave the refuge staff more time for bag checking and wildlife surveys.

On 5 September 1984, R. M. Sarvis was notified by a local commuter service pilot that a DC-3 was sitting on the runway at the abandoned U. S. Coast Guard station at Cape Sarichef, Unimak Island and was being loaded with equipment from the buildings. Federal Aviation Administration's local flight service notified R. M. Sarvis upon its arrival to the Cold Bay airstrip. Pilot and crew were greeted by refuge personnel. Upon confirmation of our suspicions that their bounty was owned by the government, they were convinced to unload into three government pickups. Refuge personnel were not only astonished at the collection of goods ranging from one pound containers of black pepper to broken crutches, mop handles, broken radio equipment, broken cross country skis, broken light bulbs and three rusted oven racks, but by the enormous expense, trouble and risk these individuals took in flying a large aircraft about 80 miles for such paltry loot. The four were cited the following day for stealing government property and paid their fines. Neither plane nor crew have been seen in Cold Bay since.

18. Youth Programs

Izembek NWR continued its YCC programs at the level established in 1983. Two enrollees, Angela Taylor from Cold Bay, and Morgan Kirk from Fresno, California were on staff from June through August. They were a great help on duties ranging from painting to brown bear capture.

I. EQUIPMENT AND FACILITIES

1. New Construction

In 1984, we programmed $24,000.00 for erection of a larger aircraft hangar. Corrosion of the existing sliding doors, leaking roof and siding panels, insufficient space and safety considerations relating to fueling of the refuge aircraft were some factors requiring this new construction.

Part of a confiscated load of "equipment" stolen from the abandoned U. S. Coast Guard station at Cape Sarichef on Unimak Island (now owned by USFWS).

Dau (9/7/84)

This cabin, illegally constructed by a commercial fisherman in the Unimak Island Wilderness Area, was "lowered" to tent frame status per a Regional Office compromise.

Sarvis (9/13/84)

Table 43 . LAW ENFORCEMENT CASES, 1984

Violation	Date	State Court	Federal Court	Residency		Source	Disposition
				Local	Non-Local		
1. Overbag - Canada goose	10/12/84		x		x	Patrol-foot	$100 fine; forfeit 5 Canada geese
2. Overbag - Canada goose	10/12/84		x		x	Patrol-foot	$100 fine; forfeit 5 Canada geese
3. Motor vehicle off desig. road system	12/3/84		x		x	Phone call tip	$100 fine; pending
4. Take sea otter	2/15/84		x	x		Investigation-local	$150 court settlement offer
5. Theft of Govt. Property	9/6/84		x	x		Investigation-local	$250. fine
6. Theft of Govt. Property	9/6/84		x		x	Investigation-local	$250. fine
7. Theft of Govt. Property	9/6/84		x		x	Investigation-local	$250. fine
8. Theft of Govt. Property	9/6/84		x		x	Investigation-local	$250. fine
9. Viol. of SUP Conditions	1984		x		x	SUP compliance check	$250. fine
10. Viol. of State reg./ harvest tickets	11/12/84		x		x	Patrol	$125. fine/ pending
11. Comm. operation- Guiding W/O SUP	11/12-13/84		x		x	Patrol	$250 fine/ pending

One violator took to off-road vehicling to retrieve a downed caribou and got stuck. A citation was issued for driving off the designated road system.

Blenden (12/13/84)

The estimate for purchase (i.e. approximately $22,000.00) and construction (i.e. approximately $25,000.00) of this structure was obtained from a manufacturer in Anchorage familiar with construction costs in rural Alaska. At the outset, the Engineering Division (RO) disagreed with our cost analysis, believing it was low, in spite of the fact it was obtained from a company that sells and erects aircraft hangars.

The hangar itself was purchased and delivered to Cold Bay by the Cool Barge which arrived on 14 May. The final purchase and shipping charges were $55,776.78 and $5,700.83, respectively. The hangar, some portions of which were slightly damaged, was stored at the refuge headquarters while the RO (CGS and EN) prepared for the next step.

