

KENAI NATIONAL WILDLIFE REFUGE

Soldotna, Alaska

ANNUAL NARRATIVE REPORT

Calendar Year 1993



U.S. Department of the Interior

Fish and Wildlife Service

NATIONAL WILDLIFE SYSTEM

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REVIEW AND APPROVALS

KENAI NATIONAL WILDLIFE REFUGE

Soldotna, Alaska



ANNUAL NARRATIVE REPORT

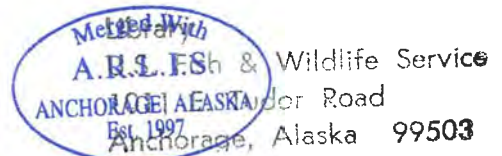
Calendar Year 1993

John L. West 3/25/96
Refuge Manager Date

C. J. [Signature] 3/27/96
Refuge Supervisor Review Date

A. P. [Signature]
Regional Office Approval

2/28/96
Date



INTRODUCTION

The Kenai National Wildlife Refuge is located on the Kenai Peninsula in southcentral Alaska. The northern portion of the Refuge is 20 air miles from the state's largest population center, the city of Anchorage. Although a scenic 112-mile drive through the Kenai Mountains is necessary to reach the nearest portion of the Refuge by road from Anchorage, commercial commuter aircraft fly into the nearby cities of Kenai and Soldotna daily.

Extending 115 miles from Turnagain Arm on the north to nearly the Gulf of Alaska on the south, this Refuge encompasses about one-third of the Kenai Peninsula. The western portions of the Kenai Mountains generally form the eastern Refuge boundary, a common boundary shared with Chugach National Forest and Kenai Fjords National Park.

Since the establishment of the Refuge as the Kenai National Moose Range on December 16, 1941, under E.O. 8979, these lands have undergone at least two boundary changes and a name change. The original Refuge included 2,058,000 acres and, among other mandates, authorized settlement, location, and other disposition under public land laws applicable to Alaska. At that time, the Refuge was bounded on the northwest, from Point Possession to the Kasilof River, by the waters of Cook Inlet. A six-mile-wide strip of land from Boulder Point to the Kasilof River and a six-mile strip of land, including portions of the Kenai River, were left open for development. Homesteads, grazing areas, road systems, and other developments occurred in these areas, and they were excluded from the Refuge during a 1964 boundary adjustment. Excluded at the same time were Cook Inlet coastal lands one to three miles inland and considerable portions of the Harding Ice Field, reducing the Refuge area to 1.73 million acres.

Passage of the Alaska National Interest Lands Conservation Act (ANILCA), commonly known as "The Alaska Lands Act", on December 2, 1980, redesignated the Kenai National Moose Range as the Kenai National Wildlife Refuge. The Act also increased the Refuge acreage, adding approximately 150,000 acres at the southern tip of the Refuge and about 90,000 acres of former Chugach National Forest lands to the extreme northeast portion of the Refuge near the Chickaloon Flats. At the same time, passage of ANILCA withdrew 16,535 acres from the Refuge to satisfy the claims of the Salamatof Native Association under the Alaska Native Claims Settlement Act of 1971. The now 1.97 million acre Refuge was redesignated with the following purposes: 1) conserve fish and wildlife populations and habitats in their natural diversity, 2) fulfill international treaty obligations with respect to fish and wildlife, 3) ensure water quality and quantity, 4) provide opportunities for scientific research, interpretation, and environmental education, and 5) provide opportunities for fish and wildlife-oriented recreation. In addition to establishing a new name, new boundaries, and new purposes, ANILCA formally designated 1.35 million acres of the Refuge as wilderness.

The Refuge is divided into two main physiographic regions: a mountainous region and a forested lowland. Elevations on the Refuge range from sea level to over 6600 feet in the Kenai Mountains, with treeline at about 1800 feet. Among the peaks of the Kenai Mountains lies the Harding Ice Field,

which thrusts numerous glacial fingers into the Refuge. The glaciers, mountains, lakes, alpine tundra, and foothills are extremely scenic.

Thirty-nine percent of the Refuge is forested. Swampy forests of black spruce alternate with peatbogs and grassy mires, while white spruce forests dominate the drier areas and the foothills and mountains. White spruce stands are often intermixed with or include deciduous trees, such as white birch and aspen, especially in old burns and cut-over areas. Lowland shrub (alder and willow) covers 9 percent of the Refuge. Mountain tundra covers about 11 percent. Of this class, about 87 percent is dwarf shrub and lichen tundra, and 13 percent is tall shrub (alder and willow) thickets usually associated with tundra. Water and associated wetlands cover 13 percent, and snow, ice, and glaciers cover the remainder of the Refuge.

The Kenai River, the largest river system on the Peninsula, drains about 2148 square miles (5563 km²). About 54 percent of the watershed is on the Refuge, 37 percent in the Chugach National Forest, and the remainder on private lands. Ten major tributaries feed the Kenai River System: Beaver Creek, Slikok Creek, Soldotna Creek, Funny River, Moose River, Killey River, Skilak River, Russian River, Cooper Creek, and Juneau Creek. Other Refuge river and stream systems flowing westward into Cook Inlet include the Kasilof River (which drains Tustumena Lake), Deep Creek, and the Swanson, Fox, Ninilchik, and Chickaloon Rivers.

There are thousands of lakes on the Kenai Peninsula, and most of them are on the Refuge. The largest are two glacial lakes, Tustumena Lake (74,000 acres or 31,000 ha) and Skilak Lake (25,000 acres or 10,000 ha). More than 4500 smaller lakes dot the Refuge, mostly in the Moose, Swanson, and Chickaloon River drainages.

At least 199 species of amphibians, birds, and mammals use the wildlife habitats on the Refuge. None of these species are known to be threatened or endangered. Five species of salmon, a wide variety of furbearers, and significant populations of brown and black bear, sheep, goats, wolves, bald eagles, trumpeter swans, caribou, moose, and loons occur on the Refuge.

INTRODUCTION

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K. FEEDBACK

NTR

A. HIGHLIGHTS

- Work began on the Refuge's Public Use Management Plan (PUMP). (D2)
- Design and permitting processes were initiated for Jim's Landing rehab and Lower Skilak Campground development. (D2)
- UNOCAL succeeds ARCO as the unit operator for the Swanson River oil field. (I8)
- Moose hunting season is extended by 10 days, illegal harvest hits new high. (H8)
- Work continued on the Land Protection Plan. (C1)
- The EA for the FWS/KNA/CIRI land exchange was completed. (C1)



View from the northwest, overlooking the benchlands.

B. CLIMATIC CONDITIONS

Table 1. Monthly temperatures (averages) and precipitation data, 1993*

	Temperature (Fahrenheit)				Precipitation		Snowfall**	
	Averages			1993	Inches		Inches	
	Normal	High	Low		Normal	1993	Normal	1993
January	12.5°	38°	-24°	13.2°	1.05	1.04	10.7	14.3
February	16.5°	41°	-34°	21.4°	.96	.96	9.8	5.6
March	23.0°	45°	5°	28.2°	.96	.43	9.3	6.8
April	33.3°	57°	26°	39.9°	.82	.18	4.7	--
May	43.7 °	77°	30°	48.0°	1.10	.65	0.4	--
June	50.2°	66°	35°	51.7°	1.20	.22	--	--
July	54.5°	82°	38°	57.1°	1.61	.84	--	--
August	53.7°	76°	34°	55.1°	2.49	3.70	--	--
September	47.1°	63°	24°	46.9°	3.16	5.88	--	--
October	34.7°	57°	16°	38.4°	2.72	2.25	3.4	1.3
November	21.0°	45°	-17°	25.5°	1.50	2.67	8.6	11.6
December	14.4°	41°	0°	24.5°	1.40	.76	12.4	7.1
Yearly								
Average	33.7°	57°	11°	37.5°				
Totals					18.97	19.58	59.3	46.7

*Information obtained from monthly National Oceanic and Atmospheric Administration (NOAA) Climatological Data reports. For temperature and precipitation, the reference period for normal values is 1961-1990.

**Information obtained from monthly NOAA Climatological Data reports, the State Climatologist, and the Federal Aviation Administration.

Temperatures in 1993 were several degrees above normal for all months except September, which was only -0.2° below normal. An especially warm December was 10.1° above normal. The warm and dry spring and summer increased spruce bark beetle activity, and many beetles completed their normal two year life cycle in one year, as has been the case for the last several years. Overall snowfall was about 80 percent of normal, and precipitation was about 3 percent above normal, with a somewhat rainy fall making up for a rather dry spring and summer.

C. LAND ACQUISITION1. Fee Title

Work continued on the Kenai National Wildlife Refuge land protection plan during 1993. The land protection plan will identify and prioritize

inholding lands for acquisition, conservation easements, and other measures.

Kenai Native Association, Incorporated (KNA)

As required by Public Law 102-458, negotiations on the Kenai Native Association/Cook Inlet Region, Inc. (CIRI)/Kenai Wildlife Refuge proposed land exchange continued during 1993. Initial and review appraisals for various parcels were completed during 1993. Separate appraisals by Service and KNA appraisers produced significantly different estimated land values. KNA and CIRI tracts being negotiated and appraised in the exchange include Stephanka (north and south), Skilak Outlet, Moose River, Tustumena Lake, Swanson River Road (East and West), Tustumena Lake (Central), Tustumena Lake, South Sterling Highway, Bear Creek, and the old Kenai National Wildlife Refuge Headquarters. KNA expressed reservations about the old Headquarters Site, including potential contaminants and the right-of-way easement. To be successful, the final exchange will probably include a combination of land tracts, removal of Alaska Native Claims Settlement Act (ANCSA) section 22(g) status," and cash or surplus federal property". Progress was also made toward including Stephanka in the National Registry of Historic Places, which was a condition for exchange.

On June 3, 1993, a Refuge Compatibility Determination and associated Environmental Assessment for the proposed KNA/CIRI land exchange was finalized and signed.

The Refuge also provided comments on CIRI's request for on-site surface discharge of produced water from the West Fork 1-21 well in the Sunken Island area on 22(g) lands owned by KNA. The Service has opposed and will continue to oppose the discharge of water other than through injection into approved downhole formations.

Salamatof Native Association (SNA)

Large numbers of visitors continued to discover and use the public use easements associated with Salamatof's Moose Range Meadows subdivision. Shoreline habitat damage continued to accelerate as both public anglers and private property guests trampled accessible shoreline areas. The status of the ownership of the variable non-development easements remained in limbo as Realty turned its attention to Kodiak land purchases and other priorities. No new non-development easement encroachments were documented during 1993, but several non-development violations, including structures, land fill, and vegetation removal, remained within the easement.

The inholding status of the Moose Range Meadows and other Salamatof inholdings was reviewed during 1993. Interior Department Solicitor Dennis Hopewell determined that due to the United State's subsurface holdings underlying Salamatof lands, the surface estate remains within the Refuge as an inholding and the Refuge boundary has not changed.

The Alaska Department of Fish and Game (ADF&G) stocked Elephant Lake (Spirit Lake) with land-locked Coho salmon. A travel easement along the new access road was granted by SNA for the purposes of angler access. State policy requires public access for lakes stocked with State funding. The new access has resulted in significant new use of Salamatof land and adjacent Refuge lands.

Point Possession Native Group, Incorporated (PNG)

Corporation representatives continued to offer PNG lands for purchase as a complete block; the Refuge is unaware of any serious offers. In a related matter, Division of Realty surfaced the interpretation that the right of first refusal granted on lands conveyed to native villages does not extend to those of native groups; ANCSA section 22(g) provisions do, however, apply.

Cook Inlet Region, Incorporated (CIRI)

See KNA section for proposed KNA/CIRI land exchange discussion.

Native Allotments

A government contest hearing was held on April 15 and 16 at the Kenai City Council chambers regarding the Alec Dolchok (deceased) native allotment claim at Harvey Lake. The hearing resulted from a ruling by the Interior Board of Land Appeals (IBLA) which favored a Refuge appeal, legal action reversing previous approval of 40 acres, and an application by the Dolchok heirs for an additional 40 acres. The Refuge has maintained that Alec Dolchok claim was invalid and no land should be conveyed to the Dolchok heirs. Several elderly witnesses were called to provide evidence during the contest hearing. Numerous affidavits were entered into evidence, and Refuge staff research was admitted into evidence. The first Kenai National Moose Range Refuge manager, Dave Spencer, testified at the hearing. Final post-hearing reply briefs by the heirs of Alec Dolchok were received July 27.

In a surprise ruling, Administrative Law Judge Childs ruled in favor of the Dolchok heirs and awarded a 100-acre native allotment at Harvey Lake. Solicitor Joe Darnell immediately appealed the decision to the full IBLA and was confident that Judge Child's ruling would be reversed. At year's end, the appeal was still pending.

2. Easements

Sport fisheries funds were expended on renovation of Tustumena Road, the Kasilof River/Tustumena Lake boat ramp, and the parking area. An ADF&G habitat permit and a Corp of Engineers permit were obtained for the boat

ramp replacement. Due to high water occurring before the boat ramp could be completed, that portion of the ANCSA 17b easement work was delayed until 1994.

The three-acre Tustumena ANCSA 17b easement remains unsurveyed, and improvements reflect a minimum level of development. Non-access associated campground facilities such as picnic tables and fire grates were removed during 1993 in order to encourage use consistent with the easements provisions for access.

Regional Office Archeologist Chuck Diters inspected the Tustumena Campground and boat ramp to determine whether the rehabilitation of the boat ramp would affect cultural resources. According to a report by Ted Matelan in 1988, the Tustumena Campground is located on top of an important cultural site. Diters and Park Ranger Johnston identified one area of the facility where a parking area expansion would not negatively affect various culture features.

3. Other

Burnt Island is located in the northwest side of Chickaloon Flats, latitude 60°57' longitude 149°54', T10N, R4W, Section 24, NE1/4, NE1/4, Seward Meridian. Through an oversight, this island and its associated tidelines were not transferred to the Kenai National Wildlife Refuge from the Chugach National Forest when the boundaries of each were changed by the Alaska National Interest Lands Conservation Act (ANILCA). According to a December 1984 Bureau of Land Management (BLM) land status review, Burnt Island and its associated tidelands were withdrawn from the Chugach National Forest on February 23, 1909, and remain there. In 1980, when ownership of the adjacent Chugach National Forest lands was transferred to the U.S. Fish and Wildlife Service pursuant to ANICLA, Burnt Island was not included in the transfer because it was erroneously believed to be outside of Chugach National Forest and was depicted so in the pertinent land maps. Present boundaries and maps do not show Burnt Island and its associated tidelines in either the Chugach National Forest or the Kenai National Wildlife Refuge. In October 5, 1993, correspondence, consistent with ANILCA Section 103(b), Refuge Manager Doshier requested that the Kenai National Wildlife Refuge boundary be officially changed to include Burnt Island and adjacent tidelands.

The Refuge staff provided comments regarding two proposals to reclassify borough lands adjacent to Refuge lands. Doshier and a representative from Point Possession Native Group, Inc. attended a borough planning commission meeting on June 14. The planning commission voted not to reclassify the adjacent lake as resource extraction as had been proposed. The proposed designation was intended to allow timber salvage associated with the spruce bark beetle infestation.

Rights-of-Way

Burnt Island property owner Hiram Wells expressed interest in obtaining a right-of-way across Refuge land. Mr. Wells wishes to obtain a one-mile long connection between his property and the Enstar Natural Gas Pipeline in order to bring natural gas to his property. A standard right-of-way permit application was sent to Mr. Wells, but at year's end, no application had been received. Mr. Wells was also informed of other required permits associated with Alaska Title 16 and Federal wetland permits.

In October correspondence to the Division of Realty, Refuge Manager Doshier requested that jurisdiction of the Alaska Natural Gas Pipeline right-of-way within the Refuge boundary be transferred from the Bureau of Land Management (BLM) to the U.S. Fish and Wildlife Service. At the time of construction in 1960, the Alaska Natural Gas Pipeline crossed Cook Inlet tidelands, the Kenai National Moose Range, and Chugach National Forest lands, so the BLM retained administrative jurisdiction of the utility corridor. Land status changes since the pipeline's construction have left the BLM with no land interest along the pipeline route; Chugach National Forest lands within the right-of-way were legally transferred to the U.S. Fish and Wildlife Service in 1980 by ANILCA. Since the right-of-way is now primarily within the Refuge boundary, Doshier noted that it would be more efficient and appropriate for the right-of-way to be administered by the U.S. Fish and Wildlife Service.

The City of Kenai was asked by the U.S. Fish and Wildlife Service to file a new application for a right-of-way permit for use of Overland Avenue in front of the Old Refuge Headquarters. The new permit would involve an appraisal and subsequent fee. The city council members were openly displeased at the March 17 meeting and directed the city administration to deny the request by the U.S. Fish and Wildlife Service.

The Environmental Assessments for exploratory wells proposed by ARCO/Cook Inlet Region Inc. (CIRI) at Stormy Lake East and Southeast Swanson were reviewed and comments were submitted to the Division of Realty. Stipulations for a right-of-way permit under Title XI of ANILCA have been developed for the two wells.

A gravel borrow mining plan as required by the Upper Skilak Road construction contract was received May 20, 1993. Refuge staff consulted several times with Alaska Road Builders regarding the plan. A related special use permit for development of a borrow was drafted during May and was expected to replace a current permit expiring in late June.

