

ALASKA PENINSULA/BECHAROF
NATIONAL WILDLIFE REFUGE

King Salmon, Alaska

ANNUAL NARRATIVE REPORT

Calendar Year 1997

U.S. Department of the Interior
Fish and Wildlife Service

NATIONAL WILDLIFE REFUGE SYSTEM

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Refuge Manager

Date

Refuge Supervisor Review

Date

Regional Office Approval

Date

INTRODUCTION

The refuges within the Alaska Peninsula/Becharof National Wildlife Refuge Complex (Refuge) were established by the Alaska National Interest Lands Conservation Act of 1980 (ANILCA). The Becharof Refuge contains approximately 1.2 million acres. Approximately 400,000 acres is designated the Becharof Wilderness. The Alaska Peninsula Refuge boundaries encompass about 4.3 million acres of land -- an area bigger than the State of Connecticut. Stretching for nearly 340 miles along the Alaska Peninsula, the refuge is subdivided into the Ugashik, Chignik, and Pavlof units. The Alaska Peninsula Unit of the Alaska Maritime Refuge includes all federally owned islands, sea stacks, columns, and rocks along the Pacific Coast of the Alaska Peninsula. Seal Cape (8,200 acres) is the only portion of the unit located on the mainland. The Becharof Refuge, the Ugashik and Chignik units, and Seal Cape are included in the Complex (Figure 1).

The Refuge's purposes were established by ANILCA. Becharof Refuge purposes [ANILCA 302(2)(B)] include: (i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, brown bears, salmon, migratory birds, the Alaska Peninsula caribou herd and marine birds and mammals; (ii) to fulfill international treaty obligations of the United States with respect to fish and wildlife and their habitats; (iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and (iv) to insure, to the maximum extent practicable and in a manner consistent with the purposes set forth in paragraph (i), water quality and necessary water quantity within the refuge. The Alaska Peninsula Refuge purposes [ANILCA 302(1)(B)] add, "...brown bears, the Alaska Peninsula caribou herd, moose, sea otters and other marine mammals, shorebirds and other migratory birds, raptors, including bald eagles and peregrine falcons, and salmonids and other fish". Species mentioned in ANILCA 302(1)(B) specific to Seal Cape, Alaska Maritime Refuge include, "...marine mammals, marine birds and other migratory birds, the marine resource upon which they rely, bears, caribou, and other mammals".

Becharof Lake and tributary streams, the Ugashik lakes, Black Lake, King Salmon Rivers (2), Dog Salmon River, Meshik River and Chignik River provides nursery habitat necessary for the five species of salmon that spawn in the Refuge. A major component of the multi-million dollar salmon industry in Bristol Bay originate in Refuge waters. Dolly varden, arctic grayling, rainbow trout and other fish are found in refuge streams.

The Refuge's fauna includes a large population of approximately 10,000 brown bears. Moose inhabit the area in moderate numbers and caribou use refuge lands for calving, insect escape habitat, migration and wintering. Other animals found include: wolves, foxes, wolverines, and lynx. Sea otter, sea lions and harbor seals inhabit the shorelines as do nesting bald eagles, peregrine falcons, and thousands of seabirds on the rocky sea cliffs of the Pacific coast. The most prevalent nesting, migrating, and wintering waterfowl found on wetlands, lakes, and streams throughout the Refuge include tundra

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swan, greater white-fronted goose, emperor goose, mallard, northern pintail, American widgeon, greater scaup, and harlequin duck.

The Refuge is superimposed over the rugged Aleutian Mountain Range. This volcanic mountain range contains numerous peaks that rise above 6,000 feet elevation. This creates a coast on the Pacific side that is rocky and heavily fjorded. The Refuge contains numerous volcanoes known to have erupted since 1760. They are part of a chain of volcanoes that rim the Pacific Ocean known as the "Ring of Fire". Mt. Veniaminof in the Chignik Unit is a designated National Natural Landmark.

The Alaska Peninsula is world famous for big game hunting. The Refuge is sub-divided into 23 big game guide-outfitter use areas with 29 special use permits issued for conducting big game guiding activities within these areas. The refuge staff manages a large, and often controversial, sport hunting program that balances the needs of unguided and guided sport hunters with the needs of subsistence users.

Approximately 3,100 local residents live in 12 villages within or immediately adjacent to the Refuge. The day-to-day human activities on the Refuge, many of which have deep cultural traditions, pose issues and demands that require sensitive considerations and innovative



Pacific coastline of the Alaska Peninsula National Wildlife Refuge.

approaches to refuge administration.

The Refuge is an undisturbed continuum of sub-arctic ecosystems. A mission of the Refuge is to preserve and maintain these systems in their original state, allowing for natural processes to continue with minimal disturbance. Management is responsible for protecting and enhancing fish and wildlife and habitat resources, and for assuring that objective and policies are met through program planning, evaluation, supervision and coordination.

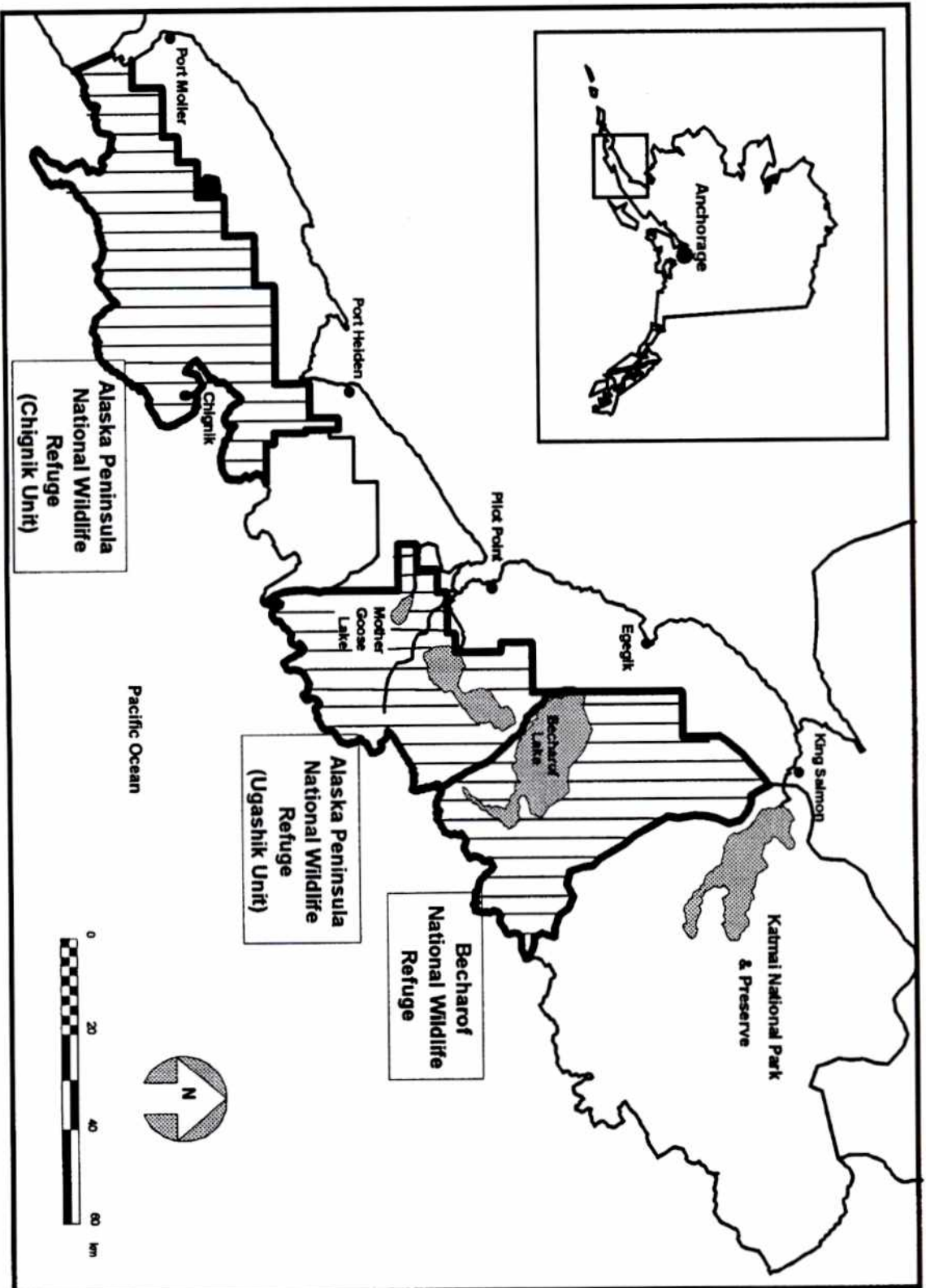


Figure 1. Alaska Peninsula/Becharof National Wildlife Refuge Complex.

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A. HIGHLIGHTS

Major staff turnover (Section E).

Mt. Chiginagak shows signs of activity (Section E).

Fire on the Alaska Peninsula refuge (Section F).

Surveys locate caribou at high elevations (Section G).

Bird banding goals exceeded (section G).



Mt. Peulik, located in the Alaska Peninsula NWR.

B. CLIMATIC CONDITIONS

1. General

The upper Alaska Peninsula is characterized by polar maritime climate with moderate temperatures, protracted cloud cover, frequent precipitation and high winds. Large atmospheric differences between interior Alaska and the Pacific Ocean and Bering Sea are the dominate influences on weather. Pacific Ocean and Bering Sea winds with high moisture content blow frequently across the upper peninsula forming fog and clouds which develop into precipitation. High winds and turbulence are especially common near the rugged terrain. The heaviest precipitation occurs on the Pacific Ocean side of

the Refuge. The Bering Sea side enjoys more clear weather but lower average temperatures.

Temperatures are generally moderate throughout the year. Daily maximum temperatures may exceed the freezing mark in all months while daily minimum temperatures drop below freezing on approximately one-half the days of the year (Table 1).

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

In an area renown for its cool and wet summers, the summer of 1997 was particularly warm and dry. Temperatures reached into the high 70's and 80's from May through August. Of particular interest, the maximum daily temperatures in May and June exceeded the historical average maximum (Table 1). June was the hottest month (83 F) of the short summer. Lowest temperature of -29 F was recorded in January. Precipitation during the year totaled 15.35 inches. Historical annual precipitation average per year is 19.25 inches.

Climatological data (e.g., high and low temperature; average maximum, minimum and monthly temperature; and precipitation) presented in Table 1 was compiled by the National Weather Service located at the King Salmon Airport, King Salmon, Alaska.

C. LAND ACQUISITION

1. Fee Title

The Refuge purchased an 80-acre parcel within the Ugashik Unit of the Alaska Peninsula Refuge. The property, purchased from Mrs. Darlene Lind was signed and recorded on April 7.

On June 28, Refuge Manager Hood made a personal inspection of U.S. Survey 3599, situated at Wide Bay in the Ugashik Unit of the Alaska Peninsula Refuge. This 4.99 acre parcel was purchased for \$30,000 from Emil A. Knudsen, Joanne J. However, Alice Ann Strain, Patricia Gallien, and James Harrigan. A "Certificate of Inspection and Possession" was completed and submitted to Realty.

Subsurface

Nothing to Report

Table 1. 1997 Climatological data reported by U.S. Weather Service at the King Salmon Airport, King Salmon, Alaska.

