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US FISH & WILDLIFE SERVICE--ALASKA



ANNUAL NARRATIVE REPORT

Calendar Year 1989

IZEMBEK NATIONAL WILDLIFE REFUGE

Including Izembek, Unimak and Pavlof Units

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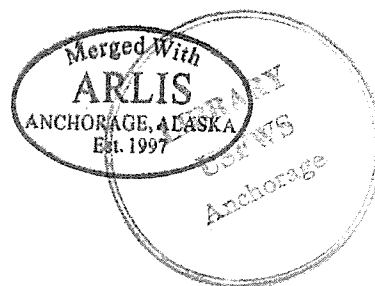
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IZEMBEK NATIONAL WILDLIFE REFUGE
P.O. Box 127
Cold Bay, Alaska 99571

Including:
Izembek, Unimak and Pavlof Units

ANNUAL NARRATIVE REPORT
CALENDAR YEAR 1989

DEPARTMENT OF THE INTERIOR
UNITED STATES FISH AND WILDLIFE SERVICE
NATIONAL WILDLIFE REFUGE SYSTEM



REVIEW AND APPROVALS

IZEMBEK NATIONAL WILDLIFE REFUGE

COLD BAY, ALASKA

ANNUAL NARRATIVE REPORT
CALENDAR YEAR 1989

Robin L. West
Refuge Manager

3-9-90
Date

Gary M. [Signature]
Refuge Supervisor

6/10/90
Date

Paul R. Schmidt
Regional Office Approval

Date

US FISH & WILDLIFE SERVICE--ALASKA



3 4982 00021127 5

INTRODUCTION

The Izembek National Wildlife Refuge is located near the western terminus of the Alaska Peninsula. The refuge is administered from its headquarters in Cold Bay. Refuge staff is additionally responsible for the Unimak Island and Pavlof administrative units of the Alaska Maritime and Alaska Peninsula National Wildlife Refuge's, respectively (Figure 1.) This narrative report incorporates information from all 3 units.

In December 1980, the Alaska National Interest Lands Conservation Act (ANILCA: P.L. 96 - 487) was enacted creating sweeping changes in the National Wildlife Refuge System in Alaska. The Act, among other things, created new refuges, enlarged and/or redesignated existing refuges, defined and redefined the purposes for all Alaska refuges, and designated wilderness areas. Additionally, several mandates were given to the Department of Interior and Fish and Wildlife Service which affect the day-to-day operation of Alaska National Wildlife Refuges. With the passage of ANILCA, nearly 54 million acres were added to the National Wildlife Refuge System bringing the total to 77 million acres within 16 refuges in Alaska. Roughly 18.5 million acres were designated as Wilderness among 13 of the 16 refuges as a result of the act.

The Izembek National Wildlife Refuge was originally established as the Izembek National Wildlife Range on December 6, 1960, by Public Land Order 2216. The Range contained 415,300 acres encompassing the Izembek Lagoon and its entire watershed. Under the Tide and Submerged Lands Act, roughly 95,300 acres of the area are owned and managed by the State of Alaska. In 1972, the State of Alaska designated the 95,300 acres of lagoon as Izembek State Game Refuge (Figure 2). With the passage of ANILCA, Izembek was redesignated as a National Wildlife Refuge. With its 320,000 acres surrounding the lagoon, it is the smallest of Alaska's refuges. Also with the enactment of ANILCA, the purposes of the refuge were redefined and 300,000 acres were designated Wilderness.

In spite of Izembek's rather paltry size (by Alaska standards), the Izembek Lagoon and associated watershed is critically important to wildlife. So much so, that in 1986, the Izembek NWR and State Game Refuge was designated as a Wetland of International Importance by the Convention on Wetlands of International Importance Especially as Waterfowl Habitat. Though the designation in itself does not affect management or afford additional protection, it does document the United States' and world's recognition that this is a special habitat that we are committed to preserving. Details of the designation are found in Section F. 2; Wetlands.

The habitat of the Izembek unit is mainly ericaceous tundra with lake, pond and stream interspersions. Dominant plants are crowberry (*Empetrum nigrum*), mountain cranberry (*Vaccinium vitis-*

idaea), bluejoint grass (Calamagrostis canadensis), white cotton grass (Eriophorum scheuchzeri), reindeer moss (Cladonia spp) sitka alder (Alnus crispa) and arctic willow (Salix spp). Eelgrass (Zostera marina) dominates the lagoon habitats and is critical to staging waterfowl. Elevations range from sea level to 6,600 feet at the summit of Frosty Peak.

Cold Bay is a small (160 people) town inhabited largely by transient State and Federal Government employees. It is rather unique among villages of the lower peninsula in that it lacks the fishing industry presence. Cold Bay was first settled in recent times by the U.S. Military who had 20,000 troops stationed in Cold Bay (then Ft. Randall) during World War II.

The Aleutian Islands National Wildlife Range was established in 1913 by Executive Order 1733. With the passage of ANILCA came the creation of the Alaska Maritime National Wildlife Refuge of which the Aleutian Islands became an administrative unit. Unimak, the first and largest island in the chain is managed by Izembek staff for both administrative and biological reasons. The passage of ANILCA designated 910,000 acres of the 989,000 acre island as Wilderness.

The administrative division at Unimak Pass conforms to the "biological" barrier at this point. Unimak, separated from the mainland by about a half a mile, supports flora and fauna similar to the mainland. It is not until one goes west of Unimak Pass that the unique flora and fauna of the Aleutians becomes apparent.

The habitat and physiography of Unimak is similar to the lower peninsula though somewhat impoverished. Volcanos both active and dormant, dominate the landscape. Elevations range from sea level to 9,372 feet at the summit of Shishaldin Volcano. Extensive, and fairly recent (geologic time), lava flows dominate the eastern portion of the island. Shishaldin itself is a designated National Historic Landmark as its easily recognized, near-perfect, cone has guided seamen since the days of the Russian explorers and undoubtedly the Aleuts before that.

False Pass, a fishing village of roughly 50 people, is the only settlement on the island. Two small military settlements on the island's west end were abandoned prior to 1980.

The Alaska Peninsula National Wildlife Refuge was created by ANILCA. The exterior boundary of the Pavlof Unit encompasses roughly 1.5 million acres on the south side of the Alaska Peninsula from Port Moller to Unimak Island. The terrain is dominated by mountains of volcanic origin that form the "backbone" on the Alaska Peninsula. The Pavlof Unit has been extensively impacted by Regional and Village Native Corporation land selections under the Alaska Native Claims Settlement Act of 1971 (ANCSA). Well over half the area has been conveyed to or selected by entitled Native Corporations and the State of Alaska.

King Cove is the primary settlement within the Pavlof Unit. This is the largest town in the area with a population of around 600. The village economy is based on the salmon and crab fisheries. Responsibility for the Pavlof Unit was given to Izembek staff in 1982 for logistical reasons.

Under the Draft Alaska Omnibus Act, it is proposed that the Unimak and Pavlof Units be officially incorporated into the Izembek NWR. This would involve a name change only and shouldn't effect current refuge programs or operations.



Alaska - "The Great Land"

RLW

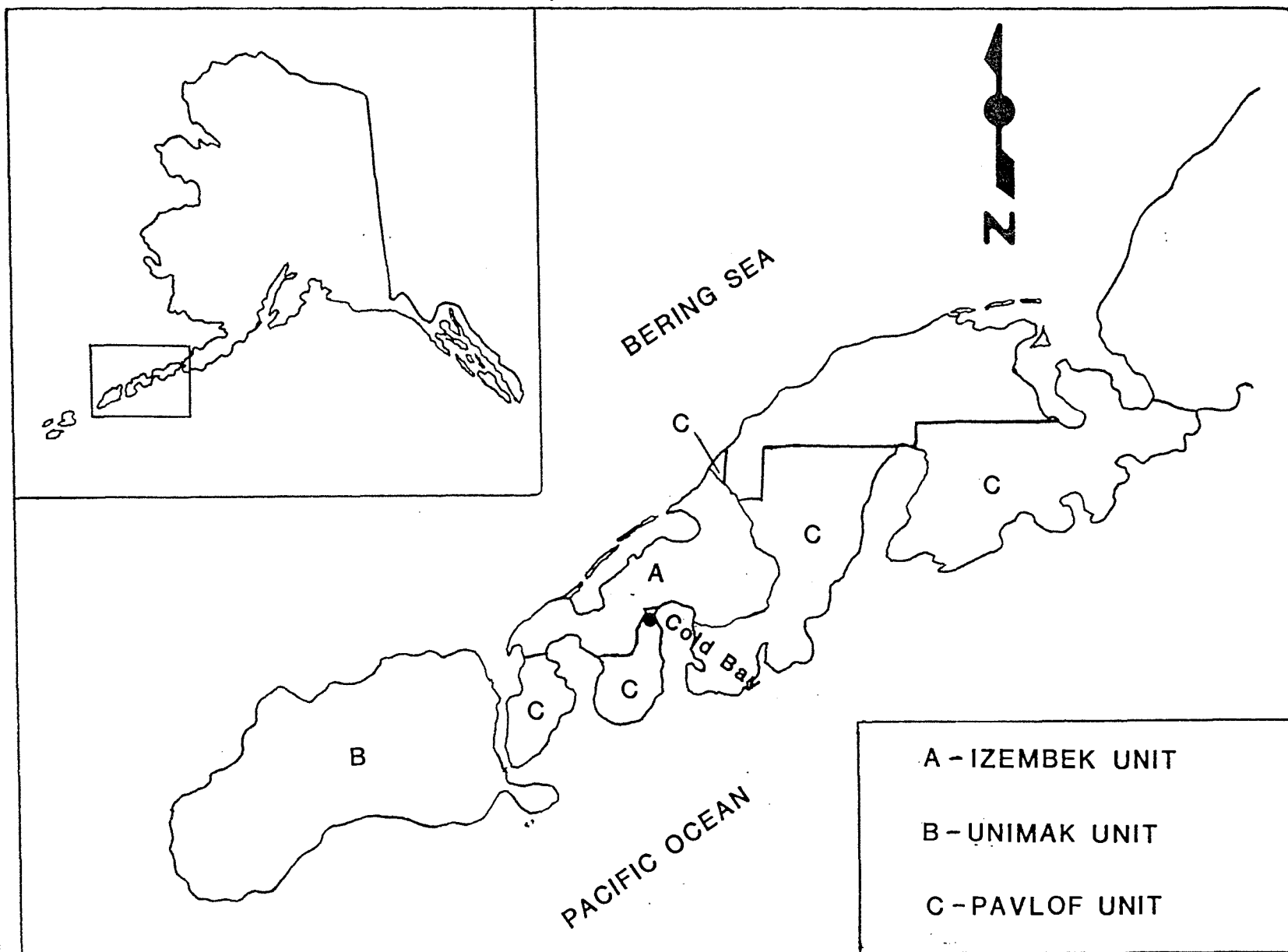


Figure 1. National Wildlife Refuge Units of the lower peninsula.

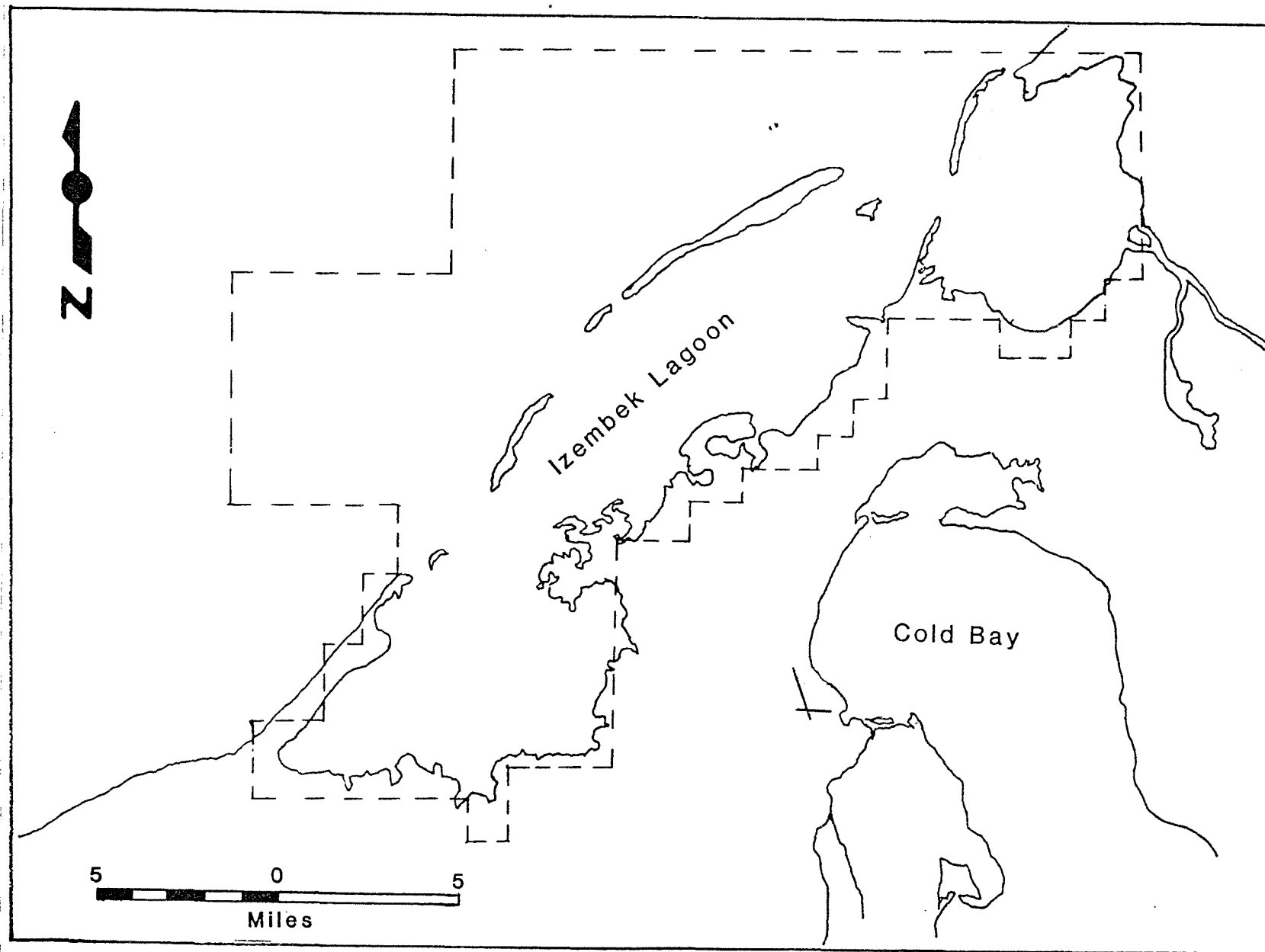


Figure 2. Izembek State Game Refuge

| | |
|---|-------------|
| INTRODUCTION | <u>Page</u> |
| TABLE OF CONTENTS | i |
| A. <u>HIGHLIGHTS</u> | 1 |
| B. <u>CLIMATIC CONDITIONS</u> | 2 |
| C. <u>LAND ACQUISITION</u> | |
| 1. Fee Title..... | 4 |
| 2. Easements..... | 5 |
| 3. Other..... | NTR |
| D. <u>PLANNING</u> | |
| 1. Master Plan..... | 8 |
| 2. Management Plan..... | NTR |
| 3. Public Participation..... | NTR |
| 4. Compliance with Environmental and Cultural Resource Mandates | NTR |
| 5. Research and Investigations..... | 8 |
| 6. Other..... | 9 |
| E. <u>ADMINISTRATION</u> | |
| 1. Personnel..... | 10 |
| 2. Youth Programs..... | 15 |
| 3. Other Manpower Programs..... | NTR |
| 4. Volunteer Program..... | 15 |
| 5. Funding..... | 16 |
| 6. Safety..... | 16 |
| 7. Technical Assistance..... | 18 |
| 8. Other..... | 19 |
| F. <u>HABITAT MANAGEMENT</u> | |
| 1. General..... | 20 |
| 2. Wetlands..... | 20 |
| 3. Forests..... | NTR |
| 4. Croplands..... | NTR |
| 5. Grasslands..... | NTR |
| 6. Other Habitats..... | 22 |
| 7. Grazing..... | NTR |
| 8. Haying..... | NTR |
| 9. Fire Management..... | NTR |
| 10. Pest Control..... | 25 |
| 11. Water Rights..... | NTR |
| 12. Wilderness and Special Areas..... | 25 |
| 13. WPA Easement Monitoring..... | NTR |

| <u>G. WILDLIFE</u> | | <u>Page</u> |
|--------------------|--|-------------|
| 1. | Wildlife Diversity..... | 27 |
| 2. | Endangered and/or Threatened Species..... | 27 |
| 3. | Waterfowl..... | 27 |
| 4. | Marsh and Water Birds..... | 64 |
| 5. | Shorebirds, Gulls, Terns and Allied Species..... | 65 |
| 6. | Raptors..... | 66 |
| 7. | Other Migratory Birds..... | 67 |
| 8. | Game Mammals..... | 67 |
| 9. | Marine Mammals..... | 76 |
| 10. | Other Resident Wildlife..... | 76 |
| 11. | Fisheries Resources..... | 77 |
| 12. | Wildlife Propagation and Stocking..... | NTR |
| 13. | Surplus Animal Disposal..... | NTR |
| 14. | Scientific Collections..... | 77 |
| 15. | Animal Control..... | NTR |
| 16. | Marking and Banding..... | 77 |
| 17. | Disease Prevention and Control..... | NTR |

| <u>H. PUBLIC USE</u> | | |
|----------------------|---|-----|
| 1. | General..... | 84 |
| 2. | Outdoor Classrooms - Students..... | NTR |
| 3. | Outdoor Classrooms - Teachers..... | NTR |
| 4. | Interpretive Foot Trails..... | NTR |
| 5. | Interpretive Tour Routes..... | 86 |
| 6. | Interpretive Exhibits/Demonstrations..... | 87 |
| 7. | Other Interpretive Programs..... | NTR |
| 8. | Hunting..... | 87 |
| 9. | Fishing..... | 96 |
| 10. | Trapping..... | 97 |
| 11. | Wildlife Observation..... | 98 |
| 12. | Other Wildlife Oriented Recreation..... | NTR |
| 13. | Camping..... | NTR |
| 14. | Picnicking..... | NTR |
| 15. | Off-Road Vehicling..... | 98 |
| 16. | Other Non-Wildlife Oriented Recreation..... | 99 |
| 17. | Law Enforcement..... | 100 |
| 18. | Cooperating Associations..... | NTR |
| 19. | Concessions..... | NTR |

| <u>I. EQUIPMENT AND FACILITIES</u> | | |
|------------------------------------|--|-----|
| 1. | New Construction..... | 103 |
| 2. | Rehabilitation..... | 105 |
| 3. | Major Maintenance..... | 105 |
| 4. | Equipment Utilization and Replacement..... | 105 |
| 5. | Communications Systems..... | 109 |
| 6. | Computer Systems..... | 109 |
| 7. | Energy Conservation..... | 109 |
| 8. | Other..... | 110 |

| J. <u>OTHER ITEMS</u> | <u>Page</u> |
|------------------------------|-------------|
| 1. Cooperative Programs..... | 111 |
| 2. Other Economic Uses..... | 112 |
| 3. Items of Interest..... | 112 |
| 4. Credits..... | 117 |

| | |
|--------------------|-----|
| K. <u>FEEDBACK</u> | 118 |
|--------------------|-----|

| | |
|--|--|
| L. <u>INFORMATION PACKET</u> ----(inside back cover) | |
|--|--|

A. HIGHLIGHTS

- US/USSR cooperative brant work begun. (G.3 and J.1)
- Investigations on brant and emperor geese by Research, Migratory Bird Management and Refuge staffs continued. (G.3)
- On March 24, 1989 the tanker EXXON VALDEZ ran aground in Prince William Sound some 730 miles northeast of the lower peninsula. Most of the oil missed us but the associated activities did not. (J.3)
- Recruitment to the Southern Alaska Peninsula Caribou Herd hits lowest level on record. (G.8 Caribou)
- Izembek receives a diploma from The Convention on Wetlands of International Importance recognizing Izembek's designation as such. (F.2)
- Grant Point Wildlife Observation Facility is constructed to increase public awareness and non-consumptive wildlife oriented recreation. (I.1)
- Biologist/Pilot Dau participated in Spring Emperor Goose Survey and Statewide Waterfowl Breeding Pair Surveys. (G.3)
- Brant and emperor goose productivity counts were conducted for the 27th and 23rd consecutive years, respectively. (G.3)



Cold Bay from the Headquarters Site MAC

B. CLIMATIC CONDITIONS

Cold Bay weather is characterized by wind, precipitation, and clouds. The average wind speed is 16.9 mph and monthly blows with sustained winds of 50 mph are more the rule than the exception. Eighty to 100% cloud cover is also the rule for a typical Cold Bay day. Daily averages of percent cloud cover are recorded by the National Weather Service in Cold Bay. Days of 0 - 30% cloud cover are classified as clear, 40 - 70% are partly cloudy and >80% are cloudy. In 1989, 317 days were cloudy, 38 partly cloudy and 10 were clear days.

Precipitation averages 35.01" annually and occurs throughout the year. A small peak in precipitation occurs in late fall and a small low in the spring. Measurable precipitation ($\geq .01$ ") occurred on 232 days in 1989. Although it rains or snows often, it seldom dumps large amounts at any one time.

By Alaska standards, Cold Bay temperatures are mild in both summer and winter. All-time extremes are recorded at $+78^{\circ}$ F and -13° F. The average February temperature is 27.5° F and the August average is 51.2° F. The average annual temperature is 37.9° F, hence the name. Weather data for 1989 is summarized in Table 1.

The high and gusty winds discussed earlier are generated each fall and winter as a continuous series of cyclonic low pressure systems that are sent to us from our Japanese and Soviet neighbors. The sequence of events in such systems are as follows: southerly winds and driving rains pelt the area, then calm as the "eye" of the storm passes, then northerly winds and blowing snow prevail as the "backside" of the low passes. There are the occasional nice days between systems, events which we "Aleuts by choice" enjoy so much.

Birds and mammals, which call the lower Alaska Peninsula home for all or a part of the year, thrive at varying levels of abundance. Adaptations have provided them the characteristics and behaviors necessary to prosper in conditions modern man views as inhospitable. Pacific brant and Taverner's Canada geese, our two primary fall migrants, make important survival-related use of the cyclonic lows we hide from. From 2 November to 15 November these species picked storms of suitable intensity to give them supportive tail-winds along portions of their flight to Mexico and Oregon, respectively. Other species exhibit similar, albeit less dramatic, behavioral adaptations with respect to migration (or annual leave) all of which is largely dictated by climate.

Table 1. Weather Summary, Cold Bay, Alaska, 1989

| Month | <u>TEMPERATURE (F°)</u> | | | <u>PRECIPITATION (INCHES)</u> | | <u>WINDS (MPH)</u> | | |
|-----------|-------------------------|-----|---------------------|-------------------------------|----------------------|--------------------|-----------|------|
| | High | Low | Average (Deviation) | Amount (Deviation) | #Days ($\geq .01$) | Average | 1-Minute* | Gust |
| January | 43 | -8 | 22.3 (-6.0) | 1.68 (-1.02) | 21 | 19.4 | 53 | 83 |
| February | 46 | 22 | 35.0 (+7.5) | 4.02 (+1.75) | 19 | 26.9 | 63 | 83 |
| March | 42 | 11 | 31.5 (+2.9) | 0.52 (-1.79) | 8 | 17.5 | 46 | 58 |
| April | 47 | 22 | 34.3 (+1.3) | 2.20 (+0.25) | 19 | 20.0 | 53 | 69 |
| May | 53 | 30 | 40.6 (+1.1) | 2.21 (-0.26) | 17 | 16.2 | 44 | 54 |
| June | 63 | 33 | 46.0 (+0.6) | 2.48 (-0.32) | 15 | 15.2 | 35 | 47 |
| July | 63 | 38 | 50.9 (+0.6) | 1.40 (-1.10) | 12 | 16.9 | 39 | 51 |
| August | 71 | 45 | 53.3 (+2.1) | 3.20 (-0.50) | 23 | 14.7 | 39 | 47 |
| September | 61 | 37 | 49.8 (+2.3) | 7.77 (+4.00) | 25 | 17.0 | 46 | 61 |
| October | 55 | 29 | 42.3 (+2.8) | 4.39 (+0.10) | 26 | 17.5 | 40 | 55 |
| November | 49 | 13 | 32.1 (-2.2) | 2.60 (-1.44) | 22 | 16.7 | 40 | 56 |
| December | 43 | 10 | 31.3 (+1.8) | 3.80 (+0.95) | 25 | 15.5 | 44 | 62 |
| | | | | 36.27 (+1.26) | 232 | 17.8 | | |

* Greatest sustained wind for a 1 minute period.

C. LAND ACQUISITION

1. Fee Title

Native conveyed lands (22g-Alaska Native Claims Settlement Act) within the Izembek National Wildlife Refuge and conveyed and selected lands adjacent to the Pavlof Unit of the Alaska Peninsula National Wildlife Refuge vary in resource value. The village corporations of King Cove, False Pass and Pauloff Harbor have suggested they are interested in land exchanges and the Realty Division prepared Land Exchange Ascertainment Reports for lands belonging to each of these three Native Corporations. These reports were distributed in December of 1986 allowing further negotiations to proceed.

Preliminary responses by the Native Corporations to appraised land values presented in the Realty Division ascertainment reports were not encouraging. Their trade lands, largely marsh, exposed coastline and areas adjacent to shallow estuaries, were evaluated at a quite low dollar/acre figure. Proposed United States Fish and Wildlife Service trade lands adjacent to the Cold Bay road system were, on the other hand, valued quite high due to their economic development potential. It will be necessary to negotiate a reasonable compromise if any land exchanges are to be consummated.

Several meetings, resulting in little progress, were held with members of the Isanotski Corporation throughout 1989. The corporation has a long standing proposal to exchange native lands, largely on Unimak Island, for refuge lands near Cold Bay. Corporation and False Pass village council representatives met with RM West in January, July and September.

In August 1989, the Nelson Lagoon Corporation contacted our Regional Office, Realty Division, and proposed a 195 acre land exchange in the Kudobin Islands/Herendeen Bay area. The corporation wishes to exchange the islands in Township 48 South; Range 75 West, Sections 16, 17, 19, 20, 21, 29, and 30 to the Service for lands in the northern half of section 3 (US Survey 1022 excluded) in Township 52 South; Range 74 West (Figure 3). Realty will be preparing an environmental assessment for the exchange. If the exchange goes through, the Kudobin Islands will become part of Alaska Maritime NWR.