The bidding process was begun in June and the refuge was alarmed at the technique employed to notify potential construction companies. Rather than allowing companies to review the project and assess their costs, CGS notified them of the estimated cost range of project (i.e. $25,000. to $100,000). It was not surprising that the several bids received came in at about the $100,000. level. The contract for $89,500 was awarded to Henning Construction in July, 1984.

During erection of the hangar, several engineering design errors were discovered. In every case, the refuge was asked to add more money to the contract to correct these deficiencies, even though the refuge had nothing to do with the errors. The final cost for the hangar, doors, shipping, erection, repainting, and structural reinforcements came to $167,827.61. Though the cost seemed out of line, the hangar is a vast improvement over the old hangar and is making the protection and fueling of the aircraft much more efficient and safe.

It is interesting to note that a private company in Cold Bay constructed a hangar half again larger, fully insulated and heated with six (6) apartments and an office in 1979 for $225,000. It seems all too common that the government and the taxpayers don't get what they pay for. Or could it be that the government gets what it asks for?

Cold Bay has suffered from numerous power outages and surges over the past few years. In May, the utility company along with its capabilities for power operation passed out of existence. We were forced to make an emergency purchase of a 30 kw Cummins generator to produce our own power until a new power company could take over. In this case, we got good and expedited support from the RO and were quickly on-line. MM Avery Bates' experience in electrical systems were put to good use in the installation of this unit.

By mid-summer, the new power company, G and K, Inc., was in operation with most of the initial bugs worked out of their new system. Power generation for the remainder of 1984 was for the most part uneventful, as it should be. A considerable expense was incurred by the refuge early in 1984 to replace various motors lost due to fluctuating power levels.

3. Major Maintenance

All, or portions of the interior of three refuge residences were painted as

Our first summer of float plane operation was a great success opening heretofore unreachable locations.

Blenden (10/2/84)

Our float plane ramp at Blinn Lake was constructed of treated lumber salvaged at no cost from the local area. YCC enrollees worked on the project throughout.

Dau (6/84)

Once constructed the ramp was fitted with bumpered walkways. Weight applied beneath the walkways and ramps lowered the unit to the lake bottom.

Dau (7/84)

Removal of the plane from Blinn Lake prior to freeze-up necessitated the construction of a road to the lake and a trailer to carry the plane.
(403)23

Jean Sarvis (11/9/84)

The system worked as planned and the plane was ferried approximately four miles to our hangar in Cold Bay. Floats were exchanged for wheels in the hangar.
(403)37 Jean Sarvis (11/9/84)

Our new hangar will provide for safer and more efficient aircraft operations.

Dau (2/85)

a YCC project. Much needed cleaning and repair of storm windows was also accomplished in this process. This gave Residences 2 and 3 a much needed face-lift prior to their occupancy by the new maintenance man and Assistant Refuge Manager.

5. Communications Systems

Mobile FM radios were obtained in 1984. Three units were received for installation in refuge vehicles and four hand-held units were received for use on field projects. The hand-held units are far superior with respect to range and often functioned without the line-of-sight requirement.

Two mobile HF radios were taken to Anchorage for repair in mid-1984 and had still not been returned by year end.

J. OTHER ITEMS

1. Cooperative Programs

In August, 1984, Dick Sellers and Mark McNay of the Alaska Department of Fish and Game provided assistance and aerial survey support in the capture phase of our brown bear project in Right and Left Hand Valley. We hope to involve them in this and other refuge projects as their schedule allows.

An aerial waterfowl survey project involving the Izembek and Alaska Peninsula NWR's, Wildlife Assistance, Research, Alaska Department of Fish and Game and FWS retirees was successfully performed in October, 1984.

4. Credits

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

Mike Blenden wrote Sections, B, C, D1.-3., E.2, 4-5, F.1-2, 12, G.8, Caribou and H.