Month	Temperature (F)				Historical		Precipitation (inches)		
	Monthly High	Monthly Low	Average Max	Average Min	Average Max	Average Min	PPT	Historical Average(1)	Snow Fall
January	44	-30	20	6	23	8	.25	1.0	3.7
February	46	-15	38	23	24	8	.34	1.0	5.2
March	45	-3	31	11	31	14	.80	.9	2.3
April	59	3	48	27	41	24	1.0	1.0	0
May	80	30	59	37	52	34	3.0	1.3	0
June	83	33	66	42	60	42	2.2	1.5	0
July	78	46	70	50	63	47	2.0	2.2	0
August	78	34	66	49	62	47	0	3	0
September	65	29	59	42	55	40	3.4	2.9	0
October	53	4	38	18	40	25	2.5	1.9	.6
November	49	-16	35	18	30	15	0	1.5	10.4
December	42	-29	17	-1	23	7	0	1.3	13.1

(1) Data since 1957

Mining Claims

On January 21, the Bureau of Land Management notified Messrs. Richard H. Jensen and Robert W. Musser that their mining claims had been deemed abandoned and void (two placer claims and 14 lode claims). This action is a result of the Service's challenge to the validity of these claims. Changes in mining law and regulations resulting from Public Law 102-381 (The Act of October 5, 1992; 106 Stat. 1374) were not followed by the claimant and irreversible errors were made. Since 1930, more than 60 claims have been voided in the Braided Creek drainage as a result of this legislation. A significant threat to the Meshik River fishery has been removed due to P.L. 102-381 and low gold prices during the last decade.

2. Easements

Refuge Manager Hood met with Realty staff in Anchorage concerning an ANCSA 17(b) easement on a Sec. 14(h)(1) site selected by Koniag Inc. (AA-11775, Parcel E). At the State's request, BLM is establishing an easement for a sixty-foot wide existing access road. While we acknowledge that a historic road existed, it is no longer extant and we plan to contest the easement. In its present form, the easement is a defacto approval of the State's RS 2477 application for the route (which the Service also plans to contest).

The Refuge Complex received notice from Bureau of Land Management of a proposed 50 ft. easement along the Kanatak trail through a Koniag Inc. small parcel in the Island Arm area. We believe an easement of that width is excessive given the recent history of use.

3. Other

On September 2, Bristol Bay Native Corporation (BBNC) relinquished their ANSCA Section 14 (h)(1) selection on the west side of the Ugashik Narrows - Parcel B of AA-10662 (19.1 acres). This is a win-win situation with the Service managing the site's archaeological resource, the public having access to an important fishing resource, and BBNC losing a management headache.

D. PLANNING

1. Master Plan

Refuges in the Bristol Bay-Kodiak region, including Alaska Peninsula/Becharof Complex, were selected as the first Alaska refuges to have their Comprehensive Conservation Plans revised under the new planning initiative.

The Service contracted Industrial Economics, Inc., a subcontractor to the University of Alaska - Anchorage's Institute for Social and Economic Studies, for an economic benefits assessment of the Bristol Bay refuges. In December the planning team drafted preliminary goals and objectives for the Refuge. Public Involvement Specialist Bob Stevens and Refuge Planner Clough facilitated a meeting resulting in identification of goals and objectives.

2. Management Plan

In March Gary Muehlenhardt of Region 7 Realty presented an overview of the Habitat Protection Plan (Land Protection Plan (LPP)) for the Refuge. Refuge Manager Hood, refuge staff, and ADF&G Biologist Richard Sellers reviewed draft reports depicting habitats of moose, caribou, bear, eagles, and other species on the Refuge.

3. Public Participation

Nothing to Report

4. Compliance with Environmental Mandates

Refuge Manager Hood and Refuge Planner/Subsistence Biologist Squibb prepared a funding proposal to remove containers of fuel, batteries, and associated contaminants and debris from abandoned cabins and other sites in the Refuge.

5. Research and Investigations

Marbled Godwit Research- Angela Mehall-Niswander completed her master's thesis in May 1997. The thesis, entitled "Time budget and habitat use patterns of Marbled Godwits (*Limosa fedoa beringiae*) breeding on the Alaska Peninsula," was a culmination of two field seasons work that the refuge supported. The study site was between the Dog Salmon and King Salmon rivers in the Ugashik drainage approximately 13 miles north of the Mother Goose Lake cabin. The project documented time budgets and habitat use during four phases of the breeding season. Godwit nests and downy chicks were documented for the first time in Alaska. This species requires special attention in part because of their restricted breeding range.

6. Other

Ecosystem Management

In 1995, the refuge hosted the Bristol Bay/Kodiak Ecosystem coordination workshop to develop and coordinate long term monitoring projects. The following projects were conducted as part of this initial cooperative effort.

- 1.) **Project:** Becharof Lake Drainage Hydrologic Investigation
Partners: King Salmon Fishery Resources Office (KSFRO); Refuge Complex; Water Resources Branch, Division of Realty [Keith Bayha]
Funds: Ecosystem, \$13K; KSFRO, in kind; Water Resources Branch, in kind; Refuge Complex, in kind
Status: Five year study initiated; gages installed on the Egegik and King Salmon Rivers. Report due.
- 2.) **Project:** Continue Baseline Terrestrial Studies: Songbirds, Avian Predators, Small Mammals and Vascular Plants
Partners: University of Alaska-Fairbanks; volunteers; Refuge Complex
Funds: Ecosystem, \$10K; Refuge Complex, \$9K
Status: Refer to section G.
- 3.) **Project:** Continue Harlequin Duck Helicopter Brood Survey
Partners: Refuge Complex (Susan Savage)
Funds: Ecosystem, \$5K; Refuge Complex, \$5K
Status: Refer to section G.
- 4.) **Project:** Becharof Lake Limnological Sampling
Partners: King Salmon Fishery Resources Office; University of Alaska- Juneau [Jim Larson/Ole Mathison]
Funds: Ecosystem, \$2,000; KSFRO in kind; Univ. of Alaska, in kind
Status: Data collection completed. Data analysis in progress.
- 5.) **Project:** Preliminary Study of the Paleolimnology of Becharof Lake, AK
Partners: University of Alaska-Fairbanks, Juneau Center; Institute of Marine Sciences; KSFRO [Bruce Finny]
Funds: Ecosystem, \$8K; KSFRO, in kind; Univ. of Alaska, in kind
Status: Data analysis in progress.
- 6.) **Project:** Limnological Monitoring of Lake Becharof
Partners: University of Alaska-Fairbanks, Alaska Cooperative Fish and Wildlife Research Unit; KSFRO [Dr. Jacqueline LaPerriere]
Funds: Ecosystem, \$7.5K; Univ. of Alaska, in kind, KSFRO, \$2,000 in kind.
Status: Data collection completed; data analysis in progress.

E. ADMINISTRATION

1. Personnel

No Photo Available

Permanent staff

1. Ronald E. Hood; Refuge Manager (RM); GS-485-13;
EOD-09/15/85; PFT
2. Daryle Lons; Refuge Manager (RM); GS-485-13;
EOD-12/20/97; PFT
3. Steven R. Hill; Deputy Refuge Manager (DRM); GS-485-12;
EOD-05/08/97, PFT
4. Cheri Amos, Administrative Technician (AT); GS-303-06;
EOD-03/2/97; PFT
5. Kim Montano; Office Automation Clerk (OA); Local Hire,GS-326-04;
EOD-09/23/96; PPT
6. Bill Smoke; Airplane Pilot (AP); GS-2181-12;
EOD-05/16/93; PFT
7. Donna Dewhurst; Wildlife Biologist (WB); GS-486-11;
EOD-02/26/89 (transferred 01/04/97); PFT
8. Susan Savage; Wildlife Biologist (WB); GS-486-11,
EOD-05/11/97; PFT
9. Ronald Squibb; General Biologist (GB); GS-0401-11;
EOD- 03/10/97, PFT
10. Angie Terrell-Wagner; Refuge Ranger /Public Use Specialist, (RR); GS-025-11;
EOD-12/29/91; PFT
11. Shirley Kelly; Refuge Information Technician (RIT), (local hire); GS-1001-08;
EOD-09/08/91; PPT
12. John (Smiley) Knutsen; Refuge Information Technician (RIT), (local hire); GS-
1001-08; EOD-09/08/91; PPT
13. Charles O'Dimon; Refuge Information Technician (RIT), (local hire); GS-1001-08;
EOD-10/5/97; PPT
14. Orville Lind; Refuge Ranger (RR), (local hire); GS-0025-09; EOD-09/08/91; PFT
15. Gary Terry; Maintenance Worker (MW); WG-4749-08;
EOD-07/31/88; PFT
16. Harvey Heffernan; Maintenance Worker (MW); WG-4749-05;
EOD- 06/23/97; Transferred 09/10/97, PFT

The Refuge staff underwent significant changes in 1997. Refuge Manager Hood retired to Texas after twelve years of service at the Refuge. Daryle Lons from the Regional office was selected to fill the Refuge Manager position. Wildlife Biologist Dewhurst was selected for a Biologist position with the Subsistence Division in the Regional

office. Steven Hill, from Imperial NWR in Arizona came on board in the Deputy Refuge Manager position. Susan Savage, from Katmai National Park was selected to fill the Station's Wildlife Biologist position. Ronald Squibb, from the Service's Regional office in Anchorage was selected to fill the Subsistence Biologist/Natural Resources Planner position. Cheri Amos, from the Service's Regional Sign Shop in Winona, Minnesota was selected to fill the Administrative Technician position. Charles O'Dimon, from Chignik Lake, Alaska, was selected to fill a Refuge Information Technician position. Harvey Heffernan, from Arctic NWR in Fairbanks, came on board as the new Maintenance Helper in June and transferred back to Yukon Flat NWR in September.

Temporary staff

1. Cindy Girten; Refuge Ranger (RR); GS-025-05; EOD-05/02/97; Local Hire
2. Randy Moore; Biological Technician (BT); GS-404-07; EOD-06/13/97
3. Amanda Sanderlin; Refuge Ranger (RR); GS-025-05; EOD-05/02/97, Local Hire
4. Corey Adler; Biological Technician (BT); GS-404-05; EOD-05/11/97, Local Hire
5. Darlene Melvin, Refuge Ranger (RR), GS-025-05; EOD-06/30/97

Full-time equivalent allocation and use at Alaska Peninsula/Becharof NWR Complex.

Fiscal Year	Full Time Equivalent	
	Authorized	Total Used
97	12.0	12.0
96	8.0	13.40
95	9.0	12.06
94	8.8	10.02
93	8.8	7.92
92	8.8	8.32
91	9.3	8.26

Permanent staff attended the following training and workshops in 1997:

Deputy Refuge Manager Steven R. Hill

Law enforcement re-qualification training on February 14.

Alaska Native Clams Settlement Act training in Anchorage on March 3.

Project Leaders meeting in Anchorage the week of November 7.

Administrative workshop in Anchorage the week of October 27.

Refuge Pilot Bill Smoke

Law enforcement refresher training in Marana, Arizona the week of January 27.

Refuge Academy in Charleston, South Carolina from March 2-20.

Boat Operator Instructor Certification Course from April 28 to May 2 in Homer.

OAS ground school in Anchorage the week of December 8.

Emergency maneuver training at the Aerobatics School in North Las Vegas, Nevada the week of January 25.

Refuge Ranger Angie-Terrell-Wagner

Alaska Natural History Association workshop in Anchorage the week of December 4.

Government Performance and Results Act training in Anchorage on January 27.

Refuge Ranger Orville E. Lind

Alaska Refuge Predator Management Team Workshop in Anchorage on July 15.

Alaska Team Steel workshop in Bethel on March 10.

Collateral Duty Safety Officer training in Anchorage the week of March 25.

Boat Operator Instructor Certification Course from April 28 to May 2 in Homer.

Hazwoper training at the AP/B NWR Complex on December 1.

Oil Spill Response training in Corpus Christi, Texas the week of July 19.

Administrative workshop in Anchorage the week of October 27.

Planner/Subsistence Biologist Ron Squibb

Administrative workshop in Anchorage the week of October 27.

Wildlife Biologist Susan Savage

Partners In Flight Workshop in Anchorage the week of December 7.