D. PLANNING

1. Master Plan

The Refuge's Comprehensive Conservation Plan (CCP) continues to be the primary planning guidance document for management.

2. Management Plans

Work continued in 1993 on the Moose/Habitat Management Plan (Moose Plan). Extensive editing and re-titling of the draft plan/environmental assessment was necessary to incorporate comments and concerns of the Alaska Department of Fish and Game (ADF&G). The preferred alternative was changed to include larger annual acreage objectives for habitat management using prescribed fire. At year's end, the "final" draft of the Moose Plan was sent to the Regional office and to ADF&G for review.

The Moose/Habitat Management Plan was made available for public review in April. Comments were received from approximately 40 people, agencies, and organizations.

As a result of a request by Ninilchik natives for a subsistence caribou hunt on the lower Kenai Peninsula, an interagency project was initiated in July to prepare a Caribou Management Plan. Refuge Biologist/Pilot Ernst was assigned primary responsibility for working with ADF&G and U.S. Forest Service personnel to develop a plan for all five Peninsula caribou herds. A first draft was completed in December.

Public Use Management Plan



Refuge Employee Richard McAvinchey provides information at a Public Use Management Plan workshop.

93/RJ

Scoping was the focus of the public use planning effort early in the year. Over 2500 workbooks were distributed to help identify issues and areas to be addressed in the Public Use Management Plan. Open houses, held in late January in Soldotna, Seward, and Anchorage, provided an additional opportunity for discussion, information dissemination, and positive public contacts. Scoping responses were received from 247 individuals and organizations. A 50-page summary of scoping responses was completed in August. The PUMP team, assisted by Paul Schrooten and Dave Patterson from the Regional Office, then met to review the comments and refine the issues to be addressed in the plan.

In late September, the Refuge was directed to condense the time schedule for completing a draft plan and environmental assessment (EA). The PUMP assumed top priority over other Refuge programs for the remainder of the year. Eight intense meetings were held to develop alternatives for the identified issues. The Regional Directorate was briefed on the proposed alternatives on December 3, and they were approved for analysis following minor modification. By mid-December, the majority of the Refuge staff was immersed in the preparation of issue analysis "chapters" for the environmental assessment. Due to the complexity of the issues and areas being addressed in the PUMP, the traditional EA format had to be adapted to fit the needs of this project.

Skilak Wildlife Recreation Area



Jim's Landing continues to be a popular access point
on the upper Kenai River.

93/RJ

Implementation of recreation facility improvements in the Skilak Wildlife Recreation Area continued with planning and design work for Jim's Landing and Lower Skilak Campground. Several permitting agencies opposed the Service's proposed development in the riparian zone of Jim's Landing, sending the project "back to the drawing board".

Region 7 Landscape Architect Paul Schrooten, accompanied by Refuge staff, did preliminary field work and analysis of the Lower Skilak area in the spring and summer of 1993. Schrooten developed seven conceptual design alternatives for Lower Skilak Campground improvements. An additional alternative was developed by the Refuge staff for consideration. Four alternatives were selected for analysis. Seasonal Park Ranger Scott Slavik's appointment was extended after his summer YCC duties to prepare an environmental assessment of the Lower Skilak alternatives.

3. Public Participation

In the early months of the year, the Public Use Management Plan (PUMP) effort focused on receiving input on the issues to be addressed. Over one thousand copies of the PUMP scoping workbook had been mailed in the final days of 1992. Open houses were held January 11, 12, and 14 in Soldotna, Seward, and Anchorage respectively to encourage public discussion and input. Prior to the open houses, staff who would be manning "issue stations" were briefed and trained. Exhibits for each station utilized photo enlargements, maps, and text, all mounted on display boards. Resource Support, Kenai Fisheries Resource Office, Western Areas Ecological Services, and Alaska Maritime Refuge generously loaned their new Skyline display systems, resulting in a coordinated, professional-looking exhibit. Attendance at the open houses was fair, and the format proved to be quite popular.

A steady stream of requests came in for the PUMP scoping workbook in January and February. A flurry of media and public interest was generated when the State Division of Governmental Coordination issued a news release summarizing the State's sixteen pages of comments on the scoping document. Written scoping comments were received from 247 individuals and organizations. Two-thirds of those commenting were Alaska residents. A summary of public comments was prepared, sent to those on the PUMP mailing list, and made available at Refuge Headquarters.

During seasonal training, Refuge employees were instructed to keep a written record of visitor contacts with comments relevant to PUMP issues. These will be retained as part of the public input.

4. Compliance with Environmental and Cultural Resource Mandates

Region 7 Landscape Architect Schrooten initiated the formal application process with the State Division of Governmental Coordination for the necessary permits for the Jim's Landing rehabilitation project. A pre-

application meeting was held with all participating agencies. State and federal permitting agencies expressed concerns about disturbance of riparian habitat and areas below the ordinary high water mark. The project was then redesigned by Schrooten. In December, the Division of Engineering reapplied for the necessary permits.

Coastal Zone Management and Corps of Engineers permits for the Tustumena access area rehabilitation project were requested in March. Region 7 Archeologist Chuck Ditters surveyed the area in April for cultural resources. Previous surveys indicated that this was an important cultural site. Ditters sent a "finding of no effect" to the State Historic Preservation Officer for the boat ramp portion of the project and found an area for expanded parking that would not impact cultural resources. The need for further inspection and clearance is anticipated prior to work on upland facilities. In May, the boat ramp rehabilitation was determined to be consistent with Coastal Zone Management and Corps of Engineer guidelines. By this time, however, the water level of the Kasilof River had risen too high to complete the planned boat ramp repairs.

In May, the Refuge requested a permit from the Alaska Department of Environmental Conservation for the Mystery Creek III Prescribed Burn. The approved permit includes smoke management stipulations to minimize particles and maintain visibility in populated areas.

Preliminary discussions about the Lower Skilak Campground project were initiated by the Division of Engineering with permitting agencies. A draft environmental assessment for the Lower Skilak project was completed in December and submitted to the Regional Office for review.

5. Research and Investigations

In November 1993, at the University of Alaska-Fairbanks graduate student Winthrop Staples completed a draft of his M.Sc. Thesis entitled Lynx and Coyote Diet and Habitat Relationships during a Hare Low on the Kenai Peninsula, Alaska. The data for this research project was collected on the Kenai National Wildlife Refuge. Win began a project on the Amur leopard in eastern Russia in November 1993 and is expected to revise his thesis and complete his degree requirements during the fall and winter of 1994-95.

Graduate student David "Burney" Dunn, University of Alaska-Fairbanks, continued to collect field data on his research project, which is designed to obtain information on the snowshoe hare population and its relationship to habitat and lynx populations on the Kenai National Wildlife Refuge. Burney's field assistants in 1993 were Todd Eskelin and Chris Whittle.

Graduate student and Refuge Biological Technician Elizabeth Jozwiak continued to analyze radio telemetry data collected from wolves over the past 10 plus years. The project is also testing the accuracy of aerial-obtained Ground-Position-Satellite (GPS) wolf locations.

Two study proposals were developed by Ecologist Ed Berg. These studies will look at the history of the two most visible disturbance agents that drive the forest cycle on the Kenai: forest fires and spruce bark beetles. Using the time scale of living trees (0-300y), randomly selected stands will be aged in order to construct a time-since-fire map to estimate fire frequency. Sudden increases in tree ring widths will be examined for evidence of old canopy-thinning events caused by bark beetles. On a longer time scale (to 8000y), annually-layered lake sediments (varves) will be studied for deposits of charcoal and beetle parts. This record could potentially show a relationship between bark beetles and fire if, for example, layers of charcoal are consistently found on top of layers of beetle parts.

E. ADMINISTRATION

1. Personnel

Table 2. Listing of permanent personnel for the Kenai National Wildlife Refuge, 1993.

1.	Daniel Doshier	Refuge Manager	GM-14	PFT	EOD 05/27/86
2.	James Frates	Refuge Ops Spec	GS-12	PFT	EOD 01/30/77
3.	Theodore Bailey	F&W Biologist	GS-12	PFT	EOD 09/12/77
4.	William Kent	Park Ranger	GS-12	PFT	EOD 04/21/91
5.	Larry Adams	Forester	GS-11	PFT	EOD 06/27/93
6.	Richard Johnston	Park Ranger/Pilot	GS-12	PFT	EOD 07/31/78
7.	Richard Ernst	Biologist/Pilot	GS-12	PFT	EOD 01/10/93
8.	Candace Ward	Park Ranger	GS-09	PFT	EOD 05/29/84
9.	Edward Berg	Ecologist	GS-11	PFT	EOD 09/05/93
10.	Elizabeth Jozwiak	Biological Tech	GS-07	PFT	EOD 08/28/88
11.	Richard McAvinchey	Wildlife Biologist	GS-09	PFT	EOD 05/16/93
12.	Richard Kivi	Equipment Operator	WG-10	PFT	EOD 10/31/74
13.	Al O'Guinn	Mechanic	WG-10	PFT	EOD 03/13/84
14.	Vivian McCain	Budget Assistant	GS-07	PFT	EOD 02/03/88
15.	Emily Dekker-Fiala	ORP	GS-09	PFT	EOD 01/12/92
16.	Deanne Nelson	Accounting Tech	GS-05	PFT	EOD 01/05/86
17.	Brenda Marsters	Refuge Clerk	GS-04	PFT	EOD 06/21/87
18.	Brenda Wise	Travel Clerk	GS-04	PFT	EOD 01/29/89
19.	Christopher Johnson	Refuge Officer	GS-07	PPT	EOD 07/29/90
20.	Albert Marrs	Carpenter	WG-9	PPT	EOD 04/19/92
21.	Brian Kemsley	Automotive Worker	WG-8	PPT	EOD 05/03/92

Table 3. Listing of temporary/seasonal personnel for the Kenai National Wildlife Refuge, 1993.

	<u>Employee</u>	<u>Position</u>	<u>Grade</u>	<u>EOD</u>	<u>Terminated</u>
22.	Gregory S. George	Park Ranger	GS-06	05/18/93	09/04/93
23.	David Hippchen	Park Ranger	GS-05	05/02/93	10/02/93
24.	Robert E. Barto	Park Ranger	GS-05	05/02/93	11/13/93
25.	Patricia L. Brown	Park Ranger	GS-05	05/02/93	08/21/93
26.	Brent J. Richey	Park Ranger	GS-05	07/08/90	11/13/93
27.	Scott S. Slavik	Soc. Svcs. Ast	GS-05	07/26/90	Intermit
28.	Jodie L. Setran	Park Ranger	GS-05	05/28/91	10/02/93
29.	Heidi M. Mouillesseaux	Park Ranger	GS-04	05/16/93	09/04/93
30.	Diana R. Thomas	Bio Tech	GS-05	05/05/89	Intermit
31.	Amy Mahler	Co-op Student	GS-04	05/23/93	07/13/93
32.	James M. Farrar	Laborer	WG-03	05/20/90	10/30/93
33.	Donna M. Bartman	Laborer	WG-03	06/02/91	Intermit

Table 4. Staff breakdown from Fiscal Year 1989-1993.

<u>Year</u>	<u>Permanent</u>		<u>Vacant as</u>	<u>Temporary</u>	<u>Volunteers</u>
	<u>Full-time</u>	<u>Part-time</u>	<u>of 12/31</u>		
FY89	18	0	0	13	15
FY90	18	1	2	13	17
FY91	16	1	3	15	66
FY92	16	1	2	15	73
FY93	18	2	0	12	71

Table 5. Temporary/seasonal positions for 1989-1993.

	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>
Biological Aids & Technicians	7	4	3	3	1
Laborers & Carpenter	4	4	4	4	3
Park Rangers	6	4	6	6	7
YACC/YCC Staff	0	1	1	1	1
Clerk/Typist	0	0	0	0	0
Student Trainee	0	0	1	1	1
TOTAL	17	13	15	15	13

2. Youth Programs

This year's Youth Conservation Corps (YCC) program consisted of eight enrollees, including one Youth Leader. Scott Slavik, Seasonal Park Ranger, led the YCC program for the fourth year. This year's program ran from June 14 through August 13. This year's crew completed a wide variety of challenging work projects, putting in 2,560 enrollee labor hours. Projects were divided into fifteen categories of task classifications:

- * Campground/Facility Maintenance
- * Recreation Building and Shelter Maintenance
- * Observation Site and Vista Clearing
- * Litter Pick-up or Removal
- * Visitor Contact Station Maintenance
- * Landscaping, Planting, and Beautification
- * Site Rehabilitation Removal of Structures or Facilities
- * Range Fence Maintenance
- * Wildlife Management
- * Trail and Boardwalk Construction
- * Trail Maintenance & Improvement
- * Facility Maintenance
- * Sign Protection or Maintenance
- * Field Trips, Camping
- * First Aid or CPR Training

The YCC Crew participated in four spike camps over the summer, which provided a welcome change in their work environment. The biology projects in which they participated provided valuable insight into wildlife management practices and helped them understand how data gathered in the field contributes to sound decision making for wildlife populations.

4. Volunteer Services

Kenai's volunteer program, which involved 71 people and thousands of volunteer hours in 1993, is comprised of five components: local volunteers, seasonal volunteers, Student Conservation Association (SCA) Resource Assistants, local service groups, and campground hosts.

Volunteers contributed 12,708 hours of service to Kenai National Wildlife Refuge in 1993, the equivalent of over six full-time staff positions. Of the total, the Student Conservation Association Program accounted for half of the work hours with 6,600 hours of service.

Local Volunteers

Local volunteers contribute a minimum of twelve-hours of service per month assisting in Refuge Visitor Center operations and hosting our weekend wildlife media programs. Local volunteers contribute significantly to the level of service we provide the public in information and interpretation.

Seasonal Volunteers

Seasonal volunteers commit to at least three months of continuous 40 hour-per-week service. Generally these volunteers are recruited through the USFWS, Region 7 Volunteer Program. Seasonal volunteers receive free housing, transportation, and a per diem subsistence allowance for food and essentials. In 1993, seasonal volunteers participated primarily in public use and biological field work, often in conjunction with pursuing undergraduate and graduate degrees.

Student Conservation Association Resource Assistant Program

Student Conservation Association (SCA) Resource Assistants work with the Refuge for either twelve-or sixteen-week terms. They completed a variety of operational tasks while learning about resource agency careers. SCA Resource Assistants receive a small subsistence allowance and round-trip transportation to the Refuge.

In 1993, twelve SCA Resource Assistants collectively contributed 6,600 work hours in biological field assistance, interpretation, environmental education, backcountry patrol, visitor service, and maintenance. Since 1985, the Refuge has been extremely fortunate to select consistently high-caliber Resource Assistants who accomplish quality work. The SCA Resource Assistant Program continues to expand and remains the backbone of the Refuge's volunteer program.

SCA Projects included the following:

- * Visitor Center and Visitor Contact Station operation
- * Interpretive and environmental education programs
- * Trail brushing and rerouting
- * Patrol of foot and canoe trails
- * Litter pick-up
- * Campground maintenance
- * Biological data collection
- * Wildlife live-trapping and radiocollaring

Through the receipt of a Challenge Cost Share Grant for the Refuge's "Friendly Trails" program, the Refuge was able to fund three SCA backcountry Resource Assistants for the summer.

Local Service Groups

During the spring and summer of 1993, several local organizations, including such as Scouts, 4-H, Campfire, church youth groups, and Alaska Flyfishers, volunteered for work projects involving litter pick-up, campground maintenance, and canoe trail portage rehabilitation. Often the groups visited the Refuge Visitor Center for training in minimum impact camping and bear safety prior to beginning their service projects.

The Refuge also received a Challenge Grant to fund much-needed rehabilitation of the Outdoor Education Center in 1993. Local artist Tom Cooper organized volunteers from the Church of Jesus Christ of Latter Day Saints to re-roof cabins, rehabilitate the central meeting room (Bear Den), and install a universal access restroom.

Campground Hosts

The Campground Host Program continued in 1993. Newcomers Rose and Erby Aucoin from Louisiana took care of Hidden Lake Campground. Dick Chace, returning for his third host season, transferred from Hidden Lake to Upper Skilak Campground.

5. Funding

Fiscal Year 1993 funding summary (000's):

1261	Fixed Costs:	\$	896.0
	Projects:	\$	141.0
	Challenge Grants:	\$	59.0
	SUBTOTAL	\$	1096.0
1262	Fixed Costs:	\$	349.0
	MMS:	\$	210.0
	Contaminants:	\$	46.0
	SUBTOTAL	\$	605.0
9110	Fire (Administration)	\$	257.0
9120	Fire (Studies/Projects)	\$	81.0
6860	Expenses for Sales	\$	90.0
4960	Fee Collection Revenues	\$	4.5
8610	Quarters	\$	13.6
	GRAND TOTAL	\$	2147.0

6. Safety

An Anchorage Supercub Pilot and his passenger were critically injured when circling to land at Chickaloon Flats. The plane stalled and burned upon impact. The injured were provided assistance by a Refuge inholder and an Air National Guard helicopter crew who were in the area. Park Ranger/Pilot

Johnston and Inholder Bill Hueners provided photos and information to a National Transportation Safety Board investigator.

On July 5, Pete Juliussen of Anchorage drowned while canoeing on the Swanson River below Swanson River Landing. According to Refuge records, it was the first drowning on the Swanson River.

