KENAI NATIONAL WILDLIFE REFUGE

Soldotna, Alaska

ANNUAL NARRATIVE REPORT

Calendar Year 1992

U.S. DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

NATIONAL WILDLIFE REFUGE SYSTEM

R

REVIEW AND APPROVALS

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Soldotna, Alaska

ANNUAL NARRATIVE REPORT

Calendar Year 1991

Refuge Manager — Date: 5/19/94

Refuge Supervisor Review — Date: 4/1/96

Regional Office Approval — Date: 4/1/96

INTRODUCTION

The Kenai National Wildlife Refuge is situated on the Kenai Peninsula in southcentral Alaska. The northern portion of the Refuge is only 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 wildlife 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 our Chugach National Forest and Kenai Fjords National Park neighbors.

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, changed the Kenai National Moose Range to the Kenai National Wildlife Refuge. It also increased the Refuge acreage, adding mostly mountains of approximately 150,000 acres at the southern tip of the Refuge and about 90,000 acres of former Forest Service lands to the extreme northeast portion of the Refuge near the Chickaloon Flats. At the same time, passage of the ANILCA withdrew 16,535 acres from the Refuge to satisfy the claims of the Salamatof Native Association under the Alaska Native Claims Settlement Act. The now 1.97-million-acre Refuge was reestablished and is currently managed to: 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 expanded purposes, ANILCA formally designated 1.35 million acres of the Refuge as wilderness.

The Refuge is divided into two generalized physiographic types, a mountainous region and a forested lowland. Elevations on the Refuge range from 150 feet above sea level in the lowlands to over 6600 feet in the Kenai Mountains with treeline at 1800 feet. Among the peaks of the Kenai Mountains lies the Harding Ice Field, which thrusts numerous glacial fingers out 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 the Refuge. 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 km^2). 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 River, 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 the 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.

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I. EQUIPMENT AND FACILITIES

J. OTHER ITEMS

A. HIGHLIGHTS

• With the hiring of Outdoor Recreation Planner Emily Fiala the long-delayed process to develop a Public Use Management Plan began in earnest. (See D 2 b.)

• The Refuge's youth and volunteer programs accomplished many projects. (See E 2-4.)

• Bird and wildlife surveys performed on the Refuge revealed some expected and some unexpected changes in populations and densities (See G.)

• Upper Skilak Campground was closed for rehabilitation for the summer. The accessibility evaluation performed on the new campground and the one at Hidden Lake emphasized the need for universal accessibility. (See H 13 and I 2 f.)

• Near-record snowfall collapsed the roofs of Refuge trailers.

• Incineration of PCB-contaminated soil in the Swanson River oilfield was completed and the associated facilities were demobilized. It would appear that all clean-up objectives (see J 2 a [2]) for this monumental project have been met.

B. CLIMATIC CONDITIONS

Table 1. Monthly temperatures (averages) and precipitation data, 1992.*

	Temperature(Fahrenheit) Averages			Precipitation Inches			Snowfall** Inches	
	Normal	High	Low	1992	Normal	1992	Normal	1992
January	10.2°	41°	-8°	20.8°	.71	1.37	10.7	17.8
February	16.1°	37°	-25°	11.3°	1.08	1.44	9.8	14.5
March	20.6°	43°	-28°	22.4°	1.04	.42	9.3	5.1
April	33.4°	51°	5°	32.5°	.90	.02	4.7	--
May	43.4°	68°	24°	43.2°	.07	.53	0.4	--
June	50.0°	68°	37°	53.8°	1.29	.98	--	--
July	54.2°	74°	41°	55.8°	2.02	1.77	--	--
August	53.6°	69°	46°	54.1°	2.56	3.12	--	--
September	47.0°	60°	16°	39.4°	3.30	1.68	--	4.
October	35.0°	49°	7°	30.6°	2.21	2.36	3.4	7.6
November	21.5°	44°	3°	26.7°	1.51	4.45	8.6	9.7
December	10.1°	43°	-19°	13. °	1.33	1.66	12.4	15.2
Yearly Average	32.93°	53.92°	11.42°	33.63°				
Totals					18.02	19.80	58.94	73.9

*Information obtained from the monthly Climatological Reports and the Federal Weather Service.

**Information obtained from the monthly Climatological Reports, the State Climatologist, and the Federal Aviation Administration.

In 1992 we once again enjoyed an exceptionally warm year. A low temperature of -28° Fahrenheit (F.) occurred on March 4. Although the year was not as warm as 1991, we still enjoyed pleasant weather. In June, July, and August, temperatures were well above normal, with our high for the year 69°F. occurring on August 8.

In the fall, temperatures seesawed back and forth between melting and freezing. Even though we received more snow in the fall than normal, we ended up with less snow on the ground because of higher temperatures. By the end of the year, the Refuge was still closed to snowmachine use due to the lack of snowcover.