Administrative Technician Cheri Amos

Administrative workshop in Anchorage the week of October 27.

Office Automation Clerk Kimberly Montano

Administrative workshop in Anchorage the week of October 27.

Refuge Information Technician Shirley Kelly

Refuge Information Technician workshop at the YK-Delta Refuge in Bethel the week of December 15.

Refuge Information Technician John "Smiley" Knutsen

Refuge Information Technician workshop at the YK-Delta Refuge in Bethel the week of December 15.

Refuge Information Technician Charles O'Domin

Refuge Information Technician workshop at the YK-Delta Refuge in Bethel the week of December 15.

Maintenance Worker Gary Terry

Hazwoper training at the AP/B NWR Complex the week of December 1.

2. Youth Programs

Nothing to report

3. Other Manpower Programs

Nothing to report

4. Volunteer Program

Eleven volunteers representing six states and two countries contributed 3,488 hours in the Biological program. Volunteers assisted with the following projects: Monitoring Avian Productivity (MAPS) project, Earthwatch volunteer travel logistics, training, shorebird surveys, herbarium collection, songbird banding, and small mammal surveys.

Volunteer staff

Josh Nove (Ipswich, Massachusetts), EOD 04/15/97.

Jennifer Stamp (Bristol, New Hampshire), EOD 04/26/97

Kristine Marcell (Olney, Maryland), EOD 04/15/97.

Chris Alderete (Pine Grove, California), EOD 05/11/97.

Betty Friest (Anchorage, AK), EOD 08/3/97.

Andrea Chatfield (Swartz Creek, Michigan), EOD 08/1/97.

Janis Smoke (King Salmon, Alaska), EOD 08/13/97.

Bob Blush (King Salmon, Alaska), EOD 08/15/97.

Katie Rich (Wellesley, Massachusetts), EOD 07/30/97.

John Ulrichsen (Australia), EOD 08/04/97.

Annie Whybourne (Australia), EOD 08/04/97.

Earthwatch Volunteers

In cooperation with the Center for Field Research, Earthwatch participants financially contribute funds to the project as well as volunteering their time. Earthwatch charges participants \$1,600.00 for the two week enrollment. The refuge receives \$800.00 from Earthwatch for each participant. A total of twenty eight volunteers representing fourteen states and five countries contributed 1700 hours assisting in the Biological program.

5. Funding

Funding history (in thousands) of the Alaska Peninsula/Becharof National Wildlife Refuge Complex.

FY	1261 Fixed	1262 MMS	8610 Quarters	4960 Permits	1230 Migratory Birds	1971 Migratory Birds	Total
97	986.0	193.0	36.0	10.1	13.0	2.8	1240.9
96	909.0	125.0	45.1	6.0	13.0		1098.1
95	669.0	346.0	27.4	8.9			1051.3
94	593.0	293.0	29.2				915.2
93	550.0	308.0	26.2				884.2

6. Safety

This station strongly supports the Regional safety program and all aspects of keeping our Refuge and facilities a safe place to live and work. The station safety committee was expanded to include Refuge Ranger Orville Lind as chairperson, KSFRO Fishery Biologist (FB) Jeff Adams as secretary, and the following employees; Deputy Refuge Manager (DRM) Hill, Airplane Pilot Smoke, and Maintenance Worker Terry. The expanded committee and active participation by all staff provides the foundation for an aggressive safety program. All refuge staff participated in monthly safety presentations on the following topics:

January- "Winter Safe" and "Skids".

February- "Taken by surprise", a thirty minute documentary by the Alaska State Troopers about thin ice incidents.

March- Collateral Duty Safety Officer training responsibilities.

April- "Prevention of Back Injuries", "Pain on the Job".

May- Fire extinguishers.

June- First-Aid-Kits and Housekeeping.

July- Hazard Communications.

August- "How to change tires safely".

September- Hypothermia.

October- Blood borne pathogens.

November - Cold Weather River Crossing.

December- Fire Safety, "Plan to Get Out Alive".

On July 3, Josh Nove, a volunteer with the Station's biological program, drowned at Mother Goose lake, Volcano Creek Delta, while chasing gull chicks across a braided

stream toward the lake. Refuge Officers Smoke and Hill responded along with Alaska State Troopers to the scene and conducted a systematic search of the area. Two days of searching with dive teams failed to locate Josh's body.

An investigation and report was completed by Phoenix Investigations, Inc. and it was determined that the drowning to be an accident with one or more of the following factors or conditions contributing to the drowning:

- Mr. Nove was chasing chicks across a silt laden, braided stream where he could not see the creek bottom or edge of the lake.
- In some areas the silt would build up and act or hold like quick sand.
- Weather conditions were hot (high 70's degrees Fahrenheit) and the water was 40 degrees Fahrenheit.
- Mr. Nove was not wearing a PFD or Mustang suit when he entered the water to chase the chicks.
- Mr. Nove was wearing hip-waders that were loose at the top.
- Mr. Nove ran at full speed for a long distance in knee deep water which would cause tremendous exertion.
- The stream had a moderate current flow into the lake.

7. Technical Assistance

Nothing to Report

8. Other Items

Nothing to Report

F. HABITAT MANAGEMENT

1. General

Plant Collections

Biological program staff, located at Gas Rocks and at Mother Goose Lake, collected twenty new specimens for addition to the refuge plant list.

2. Wetlands

Nothing to Report

3. Forests

Nothing to Report

4. Croplands

Nothing to Report

5. Grasslands

Nothing to Report

6. Other Habitats

Studies of reproductive success and body condition of caribou in the northern Alaska Peninsula herd indicate that nutritional stress may be a major factor in the herd's decline (Alaska Department of Fish and Game). Refuge staff conducted a reconnaissance of caribou winter range for availability of lichen, a preferred forage. Comparisons of an area in the northern part of Becharof Refuge that is traditional winter range with lightly grazed, undeveloped lands near King Salmon where conducted. Comparison across all habitat types of randomly placed plots revealed that fruticose lichen cover (=2.7%) and height (=1.9cm) were significantly ($P < 0.0005$) less on the area of traditional winter range (n=40 plots) than on lightly grazed range near the community of King Salmon (n=52 plots; cover=19.4%; height=3.1 cm).

7. Grazing

Nothing to Report

8. Haying

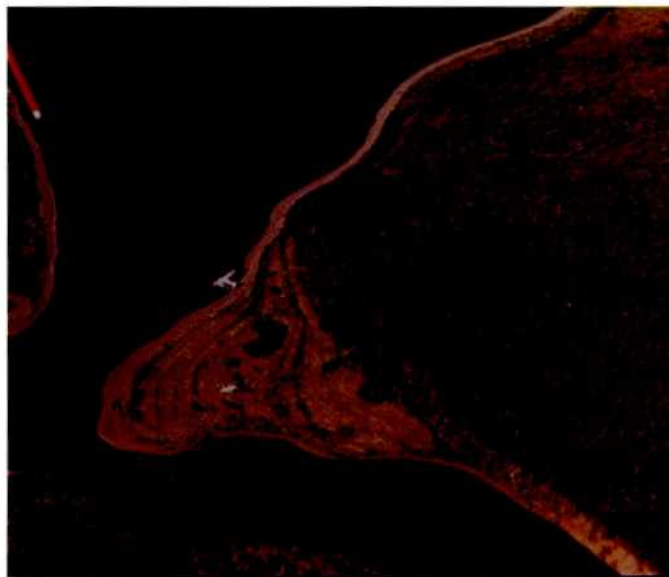
Nothing to Report

9. Fire Management

At 2:00 p.m, on June 27, Refuge Pilot Bill Smoke received a report that a small camp fire at Ugashik Narrows had escaped into dry grass. Upon Smoke's arrival, he found the fire had increased to approximately one acre, and was located on the Bristol Bay Native Corporation parcel. Refuge Manager Ronald Hood forwarded Smoke's radio report to the Alaska State Fire Service, located in McGrath. Smoke and General Biologist Squibb began cutting a fire line to protect a private lodge located downwind of the fire. State smoke jumpers arrived to provide suppression actions followed by helicopter and additional crew support. Volunteers from Ugashik and Pilot Point assisted in suppression efforts. The fire was declared out at 6:00 p.m. after consuming approximately six acres. No structures were damaged.

The fire originally escaped from a small campfire started by a fishing group. The fire was built on the shore in scattered beach rye. The fire was surrounded by a ring of large stones, but escaped along dry, surface tillers that connected the scattered bunches of grass. Had those tillers been broken by digging a narrow line around the fire, it would probably not have escaped.

Regional Archaeologist, Chuck Ditters inspected the site on July 29 and found that the fire had not damaged any archaeological resources. Smoke conducted the investigation which lead to a notice of violation issued to a local fishing guide service in King Salmon. The final suppression costs totaled \$40,000.



Ugashik Narrows fire.

10. Pest Control

Nothing to Report

11. Water Rights

Becharof Lake Drainage Hydrologic Investigation

Hydrologist Mitch Linne, Region 7 Water Resources Branch, continued field work on the Egegik River below the Becharof Lake outlet. Site visits were conducted during the months of April, May, July and August to download data logger data. Data analysis determined that the gage height at the site was tidally influenced. The data logger battery was stolen in July, causing loss of several weeks of information.

Evaluation of the stage record for April 14 to August 4 indicates a tide effect at this site. The site is approximately 60 feet above sea level and should not be effected. An evaluation of cross sections constructed from discharge measurements indicate the bed of the King Salmon River is shifting regularly so that no dependable rating can be obtained. A decision was made, in conference with Refuge Manager Hood to relocate the gage site further upstream.

12. Wilderness and Special Areas

Becharof Refuge

Approximately 400,000 acres or one-third of the refuge was established under the Alaska Lands Act as the Becharof Wilderness. The area represents a variety of superlative pristine habitats with a complete compliment of plant and animal associations still intact. Wilderness designation ensures that representative samples of these interdependent associations, some of which are unique, will be perpetuated for this and future generations to enjoy. The genetic diversity protected by the unit will serve as an invaluable source of data for scientific investigation and for potential future needs for fish and wildlife protection, restoration and enhancement. Three private inholdings are found within the wilderness area boundary. One of the inholdings (40 acres and 5 acres) is owned by registered guide, Philip Shoemaker, another is leased by him. He has built lodges on both. The third is a Native allotment, consisting of 160 acres.

An additional 347,000 acres (29 percent) of the refuge was recommended for wilderness designation in the November 1, 1988 Record of Decision for the Becharof National Wildlife Refuge Final Supplemental Environmental Impact Statement for the Wilderness Proposal of the Final Becharof Comprehensive Conservation Plan/Environmental Impact

Statement/Wilderness Review. No Congressional action has been taken on this proposal to date.

Alaska Peninsula Refuge

At present, no refuge lands are designated wilderness. A Record of Decision signed November 1, 1988, for the Alaska Peninsula National Wildlife Refuge Final Supplemental Environmental Impact Statement for the Wilderness Proposal of the Final Alaska Peninsula Comprehensive Conservation Plan/Environmental Impact Statement/Wilderness Review recommended 640,000 acres for wilderness designation.

Mount Veniaminof was determined to be eligible for natural landmark status in 1967. It was registered in August 1970. This unique active volcano is located in the Chignik Unit of the Alaska Peninsula Refuge. It is located about 20 miles northeast of Port Moller (Bristol Bay side) and 20 miles west of Chignik (Pacific Ocean side) and approximately 450 miles southwest of Anchorage.

Named for Russian Orthodox priest Ivan Veniaminof, who studied Aleutian Chain cones early in the 19th Century, this 8,400-foot volcano is centered on the last wide lobe of the Alaska Peninsula. The climactic eruption that formed the Veniaminof caldera occurred about 3,700 years ago. Mount Veniaminof is massive. The summit crater is about 5.2 miles in diameter and contains a 25-square mile cupped ice field -- the most extensive crater glacier in North America. It is the only known glacier on the continent with an active volcanic vent in its center. The volcano's base is over 30 miles in diameter. The Landmark's boundaries encompass over 800,000 acres.