Monthly safety meetings provided information on winter driving techniques, seven steps to survival, lawn mower safety, AIDS awareness, fire extinguisher use, winter survival, and the Station Safety Plan.

All-Terrain Vehicle (ATV) training was provided for several Refuge employees and seasonals in July. Certified trainer Jim Croak came down from Anchorage and gave the training at the Twin Cities Raceway in Kenai.

The Refuge Station Safety Plan was updated, and copies were provided to the Regional Office and the local State Trooper office.



Refuge employee Dee Nelson participates in safety training.

93/RJ

7. Technical Assistance

Refuge pilots and aircraft continued to support Refuge related fisheries research and resource projects on Tustumena Lake and elsewhere on the Refuge in 1993.

F. HABITAT MANAGEMENT

1. General

The Kenai Refuge has a variety of terrestrial wildlife habitats and species. Fifteen habitats have been described in six habitat classes: Special habitat class (Riparian, Wetlands, and an Estuary habitat), Forested (Mature, Intermediate, and Early forest), Alpine (Alpine shrub-lichen tundra), Shrub (Lowland and Subalpine shrub), Unique (Cliffs and Islands in lakes), Others (Snow, ice, and glaciers; Gravel and rock; and Water).

The Refuge has been categorized as having about 462,000 acres in several levels of management other than the 1,350,000 acres that is under wilderness management. About 44 percent of the non-wilderness lands are open to habitat manipulation, such as timber harvesting and firewood cutting, under the Refuge's Comprehensive Conservation Plan (CCP).

Manipulating habitats to make them more suitable for certain species is favored by those interested primarily in moose and opposed by those who favor management designed to benefit all species. In the CCP, timber harvesting is acknowledged to be an effective means of habitat manipulation and management for moose. At the present time, the Refuge has de-emphasized timber harvesting as a management tool in favor of prescribed burning.

3. Forests

Timber harvesting on the Refuge continues to be a low priority habitat management technique, prescribed fire and managed wildfire are preferred. There was no timber harvest during this calendar year.

Access to the Funny River Road public firewood cutting area remains popular with many local people. Firewood cutting also serves the purpose of low-cost habitat and fuel management. Families are allowed to cut up to five measured cords of firewood per year for their own personal use. This year, Heavy Equipment Operator Dick Kivi extended one of the access trails that was opened in 1992. Permits costing \$20 were issued to 51 people this year as compared with 58 in 1992, fifty-four in 1991, and 50 in 1990.

The Refuge was again open for free personal use Christmas tree cutting in 1993. No permits are required for this type of cutting, so the extent of

use is not known. The spruce regrowth area of the 1947 burn, located on Mystery Creek Road, was made available for commercial Christmas tree harvesting. Only one permit to cut Christmas trees was issued to cut 30 trees.

Fire-killed spruce poles for fences, furniture, and other domestic uses continue to be in demand by a few Peninsula residents. In response, we have issued free permits for pole cutting at a gravel pit access road on the Sterling Highway near Mystery Creek Road turnoff and along certain areas of Mystery Creek Road. Seven permits were issued this year compared to six in 1992, four in 1991, and five in 1990.

9. Fire Management

After several months and much paperwork and re-advertising, the Refuge hired a new fire management officer (FMO). Larry Adams came on duty as the FMO in June, direct from the local Alaska Division of Forestry office.

The Mystery Creek prescribed burn was planned for August or September, contingent upon favorable weather conditions and the availability of holding crews, which are secured through cooperative agreements. In consideration of hunters, the burn was scheduled without a general closing of Mystery Creek Road during the moose and other fall hunting seasons. The road was to be signed indicating that it might be closed during periods of actual firing and active burning.

A cooperative agreement on fire matters was presented to the Alaska Division of Forestry. It would have allowed the Division of Forestry to assist with the Mystery Creek burn during the remainder of Fiscal Year (FY) 1993. Forestry signed the agreement, but when it was presented back to the Regional Office, the agreement had to be returned to Forestry to get four original signatures. When the agreement came back to the Region, the contracting office decided not to sign due to "new" technical reasons. With no time left in the fiscal year for modifications to the agreement, no prescribed burning was attempted on the Refuge during 1993.

The FY 1994 fire budget request included a 16-person burn crew and an expanded fire training package to meet new national prescribed fire position titles and their respective training regimes. A substantial order for fire fighting gear was prepared to outfit 20 Refuge personnel for prescribed burning for the next several years.

Ten wildfires were suppressed on the Refuge by the Alaska Division of Forestry or monitored by the Refuge and Forestry during the year. The fires were all human caused and have been tabulated below.

Table 6. Kenai National Wildlife Refuge Fires in 1993.

<u>Date Discovered</u>	<u>Date Out</u>	<u>Final Size</u>	<u>Cause</u>
5/26	5/26	.1	Cooking Fire
7/10	7/14	4.0	Cooking Fire
7/17	7/18	.1	Warming Fire
7/17	7/18	.1	Cooking Fire
7/24	7/25	.1	Cooking Fire
7/25	N/A	N/A	False Alarm
7/26	7/27	.1	Cooking Fire
7/30	7/30	.1	Powerline
8/07	8/08	.1	Playing w/Fire
8/23	8/27	.1	Warming Fire
9/07	10/07	.3	Warming Fire

The fire discovered on September 7, 1993, burned on the northeast side of Tustumena Lake most of October in a "Modified reverted to Limited" suppression area. Despite significant rainfall during the month, the fire continued to smolder while remaining less than a half-acre in size. The fire was on a south-facing slope exposed to the drying effects of the sunlight and prevailing winds. It was burning in heavy white spruce, numerous squirrel caches, and a foot-deep layer of moss.

Berg and Adams attended the Fire Management Workshop at Fort Wainwright.

10. Pest Control

A series of warm summers since 1989 has intensified the recent outbreak of spruce bark beetles. A cumulative total of 800,000 acres have been affected on the Kenai Peninsula since the early 1950's, with 400,000 acres affected since 1989. For the Refuge, however, the infested acreage seems to be holding steady at about 240,000 acres (a figure unchanged since 1991). The primary areas of new outbreak are concentrated in the southern Peninsula, especially around Kachemak Bay. Several areas of the Peninsula have experienced repeated outbreaks over the years, including the Resurrection Creek drainage and areas southwest of Tustumena Lake. Northern portions of the Refuge experienced outbreaks in 1958-60 (20,000 acres), 1966-70 (300,000 acres), 1983 (45 acres), 1986-1988 (45,000 acres). (U.S. Department of Agriculture Forest Service data). No logging or silvicultural prescriptions were undertaken this year in beetle-killed stands.

11. Water Rights

Discussions were initiated between Refuge and Realty staffs regarding water rights on the Refuge. A scoping meeting was held and important refuge

waters were identified. The Water Rights staff (Realty Division) is planning to initiate field work in 1994 to install stream gauges to quantify instream flows. Following the field assessments of what we actually have, water rights applications will be filed in accordance with the State process.

12. Wilderness and Special Areas

On May 6, 1993, the Alaska Department of Environmental Conservation received a complaint that several old barrels of oil were located along Surprise Creek Trail within Kenai Wilderness. Refuge staff responded to the complaint by explaining the origin of the barrels and past efforts to remove the barrels from the former mining area. A plan for the removal of the remaining barrels was underway at year's end with a target removal date of May 1994.

Discussions continued in 1993 on the proposed Kenai Native Association land exchange and associated legislative proposals, including an option for removal of approximately one and one-half sections of Wilderness from the lowland wilderness unit. Certain lands south of the Kenai River to be returned to the Refuge would then be included within Kenai Wilderness.

G. WILDLIFE

1. Wildlife Diversity

At least 199 species of amphibians, birds, and mammals use the wildlife habitats on the Refuge. None of these species are known to be threatened or endangered. Five species of salmon, a wide variety of furbearers, and significant populations of brown and black bear, sheep, goats, wolves, bald eagles, trumpeter swans, caribou, moose, and loons occur on the Refuge.

3. Waterfowl

Trumpeter Swans

A total of 129 adult trumpeter swans were observed during the June 9, 10, 11, and 14, 1993, aerial surveys. Of these, 48 were observed as 24 non-nesting pairs (37 percent); 32, or 16 pairs, were observed with broods; and 30, or 15 pairs, were observed incubating eggs on nests. Nine of fourteen (64 percent) observed incubating attempts failed based on the absence of a brood during productivity surveys on July 8 and 9. Of 15 broods observed during the nesting survey and re-surveyed during the productivity surveys, 9 (60 percent) had the same brood size, 4 had reduced brood sizes by an average of 36 percent, and two (12 percent) broods were apparently lost. The high proportion of swans observed with broods during the nesting

surveys was unusual and suggested a 1-2 week earlier-than-average nesting year in 1993 compared to previous years.

Wintering Waterfowl

As in previous years, common goldeneyes, common mergansers, and mallards were the most numerous waterfowl using the Kenai River during the winter. Aerial surveys for eagles only were flown in February because the Kenai River was frozen over in spots. Waterfowl observations are summarized below.

Table 7. Waterfowl observed on the upper Kenai River (Kenai Lake outlet to Jim's Landing) during bald eagle float surveys, 1993.

<u>Date</u>	<u>Mallard</u>	<u>Goldeneye</u>	<u>Merganser</u>	<u>Swan</u>	<u>Bufflehead</u>	<u>Unidentified</u>
01/16/93	55	188	35			
03/18/93	42	4	60			
11/16/93	24	35	24	3	2	
12/14/93	99	76	39			14

Table 8. Waterfowl observed on the middle Kenai River (Skilak Lake outlet to Bing's Landing) during bald eagle float surveys, 1993.

<u>Date</u>	<u>Mallard</u>	<u>Goldeneye</u>	<u>Merganser</u>	<u>Swan</u>	<u>Bufflehead</u>	<u>Scaup</u>	<u>Unid.</u>
01/17/93	70	357	39	9			
03/19/93	18	340	93	9		10	
11/17/93	10	95	14				60
02/13/93	4	81	39		19		21

Table 9. Estimated numbers of snow geese and other geese and waterfowl observed on the Kenai River Flats between April 10-15, 1993.

<u>Day</u>	<u>Estimated numbers of:</u>			
	<u>Snow geese</u>	<u>Canada geese</u>	<u>Pintails</u>	<u>Mallards</u>
April 10	149	0	8	2
April 11	781	37	190	5
April 12	700	12	300	4
April 13	200	9	397	2
April 15	230	20	270	10

5. Shorebirds, Gulls, Terns, and Allied Species

An aerial survey of cormorants on the Skilak Lake nesting colony on May 6 in the PA-18 revealed 18 adults on nests. Prior to this survey, 19, 5, 4, and 2 old cormorant nests were observed on Big Middle Island, Small Middle, West, and Long Rocks, respectively, in the Upper Skilak Rock colony. On July 8, an aerial count recorded 45 adults, including 18 nesting on the nesting rocks in Upper Skilak Lake.

6. Raptors

Bald Eagles

Aerial bald eagle nesting surveys were conducted on May 6, 7, 8, and 20, 1993. Follow-up productivity surveys were flown on July 8 and 9. The low number of eaglets among many active nests suggests that productivity surveys may have been flown too late in 1993. The early spring may have permitted early egg-laying and subsequent early fledgling among chicks.

Greater numbers of eagles observed in the winter of 1992-93 may have been related to the milder winter and a larger late run of coho salmon into the Kenai River. Table 10 summarizes eagle survey results on the Kenai River over the past three winters.



View from Refuge Headquarters of an eagle.

Table 10. Numbers and ages of bald eagles observed during boat surveys along the Kenai River during winters 1991-92, 1992-93, and 1993-94.

<u>Survey Dates</u>	<u>River Route</u>					
	<u>Upper River*</u>		<u>Middle River**</u>		<u>Total</u>	
	<u>Ad</u>	<u>Juv</u>	<u>Ad</u>	<u>Juv</u>	<u>Ad</u>	<u>Juv</u>
11/16&18/91	24	12	34	12	58	24
12/12&13/91	37	22	84	53	121	75
01/15&17/92	79	23	170	53	249	76
02/13/92	108	29	N/S	N/S	108	29
***03/02/92			51	7	51	7
03/16/92	78	38	N/S	N/S	78	38
11/16&17/92	43	51	40	40	83	91
12/17&19/92	144	63	160	99	304	162
01/16&17/93	73	33	170	46	243	79
***02/17&19/93	31	0	148	14	179	14
03/18&19/93	68	15	113	30	181	45
11/16&17/93	17	8	37	6	54	14
12/13&14/93	28	2	69	5	97	7
01/17&18/94	18	4	65	11	89	15
***02/16/94	12	1	57	5	69	6
***03/17/94	1#	0	28	0	29	0

* Kenai Lake to Jim's Landing

** Skilak Lake outlet to Bing's Landing

*** Aerial

N/S Not surveyed

Kenai Lake outlet to Russian River canceled - severe turbulence

7. Other Migratory Birds

The North American Breeding Bird Surveys were conducted on the Seven Lakes Route (Skilak Loop and Mystery Creek Roads) on June 16 and on the Swan Lake Road on June 30, 1993. The three most frequently recorded species along both routes were the slate-colored Junco (109), Swainson's Thrush (104), and the American robin (55). The ten most frequently recorded species observed along each route is shown in Table 11.

Table 11. The ten most frequently recorded birds along the Seven Lakes and Swan Lakes Road Routes in 1993.

Species	Seven Lakes	Swan Lake Road
	Route	Route
Swainson's Thrush	81	23
Slate-colored Junco	50	59
Robin	27	28
Myrtle Warble [Yellow-rump]	24	20
Hermit Thrush	16	
White-crown Sparrow	15	
Alder Flycatcher	11	41
Varied Thrush	11	
Gray-cheeked Thrush	10	7
Gray Jay	10	
Common Redpoll		13
Olive-sided Flycatcher		10
Common Loon		10
Orange-crowned Warbler		7

8. Game Mammals

Moose

No moose census or population composition surveys were done during 1993 due to poor snow cover and weather conditions. A relatively mild winter in 1992-93 aided moose survival.

Caribou

The Alaska Department of Fish and Game (ADF&G) surveyed the caribou herds on and adjacent to the Refuge in 1993 (Table 12). No radiocollars were deployed on caribou in any of the five herds on the Kenai Peninsula during the year. Calves were born from mid-May to early June, with the peak between May 22 through May 29, 1993. Data suggests a high calf mortality rate on the lowland herd.

Table 12. Caribou observed on and adjacent to the Kenai National Wildlife Refuge by the Alaska Department of Fish and Game, 1993.

Date	Herd	Total					Obs.	Aircraft
		Adults	Calves	Cows	Bulls			
<u>Surveyed</u>	<u>GMS</u>							
06/08/93	Lowland (15A)	50	16	-	-	66		Supercub
11/15/93	Twin Lakes (15B)	30	6	23	7	36		Helicopter
11/15/93	Killey River (15B)	219	62	141	78	281		Helicopter
11/15/93	Fox River (15C)	50	7	31	19	57		Helicopter
11/11/92 ^a	Kenai Mt. (7)	335	55	234	101	390		Helicopter

^a This herd not surveyed in 1993; figures are the previous years.

Dall's Sheep and Mountain Goats

Sheep and goat surveys were conducted by ADF&G in fewer count areas this year, as the previous year survey was very extensive. The count areas surveyed included four on the Refuge and are listed in Tables 13 for sheep and Table 14 for goats.

Sheep numbers were lower than the 1992 count in all count areas except 855 (Skilak to the Killey River). Goat numbers were lower than 1992 for all count areas.

Table 13. Dall's sheep surveys on the Kenai National Wildlife Refuge, 1993.

<u>Count Area</u>	<u>Rams</u>	<u>Ewes</u>	<u>Lambs</u>	<u>Total</u>
831-C	19	78	13	110
855	16	46	14	76
856	119	296	54	469
857	<u>20</u>	<u>52</u>	<u>15</u>	<u>87</u>
Totals	174	472	96	742

Table 14. Mountain goat surveys on the Kenai National Wildlife Refuge, 1993.

<u>Count Area</u>	<u>Adults</u>	<u>Kids</u>	<u>Total</u>
831-C	0	0	0
855	6	0	6
856	38	10	48
857	<u>41</u>	<u>17</u>	<u>58</u>
Totals	85	27	112

Wolves

The following table summarizes information on the status of wolves on the northern portion of the Kenai National Wildlife Refuge prior to the December 20, 1993, census target date. It also indicates the fates of radiocollared wolves.

Table 15. Summary of wolf pack observations and fates of radiocollars on wolves on the northern Kenai National Wildlife Refuge, 1993.

Pack	No. of Collars	Observed Wolves	Date	Agency
Elephant Lake	4 ¹	12 ⁶	12/2,13/93	USFWS
Swanson River	4 ²	10 ⁷	12/13/93	USFWS
Pt. Possession	3 ³	?	--	--
Moose River Flats	4 ⁴	NONE(?)	--	--
Skilak Loop/Lake	1 ⁵	3-7(?)	--	--
Bear Lake	<u>0</u>	<u>6(?)</u>	--	--
Total	16	22 [visually confirmed]	to 35+	

¹Two collared wolves snared in pack territory by trappers (about December 13, 1993, January 20, 1994); one collared wolf dead of uncertain cause (by March 30, 1993) in pack territory.

²One collared wolf snared by a trapper in pack territory (January 20, 1994); one collar failed (normal battery failure).