C. LAND ACQUISITION

1. Fee Title

a. Kenai Native Claims Settlement Act

(1) Kenai Native Association, Incorporated (KNA)

Land exchange discussions continued during 1992 regarding a possible trade of subsurface Federal lands (West Fork Tract) which are being drained by Cook Inlet Region Incorporated's (CIRI's) new gas field in the Sunken Island Lake area. Initial discussion centered on a land trade that would exchange the United States subsurface lands in the tract for specific CIRI and Kenai Native Village lands which would be returned to Refuge ownership. U.S. Fish and Wildlife Appraiser Meck was at the Refuge during the first week of February appraising several parcels of CIRI and KNA inholdings that had been selected as possible trades.

Congressman Don Young introduced a land swap bill (H.R. 4694) in the House of Representatives during early April. The bill called for a land trade between the Refuge and KNA. The swap would return certain KNA lands to the Refuge but would remove Alaska Native Claims Settlement Act (ANCSA) Section 22g protection from the remaining KNA lands. The land swap would involve KNA lands which were already being examined for two other potential land trades.

In the last days of the U.S. Congressional Session, an Act (H.R. 0072) was passed directing expedited negotiations between the U.S. Fish and Wildlife Service (USFWS) and KNA under ANCSA Section 14(h)(3b), directing land acquisition and exchange negotiations by the Secretary of the Interior.

During August, CIRI and KNA reviewed the land appraisals associated with the West Fork Tract subsurface exchange proposals. A letter was also received by Regional Director Stieglitz from KNA Present Katherine Boling rejecting several other potential land exchanges. In essence, KNA's letter stated that immediately taxable lands were unacceptable for exchange, expressed concern with recent assessed land valuations of their properties, and suggested that they would continue pursuing legislative options for their desired land relief.

The ongoing land exchange negotiations between KNA, CIRI, and the Refuge involving the West Fork subsurface lands appeared to be at an impasse by year's end; however, the other exchange proposals remained active.

In a September letter, Regional Director Stieglitz acknowledged that CIRI was no longer interested in pursuing the land exchange proposal. Stieglitz acknowledged CIRI's land appraisal concerns and said that an independent appraiser would be contracted to assess certain Tustumena properties and the properties at the outlet of Skilak Lake. Stieglitz further noted that a solicitor's opinion had been requested regarding the interpretation of

ANCSA 14(b)(1) regulations. The solicitor's opinion would be included in the independent appraiser's instructions.

(2) Salamatof Native Association (SNA)

A copy of a proposal was received in late March to change the name of Elephant Lake within the Salamatof Native Association inholdings to Spirit Lake. The Refuge responded on April 1 via telephone to the Alaska State Geographic Names Board voicing no concerns regarding the name change.

(3) Tyonek Native Corporation Incorporated (TNC)

Nothing to report.

(4) Point Possession Native Group Incorporated (PNG)

During April, Refuge Manager Doshier met with Region 7's Chief of Realty Sharon Janis and Associate Manager George Constantino regarding Point Possession Native Group's stated interest in selling their 4400 acres of land for approximately $1000 an acre. Participants discussed the relative priority of purchasing Point Possession lands and the market value of the lands. Participants resolved to evaluate the government's first right of refusal to purchase the lands should a sale offer be received by Point Possession. As with other ANCSA Section 22g inholdings, the perceived and appraised value of the inholding will probably be considerably different.

(5) Cook Inlet Region Incorporated (CIRI)

A notice to issue final patent to CIRI for subsurface land within the Refuge boundary was received April 24, 1992; in all, 9600 acres were affected. The original interim conveyance took place December 4, 1981, (I.C. No. 460).

A land exchange proposal was formalized in July for a proposed three-way trade between the Federal government, CIRI, and KNA. The specifics of the proposal are contained in Section 1.a(1) above.

b. Native Allotments

The lawsuit filed during early 1992 in U.S. District Court by the heirs of Alec Dolchok (seeking to halt an Interior Department ruling to set aside an award of 40 acres of Native allotment lands at Harvey Lake) was set aside, and a government contest hearing was set for April 20, 1993. This allowed the Refuge to present the essential facts of Mr. Dolchok's early use of Refuge lands and alleged occupancy of Harvey Lake.

2. Easements

Final easement notices were received on KNA AA8579 and AA8909.1. At year's end, documents were being revised for accuracy and conformance to previous agreements.

Bank angler's use of the twenty-five-foot public use easement adjacent to the Kenai River within Moose Range Meadows Subdivision increased significantly from 1991. Serious vegetation and shoreline damage occurred at several locations due to heavy streamside foot traffic by record numbers of anglers. At certain times streamside angler density was similar to that of the Russian River.

Refuge staff made several visits to Moose Range Meadows Subdivision to document and examine increasing streamside vegetation damage and erosion on the public use easement. Damage has dramatically increased both up and down the river from the south bank boat ramp. Property owners called the Refuge Headquarters several times. Refuge Manager Doshier and Park Ranger/Pilot Johnston met with property owner Leonard Ball and Salamatof President Jim Segura in early August to discuss solutions to the problem.

3. Other

a. Inholders

The Refuge reissued Mr. Hiram Wells a special use permit for a gravity-feed water system on his Burnt Island inholding. A similar permit was initially issued by the U.S. Forest Service before the Two Indian area was included in the Refuge in 1980. The new five-year permit is for a relatively simple gravity water system using PVC pipe.