Mike Kasterin of the BLM in Anchorage, contacted the refuge office in September regarding the transfer of 3 FAA withdrawn parcels back to the refuge. The parcels were relinquished by the FAA last year and total approximately 900 acres. Evaluation work by the BLM was planned for October or November but was later postponed.

Several responses and comments were formulated regarding the Alaska Submerged Lands Act of 1988 (P.L. 100-395) The Act basically stated that submerged areas of sufficient size, within

lands conveyed to the State of Alaska (Alaska Statehood Act) and to Native corporations (ANSCA), would not be charged against the land entitlements granted to the state and corporations by the respective acts. The effects of this will be that the Native corporations and the State will be able to select additional upland areas, some of which, may be from refuges. The Act also instructed the Secretary of the Interior to prepare a report for Congress on the effects of the Act on "Conservation System Units" (i.e., refuges, national parks, etc.) and to recommend appropriate action. The report required identification of all inholdings (including conveyed and selected lands) within the boundaries of Conservation System Units, the prioritizing of these lands for possible acquisition, and recommendations to reduce any adverse impacts as a result of the Act. In response to the reporting requirements, the refuge sent a notice to local landowners of the Service's work to determine acquisition priorities for inholdings. In March, Danielle Jerry (Resource Planning) and Bob Platte (Realty) met with Izembek staff to quantify wildlife and public use values on refuge units. This was done to determine resource values for prioritizing both inholdings and unencumbered refuge lands, the latter of which may ultimately be selected as a result of the Act. Inholdings were prioritized into a high, medium, or low category based on resource values. A draft report, compiled by an Interagency Work Group, was received in October and reviewed by refuge staff. From the report, it appears that the Nelson Lagoon and Pauloff Harbor Corporations will be underselected by 3,728 acres and 1,815 acres respectively. Additional selections by these corporations could come from refuge lands. Table 2 summarizes acreages of inholdings (including selected but not conveyed) for each unit administered by the Izembek office. In some cases, different groups have overlapping selections. This inflates the acreage figures since the selections of each group were added together.

2. Easements

Work was completed on plans for the posting of Recreational Access Easements (ANCSA 17(b) easements) in 1989. Maps identifying 17(b) easements on Izembek, Unimak and the Pavlof Units were received and commented on. Ultimately, it appears that all valid easements will have to be located and their boundaries signed. A questionnaire on 17(b) easements posting needs and cost was submitted in May 1989. The 9 mile trail easement (#151-7) south of Russell Creek on King Cove Corporation land was identified as needing posting in 1990. A total of 17 access sites and 15 access trails were identified for Izembek, Unimak and the Pavlof Units. In December, information provided by the BLM on King Cove Corporation land easements was reviewed. We had concern over a proposed trail on the east side of Cold Bay which would allow ATV access to the refuge across King Cove land. We feel that since the lands in question are ANCSA 22(g) lands and that the surrounding area is included in Wilderness, that ATV

travel is inappropriate. After discussions with Realty, however, we were informed that access is assured by law and we can only regulate travel at the refuge boundary.

A right-of-way application for Interior Telephone Company (#T-262-IZ) to maintain a buried telephone cable along the road to the ILS Outer Marker was received in May. The application was reviewed and commented on and in December a compatibility determination was approved.

Table 2. Summary of acreages of acquisition priorities for inholdings, Izembek, Pavlof and Unimak Units.

| PRIORITY | | IZEMBEK | PAVLOF | UNIMAK |
|----------|----|---------|-----------|-----------------|
| HIGH | NA | | | |
| | NC | 14,940 | 16,260 | |
| | AK | | | |
| | OP | | | |
| MEDIUM | NA | | | |
| | NC | 660 | 205,409 | |
| | AK | | 1,045 | |
| | OP | 5 | 36 | |
| LOW | NA | | 1,626 | |
| | NC | 130,189 | 1,369,705 | |
| | AK | | 122,948 | |
| | OP | | 212 | All inholdings* |

NA = Native Allotment (Alaska Native Allotment Act of 1906)

NC = Native Corporation (ANCSA)

AK = State of Alaska (Alaska Statehood Act)

OP = Other private inholdings

* Acreage figures not available. All inholdings on Unimak Island were grouped as low priority.

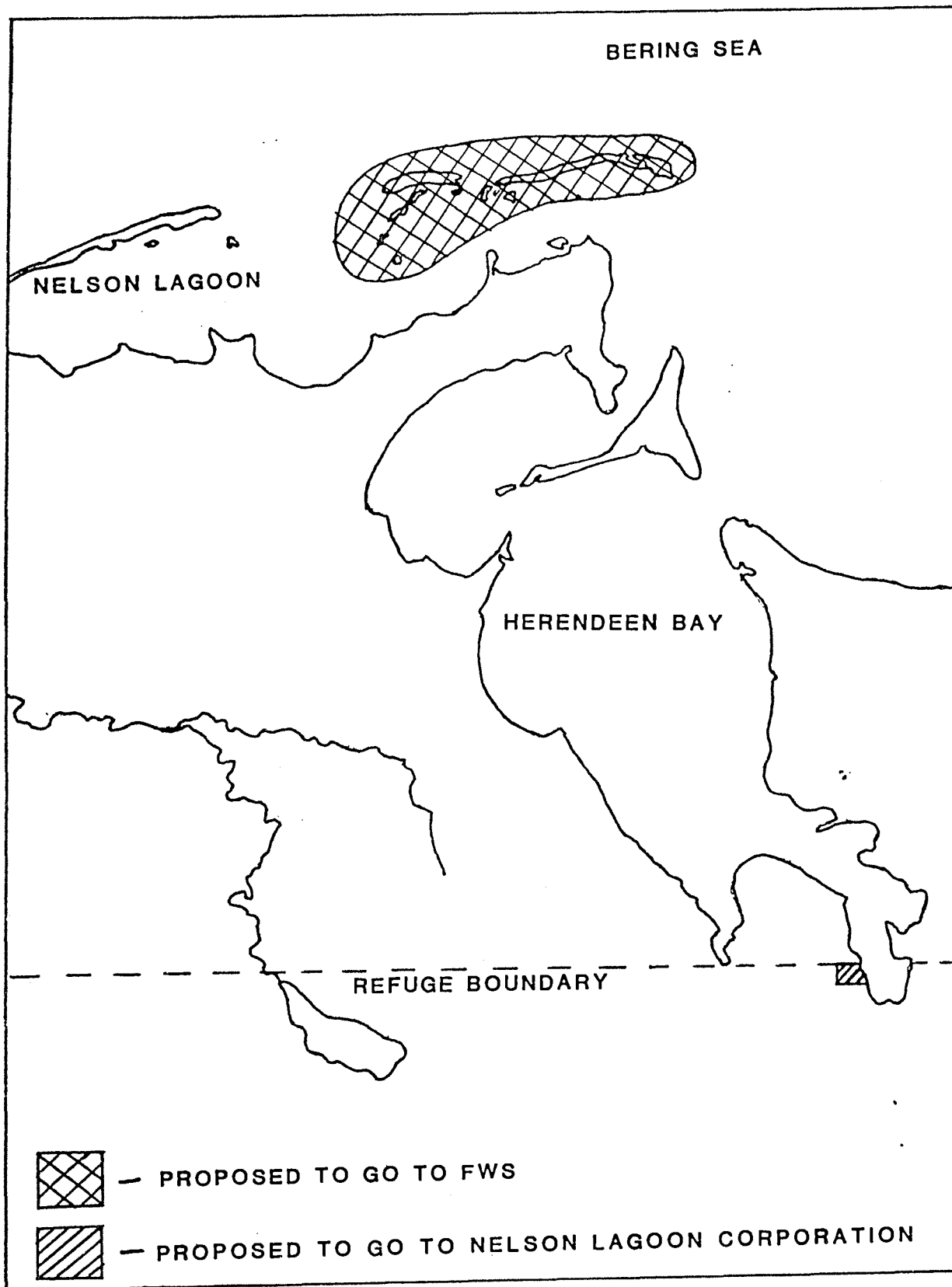


Figure 3. Proposed land exchange involving Nelson Lagoon Corporation and FWS lands.

D. PLANNING

1. Master Plan

The Izembek National Wildlife Refuge Comprehensive Conservation Plan mandated by the Alaska National Interest Lands Conservation Act in 1980, was finalized in 1985. We are currently operating under that plan.

In general, this plan restated the Fish and Wildlife Service's desire to continue management of Izembek Refuge as has been done since it was established in 1960. The Service selected a management alternative that will continue to manage 300,000 acres (95% of the refuge) as Wilderness. The remaining 15,000 acres (5% of the refuge) consist of refuge land adjoining the city of Cold Bay and the associated road system. This land was not designated as Wilderness in 1980, due to the extensive system of roads and disturbance from military habitation during World War II. Under the Service's preferred management alternative, this land will not be recommended for Wilderness designation, but is designated as a Minimal Management Area in which development and vehicular access would be kept at current levels.

5. Research and Investigations

Refuge personnel were involved in a number of investigations and surveys in 1989. Many of these surveys are routine annual censusing of the various populations utilizing Izembek refuge. Results of these surveys are detailed under the appropriate headings in Section G., Wildlife.

Personnel from the Alaska Fish and Wildlife Research Center spent a considerable amount of time at Izembek during the fall of 1989. Their work involved radio tracking of brant along with collecting data on brant and emperor goose production as well as collecting data on re-sightings of marked birds of these species. Details of their work is discussed in Section G. 3; Waterfowl.

Dr. Fred Short of the University of New Hampshire, contacted the refuge again in 1989 to assist with his research on eelgrass. Eelgrass seed, collected from hunter killed waterfowl, was sent to Dr. Short for his propagation studies.

Water Quality Sampling in Lakes on Izembek NWR

The third, and final, year of data collection for the refuge water quality investigation was completed in 1989. The purpose of the investigation was to collect baseline water quality data from representative lakes on Izembek. Samples were collected for 6 lakes, 3 "sterile" and 3 "productive". See Section F.2; Wetlands.

Investigations into the Causes of the Declining Southern Alaska Peninsula Caribou Herd (SAPCH)

Efforts were expanded in 1989 in the cooperative investigation by the Alaska Department of Fish and Game and Izembek refuge staff into the causes for the decline of the SAPCH. Methods and results are discussed in detail in Section G. 8; Game Mammals, Caribou.



Radio tracking of adult cows of the SAPCH to determine movements, calf production & mortality.

RLW

6. Other

Permission was granted from the Regional Office to initiate work on a Wildlife Inventory Plan, rather than a step-down Big Game Management Plan, in March 1989. The compiling of the Wildlife Inventory Plan will be a cooperative effort between ADF&G and Izembek staff. The plan will address agency responsibilities for the work done on Izembek's big game populations. The first draft was completed in October 1989 and sent to ADF&G for comment. A second draft, incorporating ADF&G comments, will be out in 1990.

Work on the Izembek Fisheries Management Plan was continued in 1989. The Kenai Fisheries Office is drafting the plan which should be out in early 1990.

E. ADMINISTRATION

1. Personnel



RM Robin West with top personal advisors.



Incoming ARM Mark Chase

RLW



Outgoing ARM Michael Blenden

RLW



Biologist/Pilot Chris Dau

MAC



Maintenance Worker Tom Morey

RLW



Secretary Shirley Simpson

RLW



1 2 3 4 5
6 7 8 9 10

1. RM Robin West
2. Dr. Sergei Kharitonov - Soviet Biologist
3. Secretary Shirley Simpson
4. Dr. Mikail Stishov - Soviet Biologist
5. Maintenance Worker Tom Morey
6. WB/P Christian Dau
7. Rick Lanctot - AFWRC
8. David Ward - AFWRC
9. Lee Tibbitts - AFWRC
10. ARM Mark Chase

PERSONNEL

| | | | |
|----|--------------------|---|-------------------|
| 1. | Robin L. West | Refuge Manager GS-0485-12, PFT | 9/12/88 - Present |
| 2. | Mark A. Chase | Assistant Refuge Manager GS-0485-9, PFT | 5/7/89 - Present |
| 3. | Michael D. Blenden | Assistant Refuge Manager GS-0485-11, PFT | 8/26/84 - 2/25/89 |
| 4. | Christian P. Dau | Wildlife Biologist/Pilot GS-0486-12, PFT | 1/30/81 - Present |
| 5. | Thomas Morey | Maintenance Worker WG-4749-8, PFT | 1/29/89 - Present |
| 6. | Shirley Simpson | Secretary/Typing GS-0318-4, PFT | 2/18/88 - Present |
| 7. | Scott Dietrich | YCC Enrollee | 6/5/89 - 7/28/89 |
| 8. | Page Turner | YCC Enrollee | 6/5/89 - 7/28/89 |

After four and a half years as Assistant Refuge Manager at Izembek, Mike Blenden accepted the Deputy Manager position at the Alaska Maritime NWR in Homer. His vacancy was soon filled by Mark Chase who came to Izembek from Little River NWR in Region 2.

Tom Morey accepted the Maintenance Worker position vacated by Frank Dunn in October 1988. Tom has several years of Federal Service most recently coming from a job with the Veterans Administration in Oregon.

Shirley Simpson was promoted from a GS-0322-3 Clerk/Typist to a GS-0318-4 Secretary/Typist in January 1989.

A five year summary of the Izembek staffing pattern is included in Table 3.

Table 3. Five Year Staffing Pattern, Izembek NWR.

| | <u>Permanent</u> | | <u>Temporary</u> | <u>Total FTE's</u> |
|-------|------------------|------------------|------------------|--------------------|
| | <u>Full Time</u> | <u>Part Time</u> | | |
| FY 85 | 5 | - | 2 (YCC) | 5 |
| FY 86 | 5 | - | 2 (YCC) | 5 |
| FY 87 | 5 | - | 2 (YCC) | 5 |
| FY 88 | 5 | - | 2 (YCC) | 5 |
| FY 89 | 5 | - | 2 (YCC) | 5 |

2. Youth Programs

Izembek employed 2 YCC enrollees from 5 June through 28 July, 1989. Scott Dietrich of Cold Bay and Page Turner of Wheatridge, Colorado, assisted the staff in a variety of tasks and accomplished a great deal of much needed work.

One problem arose this year when our major YCC project, the construction of the Grant Point wildlife observation facility, was delayed due to factors beyond our control. This resulted in large blocks of time being left unscheduled which increased the amount of "busy work" for the enrollees. Though a great deal of work was ultimately accomplished, having to find fill-in jobs puts additional burdens on staff members and has a negative effect on enrollee enthusiasm and moral. Intensive planning with a number of contingencies should prevent this from happening again.

Major accomplishments of this years program included: sign posting, refuge library organization, painting various things around the compound, swallow nest box construction, a thorough cleaning of the cold shop and the removal of the collapsed Fourth Bridge. Oil spill related beach surveys and water sampling, in conjunction with the Izembek water quality investigation, provided the enrollees with practical environmental education.

4. Volunteer Program

Izembek made use of 3 volunteers on a short term, intermittent basis in 1989. A total of 140 volunteer hours were devoted to construction (20 hours), photography (80 hours), and biological surveys (40 hours).

A structured volunteer program was actively pursued in 1989 but did not materialize. Four different people who had applied for

volunteer jobs were selected and contacted. All of these folks assured us they would participate in our program but backed out at the last minute due to more glamorous offers at other refuges. Volunteers for term appointments could provide valuable support to the refuge if we can find any willing to make a commitment.

5. Funding

A five year funding summary is provided in Table 4.

Table 4. Five Year Funding Summary, Izembek NWR (000's)

| | <u>1260</u> | <u>1360</u> | <u>1210</u> | <u>8610</u> | <u>Total</u> * |
|-------|-------------|-------------|-------------|-------------|----------------|
| FY 85 | 401 | 15 | | | 416 |
| FY 86 | 385 | | | | 385 |
| FY 87 | 432 | | 3 | | 435 |
| FY 88 | 442 | | | | 442 |
| FY 89 | 478 | | | 28 | 478 |

* 8610 Funds not included.

6. Safety

No lost-time accidents involving refuge staff or cooperators occurred in 1989.

Staff safety meetings were held more-or-less monthly throughout the year. Topics of discussion included the Hazard Communication Program, Fire Safety, Safety in Bear Country, Hearing Protection, Cholesterol, Unexploded Military Ordnance Safety and ATV Safety. Minutes were taken at montly safety meetings to document safety deficiencies identified and corrected throughout the year.

Regional Safety Officer, Virginia Hyatt, conducted a formal station safety inspection on 19 and 20 July. Several minor deficiencies were identified and subsequently corrected.

Radon testing canisters were placed in all 4 refuge homes and the office in January 1989. Quarters #1 required a remedial test after which, all residences and the office tested below 4.0 picocuries per liter. The 4 pCi/L is the level set by the EPA above which some remedial action is suggested. Results of the tests are shown in Table 5.

Table 5. Results of Radon Gas Testing for Refuge Buildings, Izembek NWR, January - April 1989.

| <u>Building</u> | <u>1st Test (pCi/L)</u> | <u>2nd Test (pCi/L)</u> |
|-----------------|-------------------------|-------------------------|
| Office | 0.6 | n/a |
| Residence #1 | 5.8 | 2.3 |
| Residence #2 | 1.3 | n/a |
| Residence #3 | 1.7 | n/a |
| Residence #4 | 1.9 | n/a |

On the 24 October, RM West discovered an unexploded 20 mm round in the area of the craters adjacent to the site road. In the interest of public safety, the area (\pm 3 acres) was signed and closed. Fort Richardson E.O.D. personnel arrived 18 November to inspect the site that it may be reopened to public access. Snow cover precluded the work which was postponed until spring 1990.



The "Bomb Craters National Camping Area" on the Site Road was temporarily closed to the public when an unexploded 20mm shell was found. MAC

A potentially serious situation dealing with many electrical outlets was corrected in May. After an employee's wife received a shock while unplugging a cord from an outlet with a metal cover, all the metal covers in refuge buildings were replaced with plastic covers. A memo was sent to R.O. informing them of the situation. We were then informed that there is no greater hazard of a shock from a metal cover than a plastic one provided the outlet is properly grounded. After testing the circuits, with a tester provided by the Safety Office, it was discovered that the outlet did indeed have an open ground. All other outlets in the residences and office were tested revealing open grounds in the bathrooms of residences 1, 2 and 3. All deficiencies were promptly corrected.

7. Technical Assistance

Technical assistance was provided to Alaska Department of Fish and Game - Fisheries Research and Enhancement Division (FRED) in the form of logistical support in October 1989. Biologist/Pilot Dau flew FRED personnel to several lakes within the Pavlof Unit and assisted in water sampling in conjunction with possible fisheries enhancement proposals.



ADF&G-FRED employees sampled area lakes in conjunction with some fisheries enhancement proposals.

CPD

Assistant Refuge Manager Chase met with State of Alaska Department of Transportation personnel to discuss gull hazing techniques. Large flocks of gulls found the end of runway 14 to their liking as a loafing/roosting area. The problem occurs annually through the month of August.

8. Other Items

With the passage of ANILCA in 1980, existing Special Regulations for the Izembek and Unimak Units were abolished. Resubmissions of Special Regulations for Izembek and Unimak and submissions for the Pavlof Unit have been made in 1982, 1985, 1986, and 1987. The results of these efforts have all ended up the same; no Special Regulations for any of these units. In November, 1989, the Special Regulations package was sent to Washington D.C. by Regional Office staff. Hopefully, someone, somewhere, will feel compelled to act on this package and next year we can report success.

Twenty-three Special Use Permits were issued for 11 different activities in 1989. Permitted activities include:

| | |
|--------------------------|---------------------------|
| Big Game Guiding.....8 | Archaeological Work.....2 |
| Waterfowl Guiding.....1 | Fishery Survey.....1 |
| Gravel Removal.....3 | Disposal Site Sampling..1 |
| Volcanological.....2 | Tent Platform.....1 |
| Research | Helicopter Landing.....1 |
| Seismic Station.....1 | Radio Receiver.....1 |
| Maintenance | Maintenance |
| Navigation Station.....1 | |
| Maintenance | |

Associate Manager Constantino made his first visit to Izembek in October 1989. The visit gave AM Constantino a chance to meet the staff and discuss refuge programs.

F. HABITAT MANAGEMENT

1. General

Protection and preservation of habitat integrity has long been the management goal of Izembek staff. The area administered from the Cold Bay office is chiefly wilderness in the adjective sense and a large portion is Wilderness in the legal sense. For this reason, active management in conventional terms (i.e., water level manipulations, farming etc.) is not necessary, nor is it feasible, to meet refuge goals. Instead, habitat integrity is maintained, rather than restored, primarily through the management of the activities which persist in the area. Thus far, demands in the area have been largely upon fisheries and wildlife resources rather than on habitat resources (i.e., mining, oil/gas development).

Serious challenges to the habitat integrity have not come about though some seem to continuously loom in the wind. Though Izembek and much of the lower peninsula were evaluated as having no to low hydrocarbon development potential, it seems the threat of off-shore oil and gas development in the Bering Sea just won't go away. Should it ever come to pass, Cold Bay will surely be a hub for maintenance and transportation to off-shore rigs. Increased air traffic over the lagoon could prove disastrous to staging waterfowl. Perhaps the greatest potential consequence as of result of off-shore oil development would occur with an "EXXON VALDEZ" repeat in the Bering Sea. A single incident of this type near Izembek Lagoon during the staging period could nearly extirpate the Pacific black brant and gravely impact the Steller's eider and emperor goose populations.

Additional management challenges have come about by the confounding land status of the lower peninsula brought about by ANILCA. Native and State selections and conveyances have hit the Pavlof unit particularly hard. Though specific land development plans of the villages are unknown at present, they will surely center on economic return for the shareholders. Roads, harbors, canneries, gravel mining and hydro-electric development have all been mentioned as potentials. Increased development around the refuge will surely place additional demands on the refuge proper.

A September 1989 update of the land status map for the Pavlof unit was received at the Izembek office.

2. Wetlands

In 1986, the United States joined the Convention on Wetlands of International Importance Especially as Waterfowl Habitat. The Convention, commonly known as the RAMSAR Convention by its meeting in Ramsar, Iran in 1975, is dedicated to curbing worldwide wetland losses and has 53 member nations. Upon joining the Convention, a nation must designate at least one wetland whose

importance goes well beyond the political boundaries of the country; it must be a wetland of international importance.

Upon joining The Convention, the U.S. designated 4 wetlands of International Importance, all within the National Wildlife Refuge System. Izembek NWR and State Game Refuge, Ash Meadows NWR, Edwin B. Forsythe NWR and Okefenokee NWR were all ratified on 18 December 1986 as Wetlands of International Importance. Since that time, 3 more wetlands, Everglades National Park, Chesapeake Bay Wetlands System and Cheyenne Bottoms Wildlife Area have been added by the United States.

Criteria for listing of a wetland is specified in the Federal Register; Volume 54, No. 68; Tuesday, April 11, 1989. The rationale for the listing of Izembek NWR and State Game Refuge is obvious to anyone who has visited Izembek during the fall waterfowl staging period. Nearly the entire Pacific black brant population is present to fatten up on eelgrass prior to the migration south to Mexico. Additionally, the lagoon supports significant numbers of Taverner's Canada geese, emperor geese, Stellar's eiders and a multitude of other ducks. The waterfowl all come to Izembek to exploit the abundant food resources for putting on fat reserves for the upcoming winter or migration south.

The eelgrass beds within the lagoon are probably the largest of their kind anywhere in the world. It is estimated that the eelgrass of Izembek Lagoon produces and exports, in the form of detached plants, 166,000 metric tons of carbon, 7,400 metric tons of nitrogen and 1,660 metric tons of phosphorous to the Bering Sea on an annual basis.

With the support of the waterfowl, who know no political boundaries, and the contribution to the Bering Sea food web, and ultimately the international commercial fishery, it is easy to see Izembek truly is a wetland of international importance. In 1989, the headquarters received a diploma from The Convention recognizing Izembek as a designated Wetland of International Importance.

Although the Izembek Lagoon and other lagoon systems are the wetlands of primary concern, the variety of other wetland types are important as well. Excluding the lagoon, Izembek is nearly 87% wetlands. Of the total area, approximately 61% is low ericaceous tundra, 19% is ponds, lakes and river systems and 7% is grass/sedge marsh. These other wetlands are critical to the well being of the lagoon in contributing to the water quality of the flow into the lagoon. The Pavlof and Unimak units contain substantially smaller proportions of wetlands since the terrains there are dominated by mountains. Important wetlands in these areas are the riverine systems with their associated grass/sedge meadows. In all cases, "management" is through preservation.



Aerial view of eelgrass beds. The white spots are brant. MAC

A 3-year water quality study was completed in 1989. Refuge staff have been sampling 6 area lakes to obtain basic water quality information for comparative purposes. Three of the lakes are referred to as "sterile" and 3 as "productive". The "sterile" lakes are basically land-locked, catch basins with clear water and little aquatic life. The "productive" lakes on the other hand, have outlets to the lagoon. Their water is murky and aquatic life is abundant. The salmon that run into these lakes to spawn fuel the system as they die and decompose. Results of the sampling are contained in Table 6.

6. Other Habitats

The tundra sported a bumper crop of crowberries in 1989. The crowberries are an important food for Canada geese and, to a lesser extent, emperor geese. As tides rise, flooding the eelgrass out of reach, the birds often fly inland to feed on the berries of the tundra. They didn't have to look far in 1989.