³One wolf died from unknown causes (prior to February 9, 1993); one collared wolf was shot by a hunter after dispersing (August 22, 1993); one collared wolf was killed by an unknown person after dispersing (by September 8, 1993).

⁴This pack apparently disbanded after one wolf died from uncertain cause in pack territory (probably by December 2, 1992 but not recovered until early 1993); other three collared wolves dispersed in 1993 to become loners.

⁵One wolf dispersed and the collar was found repeatedly in same location on mortality mode (in October 1993); cause of death uncertain because collar was not recovered.

⁶Includes the two radiocollared wolves later snared in 1993-94 season by trappers (December 13, 1993, January 20, 1994).

⁷Includes the radiocollared wolf later snared in 1993-94 season by a trapper (January 20, 1994).

Despite lower wolf harvest levels in the survey area from 1986 through 1993, we have not yet documented a significant increase in wolf numbers in the survey area or significant increases in the sizes of monitored packs. Preliminary data analysis from radiocollared wolves suggests the lower harvest is perhaps being compensated for by an increase in the dispersal of wolves, higher natural mortality rates, and perhaps other unknown factors. The wolf population in the northern portion of the Refuge this area needs to be closely monitored in the future, as moose densities in this area are the highest on the Refuge. The moose population, however, is expected to decline as habitat quality declines due to forest succession.

9. Marine Mammals

Skulls and tusks from two beach-found walrus and the pelts and skulls of five sea otters were sealed by Refuge personnel during 1993.

10. Other Resident Wildlife

Small Mammals

Small mammals were live-trapped for the first time this year in conjunction with the snowshoe hare live-trapping effort. A Sherman live-trap was placed in the vicinity of each snowshoe hare live-trap, for a total of 49 Sherman traps at each snowshoe hare grid. A total of 208 individual red-backed voles were captured, with 75 recaptures for a total of 283 captures. Of those 208 voles, 166 survived the trapping. Also captured were 11 shrews and one weasel, all of which died in the traps. The previous summer, a total of 909 red-backed voles and 76 shrews were snap-trapped in the same snowshoe hare grids.

Small mammals were also live-trapped in the early fall at sites along Swan Lake Road which had been sampled for several years. The following table compares small mammal trapping in those sites for 1991 (snap-trapping), 1992 and 1993 (live-trapping).

Table 16. Early fall small mammal trapping summary and comparison.

<u>Year</u>	<u>1947 Burn</u>			<u>Mature Forest</u>			<u>Crushed Area</u>		
	<u>Voles</u>		<u>Shrews</u>	<u>Voles</u>		<u>Shrews</u>	<u>Voles</u>		<u>Shrews</u>
	RB	Tun		RB	Tun		RB	Tun	
1991	49	0	9	38	0	24	30	4	30
1992	45	0	4	90	2	0	8	2	0
1993	24	0	4	40	0	2	31	5	6

Snowshoe Hares

Live-trapping snowshoe hares continued in five study grids in 1993. A slight increase in numbers was detected in the Swanson River Grid (4 to 10) and the Campfire Lake Grid (23 to 28). Captured snowshoe hare numbers declined in the Funny River Grid (11 to 2), the Skilak Loop Grid (23 to 17), and the 1969 Burn Grid (12 to 5). These numbers are only a fraction of the total numbers of individual snowshoe hares captured during the peak population period of 1983 and 1984 (Tables 17-21).

Table 17. Snowshoe Hare Capture summaries on the Kenai National Wildlife Refuge for 1983-1993

Study Area Grid: Swanson River Road

<u>Year</u>	<u>Juvenile</u>	<u>Adults</u>	<u>Total</u>	<u>Captures</u>	<u>Pellets/m²</u>
1983	11	23	34	64	64.7*
1984	20	34	54	85	51.0
1985	10	30	40	113	51.6
1986	8	23	31	101	27.9
1987	2	10	12	31	14.1
1988	5	4	9	11	10.7
1989	2	2	4	4	5.0
1990	1	2	3	6	1.8
1991	2	1	3	4	1.1
1992	0	2	2	4	3.2
1993	1	3	4	10	4.9

*Uncleared plot

Table 18. Snowshoe Hare Summaries on the Kenai National Wildlife Refuge, for 1983-1993.

Study Area Grid: Funny River Road

<u>Year</u>	<u>Juvenile</u>	<u>Adults</u>	<u>Total</u>	<u>Captures</u>	<u>Pellets/m²</u>
1983	76	27	103	232	60.1*
1984	79	47	126	216	35.0
1985	25	49	74	159	44.4
1986	15	19	34	44	20.5
1987	15	16	31	63	9.4
1988	2	2	4	5	6.6
1989	2	1	3	3	2.1
1990	0	1	1	3	2.6
1991	13	13	26	46	1.1
1992	5	2	7	11	2.4
1993	1	1	2	2	4.4

*Uncleared plot

Table 19. Snowshoe hare summaries on the Kenai National Wildlife Refuge, 1983-1993.

Study Area Grid: Campfire Lake Area

<u>Year</u>	<u>Juvenile</u>	<u>Adults</u>	<u>Total</u>	<u>Captures</u>	<u>Pellets/m²</u>
1983	-	-	-	-	-
1984	-	-	-	-	-
1985	-	-	-	-	-
1986	13	19	32	93	52.8*
1987	11	13	24	77	19.9
1988	7	5	12	39	10.4
1989	4	5	9	18	3.2
1990	1	4	5	12	4.1
1991	2	4	6	17	3.0
1992	5	5	10	23	3.4
1993	3	11	14	28	6.7

*Uncleared plot

Table 20. Snowshoe Hare Summaries, Kenai National Wildlife Refuge, 1983-1993.

Study Area Grid: 1969 Burn/Swanson River Oilfield Area

<u>Year</u>	<u>Juvenile</u>	<u>Adults</u>	<u>Total</u>	<u>Captures</u>	<u>Pellets/m²</u>
1983	-	-	-	-	-
1984	-	-	-	-	-
1985	-	-	-	-	-
1986	-	-	-	-	-
1987	-	-	-	-	-
1988	-	-	-	-	-
1989	0	1	1	1	7.5*
1990	1	0	1	1	3.1
1991	1	1	2	4	1.0
1992	1	2	3	12	1.3
1993	1	3	4	5	1.5

*Uncleared plot

Table 21. Snowshoe hare summaries Kenai National Wildlife Refuge, Soldotna, Alaska, 1983-1993.

<u>Study Area Grid: Skilak Loop Road</u>					
<u>Year</u>	<u>Juvenile</u>	<u>Adults</u>	<u>Total</u>	<u>Captures</u>	<u>Pellets/m²</u>
1983	-	-	-	-	-
1984	-	-	-	-	-
1985	-	-	-	-	-
1986	-	-	-	-	-
1987	-	-	-	-	-
1988	-	-	-	-	-
1989	-	-	-	-	-
1990	-	-	-	-	-
1991	-	-	-	-	-
1992	9	5	14	23	12.5*
1993	2	7	9	17	3.7

*Uncleared plot

Beaver

Beaver lodges were aerially surveyed in the 1947 Burn (Swan Lake Canoe System Area) and 1969 Burn (south of the Swanson River) areas in 1993. Compared to 1992, the numbers of observed active beaver lodges increased in the 1969 Burn area from 21 to 27, and declined from 22 to 15 in the 1947 Burn area. (Table 22)

Table 30. Total active lodges observed during aerial beaver surveys over trend areas on the Kenai National Wildlife Refuge, 1992-1993.

<u>Survey Area</u>	<u>1992</u>	<u>1993</u>
<u>1969 BURN:</u>		
South Swanson River	21	27
<u>1947 BURN:</u>		
Swan Lake Canoe System	22	15
Swanson River Canoe System	19	-
<u>MATURE FOREST:</u>		
Vogel Lake Area	22	-

Spruce grouse

No roadside spruce grouse surveys were conducted in 1993.

Lynx

Sixteen lynx were captured/recaptured and fitted with radiocollars during 1993 to monitor reproductive success, mortality rates, movement and dispersal. Ten of these were captured using trained dogs and six were trapped. Of these, eight were males and eight were females. During the 1993 denning period, two of six monitored females apparently gave birth, but one lost its young prior to winter. During 1993, four radiocollared lynx died. One mortality was deemed of natural causes, one lynx was poached during the moose season, and the other two disappeared after reportedly taking a liking to domestic rabbits being raised in the area. This information suggests that, in 1993, lynx productivity and kitten survival rates decreased slightly relative to the two previous years and that natural and human-related mortality are still substantial.

11. Fisheries Resources

Hidden Lake

Cook Inlet Aquaculture Association has completed all sockeye enhancement field activities at Hidden Creek and Lake since 1991. Between May 15 and July 14, 1993, a total of 359,722 sockeye smelts migrated from Hidden Lake. Based on otolith marks, 84 percent of the migrating smelts were hatchery-reared fish. Most of the smelts migrated between June 1 and June 20. Between July 15 and September 1, 11,502 adult sockeye salmon returned to Hidden Creek, and 80 percent of these fish were age 1.2. There were 2.095 million sockeye fry released in Hidden Lake on May 15, 1993. There were 2.19 million eggs collected and shipped to Trail Lakes Fish Hatchery between September 27 and October 14, 1993. No unusual water quality conditions were observed in Hidden Lake in 1993, but zooplankton biomass appeared slightly higher than the biomass observed in 1992.

Russian River

In 1993, the early run harvest of sockeye in the Russian River was 37,881, plus 39,858 escaped to spawn for a total of 77,739 early-run sockeye. The total late run for sockeye was 125,795, with 26,536 harvested by sport fishermen and 99,259 escaping to spawn. A total of 12,258 sockeye were estimated to spawn in the Russian River below the weir at Lower Russian Lake.

Tustumena Lake System

Adult sockeye salmon escapement into Tustumena Lake in 1993 was estimated at 149,939, based on sonar counts in the Kasilof River. The weir count at Bear Creek in 1993 totaled 45,125 sockeye, and no surveys were conducted at any other spawning streams in 1993. The estimated hatchery contribution to adult sockeye in the escapement in 1993 was 4,348 (2.9 percent). An estimated 18,851 hatchery-produced fish contributed to the total Tustumena Lake sockeye salmon returns for 1993. An estimated 14.3 million sockeye

salmon juveniles were in Tustumena Lake (measured through hydroacoustic/townet surveys) during September 1993, and an estimated 9.0 million smelts migrated from the lake in the spring of 1993. The number of hatchery-reared smelts in 1993 was estimated at 516,000, or 5.7 percent of the total emigration. Mild weather conditions in 1993 probably contributed to the higher biomass of *Diaptomas* and *Cyclops* zooplankton and the relatively large number of fall fry.

12. Wildlife Propagation and Stocking

In a letter dated November 18, 1993, the Ruffed Grouse Society, requested that the Service help them and the Alaska Department of Fish and Game introduce ruffed grouse on the Kenai Peninsula. The Service position is that since ruffed grouse are not indigenous to the Kenai Peninsula, this action is not consistent with the purpose of the Refuge to conserve wildlife in its "natural diversity".

16. Marking and Banding

An annual report of wildlife banded or tagged on the Refuge during 1993 was sent to the Service's Division of Law Enforcement in Anchorage.

18. Injured Wildlife

Refuge personnel continued to work with local veterinarian Bart Richards to examine, care for, and rehabilitate injured wildlife during 1993.

H. PUBLIC USE

1. General

This year was typical for public use activities and programs in regards to visitor uses and trends. Significant improvements were made to many of our visitor facilities which will enhance visitors' refuge experiences.

January through March provided many winter outdoor activities including cross-country skiing, snowmachining, ice-fishing, small game hunting, and wildlife observation opportunities. April and May saw early fishermen on the Kenai River and in many Refuge lakes. Snow geese and other returning waterfowl offered exciting wildlife observation and photography chances throughout the Refuge. June through August mean "SALMON" in Alaska, and Kenai Refuge is certainly no exception. Along with the piscatorial pursuits come camping, hiking, canoeing, boating, and additional observation and photography, especially of young waterfowl and moose. Big game hunting also begins in August and continues into October; in recent years, fishing activities have continued into October also, especially in

the upper Kenai River, and rutting moose are always favorite subjects for photographers. November and December see winter activities drawing visitors to the Refuge, especially if below freezing weather comes early, providing sufficient ice for skating and fishing.

Facility rehabilitation in the Skilak Wildlife Recreation Area continued this year at Upper Skilak Campground. Last year the facility was enlarged and became more open to sunlight, which was a significant improvement. The road into the campground received improvements late this year, improving access and visitor safety.

Other facility rehabilitation was carried out at the Outdoor Education Center, where our YCC crew and volunteers from the Church of Jesus Christ of Latter Day Saints completed a project begun last year. The volunteers constructed a new "Bear Den", built an accessible toilet, and put new roofs on all the cabins. The YCC crew constructed an accessible gravel path to the new toilet and accessible ramps to the Bear Den and the central campfire area from the accessible-designated sleeping cabin.

Overall visitation to the Refuge was 511,111; this reflects the overall Kenai Peninsula trend of nearly a 9 percent increase over 1992.

2. Outdoor Classrooms - Students

Visitor Center & "Keen Eye" Trail

In 1993, 2805 students participated in the Refuge's Environmental Education (EE) program at the Visitor Center and adjacent nature trail.

A typical field trip to the Visitor Center takes half a day. Students begin with an introductory wildlife film or videotape selected from the Refuge's extensive media library. After the media program, students explore the exhibit area using questionnaires associated with various exhibits. The questionnaires focus on concepts such as animal/plant adaptations, interdependence, natural communities, and succession. The four levels of questionnaires cover grades kindergarten through first, second through third, fourth through sixth, and seventh through twelfth.

Visitor Center activities are followed by lunch at nearby Headquarters Lake. Students then hike the three-quarter-mile "Keen-Eye" Trail with activity guides. Led by their teacher, they investigate spruce forest, wetland, and freshwater lake communities through an integrated series of "hands-on" activities. There are three levels of trail activity guides covering grades kindergarten through first, second through third, and fourth through sixth.

Outdoor Education Center

In 1993, the Refuge's Outdoor Education Center (OEC), located off Swan Lake Road, was utilized by 63 youth for a total of 126 user days. This drop in

use resulted from the closure of the center for rehabilitation, which occurred from April through August, the busiest months for group use. Groups using the upgraded facilities in the fall of 1993 appreciated the increased size and light in the new commons room ("Bear Den") and the improvement in toilet facilities.



Scott Slavik and Tom Copper working on the OEC.

The OEC provides an attractive outdoor site for overnight field trips and youth group retreats. Teachers and youth leaders use the facility free-of-charge to conduct environmental education, nature appreciation, and outdoor skills activities. Rustic accommodations include six sleeping cabins, a "commons" lodge, a campfire ring, outdoor benches, picnic tables, an outhouse, and a water pump.

3. Outdoor Classrooms - Teachers

In 1993, sixty-six educators were introduced to the Refuge's EE program through teacher orientation sessions and EE workshops taught by Refuge staff. Orientation sessions were scheduled in the fall and spring, when teachers show the greatest interest in bringing classes for field trips to the Refuge. During a one-and-one-half hour orientation, teachers experience an abbreviated version of a sample class field trip. Workshops are given in four to eight hour blocks and explore environmental education topics in greater depth with teachers and youth leaders. This focused adult leadership training by Refuge staff greatly multiplies Refuge environmental educational efforts. Two Refuge staff and four SCA resource assistants work with 66 educators, who teach 1320 youth, greatly increasing the impact of Refuge environmental education programs.

6. Interpretive Exhibits/Demonstrations

In April, for the sixth consecutive year, the Refuge public use staff participated in the Kenai Peninsula Sportsman's Show. The Regional Office Resource Support Branch lent an eye-catching, professional traveling exhibit to the Refuge for this show. Our booth made contacts with over 1000 of the 2500 people who visited the show.

A mobile display depicting legal and illegal moose antler configurations was set up at Soldotna's Kenai Peninsula Mall. The public was fascinated by the display, and people enjoy quizzing one another on "which racks are legal".

Work on rehabilitating the "Sounds of the Kenai" exhibit continued in 1993. New photos and animal sounds, as well as a new script, were obtained and developed. Final installation of the exhibit is expected in winter 1994.

7. Other Interpretive Programs

Visitor Center and "Keen Eye" Trail

The year-round weekend wildlife film series continued to be one of our most popular programs, attracting 5360 of the Visitor Center's 21,400 visitors in 1993. Local newspaper and radio stations have provided excellent, free advertising for the series. Decreased visitation to films and the center in 1993 was attributed to the phone company accidentally dropping our phone listing.

During the summer, 1200 people watched the Refuge video, "Wild Refuge: Fortune and Future of the Kenai". This volunteer produced video is instrumental in introducing the public to the Refuge's wildlife viewing and recreational opportunities.

Nearly 625 people from community organizations used the Visitor Center for wildlife-oriented meetings and programs. These groups included Kenai Peninsula Community College, Alaska Bowhunters, Scouts, Campfire Kids, 4-H clubs, summer youth camps, church youth organizations, seniors groups, mental health services, tour groups, and day care programs.

Visitor Contact Station (VCS)

The VCS operates Memorial Day to Labor Day each summer and is the first Refuge facility that visitors encounter when crossing our eastern boundary. In 1993, 4765 visitors dropped in at the VCS for refuge orientation and wildlife interpretive information. The Refuge relies on a seasonal ranger and SCA resource assistants to staff the VCS.