Skilak Lake inholder Thomas Belli partially fulfilled an agreement to remove an unauthorized dock that he had constructed into Skilak Lake within Dawson Cove. The dock had originally extended more than 100 feet. Belli agreed to remove it back to the vegetation line.

During February 1992, Johnston inspected the route of travel requested by inholder Mike Sipes for overland transport of a small piece of heavy equipment to his Tustumena Lake inholding within the Kenai Wilderness. The route, the Tustumena Lake winter trail, had been packed via tandem alpine snowmachines and a trail drag. Mr. Sipe's winter access permit was amended to address the proposed activity.

Several inholders requested and were reissued permits for access to their Bear Creek inholdings. The permits require adequate snowcover, and permittees have generally complied with the requirement. However, unauthorized "copy cat" use by the public, as well as minor non-authorized use by inholders, has occurred annually. A permanent "winter route" trail scar has developed and is visible across several open muskeg areas after the snow melts.

b. Land Acquisition

Two half-acre parcels of property on Caribou Island were forfeited pursuant to a plea agreement and subsequent judgement and commitment by the U.S. District Court and were transferred to the Refuge. Refuge Manager Doshier

requested the transfer in a letter to the U.S. Attorney. The lots were Lot 1, Block 4, and Lot 36, Block 5, within the Caribou Island Subdivision.

In late 1992, the Sportsman's Lodge (U.S. Forest Service inholding) that is directly adjacent to the east boundary of the Refuge was purchased by the State of Alaska with Federal aid money. Refuge staff were included in a 1992 meeting regarding future status and management of the property.

Sportsman's Lodge was purchased by the State of Alaska with Federal aid money. Joint interim management and long term planning were being discussed following the acquisition. RJ

c. Rights-of-way

The State Department of Transportation funded and installed new guide and approach signs within their right-of-way at the intersection of the Kenai/Russian River Access Road and the Sterling Highway.

d. Headquarters Lake

Several local pilots, Soldotna City officials, and a handful of residents of Longmere Lake again proposed to turn the Refuge's Headquarters Lake into a commercial float plane basin. Such a proposal has surfaced at various times over the years. Soldotna City Council held a meeting in July to hear

testimony on the proposal. Several newspaper articles in the local Peninsula Clarion newspaper argued the positive and negative attributes of the proposal. Refuge Manager Doshier made it clear in several forums that the area was not available for such use.

In an August Soldotna City Council meeting, a proposal regarding Soldotna's bid to generate interest in developing a floatplane basin at Headquarters Lake was presented. Public testimony and council discussions were tabled pending the outcome of a separate solicitation for proposals privatizing the airport.

e. Stormy Lake.

A notification letter of the State Division of Park's intent to maintain the Stormy Lake Swim Beach was received on January 13, 1992. The letter requested comments or concerns regarding their plans. The Stormy Lake Swim Beach is within Kenai National Wildlife Refuge but is maintained and managed by the Division of Parks pursuant to a cooperative agreement signed December 12, 1977, between the Division of Natural Resources and the USFWS. A Refuge permit was issued for maintenance of the beach.

D. PLANNING

1. Master Plan

Nothing to Report

2. Management Plans

a. Moose Management Plan

Biologist Andy Loranger and Fire Management Officer Bill Larned completed a Draft Moose Management Plan (Plan) for the Refuge in January and submitted it to the Regional Office for review. In March, the draft Plan was revised to incorporate review comments and to convert it to an environmental assessment format. This is a step-down plan from the Refuge Comprehensive Conservation Plan (CCP) and details specific management actions for moose to be undertaken by the Service. The following actions are recommended as necessary to maintain viable and healthy moose populations at near-current densities on the Refuge: 1) manipulate the habitat using prescribed burning; 2) continue to monitor the population status using aerial surveys; 3) continue to regulate harvests to meet area-specific population composition objectives; 4) examine predation and vehicular accidents as mortality sources for moose; and 5) identify research priorities.

A bull moose feeds on regrowth vegetation on a Skilak Wildlife Recreation prescribed burn area. Unknown

In September, Refuge Manager Doshier and Biologist Loranger briefed the Regional Directorate on the preferred alternative for the Plan and its implications for funding, staffing, and public acceptance. The Regional Director expressed his support of the objectives and the preferred alternative as well as his commitment to providing the resources necessary to implement the Plan.

A public involvement strategy was developed for the Plan with the assistance of Pamela Wilson, a former Service employee hired on a temporary basis to fill the Regional Public Involvement Specialist position. The public involvement strategy will focus on ongoing education in the local area and development of cooperative relationships with the Alaska Department of Fish and Game (ADF&G) and the Division of Forestry.

b. Public Use Management Plan

Recreational and sport fishing uses of the Upper Kenai River are two of the many visitor uses that will be addressed in the Public Use Management Plan. Unknown

With the hiring of Outdoor Recreation Planner Emily Dekker-Fiala, the long-delayed process to develop a Public Use Management Plan (PUMP) for the Refuge began in earnest. In March 1992, a joint meeting of Refuge, Regional Office, and Kenai Fisheries Assistance Office (FAO) planning staff formally initiated the project. Although all present agreed on the need

for a step-down plan to guide public use programs over the next five to ten years, there was significant debate regarding the planning process and the desired end product. Concern was also expressed that the PUMP process might deteriorate into a rehash of issues covered in depth during the development of the CCP and the promulgation of Refuge-specific regulations.