Table 6. Water chemistry analysis at six lakes, Izembek National Wildlife Refuge.

| Lake | | Date | Chemical Analysis ² | | | | | | | |
|---------------|-------------------|---------|--------------------------------|-----|------|------|------|------|-----|------|
| Name | Type ¹ | | TN | TP | Ca | Mg | Na | K | S | Cl |
| Bluebill Lake | Fertile | 5/25/89 | 0.62 | 69 | | | | | 1.1 | 19.0 |
| | | 6/27/89 | 1.67 | 88 | | | | | | |
| | | 7/20/88 | 320 | 42 | 4.59 | 2.52 | 11.9 | 1.73 | 1.1 | 16.6 |
| | | 8/23/88 | 1060 | 102 | 4.42 | 2.61 | 11.6 | 1.90 | 1.1 | 15.2 |
| | | 9/30/88 | 1120 | 110 | 2.80 | 2.29 | 12.4 | 1.65 | 1.9 | 17.0 |
| Lamprey Lake | Fertile | 5/25/89 | 0.37 | 44 | | | | | 1.3 | 22.0 |
| | | 6/27/89 | 0.74 | 40 | | | | | | |
| | | 7/21/88 | 320 | 40 | 4.84 | 2.71 | 13.4 | 1.93 | 1.4 | 19.4 |
| | | 8/22/88 | 1090 | 89 | 4.82 | 2.70 | 13.0 | 2.16 | 1.2 | 18.3 |
| | | 9/30/88 | 520 | 72 | 3.33 | 2.56 | 13.8 | 1.85 | 1.9 | 17.0 |
| VOR Lake | Fertile | 5/25/89 | 0.37 | 23 | | | | | 1.2 | 22.0 |
| | | 6/26/89 | 0.66 | 25 | | | | | | |
| | | 7/20/88 | 480 | 12 | 4.48 | 2.35 | 12.4 | 1.77 | 1.1 | 18.8 |
| | | 8/09/88 | 500 | 27 | 4.93 | 2.57 | 12.4 | 2.04 | 1.0 | 19.0 |
| | | 9/23/88 | 370 | 28 | 2.71 | 2.30 | 12.7 | 1.54 | 1.5 | 19.4 |
| Blinn Lake | Infertile | 5/25/89 | 0.22 | 5 | | | | | 0.8 | 22.0 |
| | | 6/09/88 | 60 | 5 | 0.69 | 1.32 | 9.1 | 0.47 | 0.8 | 15.8 |
| | | 6/26/89 | 0.52 | 8 | | | | | | |
| | | 7/19/88 | 80 | 5 | 0.64 | 1.32 | 9.2 | 0.48 | 1.0 | 17.0 |
| | | 8/22/88 | 110 | 11 | 0.74 | 1.33 | 9.5 | 0.56 | 1.0 | 16.9 |
| Rescue Lake | Infertile | 9/23/88 | 180 | 6 | 0.55 | 1.37 | 9.7 | 0.50 | 1.5 | 16.8 |
| | | 5/25/89 | 0.41 | 10 | | | | | 0.9 | 19.8 |
| | | 6/27/89 | 0.64 | 16 | | | | | | |
| | | 7/21/88 | 170 | 6 | 2.41 | 1.73 | 10.1 | 0.98 | 1.0 | 15.6 |
| | | 8/22/88 | 220 | 9 | 2.27 | 1.76 | 10.0 | 1.01 | 0.9 | 15.8 |
| Kayak Lake | Infertile | 9/30/88 | 300 | 22 | 1.91 | 1.79 | 10.4 | 1.01 | 1.6 | 16.4 |
| | | 5/25/89 | 0.23 | 8 | | | | | 0.7 | 22.2 |
| | | 6/27/89 | 0.76 | 16 | | | | | | |
| | | 7/20/88 | 150 | 2 | 0.65 | 1.21 | 8.3 | 0.51 | 0.9 | 14.2 |
| | | 8/22/88 | 140 | 12 | 0.63 | 1.21 | 8.1 | 0.49 | 1.0 | 13.8 |
| | | 9/23/88 | 120 | 6 | 0.38 | 1.22 | 8.5 | 0.49 | 1.5 | 15.0 |

¹ Subjective lake type either fertile (w/anadromous salmon) or infertile (w/o anadromous salmon)

² TN- total nitrogen, TP- total phosphorus, Ca- calcium, Mg- magnesium, Na- Sodium, K- potassium, S- sulfur, Cl- chloride. All units in mg/L.



WB Dau and the YCC enrollees complete the 3rd of the 3 year water chemistry study.

MAC



1989 was a banner year for crowberries.

MAC

10. Pest Control

A patch of thistles (Cirsium sp.), growing near the City Building in Cold Bay, was whacked before they could seed this year. ARM Chase hacked about a quarter-acre of thistles in an effort to control their spread. Long-term residents of Cold Bay report a minimum of range expansion over the past 10 years. However, there is enough concern that the State and some private citizens may be doing some herbicide applications next spring.



ARM Chase whacked the thistles near
the City Building before they seeded.
(Too bad they're rhizomatous as well)

CPD

12. Wilderness and Special Areas

Large portions of the Izembek and Unimak units are designated Wilderness. As mentioned earlier, the entire area is basically wilderness but 300,000 acres of Izembek and 910,000 acres of Unimak enjoy the formal designation. Currently, all the areas are "managed" as Wilderness and there have not been any serious threats to lands designated Wilderness or otherwise. It's only a matter of time however, before a serious issue threatens the

habitat of the lower peninsula. Hopefully, official designation will afford some additional habitat protection. There are several areas within the Pavlof unit which meet Wilderness criteria. Designation procedures should be initiated as soon as land ownerships are clear and the dust has settled from the ANCSA conveyances.

Regional Archeologist, Chuck Ditters, visited Izembek in August, 1989, to look over the area's cultural resource sites. The area has an abundance of Aleut midden sites, unfortunately, most have been illegally excavated, especially those near any of the villages. The wreck of the Courtney Ford was also visited during Chuck's visit.



Former RM John Sarvis revisits the Courtney Ford, an old cargo ship used to haul guano prior to its wrecking.

RLW

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. At least 25 species of fish have been documented with all but 9 of these being totally marine. Freshwater species include chum, pink, red, and silver salmon, dolly varden, arctic char, sticklebacks and, in much smaller numbers, steelhead trout and king salmon. The 16 totally marine species are reported from Izembek Lagoon.

2. Endangered Species

The presence of the Aleutian Canada Goose (B.c. leucopareia) on the Izembek Refuge was documented in 1987 when a tarsal banded individual of the subspecies was observed. Canada geese are monitored closely by observers making composition counts and hunter bag checks in the Izembek Lagoon area. The single encounter of this subspecies, considering all that have been marked, suggests they are rare stragglers to the lower peninsula.

Arctic and American races of the peregrine falcon (F.p. tundrius and F.p. anatum, respectively) may occur in the area during migration but have never been documented. The non-endangered Peales' (F.p. pealei) race is a fairly common resident of the area.

Evaluations of the population and taxonomic status of the Amak song sparrow (Melospiza melodia amaka) and the Amak tundra vole (Microtus oeconomus amakensis), both of which only occur on Amak Island, are as yet, undetermined. Amak is an isolated island of volcanic origin lying approximately 10 miles off-shore in the Bering Sea northwest of Izembek Lagoon. Some limited field work was undertaken in 1987 but proved inconclusive. Additional field work and research is necessary in order to document the subspecies.

3. Waterfowl

Izembek supports an abundance of waterfowl both in total numbers and in species diversity. Most all of the "typical" North American species visit Izembek as well as a few vagrants from the Old World. Sightings in 1989 included a Eurasian wigeon and a common teal (A.c. crecca). Tufted ducks and pochards have been documented and probably occur in small numbers every few years or so. An unconfirmed spectacle eider sighting was received in 1989. The other eiders, Stellar's, common, and king, are regulars at Izembek. Stellar's are the most abundant through the fall and winter followed by common eiders. Kings are present

each year but typically in small numbers. A white-fronted goose and snow goose were sighted in 1989, as well. Presence of these 2 species is rare, however, a small number (1-5) are sighted nearly every year.

Tundra Swan

Tundra swan, an important nesting waterfowl species at Izembek, utilize the entire refuge and varying proportions of the population remains on refuge lands all year. Therefore, their habitat needs and population parameters is useful to managing and protecting refuge ecological units. In order to fulfill one of our mandates of protecting the essentially pristine wilderness nature of the refuge, knowledge is necessary of species such as the tundra swan which require remote, undisturbed habitats.

The winter seasons of 1987/88 and 1988/89 were characterized by dramatic departures from the non-migratory characteristics of the swan population which nests on the Izembek and Unimak Units. During nine winters prior to 1987/88 only 16 neck collared birds from this population (8 in one family) had been seen in the Pacific Northwest as far south as California. The normal winter haunt for the 500-600 swans in the Izembek population was the Peterson Lagoon area of the Unimak Unit. Beginning with the winter of 1987/88 a departure from the historic wintering pattern began with 24 different marked individuals observed from Calgary, Alberta, Canada to Ensenada, Baja California, Mexico. Eight additional marked birds were seen during the 1988/89 winter period, one south as far as central California. Three swans were observed singly during spring migration in 1989 in Idaho, Montana, Saskatchewan and Alberta. A total of 22 other marked swans were observed during the winter of 1989/90 from southern British Columbia to northern California (Figure 4).

The causative factors involved in such a drastic shift in wintering are speculative. Fall and early winter climatic conditions at Cold Bay show typical levels of variation and a long term trend toward milder winters. Wintering habitat conditions at Peterson Lagoon have not appeared to differ significantly in recent years. Unknowns such as winter food availability, behavioral responses to crowding or disturbance factors may be involved. Whatever the cause, the resulting change in winter distribution is remarkable.

Spring nesting surveys of the Izembek Unit have been no less remarkable. Total birds and nesting pairs observed in 1988 were down 48 and 53 percent, respectively from the previous 9 year average. In 1989 surveys indicated a 14 percent increase in population size which was attributable to an increase in flocked birds as nesting pairs declined another 36 percent (Tables 7 and 8). Fates of the monitored nests are given in Table 9.

A 17 January 1989 aerial survey was conducted over Unimak Island

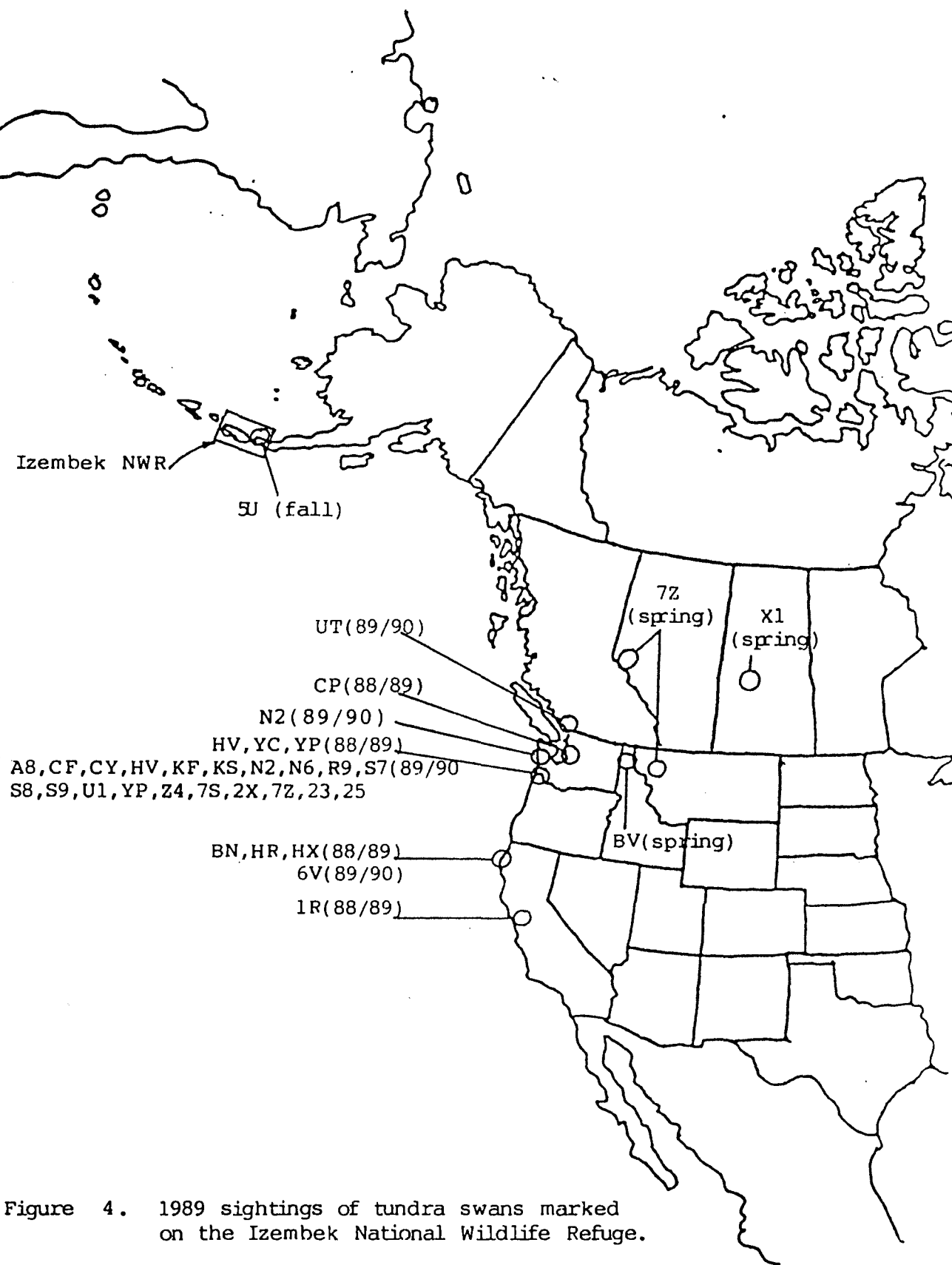


Table 7. Spring Nesting Survey of Tundra Swan, 1989.¹

| Date | Number of Swans Observed (%) | | | | | Area Cov. (Sq. Mi.) | Density (Sq. Mi.) |
|--|------------------------------|----------------------|----------------------|-----------------------|-------------------------|------------------------|----------------------|
| | Singles | Nesting Pairs | Non-nesting Pairs | In Groups | Total | | |
| Average ² 1979-87 (range) | 10.8± 4.6 (5-20) | 59.6±16.7 (24-78) | 75.8±20.0 (50-96) | 79.1±29.5 (29-140) | 225.2±20.0 (197-266) | 413.9 | .55±.05 (48-64) |
| 1988 (% - Change) ³ | 7 (-35) | 28 (-53) | 42 (-45) | 41 (-48) | 118 (-48) | 413.9 | .29 (-47) |
| 1989 (% - Change) ⁴ | 3 (-57) | 18 (-36) | 40 (-5) | 69 (+68) | 170 (+14) | 413.9 | .41 (+41) |

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

² Period prior to shift in winter distribution.

³ From 1979-87 average.

⁴ From 1988 population.

Table 8. Spring nesting surveys of tundra swans on the Izembek Unit and the western portion of the Pavlof Unit NWR, 1978-1989.

| | No. of Swans Observed (% of Total) | | | | Total | Area Cov. (sq. mi.) | Density (sq. mi.) | No. of Collared Swans Seen |
|--------------------------|------------------------------------|--------------------------|--|-----------|-------|------------------------|----------------------|-------------------------------|
| | Singles | Swans (nesting pairs) | Swans (other pairs) | In Groups | | | | |
| 5/8/78 ¹ | 6(8) | 18(23) | 26(33) | 28(36) | 78 | 315.5 | .25 | n/a |
| 4/25,28/79 ² | 10(5) | 24(12) | 96(47) | 75(36) | 205 | 413.9 | .50 | 12 |
| 5/14-15/80 | 9(4) | 60(26) | 84(36) | 80(34) | 233 | 413.9 | .56 | 1 |
| 5/13,15/81 | 16(8) | 58(29) | 94(48) | 29(15) | 197 | 413.9 | .48 | 21 |
| 6/2,6/82 ³ | 11(5) | 68(30) | 92(41) | 55(24) | 226 | 413.9 | .55 | 23 |
| 5/31-6/1/83 ³ | 8(4) | 48(21) | 94(41) | 77(34) | 227 | 413.9 | .55 | 37 |
| 6/7-8/84 ³ | 5(2) | 78(35) | 54(25) | 85(38) | 222 | 413.9 | .54 | 42 |
| 5/28,30,6/1/85 | 20(7) | 54(20) | 52(20) | 140(53) | 266 | 413.9 | .64 | 32 |
| 5/20/86 | 11(5) | 70(29) | 66(28) | 90(38) | 237 | 413.9 | .57 | 24 |
| 5/19/87 | 7(3) | 76(36) | 50(23) | 81(38) | 214 | 413.9 | .52 | 30 |
| 5/18-19/88 | 7(6) | 28(24) | 42(36) | 41(35) | 118 | 413.9 | .29 | 7 |
| 5/30-31/89 ³ | 3(2) | 18(11) | 80(47) 40(24) | 69(41) | 170 | 413.9 | .41 | 6 |
| Avg. 1979-1988 | 10(5) | 53(25) | 72(34) 61(29) | 75(36) | 210 | 413.9 | .51 | 21 |

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 late for peak of nesting.

Table 9. Summary of 1989 tundra swan nests, Izembek NWR.

| Nest No. (Survey No.) | Collar ¹ Status | Est. Clutch Size | Status | Brood Size | |
|-----------------------|-------------------------------|---------------------|----------------|---------------|---------------|
| | | | | Class I | Class II/III |
| 1(2) | | 4 | Unknown | | No brood |
| 2(17) | DCP | 4 | Hatch ≥ 2 | 2 | 0 |
| 3(29) | | ≥ 5 | Hatch 5(6/8) | 5 | Unknown |
| 4(32) | | 5 | Hatch 4 | 4 | 3 |
| 5(35) | | 3 | Unknown | | No brood |
| 6(36) | | 3 | Hatched | | No brood |
| 7(44) | | 3 | Unknown | | No brood |
| 8(56) | | 1 | Unknown | | No brood |
| 9(59) | | 4 | Unknown | | No brood |
| Totals 9 | | x3.6 (N=9) | | x3.7 (N=3) | x1.5 (N=2) |

¹ DCP= double neck-collared pair.

to monitor over-wintering swan use of traditional sites. Peterson Lagoon had been the wintering area for approximately 500 swans in previous years but only 17 were seen. Another 24 were observed on a small lagoon near Browns Peak bringing the island total to 41 birds, one of which had a neck collar. Ice cover on Unimak Island wintering sites was approximately 60 percent. Five swans were observed at Jackson Lagoon (Pavlof Bay) in mid-December and three were seen at Middle Lagoon (Morzhovoi Bay) on 19 January and 11 were seen flying over Cold Bay on about 14 February. Overall it appears that fewer than 50 swans over-wintered on Izembek in 1988/89 in comparison to over 500 prior to 1987.

During the winter of 1989/90, mild weather conditions resulted in more open water. On 26 December, 24 swans were observed near Moffet Spring on the Izembek Unit and 10 more were seen at the junction of the Caribou and Sapsuk Rivers near the Pavlof Unit.

The number of swan nests on the Izembek Unit was down 36 percent from the 1988 level which was down 53 percent from the historic 9 year average. Four of the nine nests found in 1989 were known to hatch; however, only one of these had a brood into the fledgling period. Our data suggest a nesting success of 44 percent and a 91 percent mortality rate to fledgling. Over-winter survival of cygnets belonging to the non-migratory segment of the population is routinely quite poor hence recruitment in 1989 is expected to be exceeded by natural mortality.

Pavlof Unit nesting surveys were again conducted covering the 1:63,300 scale quadrangle maps north of Pavlof Bay (Table 10). From our banding information, swans from this area have been determined to be largely from the "migratory portion" of the lower Alaska Peninsula population. On the average in 1989, total numbers were up 16 percent while nests were down only 2 percent in comparison to the 1986-89 average.

No tundra swans were captured for banding in 1989. The refuge was short staffed and without aircraft support throughout the molting period and no flightless birds were observed within access to the road system. The primary goal of our current banding program is to monitor the dynamics of the non-migratory population. This is best accomplished by marking known-age birds. Little progress could have been made in this area in 1989 due to extremely poor survival of cygnets.

The Izembek refuge has collected a large amount of valuable biological data on tundra swans since the project began in 1977. Several aspects of this work, including population and productivity surveys, are monitored on an annual basis as this species is a highly visible indicator of not only habitat quality and stability but also of the effects of various public use and/or disturbance factors. In 1990 it is hoped that some aspects of the historical work will be analyzed in a final report for publication.

Table 10. Tundra swan survey of the Pavlof Unit, Izembek NWR, 1989.

| Date | PML Maps | Single | Single w/nest | Pair w/nest | Pair w/brood | Pair w/o nest | Birds in Flocks | Total Swans | Area Covered (mi. ²) | Density (sq. mi.) (swan/mi ²) |
|---------------------------------|-------------|------------|------------------|----------------|-----------------|------------------|--------------------|------------------|--|---|
| NESTING | | | | | | | | | | |
| 31 May | D-3 | 0 | 0 | 2 | 0 | 5 | 0 | 14 | 15.0 | .93 |
| 31 May | D-4 | 9 | 5 | 16 | 1 | 32 | 151 | 263 | 175.8 ¹ | 1.50 ¹ |
| 1 June | D-5 | 22 | 5 | 11 | 0 | 60 | 56 | 225 | 177.1 | 1.27 |
| 1 June | D-6 | 2 | 0 | 2 | 0 | 20 | 6 | 52 | 104.5 | .50 |
| 1 June | C-5 | 11 | 1 | 9 | 0 | 21 | 28 | 100 | 110.7 | .90 |
| 1 June | C-6 | 2 | 1 | 0 | 0 | 9 | 4 | 25 | 110.5 | .23 |
| Total | | 46 | 12 | 40 | 1 | 147 | 245 | 679 ¹ | 693.6 | .98 ¹ |
| Average 1986-1989 (± 1SD) | | 52 (10) | 15 (3) | 38 (2) | 0 | 107 (27) | 228 (48) | 585 (85) | 690 (14) | .85 (.13) |
| % Change | | -12 | -20 | +5 | 0 | +37 | +8 | +16 | | +15 |

¹ Cygnets not included in calculations.

Black Brant

The Pacific Flyway (PF) population of black brant breeds primarily on the Yukon-Kuskokwim Delta, along the arctic coast and islands of the Chukotka Peninsula in the Soviet Union, the North Slope of Alaska, and the Northwest and Yukon Territories of Canada. Currently this population numbers about 140,000 birds and essentially all of these make the Izembek refuge area home for up to three weeks in the spring and six to eight weeks in the fall. Surveys and research on brant and their primary attractant, the eelgrass beds of Izembek Lagoon, are conducted annually by refuge personnel and cooperators. Continuing and primary commitments are toward collection of production and family group size data during fall and providing of facility, logistic and manpower assistance to the Division of Research during their spring and fall analysis of waterfowl disturbances.

The Izembek refuge staff continued to provide assistance to Migratory Birds-Waterfowl Investigations personnel in Juneau by monitoring the numbers of black brant over-wintering in Izembek and adjacent lagoons. These data are important in assessing the distribution and abundance of brant, flyway wide, as determined from the annual mid-winter surveys conducted in January. A total of 3,910 brant were found over-wintering at Izembek in January of 1989. Inventories in the winter of 1989/90 again showed high numbers of over-wintering brant. On 29 November 5,685 were counted. The January 10, 1990 survey flight, in coordination with the mid-winter inventory in Mexico, resulted in a count of 5,595 brant in the area from Izembek Lagoon south to Unimak Island.

Brant productivity and family group counts conducted at Izembek in 1989 marked the 27th consecutive year such appraisals have been made. Brant were first seen arriving on the lagoon on 16 August in 1989. The modal arrival date for first migrants at Izembek for 18 years for which we have data is 18 August. Production counts were obtained from 2 September to 27 October with a total of 17,935 individual brant classified to age. Juveniles comprised 4,281 (23.9%) of this total in comparison to the long-term average of 23.3% (Table 11 and 13). Estimated composition of the 1989 population based on the observed percentages and aerial total counts is presented in Table 12. Productivity of the PF brant population, based on observations from Izembek, has been below average in six of the past nine years, however, overall population size, determined from mid-winter surveys, is relatively stable. Average or better production has occurred only four times in the past 12 years possibly resulting from the dwindling sub-arctic Yukon Delta populations and the growing but less productive, arctic populations.

Table 11. Brant Production Counts Comparing Moffett Bay with Other Areas of Izembek Lagoon. 1989.

| Location | No. Adults | No. Juveniles | % Juveniles | Total Birds | Date |
|----------------|------------|---------------|-------------|-------------|-----------------|
| Moffett Bay | 1528 | 289 | 15.9 | 1817 | 4 OCT |
| Izembek Lagoon | 12,126 | 3992 | 24.8 | 16,118 | 8 SEP 27 OCT |
| Totals | 13,654 | 4281 | 23.9 | 17,935 | |

Table 12. Brant population composition, Izembek Refuge, 1989.

| Parameters | Est. number of birds | % Change from 1987 |
|---|----------------------|--------------------|
| Total Count ¹ | 148,994 | + 7.3 |
| Est. No. of Juveniles (23.9% of total) | 35,610 | +32.9 |
| Est. No. of Families (total juveniles 3.0 juv./fam.) | 11,870 | + 6.3 |
| Est. No. of Breeding Adults (No. of families x 2) | 23,740 | + 6.3 |
| Est. No. of Sub-adult and Non and Failed Breeding Adults (total count minus juveniles and breeding adults) | 89,644 | - 0.1 |

¹ Average of 29 September to 25 October peak counts.

Table 13. Annual black brant production counts, Izembek Refuge
1970-1989.

| Year | Adults | Juveniles | Total | % Juveniles |
|------------|--------|-----------|--------|-------------|
| 1970 | 12,104 | 6,256 | 18,360 | 34.1 |
| 1971 | 4,820 | 1,953 | 6,773 | 28.8 |
| 1972 | 6,599 | 3,698 | 10,297 | 35.9 |
| 1973 | 12,025 | 4,999 | 17,024 | 29.4 |
| 1974 | 13,118 | 632 | 13,750 | 4.6 |
| 1975 | 9,396 | 5,452 | 14,848 | 36.7 |
| 1976 | 7,962 | 4,340 | 12,302 | 35.3 |
| 1977 | 8,856 | 4,092 | 12,948 | 31.6 |
| 1978 | 10,696 | 1,842 | 12,538 | 14.7 |
| 1979 | 13,674 | 2,349 | 16,023 | 14.7 |
| 1980 | 9,618 | 3,341 | 12,959 | 25.8 |
| 1981 | 4,109 | 936 | 5,045 | 18.6 |
| 1982 | 11,509 | 1,213 | 12,722 | 9.5 |
| 1983 | 6,149 | 1,947 | 8,096 | 24.1 |
| 1984 | 9,451 | 1,499 | 10,950 | 13.7 |
| 1985 | 12,032 | 1,915 | 13,947 | 13.7 |
| 1986 | 15,621 | 2,823 | 18,444 | 15.3 |
| 1987 | 17,411 | 7,882 | 25,293 | 31.2 |
| 1988 | 16,138 | 3,847 | 19,985 | 19.3 |
| 1989 | 13,654 | 4,281 | 17,935 | 23.9 |
| 27_Yr X | 11,353 | 3,447 | 14,800 | 23.3 |

Family group size data were collected concurrently with productivity counts. A total of 303 individual families were observed giving an average of 3.0 juveniles/family (Table 14). Based on our family group counts, survival of young may have been above average (i.e., up 0.31 juveniles/family in comparison to the 24 year average). Research being conducted on the Tutakoke River, Yukon-Kuskokwim Delta, suggests that a considerable amount of brood mingling occurs among brant even before fall migration begins. As yet, data are insufficient to identify the extent of this phenomenon or its implications on family group size data from Izembek. Other goose species maintain family bonds through fall and winter and even into the following spring.