Chris Dau wrote Sections A, D.5, E.1, 3, G. 1-2, 3. Black Brant, Canada Goose, Emperor Goose, Stellers Eider, 4-7, 8. Brown Bear, 9-11, 14, 16. I. 1, 3, 5. J. 1, 3. K and L.

Bonnie Taylor typed and edited the report.

K. FEEDBACK

In 1984, we continued to monitor the growth in additional "paperwork exercises" generated from within and outside the Fish and Wildlife Service (Table 44). We began this analysis last year by maintaining a reporting"deadlines" list on which all such 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, outputs, and planning. We feel many of the "paperwork exercises" summarized below could be intercepted and answered or deleted by the ever increasing support services

Cold Bay's community power facility functioned sporadically and finally surrendered in May. A new company employing conscientious maintenance and up-to-date technology has happily taken over.

Dau (5/2/84)

Table 44 . Non-Annual Work Plan Reporting Responsibilities Assigned to Izembek NWR During 1984. /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)	12 (16)					
Regional Office (Other)	48 (66)					
Central Office	5 (7)	26.6 ± 19.9	16.0 ± 16.3	9.8 ± 16.7	23 (32)	50 (68)
Other Agency	8 (11)					
TOTAL	73					

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

The rugged Aghileen Pinnacles and Pavlof Volcano viewed across Cold Bay.

Blenden (9/84)

WHERE'S THE BEEF? RM Sarvis guided these DOI personnel on a tour of Izembek NWR. (L. to R., Bob Putz, Ray Arnett, Vern Wiggins, Larry Crawford, Rick Davidge, John Sarvis)
(77)15 Jean Sarvis (9/28/84)

functions supposedly furnished by the R.O. Instead, the "buck is passed" to the field station thereby providing additional burdens on often small staffs. The importance and emphasis the R.O. places on these additional exercises, often at the expense of management programs designed to benefit the resource, is very depressing.

Total additional reporting requirements in 1984 (n=73) increased 11 percent over the 1983 level. The refuge continued to turn the requests into responses in an expeditious manner, on the average 10 days ahead of the deadlines given. This should not be construed as this field station's view of the urgency or importance of the request but our desire to minimize the adverse effects and R. O. repercussions on our full schedule of resource management programs. It is interesting to note that the number of administrative "non-resource" type reports was stable from 1983 (n=49) to 1984 (n=50). The increased burden came in reports we felt had something, albeit remotely, to do with resource management (i.e. 17 in 1983 versus 23 in 1984). The latter type of request will probably always funnel down for field level input. However, we feel the additional "non-resource" type reporting responsibility can and should be intercepted by various support service functions.

We maintain that the primary mission of the Fish and Wildlife Service is to conserve fish and wildlife populations and their habitats through management and research. These functions are largely field level in nature. We collect the necessary data and provide our best case scenarios biased in favor of our constituents (i.e. the public that demands fish and wildlife populations and their habitats be protected). If field functions are continually eroded by unnecessary paperwork exercises, how will the data necessary to make informed management decisions get collected? And what of the irreparable scarring of the prestigious image of the Fish and Wildlife Service that still inspires some of us? A realist may suggest that if current trends and priorities continue within the Service, it may someday be in the best interest of the resource and the taxpayer to contract for management and research needs.

APPENDIX I

Helicopter/Goose Situation on Izembek NWR, 1984

The Izembek NWR has summarized the chronology of events occurring this fall relating to helicopter overflights of Izembek Lagoon. This synopsis was prepared to clarify the erroneous claims presented in the Association of Village Council Presidents (AVCP) Resolution: 84-10-26 of 18 October 1984 (Attachment 1). Several important factors should be considered prior to an analysis of this resolution and the actual chronology of events occurring in September and October, 1984, at the Izembek NWR.

1) Izembek NWR was asked to comment on oil company exploration plans by the Minerals Management Service (MMS) on 6 April 1984. We were specifically asked to prepare a map with comments designating acceptable helicopter corridors around Izembek Lagoon and associated key fall waterfowl use areas. This map was sent to MMS on that date and it appeared as part of each lessee's permit.