Field Interpretive Programs

The Refuge received a "Watchable Wildlife" Challenge Grant to fund three SCA Resource Assistants who were responsible for the Refuge's summer interpretation program. They conducted nature walks, children's programs, and campfire programs. One-thousand-three-hundred-sixty-five visitors attended their entertaining and informative programs.

In June, Refuge staff, in cooperation with the Kenai Fisheries Resource Office hosted interpretive programs for 112 youth and adults at the Kenai River Festival. This community event, coordinated by Alaska State Parks, brings resource agencies and non-profit and business groups together in helping the public learn about the unique natural history of the Kenai River and techniques for safeguarding it.

In July, 80 scouts hiked to the Refuge for environmental education activities as part of the Cub Scout Day Camp hosted by nearby Skyview High School.

The Kenai branch of the Alaska Natural History Association received a development grant to produce a joint hiking trail booklet for Kenai National Wildlife Refuge, Chugach National Forest, and Kenai Fjords National Park. Preliminary work began with a publication goal of spring of 1994.

8. Hunting

Moose

The 1993 moose season opened August 20 and continued through September 20. As the selective harvest strategy for bull moose has been deemed a success, the Board of Game decided that an additional ten days of opportunity at the beginning of the season was in order. The extended season did appear to spread out the effort and relieve some of the historic Labor Day chaos. As a probable direct result of the extended season, known illegal kills hit a new high. Fifty-three illegal moose were known to have been taken in GMUS

7 and 15. The increase in illegal harvest cannot be blamed solely on the antler conformation restrictions as a large number of cows were taken this year.

The majority of the Kenai Peninsula moose harvest occurs on refuge lands; however, harvest reporting procedures do not differentiate between refuge and non-refuge moose. Harvest totals for game management units 15A, 15B, and 15C as well as those for the Skilak Loop permit hunt are summarized in Table 23.

In response to requests from the Refuge, the Board of Game established regulations in 1993 to allow disabled hunters to shoot from parked vehicles in designated areas for the purpose of hunting. Kenai NWR administers such a moose hunt for disabled hunters in the Swanson River and Marathon oil fields. Special use permits are issued to individuals who are completely wheel-chair bound, allowing them to park within the oil fields at specified locations. Oil field roads remain closed to vehicle travel from the general public. Four permits were issued in 1993, and two of the hunters harvested moose. Unfortunately, it was later learned that both had violated permit conditions of the hunt and notices of violations were issued.

Thirty cow moose permits were issued by the State of Alaska for a special hunt in Skilak Loop. The refuge issues special use permits, with some additional restrictions, to these hunters. In 1993, eighteen hunters reported actually hunting and 10 harvested moose.

The GMU 15B (east) late season moose hunt continued until October 15. All moose hunting in this area is by drawing permit only, and harvest is limited to "trophy" bulls (≥ 50 " antler spread). A total of 24 trophy moose were taken in GMU 15B east in 1993.

Hunter check stations were in place at Swanson River Road and Captain Cook State Park for several days during the early portion of the season. Hunters generally reported good hunting in the Swanson River Road area with twelve moose reportedly harvested.

Caribou

All caribou hunting on the Kenai Peninsula is by drawing permit only. In 1993, one of the five peninsula "herds" was subject to hunting. One hundred twenty nine animals were taken. Recent harvest data are summarized in Table 24.

Dall Sheep

Sheep season opened as usual on August 10 and continued through September 20. Full-curl ram restrictions remained in effect. Thirty-three full curl rams were taken in GMU 7 and 15 in 1993; four sub-legal rams were also harvested. Recent harvests are summarized in Table 25.

Use of Fuller Lakes Trail/Round Mountain experienced increased use, due to a new Dall sheep ewe season. Twenty ewe permits were issued and eight ewes were harvested during the hunt.

Mountain Goat

All of the mountain goat hunting on the Kenai Peninsula (GMUs 7 and 15) is by permit only. Drawing permits are issued by the state for numerous goat management units within the GMUs. The goat season opened on August 10 and continued through September 20. In many areas, registration hunting is permitted following the general season where the allowable harvest has not been exceeded. Registration hunting began on October 15 and continued though ???. Goat hunters harvested 176 animals on the Peninsula in 1993. The total includes 108 males and 68 females. The recent harvest is summarized in Table 26.

Brown Bear

Brown bear season is open each spring and each fall on the Kenai Peninsula. Thus far, hunting effort has not been regulated by permit. As the Kenai brown bear population is essentially an insular group, all mortality factors acting on the population are closely monitored by both the Refuge and ADF&G. Continued increased mortality (from all sources) may lead to further hunting restrictions in the near future.

Harvest data, as well as other known human-caused mortality is summarized in Table 27.

Black Bear

Black bear season continues year-around on the Kenai Peninsula; however, the bulk of the hunting effort falls within the month of May and early in June. Many black bears are also taken in the fall incidental to other hunts.

The Refuge issued 49 special use permits for black bear baiting stations. Twenty-eight permittees (60 percent) reported actually hunting, and ?? hunters harvested 14 bears over bait stations (the limit is 3 per year). Black bear harvest in GMUs 7 and 15 is summarized in Table 28. Black bear baiting activity is summarized in Table 29.

Table 23. Total Moose Harvest on the Kenai Peninsula, 1989-93 (source: Alaska Wildlife Harvest Summary, ADF&G).

GMU	1989	1990	1991	1992	1993*
15A	173	90	174	135	222
Skilak Loop ^a	8	7	11	6	10
TOTAL	181	97	185	141	232
15B					
WEST	41	54	39	48	46
EAST	31	31	38	26	24
TOTAL	72	85	77	74	70
15C	156	200	294	184	271
Illegal Take ^b					
Cows	7	5	9	9	21
Bulls	10	25	34	20	32
TOTAL	17	30	43	29	53

* Season extended to 32 days

^a Special season cow hunt by permit only.

^b Illegal take not broken down by subunit and is included in subunit totals

Table 24. Total Caribou Harvest on the Kenai Peninsula, 1989-93 (source: Alaska Wildlife Harvest Summary, ADF&G).

HERD	1989	1990	1991	1992	1993
Kenai Mountains	14	7	16	15	29
Kenai Lowlands	3	3	4	1	6 ^a

^a No legal season after 1992, number is road kills and/or illegal take

Table 25. Total Dall Sheep Harvest on the Kenai Peninsula, 1989-95
(source: Alaska Wildlife Harvest Summary, ADF&G).

GMU	1989	1990	1991	1992	1993
7 ^a	2	8	14	5	7
15	7	25	26	28	26
Ewe Hunt ^b					8
TOTAL					34

^a GMU 7 sheep harvest is off-Refuge

^b Round Mt. drawing permit hunt, 20 permits issued for ewes only

Table 26. Goat Harvest on the Kenai Peninsula, 1989-95 (source: Alaska Wildlife Harvest Summary, ADF&G).

GMU	1989 ♂/♀	1990 ♂/♀	1991 ♂/♀	1992 ♂/♀	1993 ♂/♀
7 ^a					
Drawing	21/10	15/10	22/ 8	37/15	39/29
Registration	14/ 7	17/ 8	27/13	33/15	16/10
Tier II			2/ 0	3/ 1	
TOTAL (by sex)	35/17	32/18	51/21	73/31	55/39
TOTAL	52	50	72	104	94
15B					
Drawing	1/1	2/0	4/2	0/3	4/1
Registration		3/3		1/0	3/0
TOTAL (by sex)	1/1	5/3	4/2	1/3	7/1
TOTAL	2	8	6	4	8
15C					
Drawing	24/11	19/ 8	18/ 7	17/ 5	15/12
Registration	4/ 6	3/ 1	15/ 4	18/ 7	26/15
Tier II		1/ 4	11/ 0	16/ 4	5/ 1
TOTAL (by sex)	28/17	23/13	44/11	51/16	46/28
TOTAL	45	36	55	67	74

^a goat harvest is off-Refuge

Table 27. Brown Bear Harvest on the Kenai Peninsula, 1989-1993.

	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>
GMU					
7					
Boars	1	1	0	4	3
Sows	2	0	1	5	0
DLP	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>
TOTAL	3	1	1	9	4
15A					
Boars	0	0	0	1	3
Sows	0	1	2	2	0
DLP	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>2</u>
TOTAL	0	1	2	4	5
15B					
Boars	0	2	2	1	2
Sows	2	1	1	1	4
DLP	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>2</u>
TOTAL	2	3	3	2	8
15C					
Boars	1	3	4	7	3
Sows	0	3	1	2	1
DLP	<u>1</u>	<u>0</u>	<u>0</u>	<u>2</u>	<u>1</u>
TOTAL	2	6	5	11	5
GMU 7&15 Totals	7	11	11	26	22

Table 28. Black Bear Harvest on the Kenai Peninsula, 1989-1994.

GMU	1989	1990	1991	1992	1993*
7					
Boars	33	63	75	56	70
Sows	12	15	47	33	19
Unknown	1	2	4	3	1
DLP	0	0	0	5	2
TOTAL	46	80	126	97	92
15					
Boars	86	72	103	109	81
Sows	30	39	49	58	25
Unknown	1	4	7	2	2
DLP	0	0	0	1	4
TOTAL	117	115	159	170	112

* Bag Limit Reduced from 3/year TO: 1 bear/spring and 1 bear/fall

Table 29. Black Bear Baiting on Kenai National Wildlife Refuge, 1989-93.

YEAR	1989	1990	1991	1992	1993
Total Permittees	28	44	74	63	49
Reporting Permittees	24 (86%)	38 (86%)	68 (92%)	60 (95%)	47 (96%)
Reporting Permittees Who Hunted	14 (58%)	21 (55%)	33 (49%)	22 (37%)	28 (60%)
Hunter Success	43% (6/14)	29% (6/21)	24% (8/33)	18% (4/22)	39% (11/28)
Total Harvest	12	10	12	6	14
Harvest Composition	8F, 4M	7F, 3M	5F, 7M	5F, 1M	7F, 7M
Dates of Harvest					
APR 15-22	0	0	0	0	0
APR 23-30	0	0	0	0	0
MAY 1-9	0	0	2	0	2
MAY 10-25	CLOSED FOR BAITING DURING BROWN BEAR SEASON				
MAY 26-31	7	3	3	3	6
JUN 1-7	1	5	3	1	3
JUN 8-15	4	1	4	2	3
Total black bear observ.	45	51	59	29	58
Total brown bear observ.	8	4	10	1	7

9. Fishing

The Kenai Peninsula continues to play a major role in providing recreational fishing opportunities in Southcentral Alaska. The Kenai Peninsula supported 945,272 angler-days, or 37 percent of the State's total sport fishing effort during 1992 (Mills, 1993). The Kenai River is the most intensively fished river in Alaska and supported 332,573 angler-days, or 13 percent of the State's total sport fishing effort in 1992. The Kenai River and its tributaries are important to the entire Refuge ecosystem and the Cook Inlet salmon fishery, providing spawning and rearing habitat for major populations of chinook, sockeye, pink, and coho salmon. Resident sportfish species sought by anglers include rainbow trout, Dolly Varden, Arctic char, lake trout, and kokanee.

The rate of growth and the economic importance of recreational fisheries on the Kenai Peninsula are unequalled anywhere else in the state. In a twelve-year period from 1981 to 1992, an 82 percent increase in sport fishing effort was observed on the Kenai Peninsula (Mills 1982, 1993). During that

same period, sport fishing effort on the Kenai River increased by 86 percent. Although many Kenai Peninsula residents participate in local recreational fisheries, many anglers are from the Anchorage area, and an increasing number are nonresident tourists who contribute significantly to the economy of the Kenai Peninsula. Anchorage residents and nonresident tourists (anglers and non-anglers) spent an estimated \$91 million while visiting the Kenai Peninsula during 1991 (Kenai Peninsula Borough 1993).

Several recreational fisheries of statewide importance occur on the Refuge or are supplemented by Refuge-produced fish. The recreational fisheries, listed in Table 30, contributed 92 percent of the salmon, 80 percent of the rainbow trout, 65 percent of the Dolly Varden/Arctic char, and 73 percent of lake trout to the freshwater recreational catch on the Kenai Peninsula during 1992 (Mills 1993). These sport fishing opportunities continue to be provided on the Refuge per the management direction outlined in the Refuge's Comprehensive Conservation Plan (U.S. Fish and Wildlife Service 1985), the Kenai Refuge Fishery Management Plan (U.S. Fish and Wildlife Service, in preparation) and the Public Use Management Plan (in preparation).

The Alaska Division of Parks commissioned a Kenai River Carrying Capacity Study during 1992-93. Researchers interviewed various river users, primarily anglers; all Kenai River sections were included in the study, including several Refuge segments. The "perceived level of crowding" on the Kenai ranked among the highest of 18 surveys conducted by the authors. (Whittaker and Shelby 1993).



Successful fisherman at Jim's Landing.

Successful fisherman at Jim's Landing.

Table 30. Sport fishing effort and catch for waters on and adjacent to the Kenai National Wildlife Refuge during 1992 (Mills 1993).

Location	Angler Days	Species caught						
		Chinook Salmon	Coho Salmon	Sockeye Salmon ^a	Pink Salmon	Rainbow Trout	Dolly Varden ^b	Lake Trout
Kenai Peninsula								
Freshwater	578,040	54,742	88,157	485,656	97,720	102,387	136,985	6,462
Refuge Sport Fisheries ^c								
Kenai River	332,573	20,544	63,850	383,243	74,021	52,156	78,823	925
Russian River	67,443	0	7,401	84,924	1,823	8,312	3,629	0
Kasilof River	49,774	14,786	4,234	4,265	449	965	3,384	447
Moose River	630	9	24	271	0	79	16	0
Hidden Lake	4,172	0	32	1,604	0	602	74	2,005
Canoe routes ^d	11,228	53	2,972	361	119	18,966	1,688	0
Skilak Lake	3,820	0	0	1,791	110	522	1,352	833
Tustumena Lake	1,600	0	73	90	9	222	721	517
Total	471,240	35,392	78,586	476,549	76,531	81,824	89,687	4,727
[‡] Kenai Peninsula								
Freshwater	82%	65%	89%	98%	78%	80%	65%	73%

^a Includes kokanee.^b Includes Arctic char.^c Sport fisheries on the Kenai Refuge or supplemented with Refuge Produced fish.^d Swanson River and Swan Lake canoe routes.Kenai River

The upper Kenai River has evolved into one of the most popular fishing areas on the Refuge for resident rainbow trout and Dolly Varden (see Table 30). The area is managed as a "trophy" rainbow trout fishery, and trout under 30 inches long must be released. Anglers reported catches of 28,702 rainbow trout above and 23,454 below Skilak Lake, although relatively few were retained (Mills 1993). Reported harvests of rainbow trout above and below Skilak Lake were 403 and 1574 fish, respectively.

The effects of intensive sport fishing activity on fish and wildlife populations and habitats are recognized as a significant resource problem, and protection of shoreline areas has become a central part of most river and sport fishing discussions. The Service assisted the ADF&G with a study of habitat impacts along the Kenai River during 1993. All sections of the Kenai River downstream of Kenai Lake were surveyed.

The upper Kenai River reached flood stage at the end of September after observers noticed that the Snow River Glacier experienced a "break out". Water levels were already fairly high, and with the increased glacial water

experienced significant flooding. The river was well over its bank from Cooper Landing to Skilak Lake and remained above flood stage for more than a week. Normally excellent September upper river fishing was reported to be less than ideal due to the flooding, but many diehard drift boaters continued to fish. Difficult launching and river floating logistics seemed to eliminate only the uninitiated.



High water on upper Kenai River, September 1993.
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Russian River

The Russian River early run escapement of sockeye salmon was 39,857, and the early harvest was 37,881 with approximately 34,000 man-days of effort. The early catch-per-hour ratio during 1993 was 0.276. Approximately 65 percent of the harvest and 73 percent of the effort occurred at or just below the Kenai/Russian confluence. The Russian River fishery experienced an above average second run, which totaled 138,289 sockeyes as of August 20 when censusing was discontinued. The harvest was 26,536, and the escapement was logged in at 99,259. The catch-per-hour-ratio was 0.278. The second run man-days of effort totaled 23,491 (Table 31.)

Approximately 77 percent of the harvest and 79 percent of the effort occurred at the confluence or below. A third year of weak early runs of Kenai River king salmon effectively decreased angler use on sections of the river open to king fishing. Fishing in the Kenai River was restricted to "catch and release only" for king salmon until July 1. The entire Kenai River system experienced a strong sockeye run.

Table 31. Estimated sockeye salmon harvest, effort, and success rates on Russian River, 1973-1993.