Table 14. Black Brant Family Group Counts, Izembek NWR. 1980-89.

| Year | <u>Frequency by Family Size</u> | | | | | | | | No. Fams. | No. Juvs. | Mean Juvs./Fam. |
|---------------|---------------------------------|-----|-----|-----|----|----|----|----|--------------|--------------|--------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | |
| 1980 | 26 | 47 | 57 | 39 | 7 | 0 | 1 | 0 | 177 | 489 | 2.76 |
| 1981 | 34 | 38 | 36 | 27 | 10 | 8 | 1 | 0 | 154 | 431 | 2.80 |
| 1982 | 18 | 22 | 25 | 20 | 4 | 0 | 0 | 0 | 89 | 237 | 2.66 |
| 1983 | 25 | 40 | 55 | 26 | 21 | 6 | 0 | 0 | 173 | 515 | 2.98 |
| 1984 | 19 | 49 | 70 | 39 | 10 | 4 | 1 | 0 | 192 | 564 | 2.94 |
| 1985 | 125 | 223 | 173 | 73 | 24 | 6 | 0 | 0 | 624 | 1538 | 2.46 |
| 1986 | 23 | 46 | 43 | 19 | 4 | 2 | 0 | 0 | 137 | 352 | 2.57 |
| 1987 | 168 | 263 | 267 | 171 | 66 | 13 | 0 | 0 | 948 | 2587 | 2.73 |
| 1988 | 62 | 91 | 65 | 35 | 6 | 4 | 0 | 0 | 263 | 633 | 2.41 |
| 1989 | 42 | 80 | 72 | 65 | 28 | 16 | 0 | 0 | 303 | 914 | 3.00 |
| 24 YR MEAN | 43 | 76 | 71 | 42 | 14 | 4 | <1 | <1 | 250 | 674 | 2.69 |

Productivity appraisals of brant were conducted during the fall of 1989 by the Izembek refuge staff with substantial contributions made by Research personnel of the Alaska Fish and Wildlife Research Center.

Nesting success for brant on the Yukon-Kuskokwim Delta was 82 percent versus the 69 percent recorded in 1988. Likewise the mean clutch size during incubation was 3.9 eggs/nest this summer, up from 3.7 in 1988.

The fall population of brant at Izembek Lagoon includes birds from Alaska, the western Canadian Arctic and the Soviet Arctic. It was hypothesized that these birds mix throughout the lagoon and hence our counts are representative of the whole PF population. Radio marking of brant from various breeding areas from 1987 to 1989 addresses questions about fall distribution in the Izembek Lagoon area among other data gaps. A total of 63 brant were radio marked in 1989 from the Yukon-Kuskokwim Delta (n = 20), Teshekpuk Lake area (n = 28), Wrangel Island (USSR) (n = 9), Anderson River (Canada) (n = 4), and Victoria Island (Canada) (n = 2).

Only 33 (52.4%) of these birds were detected during the fall staging period at Izembek. Data on specific arrival and departure dates and duration of stay were obtained on only 23 birds (Table 15). Mortality of radio equipped brant was documented during the falls of 1987 and 1988 in addition to some birds losing their radio backpacks. Design improvements were made in 1988 and 1989. The low relocation rate in 1989, although not positively attributed to any one factor, is probably due to radio failure rather than death of the bird or loss of the radio package. This probability was reinforced by the sightings of nine radio marked birds with non-functional radios at Izembek this fall.

The radio-tracking effort at Izembek Lagoon involved several techniques including aerial tracking and the use of directional antenna systems at fixed locations. Aerial tracking of radio-equipped brant was used initially to determine dates and locations of arriving brant. After a majority of the radio-equipped brant had arrived, aerial tracking was concentrated on those birds that were absent or infrequently detected by ground tracking systems. Many times aerial tracking was done in conjunction with population surveys.

Six primary stations have been used for radio tracking brant in the Izembek Lagoon complex. These were Baldy Mountain, Halfway Point, Outer Marker and Outpost #1 (OP1), Cape Glaznap, and Banding Island as shown in Figure 5. In 1989, radio tracking was done from three primary locations, Baldy Mountain, Frosty Road and Grant Point. The Baldy Mountain station was unique due to it's 1000' elevation, proximity (2 miles) to Izembek Lagoon and subsequent long-ranges (approximately 10 miles) of signal

Table 15. Arrival and departure dates of radio-tagged brant marked on Yukon-Kuskokwim Delta (YKD), North Slope (NS) of Alaska near Teshekpuk Lake, Wrangel Island (WI), USSR, and Canadian Arctic (AC) at Izembek Lagoon in fall of 1989.

| Breeding location | YKD | NS | WI | CA |
|-------------------|---------|----------|---------|----------|
| Date of arrival | | | | |
| Mean | 15 Sep | 28 Sep | 23 Sep | 7 Oct |
| SD | ± 8 | ± 12 | ± 3 | ± 14 |
| n | 10 | 6 | 4 | 3 |
| First | 2 Sep | 19 Sep | 19 Sep | 24 Sep |
| Last | 26 Sep | 21 Oct | 25 Sep | 21 Oct |
| Date of Departure | | | | |
| Mean | 6 Nov | 11 Nov | 9 Nov | 9 Nov |
| SD | ± 4 | ± 3 | | |
| n | 5 | 2 | 1 | 1 |
| First | 2 Nov | 9 Nov | | |
| Last | 11 Nov | 13 Nov | | |
| Duration of Stay | | | | |
| Mean | 51 | 35 | 35 | 45 |
| SD | ± 9 | ± 16 | | |
| n | 5 | 2 | 1 | 1 |
| Range in Days | 39-58 | 23-46 | | |

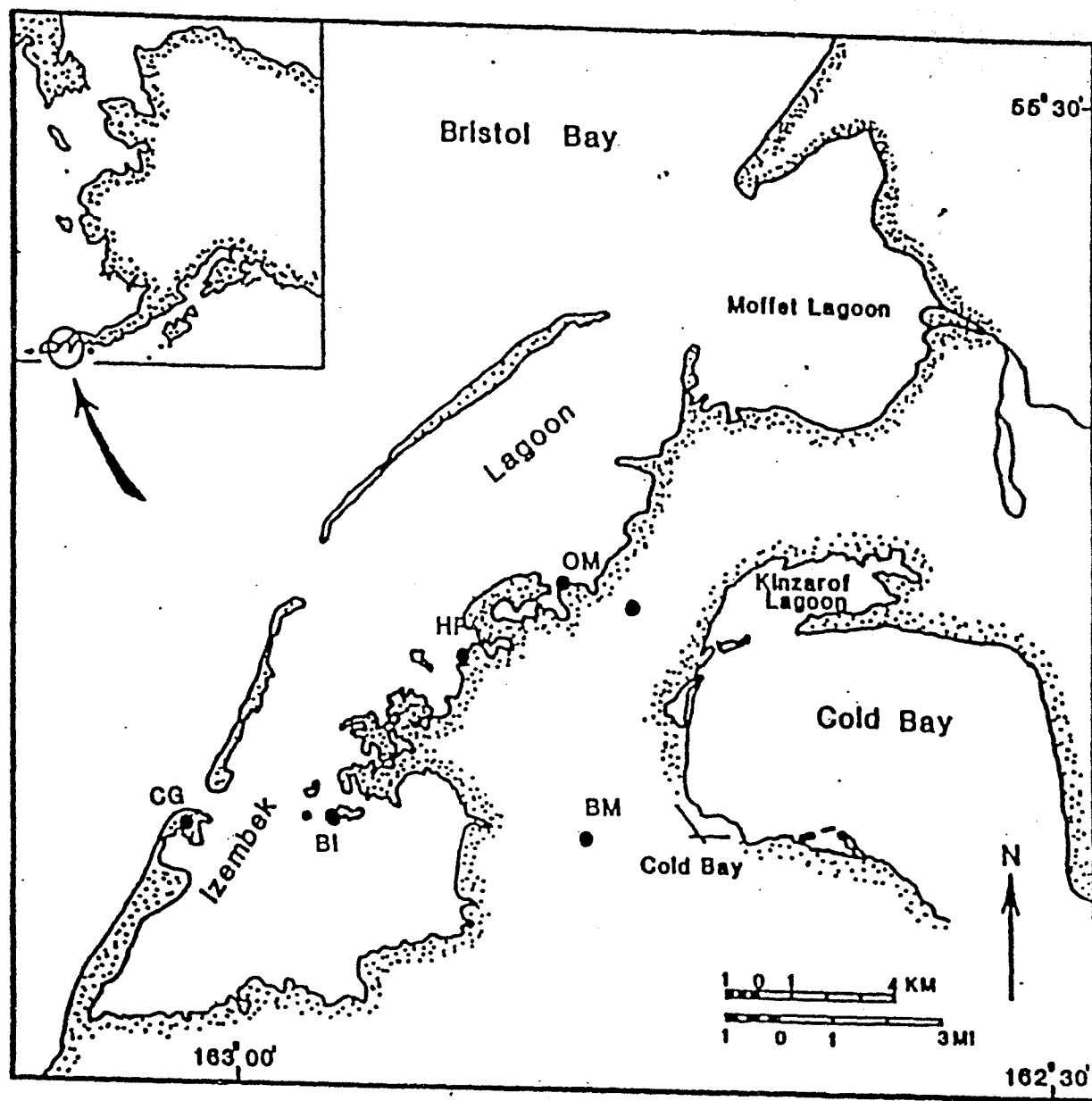


Figure 5. Black brant research observation points on or adjacent to Izembek Lagoon.

detection. This station allowed researchers to receive good, consistent signals from radio transmitters in all parts of Izembek Lagoon, except Moffet Bay, and from Kinzarof Lagoon. On occasion it was possible to detect signals from radio-equipped brant using the Big or Middle Lagoons areas of Morzhovoi Bay.

Each radio-tracking station was equipped with either four-element or five-element stacked, dual Yagi antenna arrays with a null detection system. The quality of reception of a radio signal at a particular station depended on the individual transmitter, distance between the source and receiver, obstructions between source and receiver, elevation, and weather conditions (i.e., rain reduced reception of the signal). Attempts to locate radio-equipped birds from the tracking blinds occurred intermittently, from 1 to 5 days per week for up to 12 hours a day. Time and occupancy varied for each blind site depending on weather, use of the area by geese, and timing of experimental over-flights. During a tracking session the start time, end time, and frequencies searched during each scan were recorded as well as the time, azimuth, null width, and signal strength for each frequency located.

Handheld "H" antennas were used for radio-tracking during mobile situations from boats or in areas not covered by permanent stations. This device had a very limited range of approximately 3 miles, line of sight.

Generally, the radio telemetry data suggested that brant from Canadian Arctic nesting areas arrived later than birds marked on the Yukon-Kuskokwim Delta. It appears that some migrants continue to arrive into October as suggested by aerial survey data (Table 16). Ultimately, it is hoped to determine the timing of arrivals and departures for each primary breeding location. The possible preference of Canadian Arctic birds for the Moffet Bay area throughout most of the fall staging period requires further research. It does appear that Moffet Bay is important for this and other components when first arriving in the fall.

Generally, lighter bellied brant predominate in northern and central Canadian arctic populations. Telemetry data from birds of these populations suggest a possible tendency to segregate during the fall staging period. Radio telemetry data collected from brant marked in the Canadian Arctic suggested that some of these birds prefer the Moffet Bay area of Izembek Lagoon. Efforts were continued in 1989 to observe brant from shore locations on Moffet Bay to see if light-bellied birds could be distinguished. Fewer than 150 brant were sampled for belly color and were dark. Light-bellied and intermediate color phases predominate in the Canadian Arctic population. No light-bellied birds were observed, however the productivity (i.e., 15.9% juveniles) was lower than for the Izembek area as a whole. These data may suggest either preferred use of the area by non or failed breeding brant or birds from a less successful sub-population.

Table 16. Aerial surveys of goose populations on Izembek and adjacent lagoons, 1989.

| Date | Number of Birds | | | Observers |
|----------------------|-----------------|--------------|---------------|----------------------|
| | Brant | Canada Goose | Emperor Goose | |
| 30 Aug. | 7,775 | 10 | 25 | C. Dau |
| 22 Sept. | 113,756 | 9,760 | 1,126 | C. Dau/D. Ward |
| 29 Sept. | 146,926 | 25,959 | 5,594 | C. Dau/M. Chase |
| 4 Oct. | 151,939 | 17,828 | 2,554 | B. Butler/D. Ward |
| 11 Oct. | 148,195 | 34,642 | 4,778 | R. King/L. Denlinger |
| 25 Oct. | 148,915 | 40,549 | 3,438 | C. Dau/R. West |
| 3 Nov. | 67,558 | 30,917 | 2,469 | C. Dau/D. Ward |
| 6 Nov. | 41,700 | 14,900 | no count | C. Dau |
| 29 Nov. ¹ | 5,685 | 0 | 1,650 | C. Dau/M. Chase |
| 10 Jan. 1990 | 5,595 | 0 | 4,536 | C. Dau |

¹ Izembek Lagoon only.

Canadian Arctic nesting brant show wide color variation from "typical" light-bellied (Atlantic Type) to dark phases approaching that characteristic of breeds on the Yukon-Kuskokwim Delta. In nearly 30 years of bag checking during the hunting season, refuge personnel have not documented the presence of light-bellied forms at Izembek. Likewise our preliminary observations of birds in flight at Moffet Bay were negative for light-bellied birds. Radio telemetry data showed that most of the light-bellied and intermediate phase brant marked in the Canadian Arctic have preferred the Moffet Bay area. This provided us with insight into why they have not appeared in hunters' bags. Moffet Bay is a remote, virtually un-hunted area at the north end of Izembek Lagoon.

In 1989 an increased effort was made to determine the ratio of dark to light-bellied throughout the Izembek Lagoon complex. No light-bellied birds were observed from a sample of approximately 150 brant at Moffet Bay. One light-bellied brant was seen in a sample of 500 birds from Applegate Cove while 20 were seen in a similar sample from Grant Point.

The ongoing emphasis of biological investigations on Pacific Flyway brant in Alaska during 1988 came primarily from the Alaska Fish and Wildlife Research Center which intensified its appraisal of disturbance and behavior of brant at Izembek this fall. David Ward, Lee Tibbitts and Rick Lanctot of the AFWRC made up the primary crew throughout September and October. Their efforts supplemented by those of Dirk Derksen, Margaret Petersen and Karen Bollinger also from the center. Paul Flint, a graduate student at the University of Alaska - Fairbanks, also provided extensive assistance in 1989.

Two Soviet scientists, Dr. Mikhail Stishov, Wrangel Island Reserve, and Dr. Sergei Kharitonov, Academy of Sciences USSR - The Ringing Centre, visited the Izembek refuge for one month beginning in late September. Both assisted with the cooperative capture and radio marking on Wrangel Island in July. The Soviet scientists participated in all phases of brant research and management projects at Izembek and spent a short time at Nelson Lagoon where other AFWRC researchers were working on emperor geese.

Bob Stevens, Research Division, Washington D.C., visited the Izembek refuge from 7 to 11 September to review the work being conducted by personnel of the AFWRC. Dirk Derksen, Chief, Migratory Bird Branch, accompanied him during his review. The refuge staff provided an aerial overflight of the Izembek Lagoon complex during which radio tracking of brant and emperor geese was accomplished.

The research effort took various approaches to quantify the types and effects of disturbances of fall staging geese, primarily Pacific brant. Efforts to refine the methodology used by field workers to insure the compatibility of data collected and reduce observer bias contained during this final field season of

evaluation of disturbance factors to geese. Monitoring took the form of a more thorough and precise estimate of weather conditions, bird behavior, and distance of the disturbance factor from the geese during various phases of their reaction. These types of data are essential to a more complete understanding of the overall impact of various disturbances. When the disturbance is a fast moving aircraft, disturbance/birds distances and behavioral response change rapidly necessitating the use of tape recorders by observers to describe the event. Data collected were later converted to numerical data and/or directly transferred from various data sheets to portable computers.

Several parameters relating to various disturbance factors are important to the quantification of their effects on birds. Parameters such as altitude, speed, and distances of the disturbance from the subjects were estimated as precisely as possible for all uncontrolled events. Observations of controlled disturbances were also made. In 1989 no experimental over-flights were contracted however responses to incidental air traffic, primarily scheduled airlines were monitored.

All forms of waterfowl disturbance encountered by observers were analyzed including boat and foot traffic, various types of auditory stimulus and predator activities (primarily bald eagles). It is apparent that brant can undergo some level of disturbance without having adverse effects on their physical capabilities to assimilate nutrient reserves necessary to migrate or breed. Natural forms of disturbance such as activities of predators like bald eagles or gyrfalcons are largely uncontrollable, but must be viewed as a cumulative factor in the overall analysis of disturbance. Identification of an "acceptable level" of disturbance, and development of means to avoid exceeding that level, are critical to managing waterfowl and public use at Izembek.

Behavioral interactions and responses of disturbed and undisturbed brant, engaged in various activities, are being quantified in relation to a number of climatic and phenological factors. To obtain these types of data, research crews viewed birds for several days from key areas of Izembek Lagoon throughout fall. Time budget analyses were performed throughout diurnal periods to provide these baseline data. Such observations also will help to identify increases in migratory restlessness within the population.

The spring arrival of brant at Izembek occurred 10 April to 7 May with a peak influx on about 3 May. Normally, arrival occurs over about a 10 to 15 day period and flocks of a few hundred up to a thousand are observed during daylight hours flying northwest over Cold Bay. As these birds near the head of Cold Bay, they rise to altitudes up to 1,500 feet AGL to cross the Alaska Peninsula before descending into Izembek Lagoon. Some of the spring influx occurs during nocturnal hours and may not be detected at Cold Bay. A total of 58,804 brant were counted in the

Izembek/Kinzarof Lagoon areas on 6 May. From 3 to 6 May the refuge coordinated with Migratory Bird Management - North in performing coastal waterfowl survey of southwestern Alaska with brant numbers totaling 91,346. Spring migration of brant from wintering areas to Izembek Lagoon is characterized by short, daily movements over roughly a two-month period. Nevertheless, brant have arrived at Izembek over a month-long period or less in recent years.

A total of 146,012 Pacific brant were reported during the mid-winter inventory with 129,865 of these in Mexico (Table 17). The peak fall count for southwestern Alaska was 148,915 brant on 25 October. The Izembek refuge coordinated with personnel performing the mid-winter survey by performing an aerial count of brant in the Izembek area. A total of 5,595 brant were counted during this survey.

Pacific brant are managed in accordance with a Pacific Flyway management plan which calls for a minimum population of 120,000 brant determined from a three year moving average. The current three-year average is 137,584 birds.



Nearly the entire Pacific Flyway population of black brant visits Izembek each fall.

RLW

Table 17. Black brant mid-winter survey data, Pacific flyway.

| Year | Washington | Oregon | California | Mexico (West Coast) | Total | 3 Year Running Average |
|---------|------------|--------|------------|------------------------|---------|---------------------------|
| 1974/5 | 6,163 | 1,507 | 480 | 115,340 | 123,490 | 126,382 |
| 1975/6 | 7,540 | 1,769 | 680 | 112,056 | 122,045 | 125,395 |
| 1976/7 | 14,111 | 2,100 | 0 | 130,756 | 146,967 | 130,834 |
| 1977/8 | 18,100 | 1,110 | 560 | 143,117 | 162,887 | 143,966 |
| 1978/9 | 8,078 | 1,255 | 10 | 120,070 | 129,413 | 146,422 |
| 1979/80 | 7,665 | 1,015 | 135 | 137,550 | 146,365 | 146,222 |
| 1980/1 | 10,107 | 1,790 | 540 | 181,760 | 194,197 | 156,658 |
| 1981/2 | 6,451 | 706 | 485 | 113,402 | 121,044 | 153,869 |
| 1982/3 | 3,113 | 718 | 565 | 104,918 | 109,314 | 141,518 |
| 1983/4 | 7,097 | 930 | 700 | 124,703 | 133,430 | 121,262 |
| 1984/5 | 11,675 | 641 | 801 | 131,568 | 144,685 | 129,143 |
| 1985/6 | 12,026 | 1,113 | 706 | 114,725 | 128,570 | 135,562 |
| 1986/7 | 14,371 | 1,133 | 736 | 86,913 | 103,152 | 125,469 |
| 1987/8 | 19,831 | 1,104 | 947 | 116,696 | 138,578 | 133,317 |
| 1988/9 | 18,538 | 871 | 1,033 | 107,721 | 128,163 | 123,298 |
| 1989/90 | 13,756 | 1,399 | 992 | 129,865 | 146,012 | 137,584 |

Calendar year prior to January mid-winter survey (i.e., 1988 data represents survey done in January 1989).

Emperor Goose

Based on comprehensive spring and fall aerial surveys the population of emperor geese showed gradual increases in 1987 and 1988. This trend was welcomed after abrupt declines from 1981 to 1986 when an already slumping population dropped from approximately 100,000 to 40,000 birds. Surveys in 1989 suggested further declines in both spring and fall numbers. In comparison to the 1988 levels, the spring and fall populations were down 15.0% and 7.1%, respectively (Table 18). Given favorable nesting conditions the emperor goose population has shown the potential for growth necessary to return to historic levels. The spring population size of 45,712 in 1989 is 67.1 percent below the historic, mid-1960's, level of 139,000 geese.

The Izembek refuge staff and Migratory Bird Management - North cooperated to perform the annual aerial survey of emperor geese in coastal areas from the Yukon-Kuskokwim Delta to Unimak Island including the north and south sides of the Alaska Peninsula. The 1989 spring survey from 3 to 6 May, as with previous efforts, was initiated when essentially the entire population was believed to be staging in bays and lagoons within the survey area. A total of 45,800 emperor geese were observed in the survey area (Table 19 and Figure 6). Climatological charts prepared by the National Weather Service and aerial reconnaissance by refuge personnel from the Yukon-Delta, Togiak and Alaska Peninsula/Becharof Refuges are essential indicators used to determine when to initiate the survey.

Coordination with Soviet biologist working on the Commander Islands and Kamchatka has provided information supportive of a spring migration of essentially the entire emperor goose population eastward through the Aleutian Islands and northward up the west coast of Alaska. Emperor geese are rarely seen in Kamchatka and only in small numbers. Some emperor geese do linger in the Aleutian Islands while the bulk of the population migrates through southwestern Alaska staging areas. Surveys performed in the Aleutian Islands following the 1987 spring survey indicated that approximately 1,000 birds were found west of the survey area. These were likely sub-adults or non-breeders.

Negotiations among residents of the Yukon-Kuskokwim Delta (i.e., Waterfowl Conservation Committee of the Association of Village Council Presidents), the States of Alaska and California, sportsmen's groups and the U.S. Fish and Wildlife Service culminated in the 1985 Yukon Delta Goose Management Plan. According to this plan, if the spring emperor goose population falls below 60,000 birds, based on a 3-year moving average, all hunting must stop.

The 1989 survey total of 45,800 geese brought the 3-year average increased to 50,413 (Figure 7). Restricted hunting of emperor geese may be allowed again when the spring population reaches

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

| Year | Spring Population Size (% change prev. year) | Production ^{1,2} (% young in fall) | Family Group Size | Fall Population Size (% change prev. year) |
|------|--|--|-------------------------|--|
| 1980 | No Survey | 24.8 | 2.3 | 65,971 |
| 1981 | 91,267 | 31.7 | 3.2 | 63,156 (-4.3) |
| 1982 | 100,643 (+10.3) | 7.8 | 2.7 | 80,608 (+27.6) |
| 1983 | 79,155 (-21.4) | 27.1 | 3.2 | 72,551 (-10.0) |
| 1984 | 71,217 (-10.0) | 22.3 | 2.8 | 82,842 (+14.2) |
| 1985 | 58,833 (-17.3) | 17.4 | 2.8 | 59,792 (-27.8) |
| 1986 | 42,228 (-28.2) | 26.1 | 2.6 | 68,051 (+13.8) |
| 1987 | 51,655 (+22.3) | 33.6 | 3.1 | 65,663 (-3.5) |
| 1988 | 53,784 (+4.1) | 24.2 | 3.1 | 76,165 (+16.0) |
| 1989 | 45,712 (-15.0) | 23.0 | 3.1 | 70,729 (-7.1) |

¹ Data from Izembek National Wildlife Refuge, (1980-1984).

² Data from Izembek Refuge and other Alaska Peninsula areas (1985-1988).

Table 19. Emperor goose numbers observed by segment.