Under the leadership of Dekker-Fiala, a PUMP planning team was designated, including Doshier, Kent, Bailey, and Ward from the Refuge staff, Gary Sonnevil from the Kenai FAO, and Maggi Arend and Lee Westenberg from the Regional Office planning section. Initial team meetings focused on developing goals, a work plan, a schedule, and a public participation strategy for the project. Efforts were temporarily stalled in late spring due to the illness and sudden retirement of Public Involvement Specialist Westenberg.

In May, a meeting was held with representatives of the ADF&G, the Department of Natural Resources, and the Office of Governmental Coordination to inform them of the PUMP planning process, hear their concerns, and identify issues requiring interagency discussion and/or resolution.

Rick Johnston, Emily Dekker-Fiala, and Regional Office Natural Resource Planner Maggi Arend on Skilak Lake discussing the PUMP. Unknown/5/92

Planning efforts during the summer months centered on familiarization with the Refuge for new-arrival Dekker-Fiala, identification of issues, and compilation of a mailing list of people and organizations interested in the PUMP. After much agonizing over the immense scope of the project, the complexity of the issues, and the possibility of being side-tracked by any one of many potential controversies, it became apparent that it would be necessary to take a different approach than has been employed in other Region 7 public use management plans. A strategy was developed to approach the PUMP as a series of sub-plans or components addressing various programmatic issues and geographic areas. Ideally, this will break the Plan down into manageable segments, facilitate public understanding and staff use, and be more adaptable to changing situations and to revision.

Floatplane access was anticipated as a significant concern to members of the public seeking both to decrease and increase such use of Refuge lakes.

Unknown

The new PUMP strategy was incorporated into a Work Plan and a draft Public Involvement Plan which were submitted to the Regional Office in early October. A briefing was then held for the Regional Directorate. The remainder of the fall was spent preparing a scoping workbook for distribution to those interested in participating in the development of the PUMP. The workbook provides a brief history of the Refuge, its legislative mandates, and a review of decisions made in the CCP. It identifies and solicits public input on eight Refuge-wide issues and seven geographic areas. Approximately one thousand copies of the workbook were mailed in the final days of 1992.

c. Skilak Wildlife Recreation Area

Jim's Landing, a popular camping, day use, and launch area on the Upper Kenai River, was being evaluated for design changes during 1992. Unknown

Implementation of recreation facility improvements in the Skilak Wildlife Recreation Area (WRA) continued with planning and design work for the rehabilitation of Jim's Landing. Regional Landscape Architect Paul Schrooten worked closely with Refuge staff to develop a plan that provides for existing visitor uses while protecting wetland and riparian areas.

Refuge staff met with Regional Office Public Use Specialist Dave Patterson, Natural Resources Planner Maggi Arend, and Landscape Architect Schrooten to review the ongoing implementation of the Skilak WRA facility plan and discuss how it can be interfaced with the PUMP process. The mutual concerns were that facility projects be evaluated on their individual

merits in accordance with the CCP and that a spectrum of recreational opportunities be maintained. The consensus was that channels of communication within and between the Refuge and the Regional Office need to be strengthened, a common design language and perspective for development achieved, and project priorities re-evaluated. A proposal to conduct an evaluation of Skilak WRA facility development was presented to Regional Engineer Rudy Berus and Deputy Associate Manager Art Wemmerus by Schrooten and Patterson.

3. Public Participation

Dekker-Fiala attended "Systematic Development of Informed Consent" training conducted by the Institute for Participatory Management and Planning. The principles and techniques learned at this course will be utilized to develop objectives-driven public involvement strategies for the PUMP and for other Refuge projects.

Doshier participated throughout the year in the Kenai River Special Management Area Advisory Board. The board advises the Division of Parks regarding management of the Kenai River.

Kent and Dekker-Fiala served on a committee to assist the Division of Parks in developing a social carrying capacity study of the Kenai River. A visitor-use survey was designed to determine how crowding affects the visitor experience. The study will result in recommendations to ensure that important resource and recreational values of the Kenai River are protected.

Doshier and Johnston attended meetings of the Caribou Hills Advisory Committee, established by the Alaska Department of Natural Resources. The citizen committee was formed to develop a strategy for State management of this popular snowmachining area, but the committee disbanded when it became obvious that a consensus could not be reached. The Refuge is interested in this issue because increased public use and cabin construction on State lands in the Caribou Hills is directly related to increased snowmachine activity on adjacent Refuge lands. Kent and Dekker-Fiala attended a public hearing on October 20 on the State's proposed policies for lands in the Caribou Hills. The proposed policies identify recreation as the priority use for the area and prohibit additional authorizations for private cabins.