Year	Harvest			Total Effort (Man-Days)	Catch Per Hour	Census Period
	Early Run	Late Run	Total			
1973	6,740	8,930	15,670	30,690	0.102	06/08-08/19*
1974	6,440	8,500	14,940	21,120	0.131	06/08-07/30*
1975	1,400	8,390	9,790	16,510	0.140	06/14-08/13*
1976	3,380	13,700	17,080	26,310	0.163	06/12-08/23*
1977	20,400	27,440	47,840	69,510	0.168	06/18-08/17
1978	37,720	24,530	62,250	69,860	0.203	06/07-08/09
1979	8,400	26,830	35,230	55,000	0.136	06/09-08/20*
1980	27,220	33,490	60,710	56,330	0.245	06/13-08/20
1981	10,770	23,720	34,440	51,030	0.156	06/09-08/20
1982	34,500	10,300	44,820	51,480	0.261	06/11-08/04**
1983	8,360	16,000	24,360	31,890	0.117	06/08-08/09**
1984	35,880	21,970	57,850	49,550	0.238	06/04-08/19**
1985	12,300	58,410	77,710	50,770	0.286	06/13-08/16**
1986	35,099	30,813	66,012	51,400	0.240	06/14-08/20**
1987	154,189	40,575	194,790	113,012	0.431	6/08-08/20
1988	50,820	19,540	70,356	72,023	0.264	06/13-08/09*
1989	11,290	55,210	61,500	60,569	0.284	06/09-08/20*
1990	30,215	56,175	86,390	84,710	0.255	06/12-08/20*
1991	65,390	31,450	97,840	96,161	0.290	06/01-08/20
1992	30,512	29,646	60,158	60,449	0.238	06/12-08/18
1993	37,261	38,289	75,550	57,491	0.277	06/11-08/20

*Census period was not continuous during these years due to emergency closures required to increase escapement levels.

**Census period was not continuous during these years due to negligible fishing effort after completion of the early run and prior to arrival of late run.

Table 32. Kenai Peninsula Freshwater Sport Fisheries, 1993.

	Days Fished		Est. % occur. on KNWR
	<u>(Non-guided)</u>	<u>(Guided)</u>	
Kenai River; (Soldotna Bridge to Moose River)	69,481	11,897	10%
Kenai River; (Moose River to Skilak Outlet)	43,319	6,455	15%
Kenai River; (Skilak Inlet to Kenai Lake)	45,602	5,570	70%
Russian River	67,443		70%
Kasilof River	40,118	9,656	5%
Swanson River	4,897		90%
Other Rivers	3,139		20%
Swanson River/Canoe Lake System	3,397		100%
Swan Lake/Canoe Lake System	2,934		100%
Other Lakes	11,398		40%
Tustumena Lake	1,600		100%
Skilak Lake	3,820		100%
Hidden Lake	4,172		100%

The statistics in Table 32 represent survey data for 1992 published during 1993.

Swanson River

The Swanson River system, with its tributaries and lakes, continues to be the third most popular watershed on the Refuge. The Swanson River supports a small population of sockeye salmon; a weir count of 1542 fish was observed during 1988 (Jones et al 1993). These fish spawn primarily in the vicinity of the two oil field bridges on the main stem river during late July and early August. This section of river is also an important spawning area for rainbow trout during May and early June (Jones et al., in preparation). Existing sport fish regulations protect rainbow trout in the Swanson River during spawning.

Rainbow trout and coho salmon are the most popular sport fish species in the Swanson River drainage. Mills (1993) estimated that 11,228 angler-days of effort occurred in the canoe routes during 1992, with an estimated catch of 18,966 rainbow trout and 2972 coho salmon. Approximately 68 percent of the coho salmon caught were harvested. Only 33 percent of the rainbow trout caught were harvested, an indication that many anglers voluntarily practice "catch and release" for this species. Total sport fishing effort reported for the canoe routes in 1992 was more than twice the level reported in 1981.

Lakes

Hidden Lake, the third largest lake on the Refuge, supports the most popular lake trout fishery on the Kenai Peninsula. Fishing occurs in the summer and during a winter ice fishery. Estimates of angler effort averaged 5,321 angler-days annually from 1981-1992 (Mills 1982). During that same period, lake trout were harvested more than any other species, with catches averaging 1,453 fish per year. Other species harvested include kokanee, rainbow trout, and Dolly Varden.

Other lakes and rivers on the Refuge generally receive less sport fishing use than the waters described above (Table 32). Angler effort on Tustumena Lake, the largest lake on the Refuge, had only 1600 angler-days (Mills 1993). Skilak Lake, the second largest lake on the Refuge, received 3820 days of angler use. Angler effort on the Kasilof River was nearly 50,000 angler-days; however, most fishing effort on this river occurs below the Refuge boundary near the confluence with Crooked Creek. Anglers in this road-accessible fishery target salmon and steelhead returning to the Crooked Creek hatchery.

Remote lakes and rivers receive the lightest amount of use on the Refuge. Anglers generally access remote locations with fixed-wing aircraft.

10. Trapping

Two trapper orientation programs were held during 1993, on January 22 and November 9, in an effort to educate trappers and promote responsible trapping.

The Refuge issued 65 special use permits for trappers during the 1992-93 season. Forty permittees returned their trapping harvest report forms on time. Reminder letters were sent via certified mail to the 25 persons who had not reported. A total of 56 harvest report forms were received as of October 1, 1993; nine permittees did not report. Twenty permittees did not trap on the Refuge during the 1992-93 season. Two cited poor snow conditions and one cited lack of free time as reasons for not trapping.

Nine of 37 trappers who reported trapping on the Refuge were unsuccessful. The other 28 trappers succeeded in harvesting the following: 74 mink, 11 weasels, 31 coyotes, 31 beaver, 8 wolves, 15 otter, 6 muskrat, and 1 wolverine. Activity averaged 38.1 days and 10.8 sets per trapper. Most of the trapping pressure occurred near Swanson River/Swan Lake Roads, Moose River, Kasilof River, Swanson River canoe route, and Tustumena Lake.

Table 33. Total reported aquatic furbearer harvest and average per permit holder on the Kenai National Wildlife Refuge, 1960-61 through 1992-93.

Aquatic Furbearer Reported Harvest									
Season	Total permits	Beaver		Otter		Muskrat		Mink	
		Tot	Mean per Permit holder	Tot	Mean per Permit holder	Tot	Mean per Permit holder	Tot	Mean per Permit holder
1960-61	16	145	9.1	16	1.0	2	0.1	42	2.6
1961-62	24	79	3.3	19	0.8	0	0	69	2.9
1962-63	28	109	3.9	19	0.7	2	0.1	66	2.4
1963-64	33	150	4.5	26	0.8	0	0	83	2.5
1964-65	17	6	0.3	3	0.2	0	0	15	0.9
1965-66	16	17	1.1	4	0.2	0	0	13	0.8
1966-67	25	22	0.9	9	0.4	0	0	45	1.8
1967-68	---	---	---	---	---	---	---	---	---
1968-69	22	14	0.6	10	0.4	207	9.4	64	2.9
1969-70	53	33	0.6	32	0.6	75	1.4	82	1.5
1970-71	59	25	0.4	9	0.1	29	0.5	60	1.0
1971-72	61	23	0.4	8	0.1	18	0.3	9	0.1
1972-73	65	76	1.2	24	0.4	111	1.7	48	0.7
1973-74	81	40	0.5	26	0.3	334	4.1	160	2.0
1974-75	52	6	0.1	8	0.1	21	0.4	33	0.6
1975-76	70	34	0.5	13	0.2	82	1.2	25	0.4
1976-77	86	24	0.3	7	0.1	8	0.1	39	0.4
1977-78	86	19	0.2	9	0.1	140	1.6	33	0.4
1978-79	96	22	0.2	6	0.1	73	0.8	25	0.3
1979-80	104	83	0.8	17	0.1	127	1.1	57	0.5
1980-81	102	82	0.8	30	0.3	191	1.9	111	1.1
1981-82	104	61	0.6	26	0.2	183	1.8	119	1.1
1982-83	122	93	0.8	18	0.1	227	1.8	202	1.6
1983-84	114	43	0.4	18	0.2	39	0.4	268	2.3
1984-85	107	103	1.0	20	0.2	121	1.1	392	3.7
1985-86	114	86	0.8	24	0.2	209	1.8	322	2.7
1986-87	109	55	0.5	21	0.2	85	0.8	88	0.8
1987-88	83	50	0.60	11	0.13	14	0.17	44	0.53
1988-89	63	17	0.27	1	0.02	6	0.1	17	0.27
1989-90	90	5	0.06	7	0.08	0	0.00	45	0.50
1990-91	52	7	0.14	4	0.08	5	0.1	16	0.32
1991-92	55	13	0.24	6	0.11	10	0.18	63	1.15
1992-93	65 ¹	31	0.55	15	0.27	6	0.11	74	1.32

¹ Calculations based on 56 returned harvest reports.

Table 34. Historical wolf harvest/known wolf mortality on the Kenai Peninsula, 1973-74 through 1992-93. (Source: Alaska Department of Fish and Game).

YEAR	UNIT 7	SUBUNIT 15 (A)	SUBUNIT 15 (B)	SUBUNIT 15 (C)	TOTAL	LAND AND SHOOT METHOD ⁹
1973-74 ¹	1	0	0	1	2 ²	
1974-75	1	0	1	4	6	
1975-76 ³	7	3	1	8	19	
1976-77 ³	3	5	2	3	13	
1977-78 ³	16	5	7	8	36	6
1978-79 ³	12	24	5	14	55	10
1979-80 ³	6	15	13	12	46	3
1980-81 ³	12	18	1	11	42	0
1981-82 ³	12	28	15	7	62	3
1982-83 ³	8	27	10	3	48	0
1983-84	10 ³	27 ^{3,4}	5	8	50	3
1984-85	5 ³	32 ³	3	7	47	-
1985-86	13 ³	24 ^{3,5}	15	12	64	-
1986-87	20 ³	9 ³	13	8	50 ⁶	-
1987-88	3 ³	8 ³	9	5	25	-
1988-89 ⁷	2	6	6	4	18	-
1989-90 ⁷	3	5 ⁸	10	1	19	-
1990-91	3	5	2	0	10	-
1991-92	2	2	0	5	9	-
1992-93	3	8	2	6	9	-

¹Beginning of legal season on wolves.

²Two non-sport kills.

³Trapping season November 10 - March 31.

⁴Western portion of 15(A) closed to trapping and hunting February 12 due to lice control efforts.

⁵Trapping and hunting closed February 15, 1986 (quota set at 20).

⁶One non-sport kill in Unit 7 and one non-sport kill in Subunit 15(B).

⁷Trapping season November 10 - February 28.

⁸Season extended 31 days, no harvest during extended season.

⁹Land and shoot hunting of wolves was prohibited on the Kenai Peninsula beginning with the 1984-85 season.

Table 35. Total reported land furbearer harvest and average per permit holder on the Kenai National Wildlife Refuge, 1960-61 through 1992-93.

		Land Furbearer Reported Harvest									
		Lynx		Coyote		Wolverine		Weasel		Wolf	
		Mean	per	Mean	per	Mean	per	Mean	per	Mean	per
		per	permit	per	permit	per	permit	per	permit	per	permit
Season	permits	Tot	holder	Tot	holder	Tot	holder	Tot	holder	Tot	holder
1960-61	16	13	0.6	15	0.9	1	0.1	1	0.1	--	---
1961-62	24	23	1.6	30	1.2	4	0.2	13	0.5	--	---
1962-63	28	28	1.0	27	1.0	2	0.1	0	0	--	---
1963-64	33	28	0.8	39	1.2	1	0.1	6	0.2	--	---
1964-65	17	24	1.4	11	0.6	6	0.3	10	0.6	--	---
1965-66	16	17	1.1	16	1.0	4	0.2	2	0.1	--	---
1966-67	25	7	0.3	5	0.2	4	0.2	35	1.4	--	---
1967-68	---	---	---	---	---	---	---	---	---	--	---
1968-69	22	18	0.8	44	2.0	1	0.1	81	3.7	--	---
1969-70	53	62	1.2	23	0.4	3	0.1	35	0.7	--	---
1970-71	59	67	1.1	30	0.5	10	0.2	79	1.3	--	---
1971-72	61	181	3.0	13	0.2	14	0.2	35	0.6	--	---
1972-73	65	146	2.2	51	0.8	8	0.1	4	0.1	1	0.1
1973-74	81	245	3.0	58	0.7	7	0.1	149	1.8	0	0
1974-75	52	162	3.1	24	0.5	10	0.2	68	1.3	0	0
1975-76	70	113	1.6	32	0.5	6	0.1	16	0.2	1	0.1
1976-77	86	53	0.6	25	0.3	6	0.1	10	0.1	2	0.1
1977-78	86	43	0.5	34	0.4	4	0.1	14	0.2	8	0.1
1978-79	96	36	0.4	44	0.5	3	0.1	7	0.1	32	0.3
1979-80	104	12	0.1	64	0.6	3	0.1	58	0.6	19	0.2
1980-81	102	2	0.1	38	0.4	0	0	14	0.14	16	0.16
1981-82	104	17	0.2	66	0.6	4	0.1	70	0.7	44	0.4
1982-83	122	47 ¹	0.4	80	0.6	2	0.1	43	0.3	39	0.3
1983-84	114	38 ¹	0.3	87	0.8	2	0.1	29	0.2	30	0.3
1984-85	107	31 ¹	0.3	107	1.0	2	0.1	17	0.2	38	0.3
1985-86	114	23 ¹	0.2	110	1.0	4	0.1	3	0.1	33	0.3
1986-87	109	33 ¹	0.2	43	0.4	5	0.1	2	0.1	17	0.2
1987-88	83	2	0.02	41	0.5	7	0.08	2	0.02	12	0.14
1988-89	63	1	0.02	15	0.24	0	0.0	1	0.02	12 ²	0.19
1989-90	90	1	0.01	28	0.31	8	0.09	15	0.17	7	0.08
1990-91	52 ³	0	0.0	22	0.44	0	0.0	6	0.12	3	0.06
1991-92	55	0	0.0	35	0.64	3	0.05	3	0.05	0	0.0
1992-93	65 ⁴	0	0.0	31	0.55	1	0.03	11	0.20	8	0.14

¹ Includes lynx radiocollared and released for study.

² Includes four wolves radiocollared and released for study.

³ Two permits revoked - calculations based on 50 trapping permittees.

⁴ Calculations based on 56 returned harvest reports.

11. Wildlife Observation

Many Refuge visitors make inquiries regarding wildlife viewing opportunities during stops at the Visitor Contact Station and the Visitor Center. They are encouraged to get an early start and to stay out late to have the best chances of seeing critters.

Spruce grouse are readily seen along Refuge roads; Dall's sheep can be seen with the Refuge-provided spotting scopes at the Russian River Access Area; and moose can be encountered at any time of the year on roads and trails throughout the Refuge. Brown and black bears, while not always visible, make their presence known along Refuge trails with their droppings and with claw marks on trees. Black bears are occasionally seen along the Skilak Loop Road and the Swanson River/Swan Lake Roads.

Beaver viewing has been significantly enhanced as a result of trapping restrictions at roadside lakes and day-use trails. A spotting scope at the end of the Keen-Eye Trail at the Visitor Center allows visitors to view loons, gulls, and an occasional bald eagle. Eagles are also readily seen along the upper Kenai River during the fall and winter as they feed on the last of the salmon.



A Refuge visitor photographs a fleeing cow moose and her calves.

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The Refuge maintains a variety of roadside wildlife/wildland observation points along roadways. Swans, moose, beaver, eagles, waterfowl, passerines, and other wildlife can be seen at these locations. A new overlook/observation point was established in 1992 on Skilak Loop Road, overlooking the Kenai River inlet into Skilak Lake. This year a similar facility was completed at a site overlooking Engineer Lake, the west end of Hidden Lake and the west face of Hideout Mountain; both locations had commercial-grade spotting scopes installed. We expect wildlife observation opportunities to be excellent at these sites, and as funds become available, we will install interpretive signing to aid visitors' wildlife/wildland viewing.

12. Other Wildlife-Oriented Recreation

A busy canoeing/boating season began in earnest in May, as visitors took to the waters in pursuits of recreational activities. The traditional Memorial Day weekend "opener" for summer activities saw all Refuge launch sites, campgrounds, and canoe trails at capacity. The traditional "crazy time", Labor Day, was also quite busy with similar activities and was augmented by moose hunting activity.

The Swan Lake and Swanson River Canoe Trails continue to be popular areas for Refuge visitors; an estimated 6400 visitors pursued Refuge recreation opportunities within the two systems. Canoeists generally participate in multiple activities while on the canoe trails, including camping, fishing, wildlife observation, and hunting (during the moose season). Facility maintenance and monitoring within the systems was conducted by the backcountry crew throughout the summer. Their patrols were augmented by YCC spike camps along designated portions of the routes.

13. Camping

This year, more than 65,000 visitors spent the night on the Refuge in campgrounds or backcountry areas. Although our developed campgrounds remain popular with the recreational vehicle and car-camping set, the backcountry trails are receiving substantial use also. Many of the more popular campsites within the canoe trail systems and along the Swanson and Kenai Rivers have been heavily impacted. It is likely that some restrictions may be imposed so that the most heavily impacted sites can be rehabilitated. The Public Use Management Planning Team has identified this as an issue to be addressed.

Hidden Lake Campground continued to be a popular destination for visitors in 1993, and the improved Upper Skilak Campground also proved popular once the word got out. These are the only campgrounds where user fees were collected this year; \$15,501 was collected, an increase of over 79 percent from 1992. Fees were collected from May 20 through September 7.

The Kenai/Russian River Access Area continued to be a popular recreation area during the year. The Refuge Concessioner collected fees from 12,032 vehicles using this area during his 60 days of operation. No fees were collected after the concessioner ceased operation of the ferry at the end of the sockeye run.