2) Independently MMS asked for comments from the State of Alaska relative to oil company exploration plans and the stipulation from the Governor's Office states that:

> "In order to minimize impacts to important wildlife resources found at Izembek Lagoon, Oil Company Name must ensure that helicopter flights to support its offshore exploration activities in the St. George Basin will conform to flight corridors identified by the U. S. Fish and Wildlife Service or maintain a minimum flight altitude of 1500' when flying over or near Izembek Lagoon unless human safety or requirements of the Federal Aviation Administration dictate otherwise."
>
> NOTE: Izembek NWR was not given the opportunity to point out the inappropriatness of 1500' ASL overflights to avoid harrassment to black brant and the need to strictly follow designated routes under Visual Flight Rule (VFR) conditions. This fact was later recognized by the State and presented in an October 8, 1984 letter from the Governor.

3) Izembek NWR requested on 14 September that MMS notify oil companies operating in the St. George Basin of our concern that overflights of Izembek Lagoon were occurring and that they need to conform to their permit requirements by informing their contract helicopter companies.

4) Izembek NWR initiated contacts with local oil company representatives and contract air carriers on 17 September when waterfowl concentrations on Izembek Lagoon began to significantly increase.

Chronology of events relating to oil company related helicopter flights over Izembek Lagoon, September - October, 1984

Early September - Helicopter overflights of Izembek Lagoon at or above 1500' ASL were being undertaken by both contract helicopter companies under VFR conditions. Documentation of flights on 2, 13 and 16 September by Izembek NWR staff was made. Harrassment of black brant was noted during these flights.

14 September - The MMS was contacted concerning the helicopter flights over Izembek Lagoon which Izembek NWR felt were in violation of their permit from MMS. This correspondence and resulting correspondence from MMS to the oil companies requesting compliance with FWS stipulations are presented in Attachment 4.

17 September - Izembek NWR staff met with local representatives from EXXON, ARCO, CHEVRON, and their contract helicopter companies, ERA Helicopters and AIRLOGISTICS. The maps showing designated flight corridors were supplied to each contacted individual. None of the oil company representatives and only one of the air carriers was aware of the permit stipulations relating to helicopter flights over Izembek Lagoon. Each company/carrier agreed to follow our designated routes and to so notify their personnel.

19 September - Three (3) overflights of Izembek Lagoon in VFR conditions were documented by the Izembek NWR staff. These flights were not in accordance with our discussion with the companies on 17 September.

20 September - Two (2) additional overflights of Izembek Lagoon in VFR conditions were documented by the Izembek NWR staff and all local oil company representatives and contract helicopter companies were contacted a second time in person. Both helicopter companies had independently obtained approval from the Federal Aviation Administration (FAA) for new Instrument Flight Rules (IFR) routes from Cold Bay to the offshore platforms. This was done apparently during spring or summer. Izembek NWR notified them that these routes were unacceptable in that they crossed Izembek Lagoon. It was proposed that the air carriers follow our designated route when VFR conditions existed or when IFR, that they intercept their IFR routes outside Izembek Lagoon. Both helicopter companies agreed to this proposal.

Refuge Manager Sarvis was contacted in the evening by a reporter from the Anchorage Times in reference to the helicopter overflights of Izembek Lagoon. Three main points were stressed by the refuge in this interview:

1) The refuge had first initiated contacts with oil company representatives and contract air carriers

on 17 September.

(2) The refuge felt that the companies would comply with our stipulations relating to helicopter overflights after they were made aware of them and the facts relating to potential problems with the goose populations.

(3) The declining population trends of the black brant and emperor goose are of concern to the Fish and Wildlife Service and several State agencies. In addition, the importance of Izembek Lagoon as a pre-migratory staging area was stressed.

Newspaper articles appearing on 21 September as a result of this interview are presented in Attachment 5.