3 May, 1989

| | |
|--------------------------------------|-------|
| Hooper Bay to Kuskokwim River mouth. | 5,074 |
|--------------------------------------|-------|

4 May, 1989

| | |
|--|-----|
| 1. Bethel to Quinhagak | 5 |
| 2. Quinhagak to Jacksmith Bay | 0 |
| 3. Jacksmith Bay to Carter Spit | 364 |
| 4. Carter Spit to Goodnews Bay | 124 |
| 5. Goodnews Bay to Chagvan Bay | 0 |
| 6. Chagvan Bay to Nanvak Bay | 662 |
| 7. Nanvak Bay to Cape Pierce | 265 |
| 7A. Cape Pierce to Hagemeister Island | 77 |
| 7B. Hagemeister Island to Tongue Point | 90 |
| 7C. Tongue Point to Summit Island Point | 56 |
| 7D. Summit Island Point to Kulukak Point | 6 |
| 7E. Kulukak Point to Dillingham | 107 |
| 7F. Dillingham to Kvichak | 0 |
| 7G. Kvichak to Naknek | 0 |

5 May, 1989

Overcast with winds southwest at 10 knots; 39 degrees F;
high tide; survey time 1025 to 1855.

| | |
|---|-------|
| 8. Naknek to Egegik Bay | 0 |
| 9. Egegik Bay to 6 km South of Goose Point | 173 |
| 10. 6 km South of Goose Point to Smokey Point | 0 |
| 11. Smokey Point to Cape Menshikof (Includes Ugashik Bay) | 1,109 |
| 12. Cap Menshikof to Cinder River lagoon | 0 |
| 13. Cinder River Lagoon | 4,512 |
| 14. Cinder River Lagoon to Port Heiden | 125 |

May 1989 (Table 19. Continued)

| | |
|---|--------|
| 15. Port Heiden to 24 km South of Strogonof Point | 12,000 |
| 16. South of Strogonof Point to Seal Island | 650 |
| 17. Seal Islands to Ilnik Lake | 5,331 |
| 18. Ilnik Lake to Port Moller | 0 |
| 19. Port Moller to Herendeen | 75 |
| 20. Herendeen to Cape Rozhnof (Including Mud Bay) | 1,019 |
| 21. Cape Rozhnof to Lagoon Point (Including Kudobin Islands) | 11,022 |
| 22. Lagoon Point to Kinzarof Lagoon | 3 |
| 23. Kinzarof Lagoon | 26 |

6 May, 1989

Overcast with winds southeast at 10 knots; 40 degrees F. and mid-high tide; survey time 1100 to 2035 hours.

| | |
|---|------------|
| 24. Moffet Lagoon | 1,020 |
| 25. Izembek Lagoon | 235 |
| 26. Applegate Cove to Big Lagoon | 41 |
| 27. Big Lagoon/Hook Bay | 15 |
| 28. Morzhovoi Bay | 0 |
| 29. Bechevin Bay | 105 |
| 30. Swanson Lagoon | - |
| 31. Urilia Bay | - |
| 32. Southside Unimak Island (Cape Luke to Cape Aksit) | - |
| 33. Otter Cove | - |
| 34. Ikatan Bay to Kenmore Head | (Rain/Fog) |
| 35. Kenmore Head to Thin Point | (Rain/Fog) |
| 36. Thin Point to Cold Bay | (Rain/Fog) |
| 37. Cold Bay to King Cove | 0 |

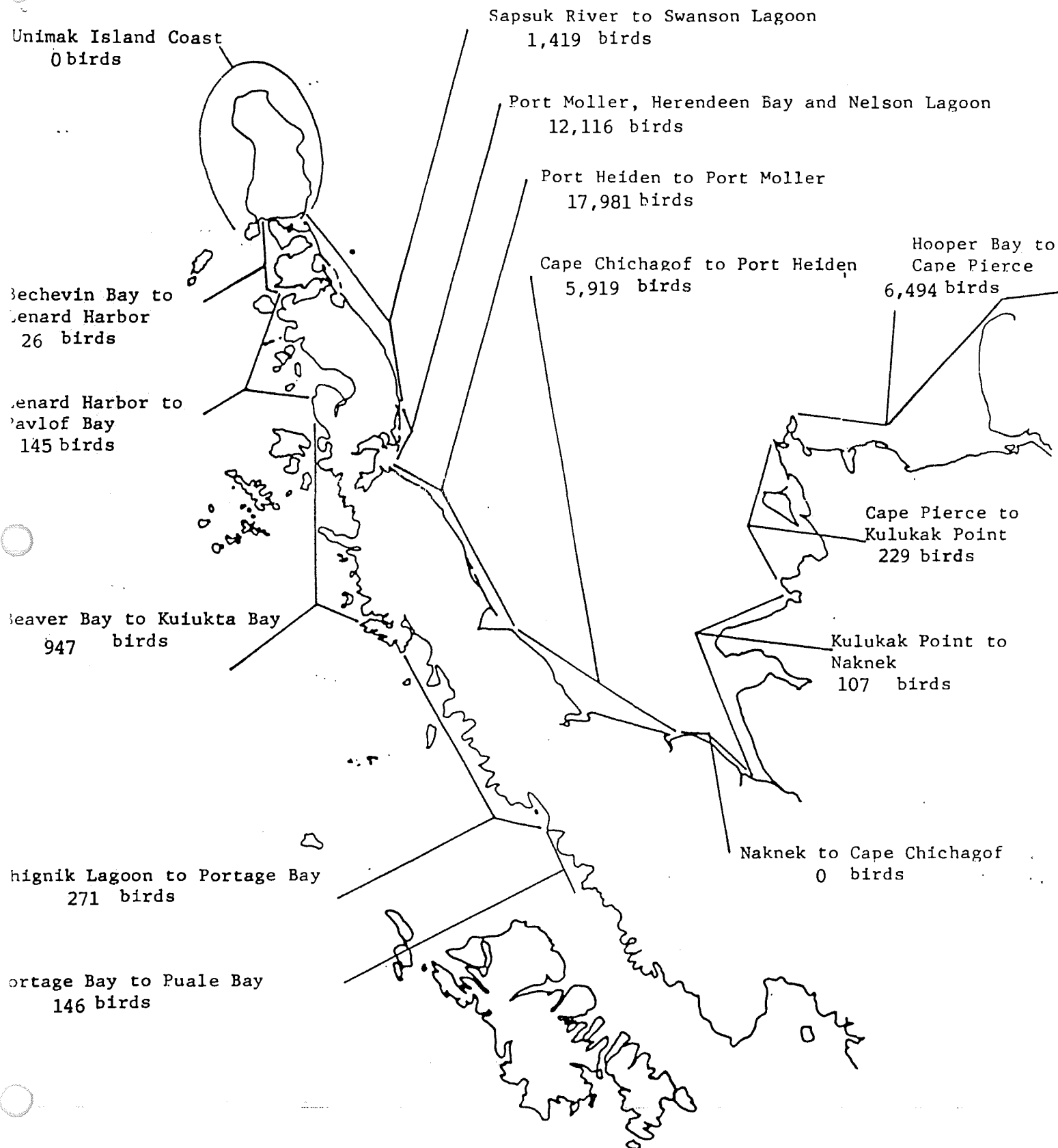
May 1989 (Table 19. Continued)

| | |
|-------------------------------------|------------|
| 38. King Cove to Pavlof Bay | 60 |
| 39. Pavlof Bay | 85 |
| 40A. Canoe Bay to Seal Cape | 0 |
| 40B. Seal Cape to Balboa Bay | 0 |
| 41. Balboa Bay to Dorenoi Bay | 0 |
| 42. Dorenoi Bay to American Bay | 0 |
| 43. American Bay to Ramsey Bay | 0 |
| 44. Ramsey Bay to Ivanof Bay | 0 |
| 45. Ivanof Bay to Chignik Lagoon | 947 |
| 46. Chignik Lagoon to Chignik Bay | 0 |
| 47. Chignik Bay to Kujulik Bay | 45 |
| 48. Kujulik Bay to Aniakchak Bay | 6 |
| 49. Aniakchak Bay | 0 |
| 50. Amber Bay to Cape Kunmik | 220 |
| 51. Cape Kunmik to Cape Providence | 0 |
| 52. Cape Providence to Agripina Bay | 0 |
| 53. Argipina Bay to Wide Bay | 0 |
| 54. Wide Bay to Portage Bay | 146 |
| 55. Portage Bay to Puale Bay | (Rain/Fog) |

TOTAL EMPERORS

45,800

Figure 6. Percentage distribution of emperor geese by survey area,
3-6 May 1989.



80,000 geese again based on a 3-year moving average. An action plan and a draft Pacific Flyway Management Plan for emperor geese identify a population goal of 150,000 birds which is comparable to historic levels. The difficulty in reaching and maintaining a population of 150,000 emperor geese is greatly increased by allowing hunting when only 80,000 individuals are present. A more biologically sound approach would be that hunting be prohibited if the populations falls to 25% below the identified goal (i.e., when fewer than 110,000-115,000 geese are present) (Figure 7).

Emperor geese began their fall influx into the Izembek refuge on 30 August when 20 birds were seen at Moffet Point on Izembek Lagoon. Peak numbers were present beginning in October as determined from four aerial surveys (Table 16). The aerial survey conducted by Rod King, Migratory Bird Management, and Lynn Denlinger, Realty, was part of the annual fall survey of emperor geese in southwestern Alaska. The total of 70,729 geese counted from 7-12 October 1989 was used to estimate the composition of the fall population (Table 20).



The emperor goose is an Arctic nesting species that has fallen on hard times as of late.

CPD

EMPEROR GOOSE

Spring Population 1981-89

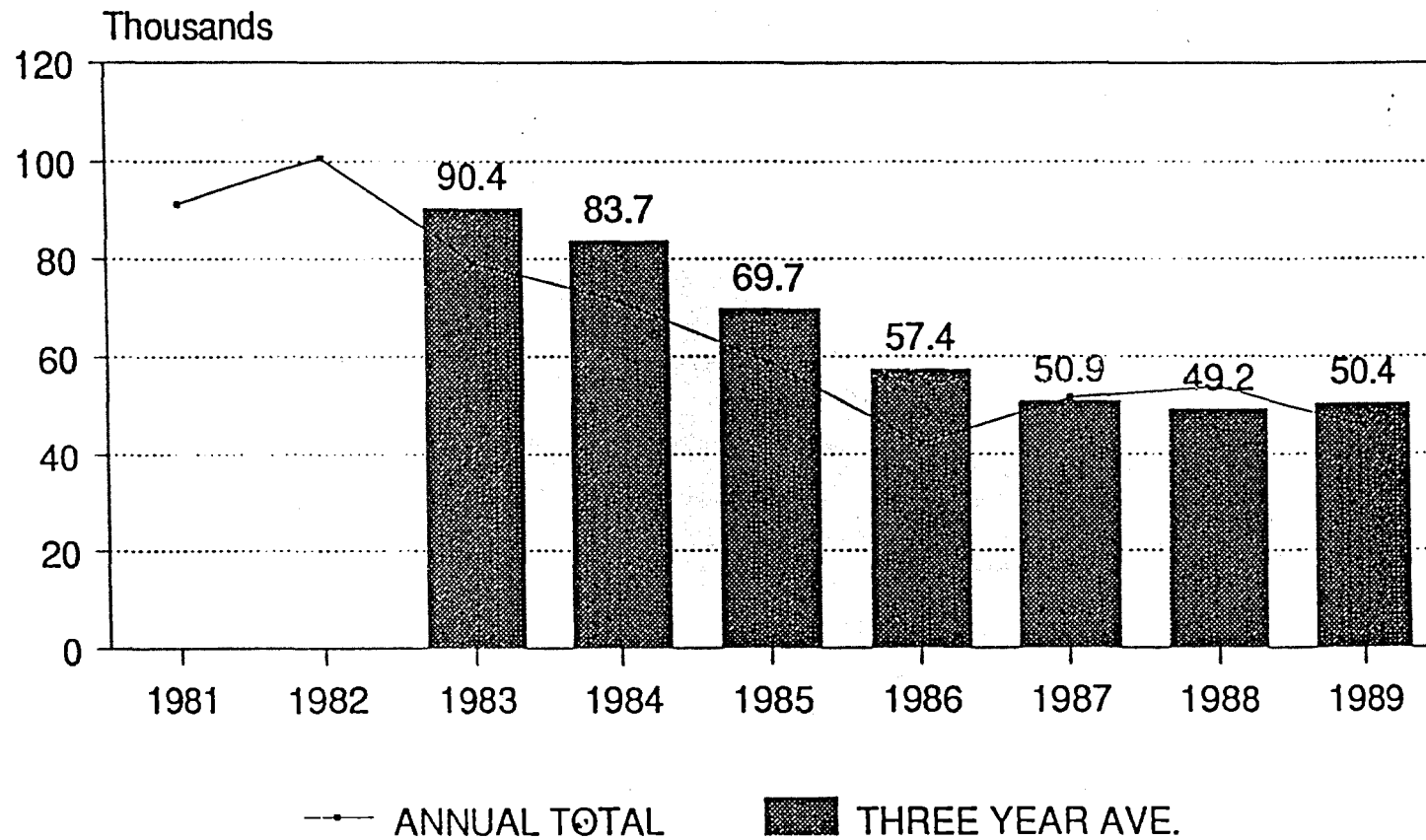


Figure 7. Three year average with total annual population plotted as a curve.

(From Gill and Dau 1989)

Table 20. Composition of the emperor goose population based on fall surveys in southwestern Alaska.

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

Emperor goose productivity counts in 1989 were performed by the Izembek refuge staff and personnel from the Research and Migratory Bird Management Divisions in the Regional Office. Observations were made from 4 September to 21 October. Emperor goose productivity as determined from Izembek counts was based on a 12 September aerial photographic survey and by conventional ground counts at other times using spotting scopes. Aerial surveys by the Izembek staff resulted in a sample of 338 from a population of geese in the Nelson Lagoon area. This sampling effort gave a weighted average of 25.7 percent juveniles in the population. Combined aerial and ground productivity counts through October resulted in 4,947 emperor geese classified to age with 1,136 (3.0%) of these being juveniles (Table 21).

²
Izembek information was combined with similar counts made at other bays and estuaries along the north side of the Alaska Peninsula from 23 September to 3 October (Table 22 & 23). The proportion of young in the population based on all sampling (12,730 geese) in 1989 was 21.1 percent.

The estimate of percent young in the emperor goose population from specific locations and times varied again this year. This corroborates previous years data that indicated production estimates from aerial photographs taken from one area and time may not be representative of the population as a whole. Comparison of the proportion of young present in each area during the first week of the survey suggest there may be a difference in the age composition of emperor geese using each lagoon. These results may indicate that discrete sub-populations may use specific lagoons for extended periods during fall migration.

Family group sizes of emperor geese observed in the Izembek area averaged 3.1 young per family (n = 145 families) over the period 5 September to 23 October (Table 21). Average Class I, II, and III/F brood sizes for emperor geese at one study site on the Yukon-Kuskokwim Delta were 3.5, 3.3, and 3.0, respectively (Craig Ely, Research, Anchorage). These data suggest an attrition rate of 11.4% for young emperor geese from hatch into the fall migration period. This rate of mortality, as evidenced by size of family groups, is 17.9 percentage points lower than the average for the historical period 1969-1980, suggesting above average survival of young in 1989 (Table 24).

Neck-collaring of emperor geese at research study sites on the Yukon-Kuskokwim Delta continued in 1989. A total of 698 birds were fitted with yellow neck-collars with black number/letter combinations. In addition, 30 emperor geese were fitted with collars with attached solar powered radio packages. Five additional birds carried solar powered radios deployed in 1988.

The Alaska Fish and Wildlife Research Center place spring and fall camps at Nelson Lagoon and Cinder River Lagoon, from which emperor goose observations were made. Data continue to suggest

Table 21. Emperor goose productivity counts, Izembek National Wildlife Refuge, 1970-1989.

| Year | Adults | Juveniles | Total | % Juveniles | No. of Families | Family Group Size |
|-------------|--------|-----------|--------|-------------|-----------------|-------------------|
| 1970 | 9,722 | 4,933 | 14,655 | 33.7 | 383 | 2.9 |
| 1971 | 8,142 | 3,458 | 11,600 | 29.8 | 480 | 2.7 |
| 1972 | 4,680 | 2,270 | 6,950 | 32.7 | 210 | 3.1 |
| 1973 | - | - | - | - | - | - |
| 1974 | 2,025 | 377 | 2,402 | 15.7 | 50 | 2.6 |
| 1975 | 744 | 405 | 1,149 | 35.2 | 51 | 2.9 |
| 1976 | 1,023 | 324 | 2,247 | 14.4 | 207 | 2.7 |
| 1977 | 996 | 683 | 1,679 | 40.7 | 108 | 2.8 |
| 1978 | 1,395 | 495 | 1,890 | 26.2 | 62 | 3.0 |
| 1979 | 841 | 113 | 954 | 11.8 | 53 | 3.3 |
| 1980 | 1,777 | 586 | 2,363 | 24.8 | 40 | 2.3 |
| 1981 | 1,067 | 495 | 1,562 | 31.7 | 181 | 3.2 |
| 1982 | 1,653 | 140 | 1,793 | 7.8 | 32 | 2.7 |
| 1983 | 1,058 | 393 | 1,451 | 27.1 | 192 | 3.2 |
| 1984 | 2,753 | 795 | 3,548 | 22.4 | 79 | 2.8 |
| 1985 | 2,245 | 503 | 2,748 | 18.3 | 125 | 2.8 |
| 1986 | 3,283 | 1,381 | 4,664 | 29.6 | 266 | 2.6 |
| 1987 | 2,989 | 1,523 | 4,512 | 33.8 | 186 | 3.1 |
| 1988 | 3,884 | 1,242 | 5,126 | 24.2 | 200 | 3.1 |
| 1989 | 3,811 | 1,136 | 4,947 | 23.0 | 145 | 3.1 |
| 23_Yr. X | 2,946 | 1,157 | 4,116 | 28.1 | 150 | 2.9 |

Table 22. Estimates of percent juvenile emperor geese from aerial photographs on the Alaska Peninsula, fall 1989.

| Date | Location | | | | | | |
|----------|-----------------------|-----------|--------------|-------------|--------------|---------------|----------------|
| | Egegik | Ugashik | Cinder River | Port Heiden | Seal Islands | Nelson Lagoon | Izembek Lagoon |
| 23 Sept. | 24.2(33) ¹ | 10.1(188) | 19.3(1959) | | | 28.7(641) | |
| 25 Sept. | | 11.3(284) | 29.1(570) | 18.5(562) | 18.1(866) | 19.4(1255) | |
| 28 Sept. | | (.02(101) | 15.6(1234) | 19.6(648) | 8.2(956) | 33.3(2080) | 55.0(178) |
| 3 Oct. | | | | | | | 17.0(1175) |
| Average | 24.2(33) ¹ | 9.2(573) | 19.6(3763) | 19.1(1210) | 12.9(1822) | 28.2(3976) | 22.0(1353) |

¹ The number of emperor geese classified from photographs at each location are in parentheses.

Table 23. Annual emperor goose productivity estimates form photographs taken on the northside of the Alaska Peninsula, 1985-1989.

| Year | Adults | Juveniles | Total | Percent Juveniles |
|-------|--------|-----------|--------|-------------------|
| 1985 | 2,657 | 536 | 3,193 | 16.8 |
| 1986 | 4,721 | 1,659 | 6,380 | 26.0 |
| 1987 | 7,760 | 2,417 | 10,178 | 23.7 |
| 1988 | 8,407 | 2,773 | 11,180 | 24.8 |
| 1989 | 10,044 | 2,686 | 12,730 | 21.1 |
| Total | 33,589 | 10,071 | 43,661 | 23.1 |

¹ Data compiled by Bill Butler, Office of Migratory Bird Management, Anchorage including observations collected by the Izembek staff.

Table 24. Juvenile mortality of emperor geese during summer and fall, estimated from historical (1969-1980) and current data.¹

| | Date | X Clutch Size (n) | X Clas I Brood Size (n) | X Class III/F Brood Size (n) | X Fall Family Group Size (n) |
|---|---------|----------------------|----------------------------|---------------------------------|---------------------------------|
| | 1969-80 | 5.0 ± 0.3(806) | 4.1 ± 0.4(517) | 3.5 ± 0.6(497) | 2.9 ± 0.3(1,805) |
| | 1989 | 5.3 ± 0.2(26) | 3.5 ± 1.6(31) | 3.0 ± 1.0(19) | 3.1 ± 1.4(145) |
| Estimated mortality from preceeding age classification | 1969-80 | | 18% | 15% | 17% |
| | 1989 | | 11% | 9% | 0% |
| Estimated mortality in relation to fall family group size | 1968-80 | 42% | 29% | 17% | |
| | 1989 | 42% | 11% | 0% | |

¹ Summer data from Yukon-Kuskokwim Delta study areas (Ely, C.R. et al. 1989); Fall data from Izembek NWR.

that some individuals show a high degree of fidelity for certain staging areas. Tracking of radio-marked geese confirmed these data in that twelve of the thirteen signals received were from sedentary birds while one other (167.998) was heard in transit to Nelson Lagoon where it stayed throughout October. Although aerial tracking within the Izembek Lagoon complex was performed from September through November, only one radioed emperor goose (167.844) was detected. Radio relocation data suggest that some birds use preferred lagoon systems for prolonged periods in fall and that the shift to Aleutian wintering areas may be direct and rapid.

Canada Goose

Taverner's Canada geese are an important component in the fall waterfowl concentration on the Izembek Refuge. The first fall arrivals were a flock of 8 observed on 23 August. A single, or a small flock, was heard by local residents near Kinzarof Lagoon on 8 August. The influx of birds continued slowly through September. Greatest numbers are present in October each year and aerial survey efforts in the fall of 1989 placed the peak population at 40,549 birds on 25 October (Table 16). This number is likely very low since the Canadas were well dispersed over the tundra feeding on the abundant crowberry crop. The fall surveys concentrate on birds on the waterbodies and geese on the tundra are extremely difficult to sight and enumerate.

The Canada goose is the primary species in the hunter's bag at Izembek. Canada geese are of increasing importance due to the harvest restrictions or closures on other species. Canada geese made up 73.8% of the estimated goose harvest and 45.7% of the total estimated waterfowl take at Izembek in 1989 (Table 33 in Section H.8). Adults predominated slightly over juveniles in the hunter harvest based on our bag check data (Table 25).

The fall departure of Canada geese from the Izembek area began on 24 October and peaked on 5 November. Canada geese initiate their migration with weather conditions similar to those used by brant, but leave during daylight hours. All Canada geese have usually departed the area by late November. Canada geese declined in number throughout November based on aerial surveys by the refuge staff. By 3 and 6 November, numbers of Canadas had declined to 30,917 and 14,900, respectively. No Canadas were seen on a 29 November survey.

Very small numbers of cackling Canada geese occur among the masses of Taverner's seen at Izembek each fall. Of the numerous cacklers banded on the Yukon-Kuskokwim Delta in recent years, none have been recovered by hunters here. Three neck-collared cacklers were seen at Moffet Bay in the Fall of 1988. Approximately 1100 Canada geese were scanned for the presence of collars at Moffet Bay on 5 October 1989. Neither collars, nor noticeably small birds were observed. Considering the relatively large number of cacklers that have been either standard banded or

Table 25. Age ratio of Canada geese in hunter's bags, Izembek NWR, 1976-1989.

| Year | Canada Geese Harvested | | Total | Adult: Immature Ratio in Harvest |
|-------|------------------------|--------------|-------|----------------------------------|
| | Adults(%) | Immatures(%) | | |
| 1976 | 78(38.6) | 124(61.4) | 202 | 1.00:1.60 |
| 1977 | 32(43.2) | 42(56.8) | 74 | 1.00:1.30 |
| 1978 | 29(37.7) | 48(62.3) | 77 | 1.00:1.70 |
| 1979 | 98(53.3) | 86(46.7) | 184 | 1.00:0.91 |
| 1980 | 30(43.5) | 39(56.5) | 69 | 1.00:1.30 |
| 1981 | 113(57.1) | 85(42.9) | 198 | 1.00:0.77 |
| 1982 | 74(50.7) | 72(49.3) | 146 | 1.00:0.97 |
| 1983 | 51(49.1) | 53(50.9) | 104 | 1.00:1.04 |
| 1984 | 37(41.6) | 52(58.4) | 89 | 1.00:1.40 |
| 1985 | 23(67.6) | 11(32.4) | 34 | 1.00:0.48 |
| 1986 | 11(50.0) | 11(50.0) | 22 | 1.00:1.00 |
| 1987 | 17(51.5) | 16(48.5) | 33 | 1.00:0.94 |
| 1988 | 50(48.5) | 53(51.5) | 103 | 1.00:1.06 |
| 1989 | 94(56.0) | 74(44.0) | 168 | 1.00:0.79 |
| Total | 737(49.0) | 766(51.0) | 1,503 | 1.00:1.04 |

neck-collared, the few sightings at Izembek seem to confirm the "uncommon" status of this subspecies on the Southern Alaska Peninsula.



Canada geese are a favorite target among waterfowlers at Izembek.

CPD

4. Marsh and Water Birds

Common loons and red-necked grebes nest regularly in the area, but in low numbers. Both species appear to use remote areas of the refuge, however, a pair of common loons has nested on Blinn Lake where we operate our float plane. The nest was unsuccessful in 1989.

A lesser sandhill crane nest was located near the mouth of Left Hand Valley during a swan survey. A follow-up flight found a single chick and both parents doing well in the marsh area west of Paul Hanson's Lake. Cranes are regular nesting and summer residents in the area with a small number occurring each year.

5. Shorebirds, Gulls, Terns and Allied Species

Rock sandpipers and semipalmated plovers are two of the most common shorebird species occurring on the refuge. Shorebird populations peak in the area during the fall migration. The extensive inter-tidal flats with the detached and decaying eelgrass provides ideal shorebird habitat.

Noteworthy observations for 1989 include:

| | | | |
|----|--------------------|---------|--------------------------|
| 2 | Golden plover | 8/12/89 | First of fall |
| 1 | Spotted Redshank | 8/20/89 | First record for Izembek |
| 5 | Lesser yellowlegs | 8/23/89 | Rare |
| 1 | Sanderling | 8/23/89 | Uncommon |
| 20 | Dunlin | 8/21/89 | Rare |
| 1 | Slaty-backed gull | 9/08/89 | Accidental |
| 1 | Long-tailed jaeger | 5/18/89 | Rare |

A one-legged golden plover hung around Grant Point throughout the summer.



Rock sandpipers are abundant in the area. Here is a breeding plumage male photographed on the breeding pair survey.

RLW

6. Raptors

A single goshawk was observed at Izembek in 1989. This is the first record of this species at Izembek.

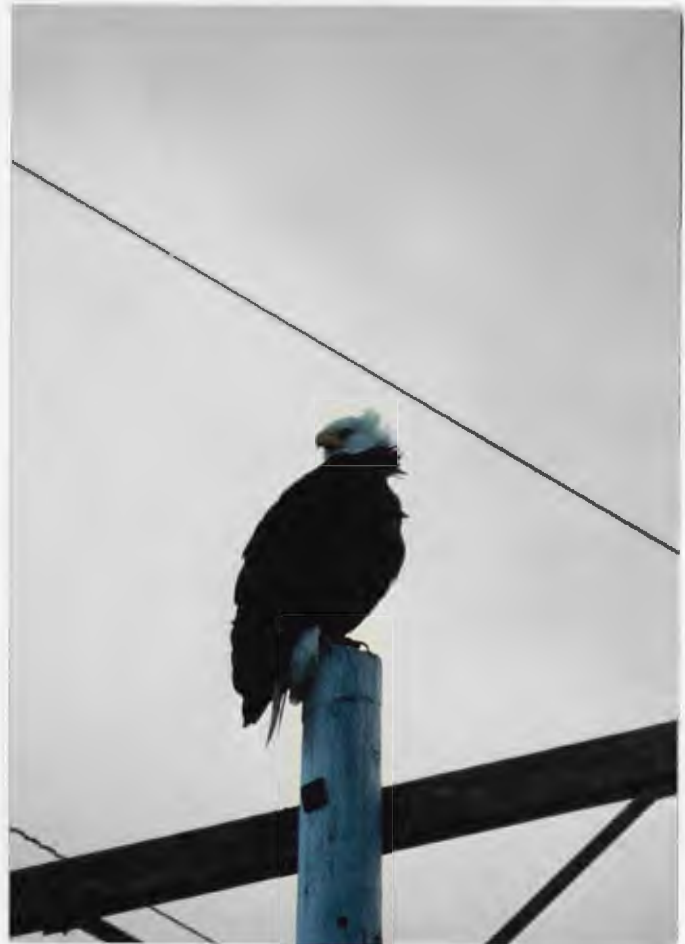
A snowy owl was seen several times during the fall of 1989 near the Applegate Trail. Snowy owls are only seen occasionally (every 3-5 years) at Izembek, and typically only during the winter.