Planning for rehabilitation of Jim's Landing Campground continued this year. This popular boat launching/recovery site on the upper Kenai River has shortcomings as both a campground and a boat ramp area. Preliminary designs allow for rehabilitation of the entrance road, slightly increased and more efficient parking, easier traffic flow at the ramp, and day-use only. Rehabilitation and stabilization of the riverbank are also significant concerns which will be addressed in the final plan. We hope work will begin at this site in the summer of 1994.

Initial planning was begun for Lower Skilak Campground this year; we envision the rehabilitation project going out for bid in late 1994 or early 1995.

14. Picnicking

Picnicking generally occurs as an aside to other visitor activities, such as fishing, wildlife observation, and environmental education.

15. Off-Road Vehicles

The near record snowpack of the 1991-92 winter was not repeated this year. Consequently snowmachining had not officially opened by the end of December. However, several roadside ice fishing lakes, otherwise safe for travel, were opened up for snowmachine-supported ice fishing. Skilak Lake froze in mid-December, providing limited ice skating and ice fishing opportunities.

Overall snowcover declined during February. Moderate temperatures, high precipitation, and high winds combined to reduce the late February snowpack to bare ground on many portions of the Refuge lowlands. The Refuge was officially closed to snowmachine use on February 27 for lack of snowcover, making the 1992-1993 snowmachine season one of the shortest on record. Roadside lakes remained open to snowmachine use for ice fishing purposes only.

Unusually low snowfall also influenced the 1993-94 opening date. The minimal snowfall combined with above normal temperatures resulted in inadequate snowcover to open Refuge lands to snowmachines on December 1, 1993. A reminder news release was sent out December 13, 1993, to provide information regarding the continuing closure due to inadequate snowcover. Unauthorized snowmachine use was documented in the Caribou Hills, Moose River area, and several other locations during aerial and snowmachine patrols. The season finally opened the first week of 1994.

The snowmachine use in the Caribou Hills continues to increase. Dramatic increases in snowmachine use through the 1980's and early 1990's are the result of several factors including: increased knowledge about routes of travel and access; increased trespass and permitted cabins on State lands; increased snowmachine ownership due to local population increases and snowmachine availability; and increased use of the area by Anchorage residents. Increased utilization of the Caribou Hills by non-Peninsula residents can be anticipated due to increasing limitations on snowmachine use within the Anchorage area. Other factors influencing the increase are: the technology and speed of newer snowmachines; the decreasing distance from overnight accommodations and trailheads, and; improved trails linking snowmachine trailheads to Refuge lands. Day use, not based at recreational cabins, has also increased as off-Refuge roads have penetrated the southern Kenai Peninsula. Grooming of the primary access trails to the Caribou Hills during 1993 maintained trail snowcover during thaws and prolonged the use season. Also, an increasing number of people with permitted or trespass cabins on State lands in the Caribou Hills are living full-time at these cabins, increasing potential use of the area.

Aerial and ground patrols by Refuge staff have revealed that, prior to 1990, there was minimal unauthorized snowmachine use before the official opening date. Observations from 1990 through December 1993 indicate a significant increase in the amount of unauthorized use prior to the opening date. In 1993, as in other years without adequate snowcover on December 1, the public is notified of the delayed opening through the news media and by posting of the primary snowmachine access routes into the Refuge. Unauthorized use, as occurred in 1993, may significantly impact moose as they congregate in open areas during late fall and early winter, as well as impacting vegetation that is not yet protected by snowcover.

Although no formal survey was conducted, snowmachine use was believed to number in the thousands of use-days during 1993. On one busy weekend, snowmachiners left hundreds of miles of tracks traversing every accessible meadow, alpine, or subalpine open area. Most snowmachiners entered the Refuge via seismic lines and tended to concentrate at certain "avenues of entry". Trophy Lake exemplified such a concentrated use area; practically any open area near Trophy Lake was entirely hard packed within a few days after a snowfall. Compacted areas generally extended across the entire expanse of open terrain, including frozen lakes and open subalpine areas. During 1993 aerial observations noted three "cirque" areas that received most of the recreational hill climb use.

Unauthorized use of snowmachiners above treeline in the Fuller Lakes area developed as a source of concern in 1992 and continued in 1993. Compliance with general snowmachiner regulations was good at most other Refuge locations.

In February, two trapper/snowmachines became stranded when several days of thawing conditions caused the Killey River to breakup. They were rescued by an Alaska State Trooper helicopter but were unable to recover the stranded snowmachines for over a month.

Protection activities including signing, rights-of-way barriers, law enforcement patrols, and news releases were used in 1993 to prevent unauthorized all terrain vehicle activity. Several areas required monitoring due to unauthorized access. All terrain vehicle use continued to be authorized to access across lake ice and along designated routes during periods of adequate snowcover to Refuge inholdings. Two special access permits were issued to Bear Creek inholders during 1993.

16. Other Non-Wildlife Oriented Recreation

Cross-country skiing is a popular Refuge activity during the winter. There are 14 miles of Refuge-maintained trails around the Visitor Center. Many times during the season, the parking lot was full of vehicles whose occupants were utilizing these trails. Additionally, skiers utilized our hiking trails and open areas on the Refuge.



A Refuge visitor taking advantage of the Refuge's cross-country ski trails.

17. Law Enforcement

The Refuge had one permanent, full-time Refuge Officer, two collateral duty permanent Refuge Officers, and three seasonal-commissioned officers in 1993. Rob Barto returned as a seasonal Law Enforcement Officer after working the winter at Umatilla National Wildlife Refuge. Greg George and Patty Brown joined the Refuge as seasonal Park Rangers, coming over from

the National Park Service. Refuge officers conducted several investigations involving violations of federal and state wildlife laws. Refuge Officer Johnson made the majority of apprehensions, particularly at roadside and accessible locations. Park Ranger\Pilot Johnston conducted several investigations of commercial operators not being in compliance with their permits and\or in violation of federal laws. Johnston also conducted numerous remote flying patrols and investigations during the year. Refuge officer's Johnston and Johnson assisted the Division of Law Enforcement and State officers with several incidents and investigations.

There were 212 violation notices issued in 1993. Sixty-two percent of those were fishing-related infractions. The number of big game hunting cases handled by the Refuge increased as 12 violation notices were issued for various big game hunting violations. Notices of Violation are summarized in Table 36.

Table 36. Kenai National Wildlife Refuge Ticketed Violations, 1984-1993.

<u>Violation</u>	<u>84</u>	<u>85</u>	<u>86</u>	<u>87</u>	<u>88</u>	<u>89</u>	<u>90</u>	<u>91</u>	<u>92</u>	<u>93</u>
Snagging fish.....	23	10	1	15	14	20	26	7	21	31
Fishing closed waters.....	4	3	3	3	1	8	15	36	15	12
Overlimit fishing.....	3	4	1	4	8	4	24	17	16	14
Fishing without a license.....	1	2	1	1	10	14	8	11	9	16
Other fishing violations.....	4	2	0	2	1	29	51	69	51	59
Snowmachine violations.....	2	0	0	2	1	0	0	0	3	3
Motor boat closed area.....	0	0	0	1	4	2	0	4	1	0
Unauth. use of motor veh.	20	28	15	13	9	2	4	7	8	15
Illegal parking.....	12	2	0	3	3	2	5	19	19	5
Illegal aircraft landing.....	0	0	0	4	2	0	1	0	0	3
Illegal fireworks.....	2	2	0	2	0	0	1	1	2	0
Weapons violation.....	0	2	6	3	1	0	0	3	0	2
Violation of big game regs.	1	0	0	4	0	7	7	10	5	10
Migratory Bird Hunting Act.....	2	2	1	2	4	2	1	4	18	8
Littering.....	2	3	4	1	1	0	4	3	1	0
Unauthorized structure.....	0	0	2	0	2	0	0	0	1	1
Illegal woodcutting.....	2	9	3	4	4	0	1	4	2	0
Speeding.....	3	0	2	1	1	1	1	1	4	1
Unattended fire.....	0	0	0	0	1	1	2	3	0	0
Interference with officer.....	0	0	0	1	0	0	0	1	0	1
Destruction of property.....	0	0	0	0	1	0	2	0	0	0
Permit violations.....	2	2	1	3	2	1	2	1	4	4
Violation Coast Guard regs.....	0	0	0	0	0	14	8	8	3	3
Violation Refuge Spec. regs.....	0	2	1	5	0	3	5	5	2	2
Trapping violations.....	0	4	4	2	0	1	2	5	2	3
Lacey Act.....	0	0	0	0	0	0	0	0	0	2
Violation of control. subs.	0	0	0	0	0	0	0	0	0	9
Violation of bear baiting regs...	0	0	0	0	0	0	0	1	2	2
Theft.....	0	0	1	5	0	0	0	0	0	0
Violation of traffic code	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>5</u>	<u>5</u>	<u>0</u>	<u>1</u>
Total	83	77	46	81	70	111	175	225	190	212



Moose seized by Refuge Officers.

CJ/8/93



An eagle was caught in a snare set too close to sight-exposed bait.

RJ/93

The Visitor Contact Station, near the eastern Refuge boundary on the Sterling Highway, was broken into sometime during the evening/morning of June 25-26. The padlock on the door had been pried off, facilitating entry. Stolen were eight T-shirts and approximately \$115.00 in cash. The Alaska State Troopers (AST) responded and attempted to lift fingerprints on various surfaces; they filed a case number but agreed that an apprehension was not likely.

18. Cooperating Associations

Final 1993 sales for the Refuge's Alaska Natural History Association cooperating sales outlet (Kenai branch) totaled \$22,700. Through a community art contest, two new T-shirt designs were created. These new T-shirt styles were the most popular sales items for 1993.

Proceeds from cooperating association sales were used for volunteer awards and were especially instrumental in creating honorarias for outstanding volunteer contributions in 1993. Association funds were used for conducting teacher environmental education workshops. Proceeds from sales were set aside for the production of a Refuge information/interpretative newspaper for the summer of 1994.

The ANHA Kenai branch received a \$2,000 development grant to produce a Kenai Peninsula multi-agency hiking trail brochure in 1994.

19. Concessions/Commercial Operations/Special Use Permits

Tawah Trading Company is under contract to operate the Russian River Ferry and collect fees at the Kenai/Russian River Access Area. A total of 12,032 vehicles were accommodated and \$46,437 in fees were collected in 1993. The concessioner's ferry transported 36,393 passengers for user fees of \$104,352. The total is not a bad bit of business for two months (Table 37). The concession contract includes a clause exempting Tawah from paying a percentage of receipts to the government. In return, the concessionaire provides free ferry passage for State and Refuge employees and pays for toilet pumping and dumpster service during the time the ferry is in operation.

This is the last year of the present concession contract. There are many areas of the contract which need to be revised for improved delivery of services to the public. Additionally, it is anticipated that the Refuge will assume operation (through a lease or memorandum of agreement) of the Sportsman's Lodge property, purchased this year by the State; the concessioner at the Russian River Ferry is the logical entity to operate the additional property. We hope to have a new contract signed in early 1994.

The purchase of the Sportsman's Lodge property by the State will be a positive step toward remedying a potentially dangerous parking situation

along the nearby portion of the Sterling Highway. With additional parking at the Sportsman's area and with the aid of the State Department of Transportation in eliminating most, if not all, of the dangerous highway parking areas, we hope to successfully address the problem in the near future.

Table 37. Visitor Use and Gross Receipts for Russian River Access Area and Ferry, 1989-1993.

	<u>1989 *</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>
<u>Vehicles</u> (24hrs)	numbers/\$	numbers/\$	numbers/\$	numbers/\$	numbers/\$
under 27' :		13,400/	12,316/	11,459/	9,788/
\$4.00		\$53,600	\$49,264	\$45,836	\$39,152
G. Age:		1097/	1,144/	1,080/	1,185/
\$2.00		\$2,194	\$2,288	\$2,160	\$2,370
over 27' :		548/	493/	706/	907/
\$5.00		\$2,740	\$2,465	\$3,530	\$4,535
G. Age:		186/	124/	288/	152/
\$2.50		\$465	\$310	\$720	\$380
TOTAL VEHICLES		15,231/	14,177/	13,533/	12,032/
TOTAL \$	\$41,992	\$59,000	\$54,327	\$52,246	\$46,437
<u>Ferry</u>					
(rnd.trp.)					
Adults:		39,261/	42,836/	32,475/	33,175/
\$3.00		\$117,783	\$128,508	\$97,425	\$99,525
Kids:		4,137/	4,617/	3,410/	3,128/
\$1.50		\$9,307	\$6,925	\$5,115	\$4,827
TOTAL PEOPLE		43,398/	47,453/	35,885/	36,393/
TOTAL \$	\$83,035	\$127,090	\$135,433	\$102,540	\$104,352
TOTAL					
GROSS RECEIPTS					
	\$125,027	\$186,090	\$189,760	\$154,786	\$150,789

* 1989: visitor use not reported, only gross receipts

A new fee structure was implemented for special use permittees during 1993. The fee was calculated on a per-client rate that varies with the activity being pursued. Rates range from \$2.00 for general visitor/clients to \$8.00 for brown bear hunters. Permittees were allowed a 50 percent discount in the first year with full fees to be charged in 1994.

Most special use permits (SUPs) for various outdoor recreation services were issued by May 1, 1993. A total of 64 individuals or businesses obtained annual permits for commercial visitor services, providing 17,000 visitor days of use. An additional 20 individuals obtained incidental permits for the upper Kenai River (Table 39). Several permit stipulations and addendums were rewritten, and two new forms for recording vehicles and permit employees were developed.

Big Game Guiding/Outfitting

Five-year SUPs were finalized for four big game guide/outfitters who successfully competed for Refuge permits. William Gavin filed an appeal for the permit in the KEN 02 big game guide/outfitter area. Regional Director Stieglitz examined the process and decided to allow Gavin to take one disabled hunter per year on Refuge lands. Including Gavin, five permits were finalized in 1993. A second appeal was filed by unsuccessful applicant Matt Owen regarding area KEN 03; successful applicants Cecil Jones and Duncan Kishbaugh were notified of the pending appeal. Kishbaugh was issued a permit for KEN 02 and not KEN 03. Regional Director Stieglitz reviewed the appeal of Matt Owen regarding his application for use of area KEN 03 Game Management Unit (GMU) 15C. Stieglitz found in Owen's favor and awarded him joint use of KEN 03 with Cecil Jones. At the end of 1993, Owen, however, had not finalized his permit.

Regional Director Stieglitz responded to a January 7, Congressional Inquiry from Senator Stevens regarding Bruce Willard's failure to apply for Guide/Outfitter Area KEN 03. Mr. Willard filed a written appeal on December 29, 1992, seeking approval to apply for this area after the award process was completed. His request was denied in January 1993.

Fly-in Tent Camps

Long time fly-in tent camp permittee Donald Cogger sold his Alaska Air Guide Inc. to Jim Bern (Jim Air Inc.) during 1993. On May 26, 1993, Cogger was requested, via certified mail, to remove all materials, debris, and equipment from King Lake within 30 days. On May 28, Acting Refuge Manager Kent sent a letter to Leonard T. Kelly, legal counsel for Jim Bern of Alaska Air Guides/Jim Air Service, explaining the current tent camp permit program and reviewing the administrative record regarding the existing camps on King Lake and their status. Jim Air Inc. requested a transfer of the permit, which was denied. An explanation of the decision, existing policy, and pending appeal was sent to Senator Stevens after his office inquired on behalf of Bern. The appeal was dropped, and a lottery was held for one of the King Lake camps as directed by the 1980 tent camp policy. Michael McBride of Alaska Air Adventures was the successful applicant. Rust's Flying Service received one of the two King Lake Camps offered. The

third camp was permanently removed. Rust's Flying Service was awarded the camp at the south end of King Lake to replace their Sandpiper Lake Camp, which had been on Refuge land conveyed to Point Possession Native Group.

A tent camp site was also made available via lottery on Sportfish Lake. Will Satathite of Clearwater Air was the successful applicant, but by year's end, had not finalized his permit.

Table 38. Tent camp use from 1985 to 1993.

	1985	1986	1987	1988	1989	1990	1991	1992	1993
<u>KETCHUM</u>									
Snag	64	60	70	69	76	70	32	36	44
(3)	180	173	210	207	218	183	86	118	116
camps	540	519	630	621	654	549	258	450	280
<u>McLain</u>									
(2)	30	29	67	62	58	53	28	45	59
camps*	468	348	807	603	630	588	154	350	404
<u>Wilder.</u>									
	44	53	47	41	49	42	23	31	39
	140	149	126	116	127	112	61	85	110
	420	447	378	348	381	336	183	245	215
<u>RUST</u>									
Bird	NR?	36	19	9	21	31	41	35	37
	NR?	149	65	35	78	108	115	92	129
	NR?	447	103	70	156	216	230	166	236
Tangera	NR?	12	11	4	10	13	11	13	9
	NR?	41	30	10	32	35	25	36	25
	NR?	123	60	20	64	70	50	75	15
King									5
(3)									14
camps									26
<u>AK BUSH CARRIER</u>									
Mull	38	33	36	42	35	44	38	41	12
(2)	135	125	138	144	130	135	112	120	24
camps	338	250	276	288	266	278	224	240	48
Bedlam	35	37	39	38	35	36	26	29	14
(2)	103	115	118	124	115	134	116	118	58
camps	206	230	295	248	230	258	232	236	144

* Scenic Lake closed due to swans; camp moved to McLain in 1986 season.