13. WPA Easement Monitoring

Nothing to Report

G. WILDLIFE

1. Wildlife Diversity

Nothing to Report

2. Endangered and/or Threatened Species

Nothing to Report

3. Waterfowl

Bristol Bay Drainage Spring Waterfowl Survey

Spring survey of staging waterfowl along the Naknek River of the Alaska Peninsula was conducted March 17 through May 16. This year's survey continued annual surveys initiated in 1983. For the seventh consecutive year, ground surveys were performed in conjunction with aerial surveys. Aerial surveys were conducted along the Kvichak, Ugashik and Egegik rivers. The Ugashik and Egegik rivers showed greater than a 300% increase in total waterfowl. Naknek River waterfowl numbers in 1997 were generally low compared to 1991-1996, possibly the result of an early spring thaw and increased availability of open water on the Peninsula. Twenty-five species of waterfowl were observed during the 1997 survey. One unusual sighting of a single Tufted duck was made. The highest number of white-fronted geese (1,343) was recorded since the initiation of the ground surveys in 1991, although that was still considerably lower than the aerial survey counts of 1984-1986 and 1995.



Tundra swans on the Naknek River.

Harlequin Duck Surveys - Becharof Lake Ecosystem

On July 22 and 23, 1997, a chartered (Kenai Air) Bell Jet 206 helicopter was used to survey harlequin duck broods in the streams emptying into Island Arm and the Kejulik River drainage. The protocol for survey followed standard operating procedures. Bible Creek survey was omitted. Seventeen hens with broods, one brood without hen, and two broody hens were counted in the two areas for a total of 18 broods, 2 broody hens and 70 young. The majority of harlequin young were classified as age class 2 and 3. Island Arm had 20 broods (eliminating broody hens) in 1995, 19 broods in 1996, and 11 broods in 1997. The Kejulik drainage had 24 broods/broody hens in 1995, but only 8 broods/broody hens in 1997 (includes Marie Creek). Overall waterfowl production was lower than previous years with 7 merganser broods (35 young), 1 scaup (5 young), 4 mallard (17 young), 1 widgeon (8 young), 3 pintail (13 young) and 1 green-wing teal (7 young) broods observed.

The low waterfowl production may be attributed to extremely dry creek conditions. 1996 and 1997 have been dry years with 1997 being extremely dry (approximately 54% of normal from October 1, 1996 to July 31 1997). Creeks ran approximately one third the width of the bed on average. Cabin Creek in Island Arm was the single most productive creek with 5 broods. Due to the low numbers of broods, replicates were not run as suggested in the standard operating procedures.

4. Marsh and Water Birds

Nothing to Report

5. Shorebirds, Gulls, Terns and Allied Species

Bristol Bay Shorebird Surveys

Informal shorebird surveys were conducted at the mouth of the Naknek River from May through August 25. These surveys showed seasonal differences in species presence and abundance over the summer.

Incidental Banding

Incidental banding at Mother Goose Lake and Gas Rocks resulted in banding 2 northern shrikes, 1 black turnstone, 2 Arctic tern chicks, and 62 glaucous-winged gull chicks (61 at Mother Goose Lake and 1 on an island near Gas Rocks).

Seabird Die-off

Refuge staff assisted in the documentation of a large and extensive seabird die-off that extended from the Chukchi Sea to the western Gulf of Alaska. Local village residents and fishermen, as well as field camp staff, reported dead seabirds or birds with unusual

behavior. Short-tailed shearwaters, black-legged kittiwakes, murres and some other species were documented dying from mid-May to early September. Fish and Wildlife staff of the Migratory Bird Management office have drawn preliminary conclusions that the die-off was attributed to starvation. Unusually warm surface waters, and highly stratified waters in some areas may have affected food sources.

6. Raptors

No formal raptor studies were conducted in 1997. A gyrfalcon nest and a rough-legged hawk nest were documented near Gas Rocks on Becharof Lake and a rough-legged hawk nest was documented near Mother Goose Lake on Indecision Creek.

7. Other Migratory Birds

Neotropical Migratory Bird Program

Monitoring Avian Productivity and Survivorship (MAPS) banding and migration banding were conducted at the Mother Goose Lake field site in cooperation with volunteers from the *Center for Field Research (Earthwatch)*. The project is coordinated by the Institute for Bird Populations in Inverness, California as part of a national program to monitor breeding populations. In addition, this avian monitoring effort is part of the regional and nationwide "Partners in Flight" program and 1997 was the fourth year of the partnership with *Earthwatch*. *Earthwatch* is a non-profit organization that sponsors research internationally by providing volunteer assistance and funding. In 1997, the program involved 32 *Earthwatch* volunteers (see section E-4) five of whom were assigned to Bible Camp. Each volunteer contributed \$800.00 (through *Earthwatch*) to help sponsor the program, for a total contribution of \$25,600 and approximately 3,100 volunteer hours.

Biological technician Moore coordinated passerine banding training sessions in King Salmon between May 9 and 28. Nets were operated on seven days, yielding 68 newly banded birds, 18 recaptures and 4 returns from 1994 - 1996 (Table 2). Unusual captures included a hoary redpoll on May 9. Four warblers were captured in 1997, compared to only one in 1996.

At Mother Goose Lake, avian monitoring consisted of mist-netting and banding songbirds during breeding and fall migration, conducting off-road point counts, nest searching and monitoring, searching for color banded birds and doing related habitat surveys. Three MAPS stations were operated, each with ten mist-nets located in three different habitats approximately one half-mile apart. The stations were operated June 10 through August 2. Color banding of newly caught adult birds was conducted at the lakeside site during MAPS to increase our odds of detecting returning birds next year and to have a means to track down MAPS site switching individuals.

In 1997, the MAPS program at Mother Goose Lake banded 876 birds of 18 species during 1,062 net hours. The stations recorded 90 returns (8 from '94, 33 from '95 and 49 from '96) and recaptured 367 birds banded this year. Of the returns, 66 birds were recaptured consistently at the same MAPS station where they were originally banded. The majority of the returns (86%) were originally banded as adult birds.

On August 3, the lakeside site was converted to fall migration banding, with five nets added to the array. Migration banding continued until September 14 and resulted in banding 2,761 birds of 20 species during 1,994 net hours. During migration, 12 birds returned (1 from '94, 3 from '95 and 8 from '96) and 334 birds were recaptured after initial banding. We had one foreign recovery; a Wilson's warbler banded in California was recaptured on August 15. There have been ten band recoveries (Table 2) in the last four years of banding for all refuge stations (seven of our bands recovered elsewhere including one locally; three birds banded elsewhere captured here).

The color band program resulted in resighting 15 individuals. Five of these were birds color banded in 1997, five were banded in 1996 and were recaptured in 1997, and five were banded in 1996 and were not recaptured in 1997. The nest searching program resulted in 21 nests of 10 species (6 of golden-crowned sparrow and 5 of Wilson's warbler were the most common). Breeding and fall migration densities of Wilson's warblers were the highest recorded in Alaska for 1994-1997. These large numbers of Wilson's warblers contributed to very high catch rates during fall migration peaking at 347 birds/100 net hours on August 10.

Table 2. Project banding summary of the Alaska Peninsula/Becharof NWR, 1997.

SITE NAME:	GARO	BICA	MOGO	MOGO	INCID	KISA	
Type of Banding:	INV	MIGR	MAPS	MIGR		TRN	TOTAL
No. days banding:	20	28	26	35		5	
No. net-hours:	1368	1284	1062	1994	n/a	n/a	
Downy Woodpecker	0	5	2	6	0	0	13
Alder Flycatcher	1	0	3	4	0	0	8
Tree Swallow	0	0	6	0	0	2	8
Black-billed Magpie	0	0	0	1	0	0	1
Black-capped Chickadee	12	69	33	213	0	0	327
Boreal Chickadee	0	0	0	0	0	2	2
Ruby-crowned Kinglet	0	1	0	3	0	0	4
Gray-cheeked Thrush	2	11	16	31	0	0	60
Swainson's Thrush	0	0	0	0	0	0	0
Hermit Thrush	33	26	65	195	0	2	321
American Robin	5	16	0	1	0	5	27
Varied Thrush	0	0	1	0	0	3	4
American Pipit	0	2	0	0	0	0	2
Northern Shrike	0	8	1	16	2	0	27
Orange-crowned Warbler	26	162	85	240	0	1	514
Yellow Warbler	37	603	54	375	0	1	1070
Myrtle Warbler	1	3	0	0	0	1	5
Northern Waterthrush	0	2	0	0	0	0	2
Wilson's Warbler	47	375	472	1279	0	2	2175
American Tree Sparrow	13	309	3	117	0	3	445
Chipping Sparrow	0	0	0	1	0	0	1
Savannah Sparrow	9	188	42	85	0	2	326
Fox Sparrow	15	23	20	17	0	5	80
Golden-crowned Sparrow	15	20	18	43	0	5	101
White-crowned Sparrow	2	14	4	32	0	9	61
Pine Grosbeak	0	0	8	6	0	0	14
Common Redpoll	23	54	43	96	0	24	240
Hoary Redpoll	0	0	0	0	0	1	1
Arctic Tern	0	0	0	0	2	0	2
Black Turnstone	0	0	0	0	1	0	1
Glaucous winged Gull	0	0	0	0	62	0	62
TOTAL OF ALL SPECIES	241	1891	876	2761	67	68	5904
CAPTURE RATE (#/100nh)	18.77	147.2	82.49	138.47	n/a	n/a	n/a

This year we assisted the Institute for Bird Populations in testing a new program for data verification. Instead of sending our MAPS data (that had only been preliminarily proofed to the institute), we ran and tested their data error detection program. Within records (for example, age or sex does not agree with skulling, molt or feather wear data), and between record errors (for example, birds with the same band number have different species, age or sex codes) are error tested.

Becharof Lake Ecosystem

Landbird inventories were conducted at Becharof Lake during June-September 1997. From June 9 through July 19, point counts were combined with constant-effort mist netting at Gas Rocks on the southern shore of Becharof Lake. From July 28 through September 13, constant-effort mist netting was conducted at Bible Camp on the northeastern shore of the lake. At Gas Rocks, 1,368 net hours resulted in 241 banded birds of 15 species and 78 birds were recaptured (Table 2). At Bible Camp, 1,284 net hours resulted in 1,891 birds banded of 18 species, 422 recaptures and 3 returns from 1996. Noteworthy species included: a female myrtle warbler in breeding condition at Gas Rocks and several other non-breeders at Bible Camp, northern waterthrush, and rufous hummingbird that flew into the banding tent at Bible Camp. Two of the returns (American tree sparrows) were banded on the same day in 1996 and were recaptured on the same day in 1997. Nest searching resulted in 5 nests of 5 species. The combination of mist netting, point counts and incidental observations allowed documentation of 74 species using the Becharof Lake area. The Bible Camp site is being considered for use as a long-term fall migration banding station.

Christmas Bird Count

The twelfth annual King Salmon-Naknek Christmas Bird Count took place on December 20. Local results were submitted to the National Audubon Society, which sponsors and publishes results in the ornithological journal *American Birds*. Even though the count is not held on refuge lands, Refuge staff coordinates this event. Nine volunteers donated their Saturday to seek out birds from Lake Camp to the mouth of the Naknek River. A clear day followed a snowy week; the Naknek River was open from just above the Savonoski Crossing to the mouth. Eleven different bird species were spotted totaling 925 individuals. Highlights included a new record high of 49 Bald Eagles (44 adults, 4 juveniles, 1 unknown) sighted during the count and a record high of 252 common redpolls.