On November 2, Doshier, Kent, Johnston, and Dekker-Fiala attended an interagency meeting in Anchorage regarding the future management of the Sportsman's Lodge property at the Kenai/Russian River confluence. The property, purchased by ADF&G Sport Fish Division with Federal aid funds, is to be managed primarily for boating access to the Kenai River. Each of the agencies involved in management of the Upper Kenai River commented on how development of Sportsman's Lodge fits with their primary tasks and goals for the area.

A public information meeting was held November 24 in Sterling to present plans for rehabilitation of Jim's Landing. Schrooten provided an

explanation and visual displays of the proposed improvements. The meeting was sparsely attended.

4. Compliance With Environmental and Cultural Resource Mandates

The Upper Skilak Lake Campground rehabilitation project, contracted to M-B Construction, required a source of 110 large boulders for traffic control barriers. An attachment to the Skilak WRA Environmental Assessment was prepared to evaluate the impact of removing rocks from the shoreline of Skilak Lake below the ordinary high water line for this purpose. Necessary permits were requested and obtained from the Corps of Engineers and from the ADF&G Habitat Division. Rock removal was accomplished in April while the ground was still frozen, using a rubber-tired front-end loader.

Fish and Wildlife Biologist Bailey and Park Ranger Johnston provided comments to Ecological Services regarding the initial scoping process for development of the Sterling Highway (Mile 3-60) Environmental Impact Statement (EIS). Ecological Services sent a letter to the Department of Transportation Project Manager incorporating most of the Refuge comments in a February 27, 1992, letter. One of the realignment alternatives discussed in the EIS would go through a portion of Kenai Wilderness.

A realigned Sterling Highway between mile 3 and mile 60 would parallel the Kenai River. One realignment alternative would require removal of a small portion of Refuge wilderness shown at the lower right portion of this photograph. Unknown

Permits were requested and received from the Corps of Engineers and from the ADF&G Habitat Division for the rehabilitation of Swanson River Landing. The State stipulated that the work occur within a specific time frame and that temporary fencing be installed to contain turbidity.

Refuge staff prepared comments on Sterling resident Walt Pedersen's proposal to construct a float plane dock on the lower Moose River in a major trumpeter swan staging area adjacent to Refuge lands. Refuge comments were submitted to Western Alaska Ecological Services, which prepared the Service's response to the proposal.

Refuge staff provided information to the Regional Office, for the development of an environmental assessment to determine the effects of awarding guide/outfitters special use permits based on a competitive selection process.

5. Research and Investigations

a. Lynx

Preliminary results of the progress and findings of the two graduate student projects on lynx populations and habitat relationships will be presented at the Northern Furbearer Conference in Whitehorse, Yukon Territory, in early 1993. The project abstracts follow.

ABSTRACT

LYNX AND COYOTE FOOD HABITS DURING A HARE LOW ON THE KENAI PENINSULA, ALASKA

WINTHROP R. STAPLES, P.O. Box 82747, Fairbanks, AK 99708 U.S.A.

THEODORE N. BAILEY, Kenai National Wildlife Refuge, P.O. Box 2139, Soldotna, AK 99669 U.S.A.

Food habits for lynx and coyote were compared during a hare low on the Kenai Peninsula, Alaska. Scats, kills, and scavenging observations were analyzed for snow (Nov-Apr) and snow-free (May-Oct) seasons during 1988-90. The percent relative frequency of major foods (≥5%) in lynx scats (N=161) for snow seasons was snowshoe hare 64%, spruce grouse 7%, red squirrel 10%, moose 5%, and red-backed voles 9%. Contents of coyote snow season scats (N=179) were significantly different than lynx scats with frequencies of hare 16%, grouse 5%, moose 44%, voles 17%, and salmon 9%. During snow-free seasons lynx scats (N=42) contained hare 38%, grouse 7%, squirrel 28%, and voles 15%. Food frequencies found in coyote snow-free season scats (N=183) were significantly different with hare 21%, grouse 5%, moose 23%, voles 31%, and birds 5%. Lynx snow-tracked for 61 km killed 10 hares, 1 grouse, 3 squirrels, and

1 vole. Visual observations confirmed that coyotes depended heavily on moose carrion during snow seasons. We conclude that at ≤0.31 hares/ha coyotes were forced to scavenge wolf-killed moose despite a 30% probability of being killed by wolves. Lynx, more efficient hare predators in deep snow, continued to prey primarily on hares during snow seasons.

ABSTRACT

SYNOPSIS OF CURRENT LYNX (FELIS CANADENSIS) AND SNOWSHOE HARE (LEPUS AMERICANUS) INVESTIGATIONS ON THE KENAI PENINSULA, ALASKA

DAVID BURNETT DUNN, Kenai National Wildlife Refuge, P.O. Box 2139, Soldotna, AK 99669 U.S.A.

THEODORE N. BAILEY, Kenai National Wildlife Refuge, P.O. Box 2139, Soldotna, AK 99669 U.S.A.