Golden eagle sightings in 1989 included 3 sightings of a single adult in the spring and 1 sighting of a single adult in October. Golden eagles are rare, but fairly regular, visitors to the lower peninsula.

Two merlin sightings were made in 1989. Both sightings were of single birds in the fall of the year. These too are rare visitors to Izembek.

Bald eagles are abundant throughout the area. Peak populations usually occur in winter, though several pairs are resident. Several pairs nest among the cliffs and spires of Unimak's south side and one pair typically nests on Izembek. The nest on Izembek was active in 1989 and fledged two young.

A bald eagle was found dead near Trout Creek in February 1989. The carcass was sent to the Madison Health Lab for necropsy.



Bald eagles are common in winter most often found near waters holding spawning salmon.

MAC



RM West with a dead bald eagle
found near Trout Creek in 1989.

CPD

7. Other Migratory Birds

Refuge Manager West performed the annual Breeding Birds Survey which is part of the nation-wide effort organized by the Migratory Bird Management Office. The survey was conducted on 30 May, 1989. A total of 1,989 individuals representing 29 species were encountered.

The Audubon Christmas Bird Count was conducted by Refuge staff in the Izembek/Cold Bay area on 20 December 1989. A total of 5,117 individuals representing 30 species were observed.

An American robin was sighted at the refuge headquarters in November. This is only the fourth observation of this species at Izembek and all 4 sightings have occurred since 1988.

8. Game Mammals

The common game mammals of the area are the brown bear and caribou. Occasionally a moose will wander down from the Port Moller area. A moose was reported near King Cove for a short time in August of 1989.

Furbearers of interest are chiefly the wolf, red fox, river otter, wolverine, and mink. With the exception of the red fox and river otter, few are taken either by trapping or hunting. Red fox are especially abundant. A coyote was taken by a bear hunter in the Pavlof Unit during the fall bear hunt. Coyotes are extremely rare in this area though a few have been documented. The hunter commented that there was an abundance of hares in the area, also rather uncommon in recent times for this area.



Red fox are common in the area; often seen in town and abundant at the dump.

RLW

Brown Bear

A gradual rebuilding of the brown bear population in or adjacent to the Cold Bay road system continued in 1989. The Cold Bay road system area is an administrative unit established by the Alaska Department of Fish and Game to provide both spring and fall brown bear hunting opportunities. Over-hunting of the population in the early 1980's depleted the local population. In the fall of 1984 the Alaska State Board of Game and the Alaska Department of Fish and Game agreed to only open this hunting area if a "nuisance" bear was present. This provided protection to the local bear population and an opportunity for the population to increase. The reduced size of the bear population and vigilance by Cold Bay residents resulted in very few bear-people encounters and no nuisance bears from 1984 to 1989.

The populations response to hunting restrictions became apparent in 1988 and 1989 when bears, singles and family groups, were observed with more regularity. The attention of long-term residents had been lulled during the "low" bear years and many new residents were unfamiliar with concerns of safety in bear country. The refuge responded with an information packet to each resident outlining steps to avoid bear problems. Of primary interest was our desire to stress proper handling of materials that could attract bears. Bears once attracted to a meal of garbage, pet food, fish, game birds or mammals are highly likely to return for further investigation. Proper handling of attractants is the key to reducing undesirable bear-people interactions.

The population response as evidenced by a subjective increase in bear numbers induced the Alaska Department of Fish and Game to re-evaluate hunting opportunities with the Cold Bay road system area. In consultation with the Izembek staff it was decided to re-open the area to hunting by registration permit during the fall of 1989. To obtain a permit, hunters were required to appear in person at the refuge office with required State license and bear tag. The number of permits issued was not limited however it was agreed to by managers that the season would be closed by Emergency Order when 2 bears were taken.

In previous years the Cold Bay road system area was open to hunting annually during spring and fall seasons. In 1989 it was agreed to have season openings coincide with the remainder of the lower Alaska Peninsula in which seasons were spring and fall during alternate regulatory years. Hence the road system hunt will be open every other May and October in the future. There was considerable interest in the fall hunting season with 14 hunters participating in the hunt which lasted only five days prior to the quota being met. The results of this hunt, that on the remainder of Game Management Unit 9D and on Unimak Island (GMU 10) is discussed in greater detail in Section H. Public Use.

Fall aerial surveys over selected sample units continue to be our primary means of monitoring the status of brown bear populations on the Izembek refuge. More accurate means of assessing total population size, involving intensive radio marking, is being evaluated by the Alaska Department of Fish and Game near Black Lake, 200 miles northeast of Cold Bay. These data may help qualify survey efforts elsewhere on the Alaska Peninsula.

On 11 September 1989 a sample aerial survey unit in the Right and Left-hand Valley area was completed. A total of 107 bears, including 15 females with a total of 29 cubs, were seen (Table 26). Brown bears are most active during nocturnal and crepuscular hours hence aerial surveys must be conducted as near as possible to dawn or dusk, with dawn preferable. Data from 1989 in comparison to historic data from 1981 to 1985 suggest the population is basically stable. Unfavorable weather conditions during the fall survey period, which corresponds to peak

Table 26. Fall aerial brown bear survey results, Izembek NWR.

| Year | Date | Single Bears | | | Females with ¹ | | | Total Females with Family Groups | Total Bears |
|--------------------|------|--------------|------|-------|---------------------------|-------|------|--|----------------|
| | | Small | Med. | Large | COY | Yrl. | 2.5 | | |
| 1988 | 8/23 | 9 | 10 | 1 | 4w/6 | 4w/8 | 1w/2 | 9 | 45 |
| 1989 | 9/11 | 18 | 23 | 3 | 6w/13 | 8w/14 | 1w/2 | 15 | 107 |
| <hr/> | | | | | | | | | |
| 1981-85 Average | | 20.0 | 28.3 | 6.3 | 9w/19 | 9/21 | 1w/2 | 19 | 109 |

¹ Total females with young in each age class.

availability of spawning salmon, precluded the staff from surveying two sample units on the Unimak Unit.

The refuge undertook an extensive brown bear capture and radio tracking program from 1984 to 1988. The study encompassed the eastern portion of the Izembek Unit, adjacent portions of the Pavlof Unit, State and Native Corporation lands. The study was designed to determine habitat use and distribution of bears in a remote, high density area of the refuge. In addition to data on habitat use and home range size we were able to address, in a preliminary way, mortality rates for various aged cubs, age structure of the population and density of bears within the study area. The goal of identifying the unique characteristics and geographic importance of the area to brown bears was met.

On 4 June 1989, a young boar was discovered dead near Russell Creek upstream from the hatchery. A local fisherman reported it to the Refuge staff who went to investigate. The bear, probably a 3.5 year old, had been killed and cached by another bear, a large boar. The dead bear, with what was believed to be his sibling sister, had been seen repeatedly in the area for several days prior to the incident. A few days before the incident, the two had been joined by another, larger bear. Apparently, the newcomer was intent on breeding the young female and the young boar was in the wrong place at the wrong time. Deaths of this sort are not uncommon among brown bear yet rarely are they so readily documented.



This young boar was killed by a larger boar. Wrong place, wrong time.

RLW

A manuscript dealing with habitat related aspects of the brown bear telemetry study was prepared, the abstract of which follows:

Brown Bear Habitat Use and Home Range on the Izembek National Wildlife Refuge, Southern Alaska Peninsula.

From August 1984 to March 1988, 36 radio-collared brown bears were relocated a total of 433 times within the 2000 km² study area. Forty-eight den sites were characterized and 301 (69.3%) bear relocations were coded to specific habitat types. Home ranges averaged 19 km² for 6 male bears, 12 km² for 13 non-maternal females, and 9 km² for 16 females with young. Uplands, usually above 300 meters in elevation, were used for denning. A narrow alder zone was used for day-bedding and as escape cover. Feeding activities restricted bears to lowlands, coastal beaches, and anadromous fish streams from May through November. Sixty-seven percent of the radio relocations during the non-denning period were in lowland habitats versus 20% in midland, and 13% in upland habitats.

Caribou

The Southern Alaska Peninsula Caribou Herd (SAPCH) has been in steady decline since 1983. The herd winters in the Cold Bay area and migrates up the peninsula to calving and summer ranges. Since the peak of roughly 10,200 animals in 1983, the herd has suffered a drastic decline due to poor recruitment and high adult mortality. Cooperative work by ADF&G and Refuge staff intensified in 1989 in order to determine the cause, or causes, of the herds recent decline.

Surveys are typically conducted by ADF&G in mid-June as an indicator of early calf recruitment. Refuge staff then conducts a pre-hunt survey, usually in September, to determine herd composition and calf recruitment. A total count is made by Refuge staff on the wintering grounds with variable timing from year-to-year. Typically, the count is conducted after the bulk of the herd is in the Cold Bay area, the snow cover is near 100% (for best visibility), and the weather is suitable for flying; not an easy combination to achieve working within a time frame.

The surveys on the calving grounds by ADF&G personnel in 1989 indicated approximately 73% of the adult females were parturient. Calving was nearly complete on the Caribou River calving grounds by 6 June and on the Black Hills calving ground by 13 June. In a composition count on 13 June, (n=1931) early recruitment was estimated at only about 20%. Of 19 radio-collared adult females, 16 produced calves in 1989. By 23 June only 6 calves remained

and a tracking flight in August confirmed that these calves had also died. By late fall, the 1989 cohort made up scarcely 3.3% of the herd. In comparison, the Northern Alaska Peninsula Caribou Herd typically has 25-30% recruitment each year. The dismal survival for calves in 1989 follows several years of poor recruitment ranging between 9 and 16% (Table 27).

The 1989 total count was conducted by Refuge staff on 26 and 27 December 1989. The survey covered the entire lower peninsula from Port Moller to Unimak Island. The total number of caribou observed was 3,957 animals and is likely very close to the actual population. The lower peninsula is narrow and complete coverage of the survey area is possible. Results of recent total count surveys are also contained in Table 27.

Table 27. Annual recruitment and population size of the SAPCH 1983 -1989

| Year | Fall Calf Composition | Winter Total Count |
|------|-----------------------|--------------------|
| 1983 | 15 % | 10,203 |
| 1984 | 15 % | NA |
| 1985 | 9 % | NA |
| 1986 | 13 % | NA |
| 1987 | 16 % | 6401 |
| 1988 | 12 % | 3407* |
| 1989 | 3 % | 3957 |

* Post-calving census.



A picture is worth a thousand words.
The SAPCH continues to decline.

RLW

The age structure of the hunter harvested animals is also indicative of the sustained poor recruitment to the SAPCH. Since 1986, Refuge staff has been collecting lower jaws from hunter killed animals and ADF&G personnel have been aging these jaws. Over the past 3 years, 83% of the reported caribou harvest has been at least 5 years old. In comparison, the Adak and Kenai herds average about 20% of the harvest being 5 years old or older. Results of the jaw aging are contained in Table 28.

Table 28. Summary of hunter-harvested caribou as determined by tooth wear and replacement, SAPCH. 1986-1989.

| Season | n | Total (%) | | | Aged to 5+ Years (%) | | | |
|--------|-----|-----------|--------|--------|----------------------|--------|--------|---------|
| | | M | F | U | M | F | U | All |
| 86/87 | 40 | 16(40) | 14(35) | 10(25) | 10(63) | 12(86) | 9(90) | 31(78) |
| 87/88 | 51 | 28(55) | 22(43) | 1(2) | 24(86) | 19(86) | 1 | 44(86) |
| 88/89 | 40 | 20(50) | 19(48) | 1(2) | 18(90) | 16(84) | 0 | 34(85) |
| Total | 131 | 64(49) | 55(42) | 12(9) | 52(81) | 47(85) | 10(83) | 109(83) |

Though there is some selection for the larger, thus typically older bulls, the age of harvested cows should approximate their availability as cows are taken for meat without a great deal of selection.

Intuitively, it is felt that undernutrition may be the key factor in the poor calf survival. This would follow naturally from the population build up through the 1970's, the increased demand on the forage resources, and the subsequent inability of the range vegetation to keep pace with demand. Range surveys and food habits analysis' were undertaken to examine this possibility. Fecal pellets have been collected on the winter range for the previous 2 years and on the calving range in 1989. Results of the analysis is summarized in Table 29. The high percentage of mosses in the winter diet may be an indication that this herd is nutritionally stressed. Field sampling to determine availability of vegetative species was initiated in 1988 and data is still being compiled.

Refuge staff initiated a serological investigation into potential disease problems with the SAPCH in 1989. Sampling kits were distributed to local hunters and they were encouraged to take a blood sample from harvested caribou. The samples were then centrifuged and the serum frozen. The samples will be sent to Randy Zarnke with the ADF&G in Fairbanks for analysis. This technique has several shortcomings but requires little effort to

examine. The large number of caribou killed around the Cold Bay road system gives the Refuge staff opportunities for large amounts of data collection with little effort. The serum samples will be analyzed for the presence of 11 different disease titers indicating exposure at some time. Collecting samples by hunters led to generally poor quality samples and a small sample size as most folks forgot to take blood. For our purposes, high quality samples are not imperative in this type of investigation. If results of this investigation reveal a need for more serological studies, blood can be taken during capture/collaring efforts by ADF&G and Refuge staff.

Table 29. Caribou fecal pellet analysis, SAPCH, 1988-1989.

| Species/Group | Collection | | |
|--------------------------|------------------------|------------------------|--------------------|
| | December 88 % Comp. | December 88 % Comp. | June 89 % Comp. |
| Moss (Type 1) | 21.77 | 14.10 | 7.50 |
| Moss (Type 2) | 31.32 | 20.90 | 3.40 |
| Other(4 minor types) | 4.73 | 17.70 | 2.10 |
| Club Moss | | | .30 |
| TOTAL MOSS | 57.82 | 52.70 | 13.30 |
| Lichen (Alectoria) | 9.41 | 8.00 | 2.90 |
| Lichen (Fruticose) | 4.61 | 6.50 | 1.80 |
| Lichen (Foliose) | 1.56 | 4.70 | 1.50 |
| TOTAL LICHEN | 15.58 | 19.20 | 6.20 |
| Sedge spp. | .76 | .30 | 12.20 |
| Festuca | | | 5.80 |
| Calamagrostis | | | 12.30 |
| Unk. Grasses | 4.35 | 5.10 | 1.90 |
| TOTAL GRASSES | 4.35 | 5.10 | 20.00 |
| Shrub stem | 1.31 | | |
| Shrub other ¹ | 15.12 | 17.40 | 34.30 |
| TOTAL SHRUB | 16.43 | 17.40 | 34.30 |
| Forb ² | .62 | 5.00 | 9.80 |
| Unk. leaf | 4.44 | | |
| Hair | | .30 | 4.20 |

1 - Winter samples primarily Empetrum, Arctostaphylos, Vaccinium and small amounts of Salix and Cornus.

Spring sample 18.6% Salix, 4.40% Empetrum and remaining 11.30% Arctostaphylos, Vaccinium, Rubus, Equisetum and Unk.

2 - Winter samples of Solidago, Trientalis, Angelica and Unk.

Spring sample mostly Angelica also with Artemisia, Epilobium, Solidago, Trientalis, and Unk.

9. Marine Mammals

Refuge staff participated in the Service sponsored sea otter surveys, initiated as result of the oil spill. Four days were devoted to surveys around the Cold Bay area. A pod of 8 killer whales was sighted in the waters south of Unimak Island on the surveys as were 3 gray whales in the Otter Cove Area.

A baby harbor seal was discovered near Grant Point tangled in a piece of fishing net in November. Several wraps of the net were tight around the seal's neck and had to be cut away. The seal was released and coaxed into joining a pod resting about 200 yards offshore. The seal was in good condition and very energetic, probably indicating he hadn't been tangled for too long. With all of the fishing net pieces along the beach and all the remote beach in the area, to find an entangled animal suggests this is potentially a problem of considerable magnitude. Over the years, Refuge staff has documented red fox and seals being entangled in pieces of nets.

10. Other Resident Wildlife

Ptarmigan, both willow and rock, are an abundant and popular resident of the area. No attempts are made by the Refuge staff to enumerate their presence in the area. Hunting season for ptarmigan opens in August and locals pursue them prior to waterfowl season in September. After the Canada geese and brant depart the area, interest in ptarmigan hunting picks up again until the season ends on April 30. The bag limit is 20 per day.



Alaska's State Bird is common in the area. RLW

11. Fisheries Resources

Although the anadromous fisheries resources are not directly "managed" by the Refuge staff, they are of particular interest in that they are an extremely important part of the food chain, especially to bears and bald eagles. Alaska Department of Fish and Game - Fisheries Research and Enhancement Division (FRED) monitor the commercial catch and escapement for the major streams in the Izembek and Pavlof Units. Data on catch and escapement is contained in the 5-part Table 30 (one part for each species) and in Table 31.

14. Scientific Collections

Personnel from the Alaska Fish & Wildlife Research Center collected small samples of eelgrass in conjunction with their brant work at the Izembek Lagoon.

16. Marking and Banding

Four snow buntings and 1 rosy finch were banded with standard leg bands at the Refuge headquarters in 1989. This banding is an excellent environmental awareness activity for visiting school children and also is providing data on migration and longevity for these two species.

No swan or caribou marking was done in 1989.



Looking north from Baldy Mt. Amak
Island in background.

MAC

Table 30. Commercial salmon catch and escapement, vicinity of Izembek Refuge, 1969-1989.¹

| Pink (Humpy) salmon (in thousands) | | | | |
|------------------------------------|-------|--------|------------------------|--------|
| Cold Bay Area & Morzhovoi* | | | Izembek & Moffet | |
| Year | Catch | Escape | Catch | Escape |
| 1969 | 0.2 | 20.3 | 0 | 2.3 |
| 1970 | 1.5 | 43.9 | 0 | 0 |
| 1971 | 3.6 | 4.5 | 0 | 0.1 |
| 1972 | 0 | 5.7 | 0 | 0 |
| 1973 | 0 | 4.6 | 0 | 0 |
| 1974 | 0 | 9.9 | 0 | 0 |
| 1975 | 0 | 8.3 | 0 | 0.1 |
| 1976 | 0.8 | 55.8 | 0.1 | 0 |
| 1977 | 0 | 21.7 | 0 | 0.2 |
| 1978 | 6.0 | 157.7 | 2.2 | 0 |
| 1979 | 0.03 | 19.2 | 0.01 | 0 |
| 1980 | 126.1 | 127.1 | 0 | 0 |
| 1981 | 8.5 | 17.5 | 0 | 0 |
| 1982 ² | 136.9 | 319.7 | 0 | 0.2 |
| 1983 | 13.8 | 31.2 | 0 | 0 |
| 1984 | 139.7 | 236.7 | 0.1 | 0 |
| 1985 | 5.3 | 15.6 | 0 | 0 |
| 1986 | 48.2 | 84.4 | 0 | 0 |
| 1987 | 0.1 | 17.4 | 0 | 0 |
| 1988 | 90.6 | 111.1 | 1.2 | 1.8 |
| 1989 | 6.9 | 132.7 | 0 | 0 |

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

¹ Data supplied by Alaska Department of Fish and Game, Division of Commercial Fisheries, Kodiak.

² Includes inner Cold Bay, Lenard Harbor, Sandy Cove-Mortensen's Lagoon, Morzhovoi Bay.

Table 30. continued.

| <u>Red (Sockeye) salmon (in thousands)</u> | | | | |
|--|----------------------------------|--------|------------------------|--------|
| | Cold Bay Area & Morzhovoi* | | Izembek & Moffet | |
| Year | Catch | Escape | Catch | Escape |
| 1969 | 2.2 | 7.5 | 6.1 | 14.0 |
| 1970 | 1.0 | 3.3 | 3.1 | 7.5 |
| 1971 | 1.1 | 2.3 | 6.9 | 3.5 |
| 1972 | 0 | 2.5 | 0.8 | 4.8 |
| 1973 | 0.2 | 3.3 | 1.2 | 2.0 |
| 1974 | 0 | 27.3 | 4.7 | 3.7 |
| 1975 | 0.5 | 15.6 | 1.5 | 13.6 |
| 1976 | 1.4 | 27.3 | 20.4 | 15.3 |
| 1977 | 12.5 | 28.7 | 3.1 | 26.1 |
| 1978 | 1.0 | 24.7 | 15.5 | 23.0 |
| 1979 | 0 | 8.5 | 10.8 | 8.4 |
| 1980 | 15.6 | 6.1 | 34.2 | 11.2 |
| 1981 | 8.9 | 7.0 | 30.9 | 12.0 |
| 1982 ² | 19.8 | 17.0 | 24.5 | 21.2 |
| 1983 | 13.8 | 18.2 | 15.2 | 18.5 |
| 1984 | 59.3 | 14.1 | 4.7 | 19.1 |
| 1985 | 30.8 | 7.1 | 6.2 | 17.2 |
| 1986 | 42.5 | 19.7 | 19.1 | 15.7 |
| 1987 | 1.5 | 23.5 | 6.5 | 13.6 |
| 1988 | 6.6 | 40.4 | 11.5 | 17.3 |
| 1989 | 7.8 | 41.7 | 8.6 | 22.5 |

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

¹ Data supplied by Alaska Department of Fish and Game, Division of Commercial Fisheries, Kodiak.

² Includes inner Cold Bay, Lenard Harbor, Sandy Cove-Mortensen's Lagoon, Morzhovoi Bay.

Table 30. continued.

| Coho (Silver) salmon (in thousands)** | | |
|---------------------------------------|----------------------------------|------------------------|
| | Cold Bay Area & Morzhovoi* | Izembek & Moffet |
| Year | Catch | Catch |
| 1969 | 0 | 0 |
| 1970 | 0 | 0 |
| 1971 | 0 | 0 |
| 1972 | 0 | 0 |
| 1973 | 0 | 0.2 |
| 1974 | 0 | 0 |
| 1975 | 0 | 0 |
| 1976 | 0 | 0 |
| 1977 | 0 | 0 |
| 1978 | 1.3 | 0 |
| 1979 | 7.0 | 0 |
| 1980 | 16.4 | 0 |
| 1981 | 13.1 | 0 |
| 1982 ¹ | 1.4 | 0 |
| 1983 | 0.7 | 0 |
| 1984 | 0.6 | 0 |
| 1985 | 1.9 | 0 |
| 1986 | 2.5 | 0 |
| 1987 | 6.7 | 2.9 |
| 1988 | 11.4 | 3.0 |
| 1989 | 5.3 | 0.1 |

* 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 (Arnold R. Shaul, Alaska Department of Fish and Game, Commercial Fish Division, Kodiak).

¹ Includes inner Cold Bay, Lenard Harbor, Sandy Cove-Mortensen's Lagoon, Thin Point Cove from 1982 on.

Table 30. continued.

| Chum (Dog) salmon (in thousands) | | | | |
|----------------------------------|-------|--------|------------------------|--------|
| Cold Bay Area & Morzhovoi* | | | Izembek & Moffet | |
| Year | Catch | Escape | Catch | Escape |
| 1969 | 0 | 24.6 | 4.5 | 94.4 |
| 1970 | 1.8 | 43.5 | 10.0 | 53.4 |
| 1971 | 0.5 | 54.3 | 36.3 | 54.8 |
| 1972 | 0 | 51.0 | 57.9 | 72.7 |
| 1973 | 0.7 | 30.4 | 96.6 | 70.3 |
| 1974 | 0 | 30.9 | 11.2 | 70.6 |
| 1975 | 0 | 17.7 | 3.4 | 77.6 |
| 1976 | 2.9 | 38.7 | 40.8 | 123.3 |
| 1977 | 0 | 139.1 | 20.3 | 368.3 |
| 1978 | 5.9 | 102.2 | 81.4 | 119.0 |
| 1979 | 4.6 | 27.4 | 17.8 | 178.0 |
| 1980 | 43.3 | 64.4 | 282.6 | 365.2 |
| 1981 | 27.0 | 48.5 | 296.4 | 235.0 |
| 1982 ² | 102.6 | 103.6 | 57.5 | 166.4 |
| 1983 | 58.9 | 62.5 | 154.8 | 173.3 |
| 1984 | 145.5 | 123.4 | 102.7 | 427.5 |
| 1985 | 87.4 | 94.4 | 126.6 | 194.7 |
| 1986 | 134.5 | 157.9 | 69.1 | 142.4 |
| 1987 | 2.9 | 163.8 | 148.6 | 286.0 |
| 1988 | 186.4 | 129.5 | 112.2 | 304.4 |
| 1989 | 5.2 | 74.9 | 14.5 | 90.6 |

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

¹ Data supplied by Alaska Department of Fish and Game, Division of Commercial Fisheries, Kodiak.

² Includes inner Cold Bay, Lenard Harbor, Sandy Cove-Mortensen's Lagoon, Morzhovoi Bay.