8. Game Mammals

Northern Alaska Peninsula Caribou Herd (NAPCH).

Refuge Pilot Bill Smoke and Planner/Subsistence Biologist Squibb conducted aerial surveys in the Becharof Refuge and the Ugashik Unit of the Alaska Peninsula Refuge on four days during June 23 through July 3. The majority of caribou (96% of unadjusted counts) were located in herds high along ridges on snow fields on steep slopes. In total, 2114 caribou, including 173 calves, were counted. Analysis of photographs of the larger groups on steep snow fields revealed that calves were substantially under counted. The ratio of calves to older caribou derived from these photographs was 0.20 in contrast to that of 0.09 from the aerial counts. The poor counts of calves probably resulted from the small calves moving under and behind older caribou; poor visibility was exacerbated by the groups moving, shadows and bright sunlight, and the oblique angle of observation on steep slopes. An estimate derived from photo counts and from aerial counts for all groups not photographed resulted in an adjusted total of 2264 caribou including 293 calves.

The NAPCH has declined from a peak near 20,000 animals in the 1980's to approximately 10,000 in 1997. Recent data indicate that caribou are in mediocre body condition, calf production is poor, and calves have a high incidence of lung worms, i.e., indications of possible nutritional stress (R. Sellers. 1997. Status of the NAPCH. Report. ADF&G, King Salmon. 4 pp.). Current ADF&G management objectives include (1) minimizing the harvest of cows and (2) maintaining an adequate ratio of bulls to cows ($\geq 40:100$). The estimated harvest from the NAPCH during 1994-1996 averaged 2023 caribou. Sixty-five percent of the harvest was by hunters from local communities (Sellers *ibid.*).

The Alaska Peninsula caribou herd is subdivided into northern and southern herds. The southern herd remains south of Port Moller and ranges to Cold Bay. These animals are monitored by ADF&G, with assistance from Izembek National Wildlife Refuge. The northern herd ranges from Port Moller northward to the Naknek River drainage, utilizing both the Alaska Peninsula and Becharof refuges. The northern herd is also managed by ADF&G, with assistance from Alaska Peninsula/Becharof NWR Complex staff.

Historically, the size of the northern herd has fluctuated widely. Apparent peaks were just prior to the turn of the century and again in the early 1940's, when the population was estimated at 20,000 caribou. The last population low occurred during the late 1940's, with an estimated 2,000 caribou. Thereafter the herd demonstrated steady growth until 1984, when the population peaked again at 20,000. Since 1989, the northern herd population has declined slightly. ADF&G management objective is a population between 15,000-20,000 animals. Photo censuses by ADF&G in June 1994 and documented low populations of 12,000 animals. Based on these censuses, ADF&G

placed emergency restrictions on caribou hunting in Game Management Unit 9C during 1994, 1995 and 1996. The emergency regulations reduced winter harvest by 60 percent.

Movement of the Northern Alaska Peninsula caribou herd has been concentrated between their calving grounds south of Port Heiden to their wintering grounds south of the Alagnak River. Approximately 90% or higher of this movement occurs off applicable Federal lands. Isolated pockets of caribou occur on Refuge Complex lands in association with the Aleutian Mountains, and are thought to be more sedentary in nature. Very little is known of the caribou population status and movement east of the Aleutian Mountain Range, along the Pacific Coast.

Moose

Refuge Pilot Bill Smoke, Wildlife Biologist Susan Savage, and Planner/Subsistence Biologist Ronald Squibb conducted aerial surveys of the Kejulik and Big Creek trend areas during November and December. Strong winds prevented a complete survey of the Kejulik trend area. On the fourth attempt to survey the Big Creek area, good weather conditions resulted in record moose counts for the area since survey initiation in 1991. Total count of 179 moose with ratios of 28 bulls per 100 cows and 26 calves per 100 cows was obtained.

Moose were present on the Alaska Peninsula in low numbers at the turn of the century; their numbers increased substantially during mid-century. Numbers peaked about 1970, but began declining thereafter. By 1984, moose numbers had declined 60% or more from their peak despite increasingly restrictive hunting regulations. The decline apparently resulted from the high densities of moose over-browsing preferred forage species. Cows showed signs of nutritional stress; poor calf production and recruitment were the apparent results. Evidence indicated that the forage base may have been recovering in the 1980's; yet it seemed that brown bear predation on young calves may have been constraining population growth. The general conclusion was that moose density on the Alaska Peninsula had stabilized at a level sustainable within the constraints of their habitat (M. McNay. 1983. Moose habitat assessment on the Alaska Peninsula. Report. ADF&G, King Salmon. 31 pp.; R. Sellers and M. McNay. 1984. Population status and management considerations of brown bear, caribou, moose, and wolves on the Alaska Peninsula. Report to Board of Game. ADF&G, King Salmon. 53 pp.).

9. Marine Mammals

Nothing to Report

10. Other Resident Wildlife

Nothing to Report



Alaska Peninsula moose twins.

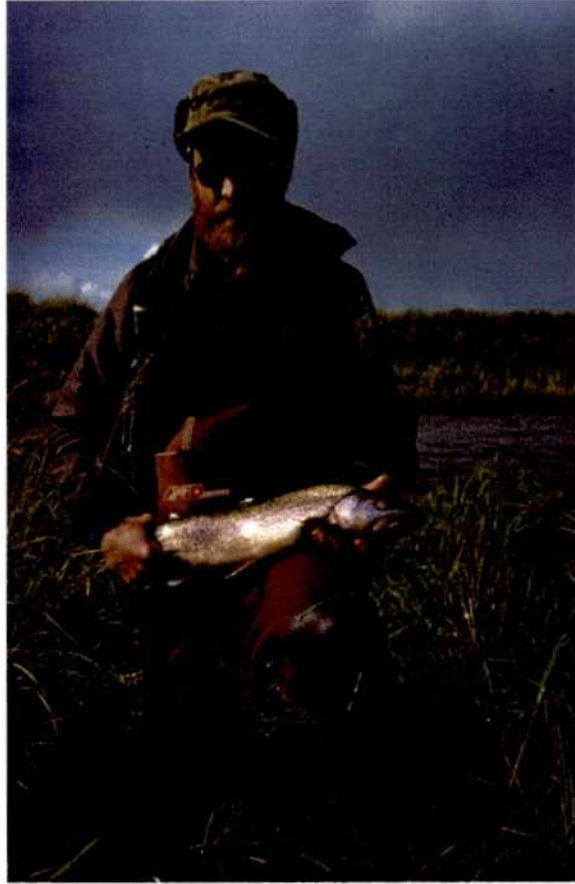
11. Fisheries Resources

The King Salmon Fisheries Resource staff conducted the following projects during 1997:

- 1.) Bias of hook-and-line sampling of a known population of rainbow trout in Gertrude Creek, Becharof National Wildlife Refuge, Alaska.

Hook-and-line sampling is a commonly used and widely accepted method for obtaining information on age composition, size structure, and abundance of fish populations in southwest Alaska. However, size selectivity of the gear, differences in angler skill and effort, and avoidance of the gear induced by previous capture, may contribute to bias in the catch. Sampling bias resulting from size selectivity of the gear makes it difficult to determine changes in the age and size structure of fish populations over time. Size selectivity also contributes to reduced precision in mark recapture estimates of abundance because of the need for stratification by size and the resultant reductions in sample size. As management decisions are often based on population surveys conducted by hook and line sampling, it is important for fishery managers to recognize its associated bias. Understanding the magnitude of sampling bias will increase the knowledge gained from past and future population studies based on hook-and-line sampling data. In turn, this will improve the ability of fisheries managers to make informed decisions relating to conservation of southwest Alaska's wild populations of rainbow trout._

Gertrude Creek is a small, clear water stream located within the Becharof National Wildlife Refuge in southwest Alaska, and is a tributary to the King Salmon River which originates in the Kejulik Mountains in Katmai National Park. A bi-directional fish weir was installed near the mouth of Gertrude Creek 18 April 1997 and was operated until 19 September. The weir was used to intercept the annual upstream migration of rainbow trout into Gertrude Creek, allowing fish to be individually marked with tags to establish a 'known population'. The marked population was subsequently sampled by hook and line on three different events during the summer. Operating the weir also provided important information regarding the movements of round whitefish, Arctic grayling and Dolly Varden char, and escapement counts for chinook, chum, sockeye, and pink salmon. We captured 883 round



Life of a fisheries biologist.

whitefish, 1,126 Arctic grayling, 902 Dolly Varden char, and 280 rainbow trout in the weir's upstream trap box. Upstream migrations of whitefish, grayling, and rainbow trout occurred primarily in the spring, whereas char moved upstream mainly in the late summer and fall. We captured 441 round whitefish, 572 Arctic grayling, 833 Dolly Varden char, and 137 rainbow trout in the downstream trap. Downstream migration of whitefish, grayling, and char occurred primarily in the late summer and fall. The peak out migration of rainbow trout occurred in June and coincided with the first upstream surge of chum salmon into Gertrude Creek. Escapement of salmon into Gertrude Creek was as follows: chum (11,133), chinook (1,333), pink (1,290), and sockeye (15). Four hundred and forty-one coho salmon were also counted at the weir before it was topped by high flows on 19 September. The weir was subsequently pulled and therefore, counts of coho salmon were incomplete.

A six-person crew caught 196 rainbow trout during the June hook and line sampling event, 153 in July, and 171, in August. Of the six contiguous 1.6 km long strata sampled, the lower three accounted for about 70% of the total catch. The catch rate of rainbow trout was highest in June (4.6/day/angler) as compared to July (3.2/day/angler) and August (3.7/day/angler). The length frequency distribution of the catch from the first hook-and-line sampling event did not differ significantly ($P=0.4$) with that of the

'known population' marked at the weir; the second two hook and line events have yet to be compared with the weir catch. A lack of smaller-sized rainbow trout in the weir catch limited the range of the statistical comparison to fish greater than 390 mm. While rainbow trout smaller than 390 mm were infrequent in the weir catch, about forty unmarked individuals were captured in Gertrude Creek during the hook and line sampling. We suspect these smaller rainbow trout overwintered in the stream, contrary to a lack of rainbow trout in Gertrude Creek in the spring of 1992.

This study will be repeated in 1998. To increase the abundance of smaller-sized rainbow trout in the 'known population', and therefore increase the range in size of the statistical comparison, we will sample the 9.6 km study reach of Gertrude Creek with an experimental fyke trap. Fyke trapping will occur in the spring, immediately after the weir is installed. The fyke trap we will be using is constructed of ½ inch mesh bar, is portable, and is assumed to be an unbiased gear for capturing rainbow trout greater than 200 mm. It is important that we decrease the minimum size of rainbow trout in the 'known population' to less than 390 mm as was used in 1997, as we suspect that if hook and line samples are biased, the error would occur in smaller size classes.

2.) Abundance and movement of rainbow trout within the King Salmon River Drainage, Becharof National Wildlife Refuge, Alaska

Prior to 1990, information on rainbow trout within the King Salmon River drainage was limited to cursory data collected on Gertrude Creek by the Alaska Department of Fish and Game and the US Fish and Wildlife Service. To improve our understanding of this important fishery resource, the King Salmon Fishery Resource Office initiated a two-year study on rainbow trout in the King Salmon River drainage in 1990. As part of this investigation, rainbow trout > 300 mm were captured and tagged from clear-water tributaries located between Contact and Whale Mountain creeks to determine seasonal movements and estimate abundance. In addition, radio transmitters were implanted in selected fish to monitor seasonal movements. Subsequent recaptures of tagged individuals and relocation of radio implanted fish indicated that individuals moved frequently between and within tributaries, and traveled downstream below Whale Mountain Creek outside the study area boundary.