The Kenai National Wildlife Refuge initiated in 1983 a long term study of lynx and their principal prey, the snowshoe hare, because of low lynx numbers. Current investigations are examining the relationships of lynx and snowshoe hares with lowland successional forest habitats during this critical period of low snowshoe hare abundance. Snowshoe hare populations peaked in 1984, declined to extremely low numbers in 1991, and are now gradually increasing in some areas, but remain unchanged in others. Data suggest lynx survival and recruitment is slowly increasing but may be hindered by low hare numbers and/or unfavorable lynx-human interactions, despite a closed lynx trapping season. Of the twenty (10 males, 10 females) lynx radio-collared since the winter of 1992, 2 died of natural causes, 2 had collars that expired, 4 died of lynx-human interactions, 2 were relocated out of the study area, and 10 were still alive as of March 1993. One of five radio-collared lynx females denned in 1990 and 1991 and raised a total of 2 kittens through the winter. Nine radio-collared lynx females denned in 1992 and 4 raised a total of 5 kittens through the winter. Wide ranging lynx movements during 1992 and the current breeding season also suggest low lynx densities and low snowshoe hare abundance. Data documenting relationships of lynx and snowshoe hares to habitat are still being collected, but study design and preliminary results are discussed.

b. Tustumena Lake Fisheries Studies

The following is an abstract from a draft manuscript prepared on information collected by U.S. Fish and Wildlife Service Fisheries Research. The reference for the manuscript is C.V. Burger, J.E. Finn, and L. Holland-Bartels.

Incidence and Pattern of Beach Spawning by Sockeye Salmon at Tustumena Lake 1993. Draft Manuscript Transactions of the American Fisheries Society.

ABSTRACT

In a 3-year period (1989-1991), 564 sockeye salmon (Oncorhynchus nerka) were radio tagged in the Kasilof River, the outlet to Tustumena Lake, Alaska. The objective was to evaluate the occurrence and timing of lake shoreline spawning in the drainage. Beach spawning was suspected in the glacially turbid lake but documented only in its clear tributaries. Of 413 salmon tracked upstream after release, spawning areas and times were determined for 324 fish. One-third spawned in shoreline areas of the lake during late August. The remaining 224 fish spawned in tributaries by mid-August. A distinct late run was discovered spawning in the lake outlet at the end of September. The run timing distributions were different ($p < 0.0001$) between tributary and shoreline spawners as were their spawning time distributions ($p < 0.02$). The lowest percentage of beach spawners occurred in the year having the highest spawning escapement and the lowest volume of water in tributaries. Such differences suggest that beach spawners are a diverging sub-population rather than surplus production from an undifferentiated run. Historic evidence infers that the intrusion of Tustumena Glacier into the lake limited sockeye salmon colonization of the shoreline to the last 2,000 years. Cold glacial meltwater from the receding glacier may be affecting present segregation of the beach-spawning component into a discrete late run, a typical spawning pattern in other Alaskan drainages that are free of the influence of glacial ice.

6. Other

Under the direction of Schrooten, planning continued for a joint administrative facility at the present headquarters site to serve the Refuge, Kenai FAO, and Lake Clark National Park and Preserve. The initial draft plan, with an estimated cost of $18 million, included constructing a new office building, warehouse, and vehicle storage shed, converting a single-family residence to a bunkhouse, re-routing the entrance road, and tying in with city utilities. The Regional Directorate was briefed on the plan in November and instructed Engineering to scale back the plan to a maximum cost of $4 million. In accordance with this directive, Schrooten revised the plan to include construction of only a new office building (25 percent smaller than in the original plan) and a bunkhouse.

E. ADMINISTRATION

1. Personnel

Management: Daniel Doshier (1). 5/91/JF

Management: Jim Frates (2). Unknown/5/91

Biology: Ted Bailey (3), Burney Dunn (Volunteer), Diana Thomas (27), Elizabeth Jozwiak (9), Andy Loranger (8).
5/91/JF

Biology: William Larned (5) and Richard McAvinchey (19).
Unknown

Public Use: Chris Johnson (17), Candace Ward (7), Rick Johnston (6), Emily Dekker-Fiala (13), William Kent (4). 2/92 JF

Administration: Brenda Wise (16), Brenda Marsters (15), Deanne Nelson (14) Vivian McCain (12). 4/91/JF

Maintenance: Back Row: Brian Kemsley (30), "Al" O'Guinn (11), Dick Kivi (10), Front Row: Donna Bartman (32), Bud Marrs (31). 5/91/JF

Emily Dekker-Fiala was selected as Outdoor Recreation Planner and assumed her duties January 12, 1992. Dekker-Fiala will be the coordinator of public involvement and will be the major writer of the Public Use Management Plan.

In February, Assistant Refuge Manager Frates interviewed three top candidates for the career seasonal WG-9 carpenter position. By April 6, Bud Marrs had been selected for the position and reported for duty. Marrs worked until mid-November to complete a backlog of sign projects.

On March 22, Fire Management Officer/Pilot William Larned was reassigned to the Migratory Birds Management Office in Anchorage. Larned's new job, Wildlife Biologist/Pilot, will enable him to remain living in the Kenai area. In fact, he will continue to occupy his office until his refuge position is filled; as of December 31 that had not occurred.