Table 30. continued.

| <u>King (Chinook) salmon (in thousands)</u> | | | | |
|---|----------------------------------|--------|------------------------|--------|
| | Cold Bay Area & Morzhovoi* | | Izembek & Moffet | |
| Year | Catch | Escape | Catch | Escape |
| 1969 | 0 | 0 | 0 | 6.9 |
| 1970 | 0 | 0 | 0 | 2.1 |
| 1971 | 0 | 0 | 0 | 0.2 |
| 1972 | 0 | 0 | 0 | 0.2 |
| 1973 | 0 | 0 | 0 | 0.7 |
| 1974 | 0 | 0 | 0 | 0 |
| 1975 | 0 | 0 | 0 | 0 |
| 1976 | 0 | 0 | 0 | 0 |
| 1977 | 0 | 0 | 0 | 0 |
| 1978 | 0 | 0 | 0 | 0 |
| 1979 | 0.002 | 0 | 0 | 0 |
| 1980 | 0 | 0 | 0 | 0 |
| 1981 | 0 | 0 | 0 | 0 |
| 1982 ² | 0 | 0 | 0 | 0 |
| 1983 | 0 | 0 | 0 | 0 |
| 1984 | 0 | 0 | 0 | 0 |
| 1985 | 0 | 0 | 0 | 0 |
| 1986 | 0 | 0 | 0 | 0 |
| 1987 | 0 | 0 | 0.1 | 0 |
| 1988 | 0 | 0 | 0 | 0.1 |
| 1989 | 0 | 0 | 0 | 0 |

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

¹ Data supplied by Alaska Department of Fish and Game, Division of Commercial Fisheries, Kodiak.

² Includes inner Cold Bay, Lenard Harbor, Sandy Cove-Mortensen's Lagoon, Morzhovoi Bay.

Table 31. Catch and escapement data for salmon in the Hoodoo (Sapsuk) Lake/Caribou River Drainage.

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

| | | Species | | | | | |
|------|------------|---------|---------------------|--------|--------|------|---------|
| Year | | Red | Silver | Chum | King | Pink | Total |
| 1983 | Catch | 192,900 | 64,000 | 14,000 | 12,100 | 0 | 283,000 |
| | Escapement | 128,800 | 13,000 ¹ | 14,000 | 12,500 | 0 | 168,300 |
| 1984 | Catch | 118,800 | 113,300 | 78,400 | 7,800 | 100 | 318,400 |
| | Escapement | 251,000 | 41,000 ¹ | 49,000 | 6,300 | - | 338,300 |
| 1985 | Catch | 706,300 | 88,200 | 6,600 | 10,900 | 0 | 812,000 |
| | Escapement | 318,500 | 18,100 ¹ | 13,000 | 3,200 | 0 | 352,800 |
| 1986 | Catch | 178,400 | 99,300 | 3,600 | 4,800 | 100 | 286,200 |
| | Escapement | 117,900 | 23,000 ¹ | 1,800 | 1,800 | 0 | 144,500 |
| 1987 | Catch | 128,500 | 83,700 | 6,700 | 5,800 | 0 | 224,700 |
| | Escapement | 155,700 | 27,500 ¹ | 5,200 | 4,100 | 0 | 192,500 |
| 1988 | Catch | 185,800 | 95,400 | 13,400 | 6,500 | 100 | 301,200 |
| | Escapement | 142,500 | 17,000 | 11,000 | 3,300 | 0 | 173,800 |
| 1989 | Catch | 325,000 | 119,300 | 5,000 | 3,800 | 0 | 453,100 |
| | Escapement | 206,800 | 32,000 | 800 | 3,100 | 0 | 242,700 |

¹ Sapsuk River only.

H. PUBLIC USE

1. General

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

As an ongoing effort to keep the user public informed, several outreach activities are routine to Izembek staff. Open houses, periodic letters to all box-holders and visits to the local communities are all informal public relations activities. Special interpretive programs or exhibits are discussed in other relevant parts of Section H.

Three open house/public meetings were hosted by the refuge in 1989. In May, a general "get acquainted" open house was held at the refuge headquarters. Thirty-five people attended. Since Cold Bay is nearly all Government employees and turnover of this segment of the population is rather quick, hosting open houses of this nature every year, or two, would not be too often. The other two open houses/public meetings were held in August and November to discuss hunting and trapping, respectively. The August meeting had 16 people attend most of them interested in the Cold Bay Road System brown bear hunt. Waterfowl and caribou seasons were also discussed. The November meeting focused on trapping and had 5 people attend.

In 1989, two letters were sent to all Cold Bay box-holders. The first, in May, dealt with the area's brown bears and how to avoid, or at least minimize the chances, of having an unwanted bear encounter. The second letter, in September, was a reminder to folks concerning the hunting seasons. Season dates, bag limits, required tags and permits, and any other special concerns related to caribou, bear, and waterfowl hunting were addressed. The majority of folks don't want to violate game laws, many however, do not want to take the time to learn them either. Letters of this type appear to be quite effective provided they are concise and remind folks of some of the most common violations.

Information received from the Regional Office on National Wildlife Week was distributed to local schools. Since the presence of the refuge does have such an impact on the local citizens' lives, area schools visit the headquarters often to take advantage of our somewhat limited visitor center. Classes from Cold Bay, King Cove, False Pass, Sand Point, and Atka toured

the refuge headquarters at various times in 1989. Subjects discussed typically covered area wildlife, the purpose of the refuge and Refuge System, and specific Refuge programs such as banding, censusing and radio-telemetry. Approximately 50 students and 5 teachers visited the refuge in 1989.



August public meeting to discuss
upcoming hunting seasons.

RLW

In addition to having students visit Cold Bay, refuge staff typically visit the schools in local villages. In 1989, RM West and WB Dau visited King Cove and False Pass. The mornings of these visits typically involve presentations to students and the afternoons are reserved for informal meetings with townspeople. In November, ARM Chase visited the Cold Bay High School class to discuss population dynamics specifically as it relates to the local caribou herd.



Cold Bay youngsters visit the
Refuge Headquarters.

RLW

A new avenue to Izembek in public outreach was pursued in 1989. Assistant Manager Chase began writing articles for the Aleutian East Borough Advocate which is published every 2 weeks. Topics are wildlife related and typically specific to the Alaska Peninsula and Aleutian Islands. Thirteen articles were published in 1989.

5. Interpretive Tour Routes

Although Izembek has no Tour Route per se, the road system does provide recreational access for visitors and thus provides us another "avenue" for interpretive information dissemination. Eight, covered billboard/bulletin board type signs were ordered from the L.C. Haney Company and received via barge in October 1989. The signs will be installed in 1990 at strategic places around the road system to display interpretive and regulatory information.

6. Interpretive Exhibits/Demonstrations

Little if any progress was made on the interpretive displays for the Cold Bay Post Office and airport terminal in 1989. This project began, innocently enough, back in April of 1987. The idea was to install wall displays at the Post Office and airport with information about the refuge and the wildlife. Texts were designed, edited and funds were obligated to complete the project by the end of 1987. A contractor was awarded the task of silkscreening the displays and paid over \$10,000 from FY87 funds. By January and February of 1988, station Monthly Activities Reports were describing the progress as "painstaking" and a "struggle". How could we know this was only the beginning? By the end of 1988 the contractor had gone bankrupt, our \$10,000 was gone and the remaining funds obligated in 1987 (many thousands of dollars) went unspent. In 1989, we were hopeful that Christmas would find a display in the Post Office and airport. In July, the material was sent to the Government Printing Office and it looked as if our wish would be realized. It appeared that if we threw another \$22,000 at the problem we would get a finished product. New Year 1990 dawned and voids remain in the corner of the Post Office and airport and in our budget. Our most recent news on the project is additional funds (perhaps \$30,000) are likely to be needed to complete the project. Refuge staff has devoted countless hours and invested significant funds in this project.

The Grant Point Wildlife Observation Facility was completed in 1989 to provide interpretation and non-consumptive wildlife related recreation. This project is detailed in Section I.1; New Construction.

8. Hunting

Hunting on Izembek is responsible for a large percentage of the public use. On the Unimak and Pavlof Units, nearly all of the public use can be attributed to hunting. On Izembek, waterfowl, caribou, brown bear and ptarmigan are the primary targets of interest. This is true for the Unimak and Pavlof Units as well, with the exception of the waterfowl. The Cold Bay road system provides ready access to excellent hunting for all species and consequently, with the exception of brown bear, most of the hunting is done within the road system. Brown bear hunting is limited within the road system to a 2 bear harvest quota per season. The hunt is by registration permit with no limit on the number of permits. Though the harvest is limited, the system does provide many locals, and a few non-locals, the opportunity to hunt brown bear locally. The majority of the bear hunting occurs outside the road system and much of this is by non-resident hunters utilizing a guide's services. With the exception of brown bear, most hunting pressure comes from local residents. In the past, large numbers of non-local hunters flocked to Izembek to experience fantastic hunting and liberal

bag limits on both waterfowl and caribou. Since the closure of the emperor goose season in 1986 and the reduction in bag limits for other species as well as caribou (from 4 to 1 for non-locals in 1986), hunting pressure has decreased dramatically from the non-local public. Due to the subsistence lifestyle, local pressure is rather constant over time.



Some took the news of the closed seasons and reduced bags harder than others. RLW

Waterfowl

Though brown bear is the "big money" species and caribou the primary dietary staple, Izembek is waterfowl country. Though the days of the big "goose charters" to Cold Bay are past, a few non-local groups still come out to take advantage of the waterfowl hunting. In 1989, one waterfowl guide operated on Izembek and had 2 clients. After seeing what Izembek had to offer, he plans on expanding his operation in the future.

Waterfowl hunter effort information is contained in Table 32 and Figure 8. Harvest data are summarized in Tables 33 and 34. The high percentage of geese of unknown sex in Table 34 is due primarily to birds being field dressed at the time of checking. The high number of pintails in the unknown age-unknown sex category is due to a time shortage while checking a large group of hunters with limits of pintails.

At approximately 10:45 p.m. on 21 October the RM West received a call that a hunter had wandered off from his hunting party and

Table 32. Waterfowl hunter statistics, Izembek NWR, 1989.

| | |
|-----------------------------------|-----------------|
| Est. Total Hunters (Sept. 89) | 261 |
| No. of Hunter Contacts (Sept. 89) | <u>52 (20%)</u> |
| Est. Total Hunters (Oct. 89) | 555 |
| No. of Hunter Contacts (Oct. 89) | <u>76 (14%)</u> |
| Est. Total Hunters (Nov. 89) | 137 |
| No. of Hunter Contacts (Nov. 89) | <u>12 (9%)</u> |
| Est. Total Hunters (Dec. 89) | 32 |
| No. of Hunter Contacts (Dec. 89) | <u>14 (44%)</u> |

| | |
|----------------------------------|------------------|
| Est. Total Hunters (1989 Season) | 985 |
| No. of Hunter Contacts (1989) | <u>154 (16%)</u> |

| | |
|---|--------------------|
| Av. No. Hours Afield/Hunter/Day Hunted (From 154 bag checks) | 4.7 Hours |
| Est. Total Hunter-Hours 1989 Season (4.7 Hours Av. x 985 Est. Total Hunters) | 4,630 Hunter Hours |

| | |
|--|-----|
| Av. No. of Ducks Taken/Hunter/Day Hunted (From 154 bag checks) | 1.4 |
| Av. No. of Brant Taken/Hunter/Day Hunted (From 154 bag checks) | .6 |
| Av. No. of Canada Geese Taken/Hunter/Day Hunted (From 154 bag checks) | 1.5 |

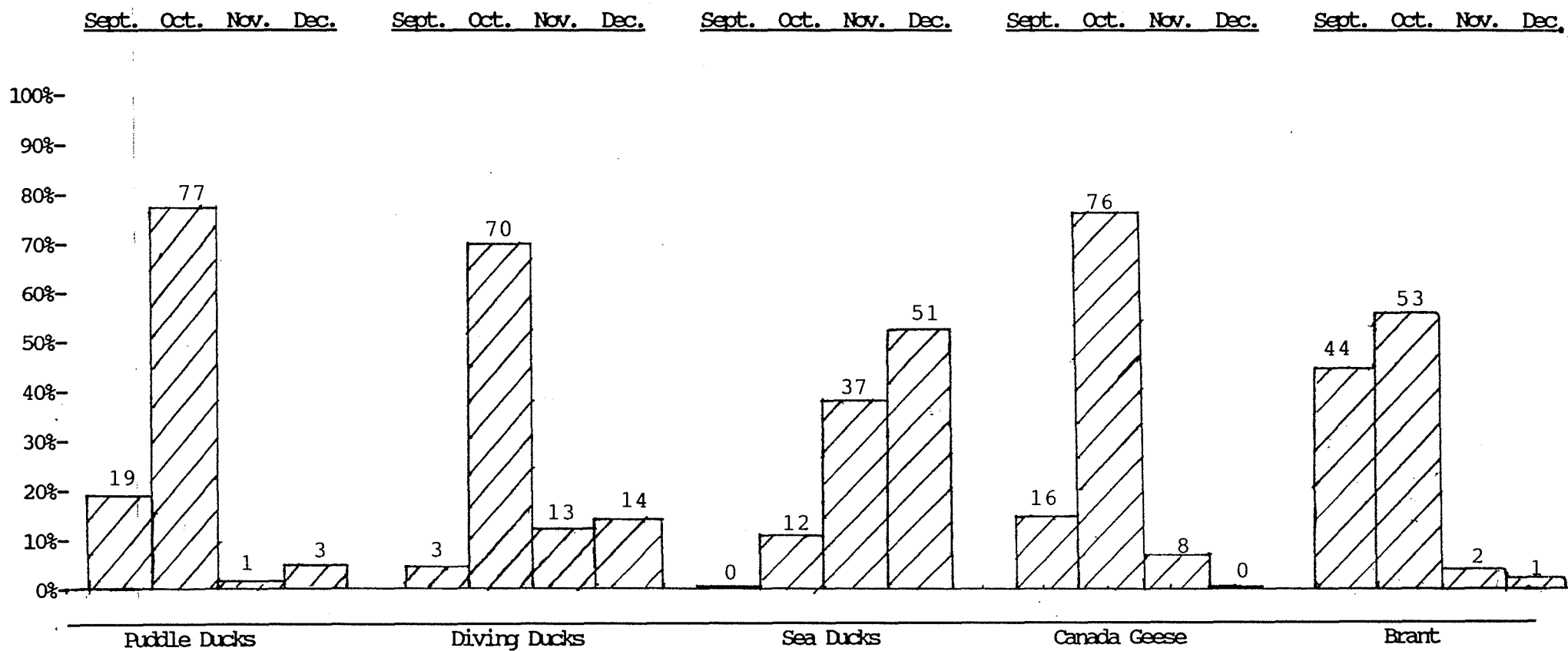


Figure 8. Waterfowl harvest by month during the open hunting season, Izenbek NWR, 1989.

Table 33. Estimates of total waterfowl harvest at Izembek NWR, 1989.

| <u>Species</u> | | <u>Estimated Total Harvest</u> ¹ |
|------------------------|-------|---|
| <u>Geese</u> | | |
| Brant | 649 | |
| Canada Geese | 1,832 | |
| | | <u>subtotal: 2,481</u> |
| <u>Puddle Ducks</u> | | |
| Pintail | 453 | |
| Mallard | 158 | |
| Gadwall | 24 | |
| Green-winged Teal | 125 | |
| American Wigeon | 117 | |
| Eurasian Wigeon | 8 | |
| | | <u>subtotal: 885</u> |
| <u>Diving Ducks</u> | | |
| Greater Scaup | 249 | |
| Bufflehead | 32 | |
| Common Goldeneye | 74 | |
| Shoveler | 32 | |
| | | <u>subtotal: 387</u> |
| <u>Sea Ducks</u> | | |
| Steller's Eider | 68 | |
| Scoter (sp) | 63 | |
| Oldsquaw | 20 | |
| Harlequin | 53 | |
| Red-breasted Merganser | 29 | |
| Common Merganser | 22 | |
| | | <u>subtotal: 255</u> |
| | | TOTAL 4,008 |

¹ Estimated total harvest is based on hunter success during separate months of the waterfowl season as determined by 154 bag checks out of an estimated 985 hunts total. An estimated 10% crippling loss was then factored in to provide an estimated total harvest.

Table 34. Summary of waterfowl bag check data, Izembek NWR, 1989.

| Species | (Harvest by age/sex) | | | | | | | | | Lost | Total | % of Harvest |
|-----------------|----------------------|----|----|----------|----|----|---------|---|----|------|-------|--------------|
| | Adult | | | Immature | | | Unknown | | | | | |
| | M | F | U | M | F | U | M | F | U | | | |
| Black Brant | 13 | 11 | 6 | 24 | 12 | 3 | 0 | 0 | 18 | 6 | 93 | 28.9 |
| Canada Goose | 46 | 36 | 12 | 29 | 29 | 16 | 0 | 0 | 53 | 8 | 229 | 71.1 |
| <hr/> | | | | | | | | | | | | |
| Goose Total | 59 | 47 | 18 | 53 | 41 | 19 | 0 | 0 | 71 | 14 | 322 | |
| <hr/> | | | | | | | | | | | | |
| Pintail | 14 | 12 | 0 | 7 | 12 | 0 | 0 | 0 | 19 | 2 | 66 | 30.7 |
| Mallard | 11 | 4 | 0 | 0 | 2 | 0 | 1 | 1 | 0 | 3 | 22 | 10.2 |
| Gadwall | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 3 | 1.4 |
| G-W Teal | 7 | 5 | 0 | 1 | 5 | 0 | 0 | 0 | 0 | 1 | 19 | 8.8 |
| A. Wigeon | 4 | 5 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 12 | 5.6 |
| E. Wigeon | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.5 |
| G. Scaup | 3 | 4 | 0 | 9 | 6 | 0 | 0 | 1 | 5 | 3 | 31 | 14.4 |
| Bufflehead | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 4 | 1.9 |
| C. Goldeneye | 3 | 2 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 10 | 4.7 |
| Steller's Eider | 5 | 1 | 0 | 1 | 0 | 0 | 0 | 3 | 0 | 7 | 17 | 7.9 |
| W-W. Scoter | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 5 | 2.3 |
| Oldsquaw | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 4 | 1.9 |
| Harlequin | 3 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 3 | 9 | 4.2 |
| R-B Merganser | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 3 | 1.4 |
| C. Merganser | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 2 | 5 | 2.3 |
| Shoveler | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 2 | 0 | 4 | 1.9 |
| <hr/> | | | | | | | | | | | | |
| Duck Total | 55 | 34 | 0 | 25 | 33 | 1 | 5 | 5 | 28 | 29 | 215 | |

had not been seen since 7:30 p.m. WB/P Dau stayed with the hunter's wife and friends while RM West and ARM Chase went out on the refuge to try and locate the lost man. It was estimated that the man had to be within about 1.5 miles of the Site Road and probably moving towards the lights of the radar site. The search involved driving the road and shining lights at the likely points where the traveler might hit the road. Help in driving the roads was received from several concerned locals. After 4.5 hours, it was decided that the man was likely not moving since he should have been out by then. The search was halted until 7:00 a.m. when, as the staff was mobilizing, a call was received from the radar site that the lost man had arrived safely there. RM West picked up the man who was in good spirits and none-the-worse for wear. His wife was another story. The man had seen our lights but had not "holed-up" as we had anticipated. Instead, he kept moving towards the site over the tussocks in nearly pitch black. When he fell in a creek, he decided he had to keep moving for fear of freezing. He ate (raw) the breasts of the geese he had shot and stuffed the feathers in his clothes for added insulation. During his ordeal, our trekker had covered 3 miles in 11 hours, in the dark, and managed to avoid the resident bears. He went to the motel that day for some sleep and went goose hunting again that evening.

Caribou

Caribou harvest is largely local subsistence take with a few non-local hunters taking animals on combination brown bear/caribou hunts. As the caribou arrive on their wintering grounds around Cold Bay, hunting activity is heavy for a short period as many hunters are trying to take large bulls before the bulls shed their antlers. For the 1989-90 season, nearly a third of the caribou were harvested during a two week period beginning 5 November; the caribou arrived in the road system in numbers on 4 November. Hunter and harvest data through 15 February 1990 are summarized in Table 35. Intuitively, it is felt that the documented harvest is about 40-50% of the actual harvest.

Table 35. Southern Alaska Peninsula Caribou Herd
Harvest Information
(Sept. 1, 1989 - Feb. 20, 1990)

| Documented Harvest | | | | |
|--------------------|-------------------|---------------------|-------------------|-------|
| Males | Females | Unknown Sex | Total | |
| 27 | 16 | 34 | 77 | |
| Cold Bay Hunters | King Cove Hunters | Other Local Hunters | Non-Local Hunters | Total |
| 43 | 18 | 10 | 6 | 77 |

| Estimated Total Harvest | |
|---|-------|
| Cold Bay Hunters | 45-50 |
| King Cove Hunters | 40-70 |
| Nelson Lagoon Hunters | 25-45 |
| False Pass Hunters | 15-25 |
| Sand Point Hunters | 30-50 |
| Non-local Hunters | 10-20 |
| Total Estimated Harvest (to date): 165-260 caribou | |
| Total Projected Harvest (through 3/90): 165-265 caribou | |

| Samples Collected to Date | | |
|---------------------------|---------------|---------------|
| Jaws | Blood Samples | Urine Samples |
| 23 | 16 | 1 |



One of the nicer bulls harvested in 1989 and a common means of local access. RLW

Brown Bear

Eight registered guides were issued special use permits for the Izembek, Unimak or Pavlof Units to guide brown bear hunters in 1989. Among the eight guides, 74 clients were booked for bear hunts in the fall of 1989. In an attempt to regulate harvest while the State Board of Game works out an equitable solution to the exclusive guide areas that were ruled unconstitutional, a special condition was added to the SUP's limiting a guide to the maximum number of clients they had on refuge lands within the past 5 years. This is difficult since only one guide in eight operated exclusively on refuge lands. Future reporting requirements dictate a guide specify how many hunters were actually on refuge lands. This is no easy task considering the land status of the southern peninsula. The number of clients per guide over the past 6 years is summarized in Table 36.

Table 36. Six year history of brown bear hunting clients of guides holding permits for the Izembek, Unimak and Pavlof Units.

| Guide | YEAR | | | | | |
|-----------|------|------|------|------|------|------|
| | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 |
| Black | 4 | 4 | 4 | - | 4 | 5 |
| Carlson | 2 | 2 | 2 | 4 | 0 | 2 |
| Gunlogson | 12 | 1 | 8 | 2 | 12 | * |
| Guthrie | 5 | 5 | 6 | 4 | 11 | 10 |
| Hakala | 2 | 6 | - | 6 | 7 | 11 |
| Johnson | 12 | 3 | 8 | 3 | - | * |
| Kahn | - | - | - | - | 3 | 4 |
| Rivers | 4 | 6 | 5 | 6 | 6 | 7 |

* 1989 Report not yet received.

The Cold Bay Road System Hunt was revamped in 1989. The new structure allows for an unlimited number of permit holders to hunt brown bear within the road system until 2 bears are taken. The season opener coincides with the remainder of Game Management Unit 9D and is closed by Emergency Order at midnight of the day the second bear is taken. Permits are issued from the Izembek Office and hunters are required to check in each day before going afield. Fourteen permits were issued in 1989 and the hunt lasted 5 days. Most everyone hunting saw bears but were passing up shots in hopes of bagging "at least a 9-footer".

Twenty-one bears were sealed at this office which included 1 shot in defense of life and property and 1 skull which was found by a local fisherman.

Unimak Island GMU 10 is open each spring and fall to a drawing permit hunt. Seven permits are issued each spring and 8 each fall. At least 3 bears were taken in the spring and 4 in the fall.

The total harvest for the fall 1989 season in GMU 9D was 60 bears. Thirty-seven of these were boars and 23 were sows.

9. Fishing

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

Sport fishing high-use seasons are basically the months of June through October. Non-local use is typically greatest in

September when fisherman can combine their trip with some goose hunting. Silver, or Coho salmon, is the "bread-n-butter" species of the area and generates the greatest fishing effort.



Silver salmon generate a great deal of the fishing effort. The Salmon Derby is held over Labor Day.

RLW

Abuse of the silver salmon resource runs rampant in September among chiefly non-local users. Parties come out for a limited time with only one concern: taking home as much fish as possible. Snagging and "double-dippin'" are commonplace. Since the fishing is off refuge, staff LE officers are in that "gray area" of jurisdiction. Attempts to have a State Fish and Wildlife Protection Officer, who are in Cold Bay for the commercial fishing season, stay on until mid-September was initiated in 1989. The FWP officers typically leave Cold Bay around 1 September and we feel the extra two weeks would be well worth their while. Refuge LE staff (2 officers) devote their time to the waterfowl hunters during this period.

10. Trapping

Izembek NWR and the Unimak Unit (Aleutian Islands Unit of Alaska Maritime NWR) require trapping permits as per 50 CFR Part 36. Two permits were issued for Unimak and 7 for Izembek for the

1989-90 trapping season. The special conditions for the trapping permits were updated in 1989. All special conditions and changes were discussed and explained in detail at the November public meeting. All trapping is basically "recreational" though some trappers are more serious than others.

11. Wildlife Observation

Wildlife observation is a common past time for residents of Cold Bay. With the road system access, many residents drive the area year-round to view and photograph wildlife. Bears and caribou are the primary species of interest for this activity since many of the residents come from outside of Alaska and have never seen a bear or caribou. With the construction of the Grant Point Wildlife Observation Facility (see Section I.1) we hope to increase the non-consumptive, recreational use of the spectacular waterfowl concentrations in the area.

15. Off-Road Vehicling

All terrain vehicles are a common mode of transportation in Cold Bay and area villages so the potential for off-roading problems is high. Actual problems are typically isolated instances of people driving off-road to retrieve a caribou or people off-roading in an ATV for a short distance to gain access to the beach. The latter is most common at the end of the Pintail Lake Loop where it is less than 100 yards to the beach. Most of this off-roading occurs during waterfowl season by hunters who are too lazy to walk. One NOV was issued in 1989 for off-roading (see H.17).

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

16. Other Non-Wildlife Oriented Recreation

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

Much of the animal parts collected on the beaches must be registered pursuant to the Marine Mammal Protection Act of 1972. The Izembek office issued 16 titles for marine mammal part registrations in 1989. Registration titles included 7 issued for sea otter skulls, 5 for walrus parts (tusks and oosiks), 3 for whale vertebrae and 1 for a miscellaneous seal bone.



A bountiful beachcomber's harvest being registered pursuant to the MMPA of 1972. Note the one skull has had the tusks hacked off, possibly what was sticking up through the ice or just someone in a hurry.

RLW

A local beachcomber found a drift bottle on 27 May near Moffet Point. The bottle's card was forwarded to the USFWS office in Seattle and information was returned to Izembek from NMFS. It seems the bottle was deployed in the Bering Sea as part of a surface current study on 9 February 1966. The bottle was recovered approximately 140 miles due east of its original launch point. Due to the condition of the bottle and lack of bleaching of the card, it is likely the marker beached rather quickly and spent the next 23 years buried in the sand.