To better understand the abundance, distribution, and seasonal movements of rainbow trout in the King Salmon River drainage, we initiated a more geographically encompassing study in the summer of 1997 than was done in 1990. In 1997, rainbow trout were sampled by hook and line from Contact Creek downstream to Egegik on four discrete sampling events. The initial marking event occurred in late April, lasted for 8 days, and resulted in a catch of 160 rainbow trout. Thirty-four of these marked fish were later recaptured at the weir on Gertrude Creek. About 70% of the recaptures had been tagged at the mouth of Gertrude or Mink creeks, areas that only accounted for 33% of the 160 fish caught on the spring marking event. Three subsequent recapture events resulted in relatively low catches. More rainbow trout were captured out of Mossy Creek and at the mouth of Gertrude than the other streams sampled, averaging about 15 fish each for

each event. On the last recapture trip that occurred in August, about 20 rainbow trout were caught from Whale Mountain Creek, which had produced few rainbow trout during the previous two sampling events. Mink, Granite, Number Five, and Gabe's creeks produced only small catches of rainbow trout during any of the three events.

Whale Mountain and Mink creeks produced significant numbers of rainbow trout during the rainbow trout study conducted in 1990. It may be that low-water conditions in 1997 concentrated rainbow trout in Gertrude Creek as indicated by the weir counts coupled with the abundance of unmarked fish that were assumed to have over winter in the stream. Repeating the study in 1998 may provide insight on the between-year variability and should result in more precise abundance estimates.

3.) Investigation of coho salmon along the Pacific coast of the Alaska Peninsula.

Many streams of the rugged Pacific coast of the Alaska Peninsula National Wildlife Refuge support large runs of wild Pacific salmon. These salmon provide an important food base for the Alaskan brown bear, the bald eagle, and other wildlife species. They also provide for unique wilderness sport fishing excursions and commercial saltwater fishing operations. Coho salmon provide for much of this activity, yet little is known about these stocks. In 1996, the King Salmon Fishery Resource Office concluded a two year study to document the abundance of coho salmon in a representative stream near the Yantarni airstrip area.

Using area-under-the-curve methodology, 143 coho salmon in Clear Creek were marked with surveyor's flagging. The number of marked fish observed during foot surveys was used to estimate residence time of spawning fish. By comparing the number of marked and unmarked fish observed with the average residence time, 2,614 coho salmon were estimated to have spawned during the season. Similar methods were used in 1995 and resulted in an estimate of 3,131 fish. Observations indicated that movements of these fish were dependent upon higher water levels and most fish did not enter the spawning area until high water made passage over or around several beaver dams feasible. The applicability of the area-under-the-curve method for estimating escapement of coho salmon in small streams along the Pacific coast is discussed in detail in a final report to be released in the fall 1998.

12. Wildlife Propagation and Stocking

Nothing to Report

13. Surplus Animal Disposal

Nothing to Report

14. Scientific Collection

A total of 55 migratory birds died incidentally to netting and banding operations on the Refuge Complex from among the total of 5,905 banded and 1,410 recaptures. Of these, 8 birds were salvaged and will be used for study skins, skeletons, and educational purposes. The remaining dead birds were damaged beyond use by net predators and some were used as bait to capture and relocate net predators. Black-capped chickadee, Wilson's warbler, yellow warbler, and American tree sparrow accounted for 35 individual deaths. Many of the birds were killed by avian net predators (northern shrike, black-billed magpies) or by an usually high abundance of short-tailed weasels.

Ten small mammals also died during small mammal studies or while managing net predators on the refuges. Three of these were salvaged and will be used for study skins, skeletons, and educational purposes.

15. Animal Control

Nothing to Report

16. Marking and Banding

A program of capturing and banding songbirds was initiated on the Refuge during 1994 in an effort to yield long-term information on neotropical migratory birds breeding on or migrating through the Alaska Peninsula. From 1994-1997 22,876 birds of 57 species have been banded at all training, breeding, migration and incidental banding sites. A species-specific list of this year's banding totals is summarized in Section G-7.

Small mammal trapping (Sherman live traps) continued at Mother Goose Lake and Gas Rocks, Becharof Lake. The purpose was to collect baseline data on local small mammal populations. Captured mammals were marked by toe-clipping and released. Mother Goose Lake staff captured 74 unmarked animals and documented 83 recaptures and 9 escapes at Mother Goose Lake in three 72-hour trapping sessions. Six species were documented: northern red-backed vole, tundra vole, dusky shrews, meadow jumping mice, brown lemmings, and short-tail weasel. Northern red-backed voles were by far the most common species encountered in the habitats sampled (tundra and moist deciduous woodland). Gas Rocks staff were disappointed when they captured no mammals in June on their grid. In July, they captured 12 animals and had 2 recaptures. They captured masked shrew, dusky shrew and northern red-backed vole.

On April 19, Refuge Pilot Smoke and Planner/Subsistence Biologist Squibb assisted ADF&G Area Biologist Richard Sellers capture caribou of the Northern Alaska Peninsula Herd on State lands between King Salmon and Port Heiden. Also on the ADF&G crew were Research Biologist Pat Valkenberg and contract helicopter pilot Chris Soloy with his Hughes 500. Sellers' project captures and radio-collars yearling

female caribou annually in order to monitor their early years of reproductive success as an indicator of the herd's nutritional condition, herd reproduction, and movements.

17. Disease Prevention and Control

Nothing to Report

H. PUBLIC USE

1. General

The majority of public use currently occurring on Refuge lands includes subsistence and sport hunting of caribou, moose, and bear; fishing for Arctic grayling, burbot, dolly varden/Arctic char, rainbow trout, lake trout, northern pike, and five species of Pacific Salmon (king, sockeye, silver, pink and chum); trapping furbearing animals and gathering berries.

Refuge resources are utilized by residents of 12 villages within or near refuge boundaries, primarily for subsistence uses. Other Alaska residents and out-of-state visitors commonly utilize refuge resources pursuing sport hunting and fishing activities.

Public demand for high quality outdoor and wildlife associated activities continues to increase. Request for off-refuge education and outreach programs also continues to increase. The public use staff (Refuge Information Technicians) assist with subsistence, public use and environmental education programs on the Refuge. Major duties include serving as liaisons and facilitating the exchange of information between the Refuge and local villages; preparing and conducting environmental education and subsistence programs; staffing the King Salmon Inter-Agency Visitor Center; and assisting in other public use programs as needed.

Public use inquiries continued to increase again this year. There were written inquiries from 37 states and 15 foreign countries. Approximately 320 information requests were answered during the year.

2. Outdoor Classrooms - Students

Education programs were conducted in the Bristol Bay School District and the Lake & Peninsula School District and consisted of the following: "Teach about Geese" curriculum, and promoting conservation of geese through the Western Alaska Goose Calendar Art and Literature contest, Alaska Junior Federal Duck stamp contest, "We Care About Eagles" and "Life Cycle of Salmon" program.

The Refuge Information Technician (RIT) staff are critical to our education and outreach efforts. Much of their time and talent is devoted to developing/presenting environmental education programs in the nearby villages. We work with teachers and students in the Bristol Bay School District and the Lake & Peninsula School District. The following programs were presented this year:

January - Educational programs were conducted emphasizing current populations of Arctic nesting geese using the "Teach about Geese" curriculum, and promoting conservation of geese through the Western Alaska Goose Calendar Art and Literature

contest. Staff also introduced students to the new Alaska Junior Federal Duck Stamp contest. Programs given by the Refuge Information Technicians this month included:

Bristol Bay School District (includes Naknek and South Naknek):

- January 7: RIT Smiley Knutsen worked with 3rd graders (28 students) for one hour.
- January 8: Knutsen worked with 8th grade (21 students) for 1.5 hours and 6th grade (25 students) for 1.5 hours.
- January 10: Knutsen worked with 4th graders (16 students) for 1.5 hours.
- January 13: Knutsen worked with 2nd graders (24 students) for one hour.
- January 14: Knutsen worked with 3rd graders (28 students) for one hour.
- January 14: Knutsen worked with 5th grade (29 students) for one hour and with 2nd grade (24 students) for one hour.
- January 16: Knutsen worked with 7th graders (26 students) for 1.5 hours. Knutsen traveled to South Naknek and worked with K-4th graders (14 students) for three hours.
- January 22: Knutsen worked with the senior high class (9 students) for 1.5 hours and 9th graders (14 students) for 1.5 hours.
- January 23: Knutsen worked with 3rd graders (28 students) for one hour.
- January 28: Knutsen worked with 1st graders (26 students) for one hour.

Lake and Peninsula School District (includes Chignik Bay, Chignik Lagoon, Chignik Lake, Egegik, Ivanof Bay, Perryville, Pilot Point, Port Heiden):

- January 9: Refuge Ranger Orville Lind and RIT Shirley Kelly traveled to Pilot Point and worked with K-2nd grades (9 students), 3rd-6th grades (8 students) and 7th-9th grades (3 students) for 6.5 hours.
- January 10: Lind and Kelly traveled to Port Heiden and worked with 3rd-6th grades (8 students) and 6th-12th grades (16 students) for 5.5 hours.
- January 17: Lind and Kelly traveled to Egegik and worked with K-5th grades (10 students) and 6th-10th grades (8 students) for 4.5 hours.
- January 19: Lind traveled to Ivanof Bay and worked with 1st-11th grades (7 students) for 3.5 hours.
- January 20: Lind and Kelly traveled to Perryville and worked with K-6th grades (16 students) and 7th-12th grades (19 students) for 4.5 hours.
- January 22: Lind and Kelly traveled to Chignik Bay and worked with K-4th grades (9 students), 5th & 6th grades (6 students) and 7th-12th grades (14 students) for six hours.
- January 22: Lind and Kelly traveled to Chignik Lagoon and worked with K-3rd grades (10 students), 4th-8th grades (9 students) and 9th-12th grades (16 students) for 3.5 hours.

In addition to the goose conservation program, a new education program called "We Care About Eagles" (30 minute slide program) was presented to the students in six Lake and Peninsula schools. A total of 85 students participated in the three hours of instruction.

On January 29, Refuge Rangers Angie Terrell-Wagner & Lind, and RIT's Kelly & Knutsen participated in a two hour conference call about the goose calendar contest. Discussions included: recruiting judges, developing a new page for Elders, and expressing appreciation to all teachers and Service staff involved in making the "Teach About Geese" program a huge success. The Goose Calendar contest is celebrating its 10th year anniversary this year.

On February 7, Kelly traveled to Egegik and presented a program highlighting the "Life Cycle of Salmon". She worked with grades K-5th (12 students) for three hours. Shirley used activities in the curriculum "Salmonids in the Classroom" for the class.

On February 12, Knutsen gave a home-school presentation about the 1998 Goose Calendar Contest to a local family. The three students participate in the contest each year and one of the children was a winner in 1994 and 1995. Smiley worked with the family for two hours.

On February 17, Lind traveled to the village of Chignik Lake and worked with K-12th grades (40 students) for four hours. He gave programs about the Goose Calendar Contest and the "We Care About Eagles" slide show.

On February 20, Kelly prepared and mailed National Wildlife Week materials to all schools in the Bristol Bay and Lake & Peninsula School Districts. A total of nineteen schools received the educational packets.

On March 5 to March 7, Knutsen traveled to the villages of Kokhanok and Levelock to give presentations about the Goose Calendar Contest to grades 1st-12th (65 students) in Kokhanok and elementary grades (13 students) in Levelock.

On March 19, Terrell-Wagner and Knutsen helped judge the annual science fair at the Bristol Bay School. Students in 1st-12th grades participated.