** King Lake sold in 1993; camp not used due to late season installation.

Other

An informational letter and accompanying land status map was sent to several affected special use permittees regarding Region 7 policy that permittees notify and obtain the views of native organizations regarding planned use of selected lands.

Table 39. Guided recreational visits occurring on Kenai National Wildlife Refuge, 1993.

	# Permits	Number Visitors	Total Visits
Upper Kenai River			
Sport Fishing	20	3298	3550
Upper Kenai River			
Scenic Floats (Rafting)	15	6300	7048
Lower Kenai River			
Sport Fishing	42	3000	3400
Fly-in Tent Camps	4	535	1378
Guides/Outfitter/			
Big Game/Transports	12	200	925
Other	<u>22</u>	<u>875</u>	<u>1350</u>
*TOTAL	115	14,208	17,675

* Several permittees utilized multiple Refuge areas, so column total exceeds total 1993 permits issued.

Special use permits were issued for the following activities: personal and commercial firewood (40), trapping (65), guide/outfitter (47), 3-day incidental (29), cow hunt (20), use OEC (15), air taxi (3), tent camps (4), transporters (4), cut poles (4), mobility impaired hunters (4), fish studies (4), use Headquarters Lake (1), salmon study (2), egg take (3), dog-sled racing (1), gravel use (2), stickleback study (1), inholder firewood (1), inholder access (4), hunt guide (5), install telephone (1), antler collection (2), geophysical research (3), audio-visual (1), other (2), scientific (2). The total number of permits issued in 1993 was 270.

I. EQUIPMENT AND FACILITIES

1. New Construction

A 150-gallon, trailer mounted aluminum water tank with 100 feet of one-inch hose, a tool box, and a valve system to permit loading from a lake or stream was fabricated in 1993 to enhance our fire response capabilities.

A new 16 x 20 foot frame shed was constructed to house the diesel generator

at the Skilak Guard Station. The facility will not only provide all-weather protection for the generator and control panel, but also considerably reduce the noise level at this remote site.

A new and enlarged parking area was constructed at the Hidden Creek Trailhead.

A new steel gate was constructed and installed at the beginning of Swan Lake Road to permit more positive traffic control during spring road closures due to "breakup" conditions.

A recreational vehicle (RV) dump station and evaporation lagoon was constructed along Skilak Loop Road. The area was designed to meet Alaska Department of Environmental Conservation (ADEC) regulations for septic wastes in newly constructed/and or improved campgrounds. The new well is operated by a remote solar-powered generating system, with solid wastes being gravity-fed into an open lagoon system. Time will be the ultimate judge of the acceptability of this type of remote power system. The solar panels erected at the nearby Hidden Lake Campground in 1992 were stolen within a year.



Nearly completed access to the new centralized Skilak Wildlife Recreation Area RV Dump Station located along Skilak Loop Road near Engineer Lake. 93/JF



This 12 x 16 foot building houses a solar powered unit for the submersible well and a 2000-gallon storage reservoir for the RV dump site. 93/JF



Evaporation pond for RV Dump Station. 93/JF



New 24-foot gate fabricated by Mechanic O'Guinn was installed at the beginning of Swan Lake Road to provide more positive vehicle control for annual road closure during spring breakup. 93/JF

Several hundred routed wooden signs were fabricated at the Refuge sign shop. Output this year exceeded that of any previous year. As in past years, several signs were made and shipped to other Alaska refuges. Increasing levels of theft and vandalism continue to place growing demands on our sign-making capabilities.



A display of some of the 250 wood-routed signs produced at the Refuge sign shop in 1993. 93/JF



A number of special request signs were also made and shipped to other refuges within the state. 93/JF

2. Rehabilitation

A 1000-gallon double-wall aviation fuel tank was installed at the Kenai Hangar to replace the old 2000-gallon underground tank removed in 1990. The tank design and installation received approval from the City of Kenai Airport Authority and the Kenai Fire Department.

The Tustumena boat ramp road was re-graveled in 1993. Raven Contractors of Kenai was awarded the 2000-cubic yard contract to gravel the 1.4 mile road.

Weaver Brothers Trucking was contracted to move 200 twelve-foot concrete planks from the Skilak storage yard to near the Tustumena boat ramp site. Reconstruction of the boat ramp was deferred until the spring of 1994 in order to take advantage of low water conditions.

Randy's Glass of Kenai was awarded a \$5000 Maintenance Management System (MMS) contract to replace eight old and worn fiberglass overhead doors in the cold storage building. Getting the all steel doors with windows was a long awaited, and much needed, improvement project.

Kraxberger Drilling Co. was lowest bidder to abandon three old water wells - two at Russian River Campground and one at Lower Ohmer Lake. This MMS project permitted abandonment of these wells in accordance with approved Alaska Department of Environmental Conservation (ADEC) regulations.

A Soldotna firm, HAPCO Inc., was awarded on MMS project to paint the new steel overhead doors in the cold storage building, the interior of the maintenance shop building, and the steel safety-guard posts in the shop compound.

DECOR Inc. of Kenai received a contract to replace the carpeting in the Refuge office/visitor center (upper and lower levels), residence, and bunkhouse. This was another much needed project made possible with MMS funding.

3. Major Maintenance

The Tustumena Lake Access well, stolen sometime during the winter of 1992-93, was replaced, retested, and put back into operation prior to the 1993 public use season.

Fearing development of a large "sink hole" at the old Kenai Refuge Headquarters in downtown Kenai, a concerted effort was made to locate the source of a chronic leak in the water line feeding off the City of Kenai's main line. After considerable digging, an inoperative check valve was found and repaired.

All pulleys and cables for the two bi-fold doors at the aircraft hangar at the Kenai Airport were replaced in 1993.

All brakes were replaced on our three lowboy trailers to conform with new State of Alaska Department of Transportation Regulations.

4. Equipment Utilization and Replacement

Our 1987 full size Dodge pickup suffered a fatal front differential problem, and considering the age, mileage, and overall condition of the vehicle, Mechanic O'Guinn performed something akin to a frontal lobotomy. The former 4 x 4 is now a 4 x 2 but is expected to serve us well until a replacement arrives.

Another full size 1986 Dodge pickup was temporarily moth-balled due to acute rear differential and axle failure. The unit was later driven to Anchorage, where Selewik National Wildlife Refuge picked up the tab for a new differential prior to the truck being permanently transferred to that station.

The old parts washer was replaced with a new De-Solv-it unit which uses a non-hazardous biodegradable solvent. A local firm cleans and properly disposes of sludge on a monthly basis, thus solving one of a growing number of problems dealing with storage and disposal of hazardous wastes.

5. Communications Systems

A new phone system was installed at a cost of \$14.6K in 1993. The new system allows for voice mail and auto-attendant capabilities.

During the system overhaul, all FTS lines were pooled and are now separated entirely from any commercial lines.

6. Computer Systems

No major changes occurred to the computer system in 1993. The station is planning to install a Local Area Network (LAN) sometime next year.

7. Energy ConservationTable 40. Energy use comparisons, 1992 - 1993.

<u>Product</u>	<u>Unit of Measure</u>	<u>Energy Use Comparisons</u>		<u>%Chg.</u>
		<u>1992</u>	<u>1993</u>	
Electricity	Kilowatt hours	171,677	179,411	+ 4.3
Natural Gas	100 cubic feet	18,068	16,704	- 7.5
Vehicle Gas	Gallons	14,587	12,858	-11.8
Aviation Gas	Gallons	4,835	5,157	+ 6.3
Propane	Gallons	572	391	-31.6
Diesel Fuel	Gallons	3,331	4,186	+20.4

Reasons for changes in the magnitude of energy consumption from year to year are not always readily discernable; however, total fleet mileage for gasoline powered vehicles was down from 1992, but up for diesel powered units. More flying hours (Super Cub and Cessna 206) occurred in 1993. A higher level of occupancy in the Refuge bunkhouse for a longer period of time placed additional demands on electricity consumption, while warmer than average winter-time temperatures saved on overall heating costs (natural gas).

8. Other Oil and Gas & ContaminantsSwanson River Field (Unocal Corp.)

Union Oil Company of California (Unocal) succeeded Arco Alaska, Inc., as operator of the Swanson River Field on December 15, 1992. One of UNOCAL's first official actions was submittal of an amendment to the current Plan of Development, requesting approval to begin delivery of a limited portion of salable gas from the field. While this amendment has been approved by both the Bureau of Land Management (BLM) and the Service, Unocal has yet to finalize their long term marketing and distribution plans.

It is well known that oil production operations in the Hemlock Reservoir of the field, which has historically been supported by gas cycling, are reaching their limit of profitability. For this reason, Unocal is committed to redirecting past operational strategy to focus on a limited volume of gas sales while maintaining gas injection at current rates. This new objective will be supported by the development and use of a computer model of the Hemlock zone. The model will aid in formulating long range production and injection strategies so that economic recoveries from the reservoir will be maximized.

Unocal's first year of field operations was directed primarily toward "gearing up" for production of natural gas reserves while attempting to recover the last economically recoverable vestiges of crude oil.

As Unit Operator, Unocal inherited the responsibility to continue remediation efforts on several on-going contaminant clean up projects: (1) Pipe and Supply Yard (P&S) ground water circulation and aeration for Benzene, Toluene, Ethylbenzene and xylene contamination; (2) 3-9 Tank Setting pilot project to determine remediation options for long standing hydrocarbon contamination; (3) residual PCB's stemming from original Order by Consent Agreement signed with Chevron USA in 1985; and, (4) hydrocarbon contamination from seven flare stack sites within the field.

In June, Refuge Operations Specialist Frates drafted a Freedom of Information Act (FOIA) response concerning pending litigation over the Swanson River PCB Remediation Project. The case is being litigated by a Los Angeles Law Firm representing insurance companies handling claims submitted by former Swanson River Unit Operator Arco Alaska, Inc. This is the second FOIA request received from the same Los Angeles firm, the last being in August of 1991. It appears that all parties are settling in for what will undoubtedly be a lengthy battle of corporate barristers.



The first documented osprey nesting attempt within the Swanson River Oil Field in over 30 years-- unfortunately, atop a "hot" 24.9KV feeder line. 93/JF

On July 26, the Refuge was advised that at least one osprey was attempting to construct a nest atop the single-pole, dual cross arm feeder line which serves as the main breaker for field operations. The few sticks placed across the incoming 24.9KV line posed a serious threat to both the osprey and the entire field's electrical system. In an attempt to lure the insistent nest builder away from the "bad" pole to the "good" pole, field personnel erected a 40-foot pole nearby, complete with platform and a few "starter" nesting sticks. At least three ospreys were periodically observed roosting and carrying sticks to the artificial platform during the rest of the summer and fall. Should the birds attempt to nest in 1994, it will be the first documented osprey nest within the field since the early 1960's.



Unocal Field personnel erected a 40-foot pole nearby, complete with "starter sticks". At least three individual ospreys' added to the nest during the year, but no serious nesting attempt was evident.

93/JF

On September 20, a moose hunter discovered what later proved to be an undetonated explosive charge while hunting along the eastern border of the Swanson River Field. The tubular container, identified with the brand name of Vibra Gell, was quickly traced to Northern Geophysical Company, which had done seismic work in the area during the winter of 1989-90. On September 21, the company dispatched two field technicians to the area, accompanied by Refuge Ranger Chris Johnson. The charge was located and removed from the site by Northern Geophysical. Company representative Jeff Hastings apologized for what he described as "a serious mistake which should not have happened", given the rigid accountability procedure employed during seismic operations.

Scars from the extensive PCB cleanup at the 14-3 Materials Site from 1987 to 1992 are showing promising signs of healing. Site seedings during the spring and late summer produced good cover at both the Circulating Bed Combuster site and the nearby repository area for the nearly 107,000 tons of incinerated soil.



Before: The approximate 10-acre site where over 107,000 tons of incinerated PCB-contaminated soils were deposited. The area was covered with two inches of topsoil and then seeded and fertilized. 93/JF



After:

Beaver Creek Production Facilities (Marathon Oil)

Marathon Oil Company (MOC) continued to evaluate contaminant levels in ground water stemming from a 1990 diesel spill at the main generator and distribution facility. Monitoring several water wells around the perimeter of the area revealed no "downstream" or "migrant" contamination which may have posed a threat to the Beaver Creek drainage system. MOC contracted with an Anchorage consulting firm, TERRASAT, Inc., to develop a mathematical model of diesel contamination and potential migration patterns while also studying possible vegetative changes using aerial photo interpretation. A final report, along with remediation options, will be completed in 1994.

Beaver Creek continued to experience natural gas production problems due to water infusion in two of their five wells. At least one well, BCU #7 was shut down indefinitely. Marathon has plans to drill a new well in 1994 in hopes of increasing production capabilities to meet their outflow contract obligations with ENSTAR, Inc.

On July 22, at approximately 8:30 a.m., a contract tanker hauling crude from Beaver Creek to a Nikiski refinery developed a crack in the forward bulkhead weld seam while approaching the bridge over the north fork of Beaver Creek. Quick action by the driver, and a hastily assembled in-field response team, prevented what could have been a major spill. Approximately 40 gallons of crude was spread for about 600 feet on both sides of the bridge. Some spotting of crude was observed on the bridge, but no visible sheen was apparent in the water.

The incident proved to be an excellent test of MOC's emergency response capability. The driver and on-duty field personnel are to be commended not only for their decisive action in only cleaning up visible crude oil, but also for their quick response in getting the product pumped out of the crippled tanker into another tanker. Ironically, the spill site was only 50 yards from a simulated tanker spill-drill conducted just months before.



An approximate 14-inch long break in the seam weld in the forward bulkhead of this fully loaded tanker resulted in minor spillage of crude oil along Marathon Road within the Beaver Creek Field. 93/JF

Contaminants (non-unitized areas)Underground Storage Tanks (UST's)

Three underground fuel storage tanks, a 2000-gallon aviation gas tank at Headquarters Lake, a 1000-gallon diesel fuel tank, and a 1500-gallon unleaded fuel tank located at the maintenance shop complex, were removed, and their sites tested for residual fuel contamination. While no confirmation of tank leakage was detected, some hydrocarbon contamination was detected beneath the two above-ground dispensing pumps. Funding will not be available for re-excavation and further testing until 1995. Contaminant levels were not alarming, but ADEC will require further site evaluation before issuing a final closure.



Two underground fuel storage tanks and their pumps (unleaded and diesel) were removed within the shop compound. Some leakage was detected during soil sampling directly beneath the pumps. Further sampling and site investigation will be required at this site.

93/JF



The 2000-gallon aviation tank at Headquarters Lake showed no signs of leakage. The tank will be replaced with a 1000 gallon above ground, double-walled unit. 93/JF

Pentachlorophenol (PCP) Site

The Denver Engineering Center (DEC) administered the first of a multi-level PCP evaluation, investigation, and remediation project at the old Swan Lake Wildcat Well #1 site within the Moose Research Center. The well pad was used to treat fence posts with PENTA back in the late 1960's and early 1970's and contains some residual contamination as a result of treatment operations.

Site investigative work was awarded to EBASCO Environmental, Inc., a Colorado based consulting firm. The first phase report identified a number of tasks to be completed before year's end, including moving several stacks of steel drill stem from the site.



Site investigation being conducted by EBASCO Environmental, Inc. for pentachlorophenol (PCP) at the old Swan Lake #1 drill pad--site of fence post preservation activities in the late 1960's and early 1970's. 93/JF

Extensive mapping was completed using a magnetometer, as well as soil density investigative techniques. Computer generated maps showed a number of "anomalies" below the surface, but further investigations will be necessary in 1994 to delineate PCP contamination from other contaminants left over from the early 1960's well drilling operations. As it now stands, additional detailed site analysis will be completed in 1994, and clean up efforts (if necessary) will be initiated in 1995.

Overland Drive Oil Shed Site (old Kenai Refuge HQ)

A small (10 cubic yards) pile of hydrocarbon contaminated soil is all that remains from a previously extensive clean-up effort at the old Kenai Refuge administrative site along Overland Drive in downtown Kenai. Rozak Engineering completed a Final Corrective Action Plan listing remediation options. Unfortunately, all were expensive and complex considering the small quantity of material involved. We are expecting a local firm to receive necessary ADEC permitting in 1994 for contaminated soil disposal. We are currently in the process of negotiating a contract for final resolution and closure of this site.

J. OTHER ITEMS

1. Cooperative Programs

Winter Wolverine Aerial Surveys

Refuge and ADF&G personnel cooperated in an aerial survey of wolverine distribution and relative abundance on the Kenai Peninsula. Areas in the Caribou Hills and south of the Fox River were surveyed.

3. Items of Interest

An old cabin, probably built for trapping, was "discovered" by Refuge staff in 1993. The cabin was apparently built in 1926 by Harry Johnson. It is located on an unnamed stream located approximately six miles southeast of the second air strip on the Mystery Creek Pipeline Road, Range 4 west, Township 8 north, southwest 1/4 of Section 26. The cabin is in excellent condition and looks like one could move right in. By looking at the notes left at the cabin and dates on canned goods in the cabin, it appears that no one has used the cabin since 1976. We believe Refuge Officer Johnson is the first Refuge employee to visit the cabin. The cabin was in the Chugach National Forest until the boundary change with the Refuge in 1980.

4. Credits

This report was truly an entire staff effort.

Photo Credits:

RJ - Rick Johnston
JF - Jim Frates
CJ - Chris Johnston