21 September - As a result of the newspaper article, Izembek NWR received numerous inquiries and verbally discussed the "helicopter overflight problem." Calls included those from MMS, California Department of Fish and Game, USFWS (Anchorage), Alaska Public Radio and Alaska Department of Fish and Game.

Izembek NWR staff responded to inquiries with the following information:

1) The refuge had initiated contacts with local oil company representatives and contract air carriers relative to helicopter overflights of Izembek Lagoon.

2) Total compliance with FWS stipulations was not achieved yet but we felt it would be due to our efforts at coordination.

3) FWS and State agencies are concerned for the status of these declining goose populations (black brant and emperor goose). The refuge will continue to monitor and deal with the "helicopter overflight problem" to insure oil company compliance with their permit stipulations.

4) None of the oil companies or helicopter contract companies disagreed with or attempted to dissuade us from the stipulation of going around the lagoon and all said they would comply.

25 September One (1) VFR overflight of Izembek Lagoon was documented by Izembek NWR staff and the subject helicopter company was immediately contacted. Refuge staff and the company's chief pilot met that afternoon. Izembek NWR stressed the require-

ment that VFR traffic avoid Izembek Lagoon and a complete discussion of acceptable VFR and IFR routes to and from Cold Bay followed. This company agreed to our requirements and no further problems with their flight routes have been documented.

6 October - One (1) VFR overflight of Izembek Lagoon was documented by Izembek NWR staff by the second helicopter company and they were contacted this date. As occurred on 25 September with the other helicopter company, the Izembek NWR stressed the permit requirements that VFR flights avoid Izembek Lagoon or use the normal published IFR corridor during IFR conditions. This company also agreed to our requirements and no further problems with their flight routes have been documented.

7 October - Izembek NWR was contacted by the reporter from the Anchorage Times to follow up his newspaper article of 21 September. The Refuge was questioned as to whether or not the helicopter companies were following our designated flight routes. We advised that both helicopter companies had deviated once from our designated VFR routes. We also advised that the companies had been contacted by the refuge and that these two flights were not intentional deviations, but mostly a matter of miscommunication with new pilots. Attachment 6 presents the article that appeared as a result of this interview in the Anchorage Times (10 October).

11 October
12 October Telephone inquiry received by the Izembek NWR from Harold Sparck, Nunam Kitlutsisti (NK),Bethel. One question was asked and responded to:

1) In reference to correspondence between NK and EXXON have we documented helicopter flights over Izembek Lagoon at less than 1500' ASL? Answer: No.

Mr. Sparck congratulated Izembek NWR for dealing with the helicopter overflight problem and for insisting that helicopter overflights avoid Izembek Lagoon. Information supplied to Mr. Sparck included:

1) The FWS worked through the MMS permit process to identify the acceptable helicopter flight corridors which appeared in each oil company's permit.

2) The Izembek NWR initiated contacts with MMS, local oil company representatives and contract helicopter companies to insure awareness of our stipulations regarding helicopter overflights.

3) Through this coordination effort by Izembek NWR,

the two contract helicopter companies were now in compliance with their respective oil companies' permit stipulations.

25 October - KDLG news director, Bob King, interviewed Sarvis about the situation and was assured that the problem was solved and all VFR helicopter flights were going around the lagoon.

26 October - KDLG aired a release on the situation and some biological information on black brant. Broadcast was positive and said the problem was solved.

End of Chronological Presentation

The Izembek NWR has made efforts to provide accurate documentation of the behavior of fall staging geese (especially black brant) to helicopter overflights. These data suggest that there is not a suitable altitude for helicopter overflights of Izembek Lagoon which would avoid harrassment of black brant. This is primarily due to a maximum service ceiling of approximately 8,000 feet for the types of large helicopters currently in use in Cold Bay. Further, we have attempted to determine the validity of our assumption that helicopter flights along our designated corridor will not adversely affect brant feeding or roosting. The refuge has documented approximately fifteen such flights and feel that following our identified routes will ensure that fall staging waterfowl populations, including the black brant, are not adversely affected at the current level of flight operations. We will certainly monitor this situation whether or not the numbers of daily helicopter flights change in future years and reevaluate permit stipulations as necessary.