On April 14, we were notified of the 1998 Goose Calendar winners. We are very pleased that several of our local students (Bristol Bay and Lake & Peninsula School Districts) are winners in this important conservation effort. The contest continues to be very popular in our area, with 382 local students entering the poster contest and 29 entering the literature contest. Local students who did not win in the Western Alaska contest were judged by the Refuge and KSFRO staffs in a local refuge contest. We wanted to recognize and give credit to the many students who participate in this conservation project.

All prizes and gifts for student winners in the 1998 goose calendar contest arrived and were distributed mid-month. The Lake and Peninsula student prizes were sent to their schools for the teachers to present. The Bristol Bay School winners were given their prizes by Terrell-Wagner and Knutsen in a School Awards Ceremony on the 28th.

Beginning May 8, an exhibit showing the student's award winning art and literature work was put on display at the King Salmon Visitor Center. Entries not selected were returned to the schools for the community to enjoy.

On May 12, students from Egegik School came to tour the Visitor Center and learn about the Fish and Wildlife Service. Kelly and Refuge Ranger Cindy Girtten spent one hour with thirteen Jr. High school students.

On October 29, Terrell-Wagner and Kelly, Knutsen and RIT Charles O'Domin participated in a conference call to discuss the 1999 goose calendar contest. Topics included selecting a new theme, reviewing contest rules, and calendar distribution.

On November 6, Lind traveled to Port Heiden to give a presentation about the FWS and marine mammals in the Meshik school. He worked with K-3rd, 4th-8th and 9th-12th grades (36 students) for three hours of instruction.

On November 7 and November 10, Lind and O'Domin traveled to Chignik Lake and gave a presentation about the Alaska Peninsula Refuge and O'Domin's new position with the Service. The two worked with K-8th grades and 9th-12th grades (39 students) for three hours.

On November 25, Terrell-Wagner attended a meeting in Anchorage to discuss the future of the Western Alaska Goose Calendar contest. Discussions included project purpose, funding, distribution, themes and success stories. Attending the meeting were Service personnel and representatives of Ducks Unlimited and the Audubon Society.

During December staff effort concentrated on preparing for the upcoming 1999 goose calendar contest. Letters were written to the teachers and calendars prepared for distribution to the Bristol Bay and Lake & Peninsula school districts.

On December 4, Knutsen traveled to South Naknek to present an educational program highlighting Arctic geese conservation and the 1999 goose calendar contest. Smiley worked with K-6th grades (16 students) for one hour.

On December 10, the 1998 goose calendars were sent to several schools in the Lake & Peninsula school district. Calendars were also distributed to school board members, home schoolers, village councils, Elders and other community leaders.

"Spirit of Becharof" Ecosystem Science Camp

The ecosystem science camp was held from September to December at the Becharof Lake Youth Camp facility on the north shore of Becharof Lake. The facilities are located south of King Salmon on the Becharof National Wildlife Refuge, 35 minutes by small aircraft. The camp is situated in an ideal location for students to experience the second largest lake in Alaska, an active salmon spawning stream, and tundra environments. A total of nine high school students (predominantly Alaska Native) and ten adults participated. The camp was funded through the challenge cost-share funds in cooperation with the Bristol Bay School District, the USGS/BRD, Alaska Audubon Society, Native American Fish and Wildlife Society, Alaska Natural History Association, and Harlan & Tyler Willis.

The camp introduces students to the importance and diversity of the Becharof Lake Ecosystem. Learning modules include aquatic biology, bears, birds, caribou, tundra plants, telemetry, and orienteering with map, compass and global positioning equipment. Additional sessions highlight Native People/cultural awareness including customary and traditional land/resource uses.

3. Outdoor Classrooms - Teachers

The Lending Library program in the King Salmon Visitor Center consists of excellent natural resource educational books, video tapes and audiovisual materials that are available for use by teachers in the Bristol Bay School District and the Lake & Peninsula School District. The educational video tapes are also used extensively in the Visitor Center during the summer months. This year a total of 1,719 people viewed the educational films available in the program.

4. Interpretive Foot Trails

Nothing to Report

5. Interpretive Tour Trails

Nothing to Report

6. Interpretive Exhibits/Demonstrations

The Station's public use staff is responsible for daily management and operation of the King Salmon Inter-Agency Visitor Center. The Visitor Center is a cooperative effort of the U.S. Fish and Wildlife Service, National Park Service, Bristol Bay Borough, and Lake & Peninsula Borough and is managed under a cooperative agreement.

The Visitor Center serves a wide variety of people including local and state residents, U.S. citizens and many international visitors. In 1997, visitors signing the guest register represented 43 states and 14 foreign countries.

A new sport fish exhibit showing common salmon species in the Bristol Bay region was completed. The exhibit's background is a large color mural (26 feet X 4 feet) illustrating underwater habitat along the Naknek River. Ten life-size salmon models in ocean and spawning colors are featured.

A bird exhibit was completed highlighting common bird on the Alaska Peninsula. This exhibit includes a large wall mural with 20 bird species and a life-size bald eagle family.

In partnership with the National Park Service, a visitor donation program was initiated at the Visitor Center. The donation box design is very unique and includes a life-size king salmon head. To put money in the donation box, visitors must place a hand into the mouth of the salmon. All donations will be used for exhibit and outreach program development at the Visitor Center.

7. Other Interpretive and Outreach Programs

On February 5, Refuge Information Technician Smiley Knutsen attended the quarterly meeting of the Bristol Bay Visitor Council. The council is a new group of borough, state, federal, profit and nonprofit Native groups, local business owners and others interested in promoting tourism in the Bristol Bay region. This group provides a good networking opportunity with potential partners in our outreach efforts.

On April 8, Refuge Information Technician Shirley Kelly attended the Native American Fish and Wildlife Society (Alaska Region) conference in Anchorage. Shirley gave a presentation about fisheries educational materials and curricula available for educators. A total of eighteen people attended her session.

On April 10, Airplane Pilot Smoke was the guest speaker at the third grade class at Naknek School about aviation. The students were very interested in the different types of missions flown by the Service.

On April 28 and 29, Refuge Manager Hood participated in the Bristol Bay Borough School "Career Days" by hosting two students in a job shadowing experience.

On April 30, Refuge Ranger Terrell-Wagner participated in the spring meeting of the Bristol Bay Visitor's Council by teleconference and attended a planning meeting with representatives of the Bristol Bay Borough and Naknek Village Council to discuss the feasibility of developing a joint Cultural Museum/Civic Center in Naknek. Refuge staff spoke about current services offered at the Visitor Center and plans for the future.

International Migratory Bird Day, celebrated in May, included a banding demonstration and waterfowl watching on the Naknek River. Approximately 20 people attended these events. To celebrate the birthday of the Visitor Center and also the thirty-fifth Anniversary of the Bristol Bay Borough (one of our partners), we sponsored an all day "Open House". Activities included: a ceremony to dedicate several new exhibits

(Pacific salmon, sport fishing and Native People of the Peninsula) refreshments, door prizes and a sale on all ANHA items. More than 180 people visited throughout the day.

National Fishing Week was celebrated in August with five adults and seven youth on the Naknek River to fish for silver salmon. RM Hood, DRM Hill, RR Lind, MW Terry, MH Heffernan and OA Montano assisted in the event. Refuge Ranger Cindy Girten coordinated the trip and prepared a picnic lunch for everyone.

On July 11, Smoke gave a presentation to pilots and guides at the Alaska Rainbow Lodge. Permit procedures and reporting requirements were discussed and a question/answer period followed.

Educational programs were conducted in the villages of Egegik and Pilot Point in celebration of "National Wildlife Refuge Week" in September.

On October 28, Terrell-Wagner participated in the fall meeting of the Bristol Bay Tourism Council by teleconference. Council members discussed goals for the winter including developing a Visitor's Guide for the Bristol Bay region.



National Fishing week participants on the Naknek River.

8. Hunting

Hunting is a major public use on the Complex. Commercial guiding includes hunts for world-class trophy brown bear, caribou and moose. Some hunters take advantage of overlapping seasons to pursue all three species. Brown bear seasons occur on an 18-month rotation (spring hunt during even years and fall hunt in odd years).

King Salmon is the hub for commercial air service to access the Complex and is the base of operation for numerous guide/lodge businesses operating on the Alaska Peninsula. Those hunters wishing to hire the services of a guide will generally find that fees can be costly and highly variable depending on the length of the hunt, amenities provided, area, and species of animal hunted. Commercial guide fees for caribou or moose hunts range from \$2,500 to \$7,500 and a brown bear hunt costs \$10,000 to \$15,000.

The harvest of caribou from the northern peninsula herd as reported by state harvest tickets has been around 500 animals in recent years (Table 3). Many subsistence hunters from GMU 9(C) & 9(E) villages do not appear to report their harvest through the state system. Estimates of caribou harvest by local villages derived from household surveys indicated that 531 caribou were taken by villages of 9(C), 415 caribou were taken by villages in Bristol Bay drainage's of 9(E), and 101 caribou were taken by villages in Pacific drainage's of 9(E) in 1996/97, the most recent winter of surveys (T. M. Krieg, J. A. Fall, C. J. Utermohle, and L. Brown. 1998. Subsistence harvests and uses of caribou, moose, and brown bear in 12 Alaska Peninsula communities, 1995/96 and 1996/97. Tech. Paper no. 244, ADF&G, Juneau. 136 pp.).

Table 3. Caribou harvest from the Northern Alaska Peninsula herd (ADF&G data).

Season	Bulls	Cows	Unknown	Total
1996-97	491	48	4	543
1997-98	419	32	0	451

The harvest of moose in GMU 9(C) & 9(E) as reported by state harvest tickets was 146 bulls and 3 cows in 1997 (preliminary data summary, ADF&G). Many subsistence hunters from GMU 9(C) & 9(E) villages probably do not report their harvest through the state system. Estimates of moose harvest by local villages derived from household surveys indicated that 41 moose were taken by villages of 9(C), and 21 moose were taken by villages of 9(E) in 1996, the most recent year of surveys (Krieg et al., *ibid.*).

The harvest of brown bear in GMU 9(C) & 9(E) as derived from sealing data has ranged from about 250 to almost 400 animals (Table 4). Males have consistently comprised 60 to 70% of the harvest.

Table 4. Brown bear harvest for the Alaska Peninsula, 1975-1998, GMU 9(C) and 9(E) (ADF&G sealing data, including defense-of-life-or-property mortality, etc.)

Date	Total	Percent	Mean Age		Percent Harvest	
	Bears	Boar	Boar	Sow	Boar	Sow
1988-89	347	66	-	-	66	34
1989-90	328	67	-	-	-	-
1991-92	350	66	-	-	-	-
1993-94	310	66	-	-	-	-
1995-96	306	70	-	-	-	-
1997-98	355	72	-	-	-	-

9. Fishing

The rivers and lakes within the Alaska Peninsula/Becharof Refuge Complex provide world-class fishing opportunities. Game fish include five species of Pacific salmon (chinook, sockeye, coho, pink and chum), Arctic grayling, dolly varden/Arctic char, rainbow trout and burbot. In large lakes, northern pike and lake trout are common. Flowing-water areas most often utilized for sport fishing include King Salmon rivers (Becharof Refuge and Chignik Unit, Alaska Peninsula Refuge); Big, Featherly, Gertrude and Painter creeks; and Upper and Lower Ugashik lakes, including the Ugashik Narrows.

A total of 29 guides/lodges offering fishing packages operated on the Refuge under special permit in 1997. Most operators promote "catch and release" angling for resident fish species. A variety of package programs that include lodging and air transportation to the fishing areas are available. These package deals range in price from \$1500 to \$5000, depending on the length of stay and quality of amenities offered by the lodge.

10. Trapping

Historically, the trapping of fur bearing mammals was a full-time winter endeavor on the Alaska Peninsula. Today, trapping popularity is highly variable due to the price fluctuation of raw hides. Fox, mink, ermine and beaver are commonly trapped; and to a lesser extent, coyote, wolf, wolverine, lynx and land otter are caught. Alaska Department of Fish and Game requires sealing tags on wolverine, wolf, lynx, land otter and beaver (Table 5).