In April, Brian Kemsley was selected to fill the new permanent seasonal Automotive Worker WG-8 position advertised in March. He assumed his new duties May 3. Kemsley's tour of duty for the season ended October 31.

Biological Technician Liz Jozwiak went on leave without pay, beginning July 27, while she attends graduate school at Colorado State University. She will be analyzing ten years of Refuge wolf data for her Master's project.

Table 2. Listing of permanent personnel for the Kenai National Wildlife Refuge, 1992.

1.	Daniel W. Doshier	Refuge Manager	GM-14	PFT	EOD 05/27/86
2.	James E. Frates	Refuge Operations Specialist	GS-12	PFT	EOD 01/30/77
3.	Theodore N. Bailey	Fish & Wildlife Biologist	GS-12	PFT	EOD 09/12/77
4.	William C. Kent	Park Ranger	GS-12	PFT	EOD 04/21/91
5.	William W. Larned	Fire Management Officer (Pilot)	GS-12	PFT	EOD 01/08/84
6.	Richard K. Johnston	Park Ranger/Pilot	GS-12	PFT	EOD 12/31/78
7.	Candace D. Ward	Park Ranger	GS-09	PFT	EOD 05/29/84
8.	Andre J. Loranger	Wildlife Biologist	GS-11	PFT	EOD 02/26/89
9.	Elizabeth A. Jozwiak	Biological Technician	GS-07	PFT	EOD 08/28/88
10.	Richard D. Kivi	Equipment Operator	WG-10	PFT	EOD 10/31/74
11.	Elvin "Al" O'Guinn	Maintenance Mechanic	WG-10	PFT	EOD 03/13/84
12.	Vivian J. McCain	Budget Assistant	GS-07	PFT	EOD 02/03/88
13.	Emily A. Dekker-Fiala	Outdoor Recreation Planner	GS-09	PFT	EOD 01/12/92
14.	Deanne K. Nelson	Accounting Technician	GS-05	PFT	EOD 01/05/86
15.	Brenda E. Marsters	Refuge Clerk	GS-04	PPT	EOD 06/21/87
16.	Brenda B. Wise	Travel Clerk	GS-04	PFT	EOD 01/29/89
17.	Christopher G. Johnson	Refuge LE Officer	GS-07	PPT	EOD 07/29/90

Chief Rob Shellenberger, Division of Refuges, visited the Kenai Refuge on July 1. A group including Shallenberger, Refuge Manager Doshier, Supervisory Park Ranger Kent, Associate Manager Constantino, and Outdoor Recreation Planner Dekker-Fiala visited several locations, including Finger Lakes, Skilak Wildlife Recreation Area, and the Kenai/Russian River areas.

Refuge Manager Doshier with Chief of Refuges Shallenberger and party at Pothole Lake Fire. Overlook/Interpretive Site. 6/92/WCK

Chief of Refuges Shallenberger's visit included a raft trip on the Upper Kenai River. Unknown

October 31 was Wildlife Biologist Andre Loranger's last day at Kenai, as he accepted the Refuge Manager's position at Imperial National Wildlife Refuge in Martinez Lake, Arizona. On October 28, Refuge employees gave a joint going away dinner at the bunkhouse for Bill Larned and Andy Loranger. Some of their associates from Alaska Department of Fish and Game attended. In December, Rick Ernst from Yukon-Delta National Wildlife Refuge was selected as Wildlife Biologist/Pilot.

Biologist Andy Loranger and his wife Linda were given a "howlin" send-off during a gathering of Refuge staff and State of Alaska Department of Fish and Game Personnel on October 28. 10/92 JF

Supervisory Park Ranger William Kent received an on-the-spot cash award in September for initiating action that resulted in property valued at

b. Temporary Personnel

Table 3. Listing of the temporary personnel for the Kenai National Wildlife Refuge, 1992.

	Employee	Position	Grade	EOD	Terminated
18.	Winthrop Staples III	Biol. Tech.	GS-05	02/14/88	03/15/92
19.	Richard J. McAvinchey	Biol. Tech.	GS-05	05/21/89	
20.	Robert E. Barto	Park Ranger	GS-05	05/31/92	10/04/92
21.	Jean A. Evanoff	Park Ranger	GS-05	05/21/92	10/03/92
22.	Brent J. Richey	Park Ranger	GS-05	07/08/90	Intermit
23.	Scott S. Slavik	Soc. Svcs. Ast	GS-05	07/26/90	Intermit
24.	Jodie L. Setran	Park Ranger	GS-05	05/28/91	Intermit
25.	John R. Gahr	Park Ranger	GS-05	05/28/91	Intermit
26.	Heidi M. Mouillesseaux	Park Ranger	GS-04	05/17/92	08/08/92
27.	Diana R. Thomas	Biol. Tech	GS-05	05/05/89	Intermit
28.	Denise Teghtmeyer	Co-op Student	GS-04	05/17/92	08/23/92
29.	James M. Farrar	Laborer	WG-03	05/20/90	Intermit
30.	Brian A. Kemsley	Laborer	WG-03	04/22/90	Intermit
31.	Albert "Bud" Marrs	Carpenter	WG-09	04/24/88	Intermit
32.	Donna M. Bartman	Laborer	WG-03	06/02/91	Intermit

Table 4. Staff breakdown from Fiscal Year 1985 to Fiscal Year 1992.