17. Law Enforcement

Refuge officers LE activities are primarily geared toward the waterfowl and caribou seasons. In 1989, refuge staff received assistance from our Law Enforcement Division for the weekend of October 7-9. Special Agents Jim Sheridan and Gary Mowad came out to Cold Bay to work waterfowl hunters over the traditionally high-use 3 day weekend. This year's hunter turnout was exceptionally low due primarily to the U.S. Navy exercises being held near Cold Bay which created a local lodging shortage (see Section J.3). The agents did make a few contacts and word soon got around that there were more officers around than just West and Chase. No NOV's were issued over the long weekend.



Results of a Christmas present to a local youth.

RLW

Three of the large, wooden boundary signs around the road system were shot at close range with a shotgun in January 1989. At this same time, some vandalism occurred to some FAA facilities and the State Troopers were called in. The case was wrapped up quickly and 2 Cold Bay, teenage males were convicted. The refuge staff worked with the State Juvenile Probation Officer and for the FWS sign shooting, the young men received a sentence of 35 hours of service to the refuge. The youths put in their "hard-time" in April replacing the signs, painting around the headquarters and cleaning the shop.

Nine NOV's were issued in 1989 by refuge officers. Seven were Migratory Bird Treaty Act violations and 2 were National Wildlife Refuge Administration Act violations. Following is a summary of LE actions for 1989.

Summary of Law Enforcement Actions,
Izembek NWR, 1989.

| <u>Case Description</u> | <u>Disposition</u> |
|---|--|
| Failure to immediately validate harvest ticket upon taking a caribou. | Warning- required harvest ticket to be validated. |
| Failure to immediately validate harvest ticket upon taking a caribou. | Warning- required harvest ticket to be validated. |
| Driving vehicle off authorized roadway. | Violation notice issued, \$100. fine. |
| Destruction of Government property (juvenile shooting refuge sign). | Required 35 hours work as restitution on the refuge. |
| Destruction of Government property (juvenile shooting refuge sign). | Required 35 hours work as restitution on the refuge. |
| Hunting brown bear without State tag. | Warning- required follow-up proof of tag purchase. |
| Taking of brown bear without State tag (by a juvenile). | Warning- required follow-up proof of tag purchase. |
| Shooting a red fox during the closed season. | Prosecuted by the State of Alaska. |

Hunting waterfowl in violation of State law.

Violation notice issued, \$100. fine.

Hunting waterfowl with unplugged gun.

Violation notice issued, \$100. fine.

Hunting on the refuge without a State license.

Violation notice issued, \$125. fine.

Failure to leave a clean camp. (Littering)

Written warning issued.

Hunting waterfowl in violation of State law.

Violation notice issued, \$100. fine.

Hunting waterfowl with unplugged gun.

Violation notice issued, \$100. fine.

Taking migratory bird during closed season (emperor goose).

Violation notice issued, \$100. fine.

Attempting to snag salmon. (2)

Warnings given.

Shooting after hours (50 minutes late). (2 cases)

Violation notices issued, \$150. fines.

Failure to seal a wolf within 30 days.

Warning given.



Off-roading to retrieve a caribou. The vehicle is stuck. The owner received a VN. RLW

I. EQUIPMENT AND FACILITIES

1. New Construction

The Grant Point Wildlife Observation Facility was completed in 1989 after overcoming an abundance of setbacks. The structure was prefabricated in Anchorage and arrived in Cold Bay in the fall of 1988. Work began to have the concrete foundation contracted and Mountain West Construction Ltd. was awarded the contract in June. We had hoped to have the foundation in place and construct the building with YCC enrollees. By mid-August, the slab was completed and the enrollees were gone. Actual building construction got under way around September 1. Rudy Berus and Walt Szelag from Regional Engineering traveled to Cold Bay to oversee the construction. Additional help was received from the State of Alaska Department of Transportation who supplied a crane and an operator as needed. The 8 walls and 8 pieces of the roof were finally secured after a few days and a great deal of persuasion from a few sledge hammers. Walt Szelag returned later in September to assist refuge staff with the installation of the windows and door. Refuge staff then completed the building with the installation of chairs and an 18 inch interior counter on 7 of the 8 walls.



"Think it'll hold up in the wind?"

MAC



The State D.O.T provided a crane and operator for the GP facility construction.

MAC

Interpretive panels dealing with waterfowl, eelgrass, local geography and other topics were received from Wilderness Graphics. These panels were installed under plexiglass coverings on each of the 7 counters. Additional panels, dealing with bird identification, will be received and installed in 1990. A pair of deck binoculars, mounted on a four foot stand were received for installation in the building. The binoculars will provide an excellent aid to viewing the waterfowl using Izembek Lagoon. Numerous cooperators assisted in many aspects of the observation facilities construction. The U.S. Navy Construction Battalion (CB's), in Cold Bay for PACEX-89, hauled the materials from Cold Bay to the site. Scaffolding was provided by the Russell Creek Hatchery. The sign for the facility was built by the Kenai NWR sign shop crew. Regional Engineering and State D.O.T. folks assisted in actual construction and even Chuck Dieters, Regional Archeologist, chipped in on his visit to Izembek in August. With our limited refuge resources, this project could not have been accomplished without the support received from both within the Service and outside sources, our thanks to all those involved.

2. Rehabilitation

A power washer, sand blaster, and \$7,000.00 worth of paint and primer were purchased to rehabilitate the metal roofs on all buildings in the compound. The ice, rain, salt air, wind and volcanic dust have wreaked havoc on these metal roofs. The paint and primer is the same type used on off-shore oil platforms and should be worth the investment. Other priorities and lack of cooperating weather precluded the work from being accomplished in 1989. This will be a priority 1990 project.

Maintenance Worker Morey devoted a considerable amount of time to the rehabilitation of the aircraft hangar door. The door often would not open and once open, would not shut. The door has a reputation of breaking cables and generally failing to work when you need it most. A new switch, limit switches and adjustments to all the cables has had the door functioning as intended. A remote control switch was installed and is greatly appreciated in times of foul weather.

3. Major Maintenance

Refuge staff identified over \$1 million in the Maintenance Management System Exercise in 1989. A large portion of this comes from some badly needed road and bridge repairs, and the necessity of bringing the underground storage tanks into compliance with EPA and Service directives.

The collapsed 4th Bridge was removed with the help of the YCC enrollees in 1989. The bridge was collapsed in 1988 when a local took out a front-end loader to retrieve his stuck Blazer. Public use of this area is limited and is most often by 3 or 4-wheel ATV's. Rather than replace the bridge it was removed. Access is still available for ATV's in the form of a low-water crossing.

The underground storage tank (UST) inventory was completed in September. All the UST's at Izembek will need to be brought above ground or have the underground monitoring systems installed in order to comply with EPA and Service directives. All refuge UST's will need to be brought into compliance by the end of FY93. This will be a major undertaking that will be contracted, as Izembek lacks the equipment for such a project. Current feelings are to raise all tanks above ground rather than install all the whistles and bells required for an underground leak detection system.

4. Equipment Utilization and Replacement

In the time between Maintenance Worker Dunn's departure and Tom Morey's arrival, maintenance problems grew at an exponential rate. During the interim, the office heater and bunkhouse heater decided to take vacations of their own. This occurred,



Fourth Bridge after the collapse.

MAC



YCC enrollees removed the bridge and manicured an ATV low-water crossing.

MAC

predictably, during the big cold snap of 1989. The refuge vehicles also took advantage of this man power shortage and upon Morey's arrival, 2 of 5 were running. Tom was put to work immediately and the heating system in top shape in no time. Vehicles were treated with the "catch as catch can" philosophy and the entire fleet was soon back on its wheels.

The blue Dodge pickup (PN 170774) and the gray Dodge from Cape Sarichef were put on the auction block in July. A Cold Bay resident had the high bid on both vehicles which are now part of the Cold Bay rental fleet. Two Chevy S-10 pickups were received in August to replace the old timers.



Arrival of the new pick-ups via barge.

RLW

The 1980 Jeep Cherokee received a new engine in June 1989. The "old" engine, with only 13,000 miles, was blown in the fall of 1988 after being run without any oil, imagine that. The vehicle was on loan to a cooperator at the time; enough said.

Two Suzuki 4-wheel ATV's were received in July to afford refuge staff the same access opportunities as the local public. The ATV's are extremely useful for LE patrols and for the numerous beach surveys associated with the oil spill.



RM West conducting an oil spill related beach survey with new ATV 4x4.

RLW



The refuge super cub being put in Blinn Lake near Cold Bay.

MAC

The refuge Super Cub, N745, was put on floats 12 July. This unusually late date was a result of WB/Pilot Dau being gone on emperor and breeding pair surveys until the latter part of June.

On 7 November, the plane was put on tundra tires and the lift struts were inspected as per an OAS directive.

Maintenance Worker Morey developed files for refuge Real Property and capitalized equipment in 1989, keeping with MMS guidelines. The files contain maintenance schedules, documentation of work, and sources with phone numbers for parts or repairs. The system is extremely helpful when information is needed for reports or when breakdowns occur in Tom's absence. Perhaps it will be most appreciated by the Maintenance Worker who will follow Tom at Izembek.

5. Communications Systems

We were informed in July that our VHF radio frequency would need to be changed in order to comply with existing policy. A list of all radio equipment was submitted to the Regional Office along with a request to delay the change until after the field season. Radio equipment will be shipped to Anchorage early in 1990. The frequency will be changed from 168.350 to 172.450.

The station copy machine was shipped to Anchorage for servicing via the FAA Commissary Flight. The machine was set to its lightest setting but produced poor quality, dark copies. Cooperation with the FAA to take in the copier cuts freight costs in half. The machine was returned via Reeve Aleutian Airway within 5 days and is functioning well.

A facsimile Machine was received and installed in November. Though the FAX is convenient in emergency situations, it costs nearly \$45/month just to keep it on line.

6. Computer Systems

The Compaq 386 computer, ordered in FY87, arrived in January. The compaq replaces the Data General 10sp which provided several years "service". Software packages of Word Perfect, Lotus 1-2-3 and DBase 3 Plus were acquired with the computer. We're all still learning, however it is evident that the computer's capabilities still exceed those of the users.

7. Energy Conservation

The last shipment of the triple-pane windows for residences 1, 2 and 3 arrived in January. The FAA Commissary Flight delivered the windows to Cold Bay saving the station over \$2,000.00 in freight charges. By year's end, the windows had not been

installed but will be a priority for summer 1990. Installation labor will be contracted to complete the project. Currently, the windows in the 3 residences allow wind, rain and sand to disturb the occupants while sleeping. Installation of the new windows should lead to a considerable reduction in heating costs for all homes.

8. Other

Maps depicting the locations of cabins on refuge lands were sent to Regional Office in July. The information is being put in a data base for use in the implementation of the new fire protection policy for cabins.

The station's #1 priority RNIS project failed to get funded again in 1989. The station is attempting to purchase a backhoe/loader for snow removal and road repairs but has been unable to acquire the necessary funding. The State D.O.T had a backhoe which broke down and will not be replaced. The FAA in Cold Bay has failed in their efforts to acquire a backhoe as well. Consequently, we can't even beg or borrow one. Currently, the refuge is clearing snow with a Bobcat which is similar to shoveling sidewalks with a tablespoon.



Refuge snow-removal equipment broken
down outside the shop.

RLW

J. OTHER ITEMS

1. Cooperative Programs

Soviet Biological Exchange

From 3 July to 6 August, WB Dau and Dr. Dirk Derksen, Chief, Migratory Bird Branch, AFWRC, travelled to the Soviet Union. The primary purpose of the trip was to initiate a cooperative research project on Pacific black brant on Wrangel Island. The objectives were to assess the status of breeding and molting populations of brant on Wrangel Island and adjacent areas of the arctic coast, and by banding and radio telemetry, evaluate the fall and winter distribution of brant summering in the USSR.

A total of 231 failed or non-breeding brant were captured on Wrangel Island. All were leg banded, 96 were marked with red tarsus bands and 9 (7 females & 2 males) were outfitted with battery powered, backpack radio transmitters. Seven brant captured had been previously banded in Alaska which points out the international importance of this site to the Pacific Flyway brant population.

Two Soviet scientists who participated in the work on Wrangel Island, Dr. Mikhail Stishov, Wrangel Island Reserve, and Dr. Sergei Kharitonov, Academy of Sciences, The Ringing Centre, travelled to Alaska and the Izembek NWR on 26 September and participated in the brant research projects being conducted here. Sergei and Mikhail worked closely with AFWRC staff until they departed on 20 October. Numerous radio relocations of brant marked in Canada, Alaska, and the Soviet Union were obtained and several marked birds from Wrangel Island were observed.

The initial phase of the cooperative work with Pacific brant was successful and we look forward to continuing efforts to better understand brant distribution and abundance in the USSR. In addition, numerous other species of mutual concern were discussed in the hopes of initiating other cooperative projects in the future.

Other

Refuge staff provided pintail samples to Matt Cronin of the Alaska Fish and Wildlife Research Center. The samples will be used for a pilot study on mitochondrial DNA differences in sub-populations of pintails. It is currently undecided whether additional sampling efforts will be necessary at Izembek or not. As primarily a migration/staging area, birds present at Izembek represent several breeding areas throughout Alaska. For the purposes of this investigation, it may be more feasible to collect birds from the known breeding areas prior to migration.

The U.S. Army Corps of Engineers (COE) completed a field investigation and subsequent report on 3 former Department of Defense (DOD) sites on Unimak Island. The investigation and associated report are part of the initial phase of a two-phase process designed to identify and ultimately remove any potential hazards to human health or the environment that persist as a result of past DOD activities.

Field work was completed in June 1989. A total of 108 samples, ranging from soil to surface water, were collected from the 3 sites. Field observations identified possible soil contamination at all 3 sites due to a leaking underground storage tanks. Potential asbestos-containing materials were also observed at all sites. Off-site migration of any hazardous chemicals or petroleum products was only observed at 1 site. The second phase of the process is the actual clean-up of the sites which is tentatively planned for 1990.

2. Other Economic Uses

The Oil and Gas Assessment Report for Izembek was received in 1989. The report was compiled by the BLM, Division of Mineral Resources, to help comply with ANILCA Section 1008. Section 1008 basically requires the Secretary of Interior to initiate an oil and gas leasing program on federal lands in Alaska. Part of this program is to collect and analyze data for federal lands to assess the potential for oil and gas development. The BLM has a Memorandum of Understanding with FWS to assess oil and gas resources within National Wildlife Refuges. The results of the assessment classify the northeast corner of Izembek as having high potential for hydrocarbons. The rest of the refuge is classified as no or low hydrocarbon potential. From an economic standpoint, the refuge was classified as having no to low economic feasibility for development as the area with high hydrocarbon potential is small and remote. The hydrocarbon potential is mapped in Figure 9.

3. Items of Interest

EXXON VALDEZ Oil Spill

Oil spill activities from the March 24 EXXON VALDEZ spill in Prince William Sound geared up in April at Izembek. At first, it was not known if the oil would actually reach the tip of the peninsula so much of April was spent contingency planning assuming it would. Areas of wildlife concentrations in the Pavlof Unit were mapped and the information passed on to the Regional Office. The U.S. Coast Guard and NOAA set up a portable lab in Cold Bay at which, samples of water, tissues, tar balls, or oil could be "finger-printed" quickly as to coming from the VALDEZ or not. Coast Guard and NOAA personnel stayed in the

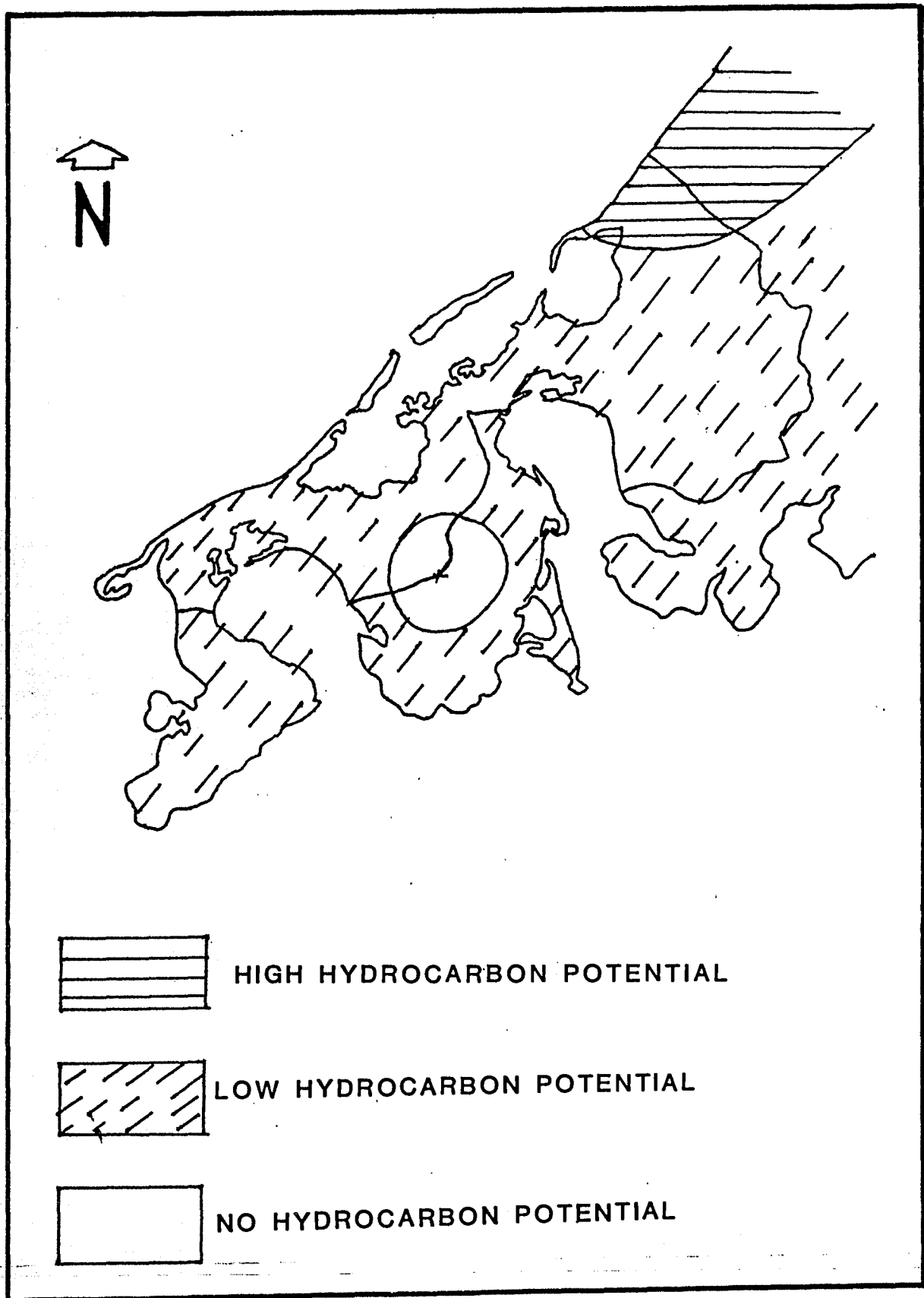


Figure 9. Hydrocarbon development potential, Izembek NWR.

refuge bunkhouse through mid-June. Periodic surveys of the outer beaches of the south side of the lower Peninsula were initiated by refuge staff to look for signs of oiling. These surveys continued through September.

Much of May was devoted to reconnaissance efforts looking for oil. On 11 May, Secretary Simpson, acting as an observer on a Coast Guard helicopter, accompanied by NOAA personnel participated in a reconnaissance flight to Sand Point. The starter in the helicopter went out at Sand Point and return to Cold Bay was delayed several hours. No oil was discovered.

The Service conducted sea otter survey reached the lower peninsula in mid-May. ARM Chase flew several days with Coast Guard and Service personnel in this effort. During the sea otter surveys, a beached whale was spotted on Sanak Island. At the request of NMFS, West and Chase were flown to the carcass, via Coast Guard Helicopter, to obtain tissue samples for analysis. Blubber samples were taken from the 34 foot, male Gray whale and analyzed at the Coast Guard laboratory. There were no indications the whale's death was attributed to the spill.



RM West collects blubber samples from a gray whale at the request of USCG.

MAC

Reports were received throughout the summer of oil at various locations around the lower peninsula. One report could be substantiated as analysis showed the sample to be oil but not crude oil, probably bilge. No other reports could be substantiated by sampling.

On a, what had become routine, beach survey in September, RM West discovered several patches of beached oil at the head of Cold Bay in Kinzarof Lagoon. Samples were collected and submitted for analysis to conclusively determine if the source of this oil was the EXXON VALDEZ. As of this writing, we have not received any word on results. This is a rather significant find since, if documented, would be the farthest point from Bligh Reef with confirmed EXXON VALDEZ oil. Oil was reported in Unimak Pass but was never confirmed, to our knowledge.

Hopefully, this will be the only time it is necessary for Alaskan, or any other, refuges to include an Oil Spill category in the Annual Narrative. With any luck, 1989 will go down as the year of the Alaska oil spill; not the year of the first Alaska oil spill.



"Tar balls" and a dead shearwater
on the beach at Kinzarof Lagoon.

MAC

PACEX - 89

The U.S. Military, primarily the Navy, conducted extensive exercises around Cold Bay in September and October 1989. PACEX-89, as the maneuvers were known, brought several ships, aircraft and personnel to Cold Bay. Lodging at the Weathered Inn was booked for the duration of the exercise and the bar was filled to capacity most every night. Concurrently, the GMU 9D brown bear season was open and several guides expressed concern about the increased air traffic, especially from helicopters. The over-flights of the guide areas by the military were at high enough altitudes that no incidents occurred. The guides reported no problems at the season's end. The majority of the Naval activity was off-shore in deeper waters. Several ships remained in Cold Bay but no activity occurred in Izembek Lagoon. This, along with having several hundred people loose on the refuge, created the greatest potential for conflicts with refuge resources. During this time, waterfowl use of Izembek Lagoon is at its peak. Minimizing disturbance to the birds is of primary concern to refuge staff. No problems arose as few folks ever got out on the refuge on land, over-flights were high and ships avoided the lagoon all together. There are rumors that this may become an annual event.



The USS MCKEE sub tender spent several weeks in Cold Bay in conjunction with PACEX-89.

MAC

PCB Barge

A barge carrying highly diluted PCB contaminated soil ran aground on 1 January near Thinpoint. The KENAI broke away from its tug in high winds and rough seas and grounded on a sandbar. When weather and tides improved, the KENAI was moved to the Cold Bay dock where minor repairs were made. All the containers holding the contaminated soil remained intact.



The KENAI, carrying PCB contaminated soil, spent a couple days at the Cold Bay dock receiving repairs.

RLW

4. Credits

RM Robin West wrote the feedback and reviewed and edited the report.

ARM Mark Chase wrote the report with the exception of G.3 and G.8 Brown Bear.

WB Christian Dau wrote G.3 and G.8 Brown Bear

Secretary Shirley Simpson and ARM Chase typed the report.

K. FEEDBACK

Vendors calling 6 months after a purchase requesting payment. Travel vouchers returned 5 weeks after submission requiring some obscure refinement. The utilities company threatening to disconnect the phone for lack of payment. Interest rates added to billings because of late payment. The station's 13th month report after reconciliation shows \$31,000. unspent; the station's records show \$2,700 in unobligated funds remaining....Any of this sound familiar? All, and more, reflect our 1989 interactions with the finance center. All of the blame for problems in billings, payments, and reconciliation cannot fairly be pinned on Denver. Some of the problems originate from poor communications or mistakes by the vendors or at the field or regional level. But even under the best of conditions our accounting process is slow and inefficient.

Let's take a trip to fantasy land for a moment and pretend that we didn't have to live with the myriad of government financial regulations that restrict who can spend, and how they can spend government dollars. Let's give every project a check book with a beginning balance each fiscal year equal to their approved budget. Projects leaders could be given authority to approve spending of up to say \$5,000. without higher authority approval. Minimal training could be provided project leaders on spending regulations and a couple of regional auditors could ensure accountability. Projects obligate the funds now; by also letting them make actual payments the time, confusion, and expense of dealing with a finance center would be avoided. Vendors would be paid sooner and governmental credibility would be greatly enhanced. Projects could balance their check books and know precisely where their budget was without lengthy delays and reconciliation. An unbelievable amount of time and money would be saved. We wouldn't need GBL's, GTR's, TDS's, or a DFC.

Now, back to reality.

HOW DO YOU SPELL THAT?

- | | |
|---------------|-----------------|
| 1. Isemeek | 44. Izionleek |
| 2. Izembeck | 45. Isenback |
| 3. Izembec | 46. Isnbeh |
| 4. Isembek | 47. Izembrek |
| 5. Izenbeck | 48. Izembik |
| 6. Isenbeck | 49. Izemer |
| 7. Iceyembek | 50. Ixembek |
| 8. Izemback | 51. Brombeck |
| 9. Irembeck | 52. Isenbech |
| 10. Izemeek | 53. Izombek |
| 11. 12 Ember | 54. Zambeck |
| 12. I Z Embek | 55. Isenbec |
| 13. Izenbek | 56. Izenbel |
| 14. Izembelk | 57. Izenbuck |
| 15. Izmebek | 58. Zaubeck |
| 16. Izembak | 59. Izebbek |
| 17. Ezembek | 60. Izembex |
| 18. Izambak | 61. Bembek |
| 19. Izebek | 62. Jzembeck |
| 20. Izemeck | 63. Eisenbach |
| 21. Icembec | 64. Issezenbeck |
| 22. Izemoeck | 65. Izembeknwr |
| 23. Yzembek | 66. Izumbeck |
| 24. Izembrick | 67. Izembia |
| 25. Isambek | 68. Izembaek |
| 26. 1 Zembek | 69. Izenbed |
| 27. Izimbik | 70. Izembel |
| 28. Izembeu | 71. Izemhek |
| 29. 12 Enbek | 72. Zembech |
| 30. Iyembek | 73. Ilemkbek |
| 31. Igembek | 74. I 2 Ember |
| 32. Zembek | 75. Izembell |
| 33. Inzembek | 76. Izemler |
| 34. Zember | 77. Ivenbec |
| 35. Uzembek | 78. Eizenbek |
| 36. Tsembek | 79. Zembex |
| 37. Izemmbek | 80. Icembek |
| 38. Izembez | 81. Lizembeck |
| 39. Izemek | 82. Izimbek |
| 40. Yzembels | 83. Izzembek |
| 41. Icenbec | 84. Rembek |
| 42. Eisenbeck | 85. Izambek |
| 43. Izember | |

Since the Izembek refuge was established in 1960 we have been misspelled at least 85 different ways.