Table 5. Fur bearer harvest in GMU 9(C) and 9(E) (ADF&G data).

<u>Year</u> (winter)	<u>Number Harvested</u>				
	Beaver	Otter	Lynx	Wolverine	Wolf
1993-94	116	26	35	27	52
1994-95	89	49	36	30	11
1997-98	64	64	17	30	47

11. Wildlife Observation

Nothing to Report

12. Other Wildlife Oriented Recreation

Nothing to Report

13. Camping

Nothing to Report

14. Picnicking

Nothing to Report

15. Off-Road Vehicles

Nothing to report

16. Other Non-Wildlife Oriented Recreation

Nothing to Report

17. Law Enforcement

Commissioned staff on the Refuge consists of two collateral duty officers. Law enforcement activities on the Refuge in 1997 consisted of patrols on the Refuge throughout the season and more intensively during the big game hunting seasons. Coordination and cooperation among all local law enforcement agencies are critically important. Refuge staff attended local law enforcement coordination meetings at the National Park Service headquarters in King Salmon.

On February 7, 1997, Randy D. Farrell plead No Contest to a charge of removing antlers before meat and had his wanton waste charge dismissed in State Court. Mr. Farrell paid a \$750.00 fine with \$750.00 suspended and forfeited his antlers and 214 pounds of meat. These charges were brought as a result of an incident that occurred during the September, 1996, moose season near the Dog Salmon River. That incident was investigated by both Refuge staff and Alaska Fish and Wildlife Protection officers.

On April 3, Refuge Officer Smoke received a report of dead eagles near Naknek Lake. This report had been received and investigated at least twice in the past. Smoke went back to the area and gathered portions of two carcasses that had been dead for at least a year.

On April 15, Smoke and Refuge Manager Hood inspected the Kanatak Village site to assure that George F. Gottschalk Jr. had complied with the "special Conditions of Supervision" stipulated in the United States District Court, District Court Judgement, Case No. 3:96CR00011-001. They were transported to the site by Bell 206 helicopter, N5006R, piloted by Jim Sink, Calalaska Helicopters. A report was filed with Gottschalk's probation officer.

On April 15, a report was received that a dead eagle had been located near Naknek. Smoke and Maintenance Worker Terry drove to the area of the Watchable Wildlife viewing platform and located a dead immature bald eagle. The bird was collected and examined, it appeared to have been dead for several weeks.

On April 18, a report was received that a juvenile had killed an owl near Naknek. The juvenile's father was contacted and interviewed by Smoke. The owl had apparently been previously injured and the youth and a friend had clubbed it to death to "put it out of it's misery." Smoke explained that owls were protected by the Migratory Bird Treaty Act and that injured birds can many times be saved.

In August, a notice of violation was issued to Rainbow King Lodge, Alaska Trophy Adventures and Peninsula Airways for violations of 50 CFR 27.97, Conducting a Commercial Enterprise on National Wildlife Refuge without a permit.

A notice of violation was issued to King Salmon Lodge for unauthorized setting of fires on a National Wildlife Refuge. This fire consumed approximately six acres at the Ugashik Narrows on June 27.

On September 6, a notice of violation was issued to Branch River Air for violation of the temporary restriction on air taxi delivery of hunting clients in the Island Arm area. This area is closed to the delivery of hunting clients except qualified subsistence users between September 1 and September 20.

Smoke worked with Alaska State Fish and Wildlife Protection officers on several cases during moose season. Most cases involved nonresident hunters failing to salvage the edible meat from moose and caribou.

There was a fall hunting season for brown bear hunting this year. Smoke worked with Alaska FWP officers, spending two nights at their Pumice Creek camp. Patrols were flown in both the Cessna 206 and PA-18.

On December 13, and December 27, Smoke and Deputy Refuge Manager Hill patrolled Big Creek for moose hunters on snow-machine. On December 27, three hunters were contacted near the high bluff on Big Creek. The hunters had shot three moose and since they had 46 miles to travel and only two hours of light remaining, further field interviews were not conducted. Smoke learned that one of the hunters had moved to Anchorage and may not have been eligible to hunt in the December moose hunt. The hunter was contacted and an interview was scheduled at refuge headquarters. The hunter admitted that he had moved to Anchorage in 1995 and had not read the hunting regulations. He knew that there were restrictions in the refuge during December but thought that he could shoot a bull moose. He forfeited the 65" antlers and the meat which was donated to St. Therasas Catholic church for distribution to needy people in the community. The individual was charged under 16USC 3372(a)(1), Lacey Act, transport wildlife taken or possessed in violation of any law treaty or regulation of the United States.

18. Cooperating Associations

A branch of the Alaska Natural History Association (ANHA) was established at the King Salmon Visitor Center in May, 1992. In 1997, sales totaled \$49,589.00, 101 association memberships were purchased.

The bookstore offers more than 100 book titles, an extensive map selection including topographic maps, FAA air charts, nautical charts, and numerous posters and note cards. To encourage local residents to use the Visitor Center and to promote ANHA sales, we offered two "book sale" events this year. Items were discounted 15% for non-ANHA members and 25% for members. The first book sale was held during the annual Anniversary Celebration of the Visitor Center in May. Sales during the event totaled \$1,500.00, our highest sales day ever.

19. Concessions

Nothing to Report

20. Cabins

A permit was issued to Rod and Gun Resources for a sport fish camp cache located at T36S, R47W, Section 25, Chiginagak Bay.

21. Guides-Outfitters

A total of 45 special use permits were issued for commercial big game, sport fish guiding, and transporting activities occurring within the Refuge (Table 6). Commercial big game guiding permits issued in 1993 are five-year permits, currently 27 valid permits are held by 19 different big game guides.

Table 6. Big Game/Fish Guides/Outfitters and Transporters Special use permits.

Year	Big-Game	Fishing	Tours	Transporter	Total
1997	27	29	1	15	72
1996	29	25	1	12	67
1995	29	23	1	10	62
1994	28	21	0.00	12	61

Forty-nine commercial guide permittees recorded 2912 client use days within the Complex last year. Fishing clients represented approximately 60 percent of the total client use days.

Twenty big game guide permittees were responsible for harvesting 54 brown bears, 38 moose and 48 caribou last year. Sows represented approximately 30 percent of the bear harvest, while no cow moose and no cow caribou were harvested.

Twenty-nine sport fish guides were responsible for 15,091 fish being caught, of these, 891 or 6 percent were kept. Approximately 52 percent salmon, 38 percent arctic char, 8 percent arctic grayling and 1 percent rainbow trout made up the total reported catch.

22. Subsistence

Subsistence Caribou Hunting Regulations

Federal Subsistence Regulations for caribou in Game Management Unit (GMU) 9(E) generally correspond with state regulations in 1997. One exception was the continuation for a third year of the closure of federal public lands in the Chignik Unit from Seal Cape to Ramsey Bay on the Pacific side and from Blueberry Creek to the Sandy River drainage on the Bristol Bay side to all hunting of caribou.

Subsistence Moose Hunting Regulations

An early season moose hunt was again offered for subsistence users in GMU 9(C) on federal public lands draining into the Naknek River from the south (Big Creek). During the period August 20 through 31, one antlered bull could be taken by Federal registration permit only. Thereafter, the federal subsistence season corresponded to the state season

ending September 15. Also in the Big Creek area during all of December, hunting of antlered bull moose was open only to eligible rural Alaska residents, and antlerless moose could be taken by federal registration permit only. The antlerless season was to be closed when 5 antlerless moose had been taken; records indicated that only 2 were taken.

An early season moose hunt was offered for subsistence users in GMU 9(E) during September 1 - 20 with a limit of one antlered bull. The State sport season ran September 10 - 20 with a limit of one bull with 50-inch antlers or antlers with 3 or more brow tines on at least one side.

The closure of the Island Arm area to transporter (air taxi) permittees during subsistence moose season was continued in 1997. Refuge Complex special use permits allowed no Air Taxi drop offs in Island Arm north of Burls Creek and Bear Creek during September 1 - 20. Drop offs for five sport hunting camps (maximum of 4 hunters each) are allowed south of Burls Creek and Bear Creek to the end of the Arm. Air taxi transportation to Island Arm was allowed for qualified local subsistence users. The area was patrolled by air during September.

Proposed Changes to Federal Subsistence Regulations.

The Refuge proposed to simplify regulations for local hunters of bull moose in GMU 9 by changing the wording of federal subsistence regulations from "1 antlered bull" to "1 bull" so that they would be consistent with state regulations.

In November, the Aniakchak National Monument Subsistence Resource Commission requested a special action by the Federal Subsistence Board to consider their proposal to close all federal public lands in GMU 9(E) to the taking of caribou and moose except by qualified rural residents. Their request was deferred to the agenda of the March 1998 meeting of the Bristol Bay Federal Subsistence Regional Advisory Council.

I. EQUIPMENT AND FACILITIES

1. New Construction

Nothing to Report

2. Rehabilitation

Nothing to report

3. Major Maintenance

Nothing to report

4. Equipment Utilization and Replacement

Twelve new outboards ranging in size from 15 to 60 horsepower were purchased to replace existing worn out units.

Rehabilitation work on the hot water heating system for building #3 (bunkhouse) and building #4 (office) at the administrative site was completed in July. This maintenance management system project included removal and replacement of nine zone valves, one single flow fitting and eight air vents at the bunkhouse. At building #4 the existing boiler room heating system piping, valves, control wiring and associated equipment was removed. Four new return heating runs were installed, boiler room was plumbed with new pipe, valves, and all new controls.

5. Communications Systems

Regional Telecommunication Manager Tim Miller installed an updated Panasonic Electronic Key Telephone System throughout the Refuge Complex in February. The system has a larger user capacity and offers additional features such as call forwarding.

The Complex continues to be plagued with radio communication problems. Miller and National Park Service Radio Maintenance Supervisor conducted radio maintenance for the Complex. The local VHF radio system is obsolete and needs to be redesigned.

6. Computer Systems

Regional office IRM staff Ben Sherburne and Addie Sheridan installed a peer to peer Windows 95 network to support individual cc:Mail addresses for all Refuge and Fisheries personnel at the Complex. The system is based on the fault tolerant network topology 10 Base-t, and connects each user to the station mail server. The server is a Micron Pentium II 266MHZ computer. An Austin P5/75MHZ computer was utilized as the mail router. The server and mail router are mounted in a Chatworth 19" aluminum equipment rack. Nine new Micron P5/166MHZ and three Gateway 2000 Pentium desktop workstations were installed for end users and all station personnel that did not receive a new computer, were upgraded to Windows 95.

7. Energy Conservation

Nothing to Report

J. OTHER ITEMS

1. Cooperative Programs

Nothing to Report

2. Other Economic Uses

Nothing to Report

3. Items of Interest

Nothing to Report

4. Credits

Without the efforts of the following people, this annual narrative would not be possible. Thanks and appreciation go to everyone.

Hood	Introduction, Sections C, F.12.
Lons	Editing
Amos	Sections I.5, 6, and Editing.
Savage	Sections E.4, F.1., G.3., 5., 6., 7., 14., 16.
Hill	Table of Contents, Section B, D.5., editing, compiling, and production.
KSFRO	Section G.11.
Lind	Sections C, A.1., 2., 3., E.6.; H.22.; and J.3.
Montano	Copying
Smoke	Sections H. 8., 9., 10., 20., 21.
Terrell-Wagner	Sections H.1., 2., 3., 6., 7.
Squibb	Sections D. 1., 2., 3., F. 6., G. 8., 18., H. 22.
Terry	Section I. 4.

Photograph credits: Staff photos

K. Feedback

Nothing to Report