The AVCP Resolution: 84-10-26 is erroneous and misleading in light of the actual chronology of events. Izembek NWR is particularly offended by the statement that we made no intervention in the helicopter-black brant harrassment problem on Izembek Lagoon. We, in fact, initiated the mapping of acceptable flight corridors which appeared in permits granted to each oil company. In addition, we made the necessary follow-up contacts with the local oil company representatives and their contract helicopter companies in Cold Bay in mid-September to reinform them of our stipulations in their permits. We continued to monitor the situation and keep the parties in question informed until permit compliance was fully achieved. In addition, we are now attempting to set up a meeting this winter with all parties involved to further discuss and clarify this situation and attempt to obtain better coordination between all agencies involved.

The information presented supports the fact that in no way should the FWS be considered in violation of either the "Chevak Agreement" or the National Wildlife Refuge Administration Act due to activities by the Izembek NWR.

ASSOCIATION OF VILLAGE COUNCIL PRESIDENTS
TWENTIETH ANNUAL CONVENTION
SAINT MARY'S, ALASKA - OCTOBER 18,1984

CONVENTION RESOLUTION # 84-10-26

WHEREAS, the Association of Village Council Presidents (AVCP), is the regional tribal organization and non-profit Alaska Native regional corporation for the 56 member Yup'ik Native communities of the Yukon and Kuskokwim Delta Region of Western Alaska; and,

WHEREAS, the AVCP FullBoard recognizes the importance of the work carried on by the AVCP organization and its obligation to assist member villages in their soical and economic conerns as well as having its support in each member village's endeavors; and,

WHEREAS, the AVCP Waterfowl Conservation Committee has worked to insure the cooperation of the villages of the Y-K Delta to conserve the populations of three Arctic nesting geese: the Pacific Black Brant, the Cackling Canadian Goose, the Pacific White-Front goose, whose populations are declining in the Hooper Bay agreement; and,

WHEREAS, the Chevak Agreement made between AVCP-WCC, the federal Fish and Wildlife Service, the Alaska Department of Fish and Game, the Pacific Flyway Council, and sports takers in the lower 48 concentrated on conservation of waterfowl habitat throughout the Flyway, including Mexico; and,

WHEREAS, the harassment of staging Black Brant in Izembek Lagoon has continued without intervention of State and Federal resource agencies by helicopters servicing offshore oil rigs exploring the Saint George Basin stationed at Cold Bay; and,

WHEREAS, Izembek Lagoon is critical resing area for Black Brant for approximately six weeks as they build body fat for their 50 hour plus flight to Mexico's Baja Peninsula,

NOW THEREFORE BE IT RESOLVED that the Association of Village Council Presidents Convention finds that:

A. The Federal Fish and Wildlife Service is in violatio of the Chevak Agreement's habitat conservation provisions.
B. That the Federal Fish and Wildlife Services is in violation of the National Wildlife Refuge Administration Act (16 USC 668dd-668jj), and 50 CFR 36.21(e) which authorizes the FSW to prohibit the harrassment of wildlife in refuges by aircraft.
C. That the Regional Director of the Alaska Area place into effect immediately a ban on the crossing of Izembek Lagoon by helicopters during the duration of the Pacific Black Brant's stay in 1984.
D. Set into motion a meeting between all resource agencies to deal with 1985 activities specifically prohibiting overflights in Izembek Lagoon during periods of time of occupancy of the Lagoon by significant numbers of migrating goose, and those times required by biologist to monitor waterfowl populations

CERTIFICATION

Adopted by action of the full Board of Directors of the Association of Village Council Presidents (AVCP) meeting in Convention at Saint Mary's, Alaska this 19th day of October, 1984, in a duly constituted meeting with a quorum being present

Gene Peltola, President Harry Wilde, Sr., Chairman