Year	Permanent Full-time	Permanent Part-time	Vacant as of 12/31	Temporary	Volunteers
FY85	13	2	2	10	43
FY86	16	0	1	13	28
FY87	16	0	1	13	30
FY88	18	0	2	18	19
FY89	18	0	0	13	15
FY90	18	1	2	13	17
FY91	16	1	3	15	66
FY92	16	1	2	15	73

Full-time equivalent utilization for 1992 was 22.14.

Table 5. Temporary positions for 1986-1992.

	1986	1987	1988	1989	1990	1991	1992
Biological Aids & Technicians	2	3	5	7	4	3	3
Laborers & Carpenter	4	4	5	4	4	4	4
Park Rangers	5	5	7	6	4	6	6
YACC/YCC Staff	2	0	0	0	1	1	1
Clerk/Typist	0	1	1	0	0	0	0
Student Trainee	0	0	0	0	0	1	1
TOTAL	13	13	18	17	13	15	15

2. Youth Programs

The Youth Conservation Corps (YCC) performed excellent work for the Refuge this year under the direction of returning leader Scott Slavik. Six enrolles were on board June 15, and they completed their Refuge work experience on August 7. We appreciate the work done by Johnthomas Williams, Eddie Greenhalgh, Heather Gerhard, Emily Johnson, Mike Friendshuh, and Kelly Harpole.

1992 YCC enrolles: (left to right) Greenhalgh, Harpole, Friendshuh, Gerhard, Williams, Johnson, Leader Slavik. 7/92/WCK

Table 6. Youth Conservation Corps work projects for 1992.

Project	Hours Worked	Percent of Total Hours
Trail Maint./Boardwalk Constr.	454	26.40%
Environmental Education	190	11.05
Orientation/Training/Safety	190	11.05
Transport/Daily Preparation	168	9.77
Facility/Sign Maintenance	168	9.77
Litter Pickup	138	8.02
Recreation Bldg./Shelter Maint.	90	5.23
Vista Site Clearing/Rehab./Landscaping	90	5.23
Fence Constr./Maintenance	90	5.23
Campground/Picnic Facility Constr.	76	4.42
Paid Holiday	48	2.79
Recreation Projects	18	1.05
TOTAL	1720	100%

YCC improvements to Keen-Eye Trailhead will assist visitors in the Headquarters area. 6/92 SS

A diversity of work projects is the single most important factor in maintaining the interest and enthusiasm of the enrolles. This year's crew completed a wide variety of challenging work projects. The projects were divided into 19 categories and produced a total of 1720 hours of labor. (see Table 6 above; some categories are combined.)

YCC constructed a footbridge on Skilak Lookout Trail.
92/SS

A more detailed listing of this year's YCC projects follows:

* Constructed and installed bollards in the Dolly Varden campsites
* Painted cabins at the Outdoor Education Center
* Cleared downfall and seeded embankment at the Hidden Creek Overlook
* Repaired fencing at the Moose Research Center
* Placed, set, checked, and removed snowshoe hare traps for biology program
* Cleaned campsites, picnic tables, and fire-rings at four campgrounds
* Cleaned and repaired all outhouses along Swanson River/Swan Lake Roads
* Conducted litter patrols along Sterling Highway and at Russian River Ferry
* Assembled fifteen new picnic tables for public use areas
* Cleared fifteen trails, including sign repair and maintenance

* Constructed 150' of boardwalk on Bear Mountain Trail and 225' of boardwalk along canoe portages
* Installed a sediment catch-fence at Swanson River Landing prior to rehabilitation by Refuge Equipment Operators
* Laid a temporary boardwalk along public access easements on shore of Kenai River to reduce impacts
* Constructed a new trailhead for Keen-Eye Trail at Refuge Visitor Center/Headquarters
* Constructed an 18' X 3' footbridge at beginning of Skilak Lookout Trail

YCC enrolles clearing brush below site of new overlook.
7/92/SS

The YCC season would not be complete without spike camps. These offer the enrolles a unique camping experience while providing diverse work projects and environmental education opportunities. Spike camps were held this year at the Moose Research Center, the Outdoor Education Center, and in the Swan Lake Canoe System. Planning and organizing a successful camping experience is a valuable skill, and the enrolles were involved as much as possible. Logistics such as meal planning and food selection, purchasing, and packaging were completed as a group. Minimal impact issues such as clothing choices, equipment use, campsite selection, and waste disposal were addressed by Student Conservation Association (SCA) Resource Assistant Cameron Stormes prior to the camps.

Emily Johnson, and Johnthomas Williams portaging during spike camp. 7/92/SS

Environmental education is also an integral part of Kenai National Wildlife Refuge (NWR) YCC camps, and about ten percent of the enrolles' work time is devoted to that pursuit. Promotion of environmental awareness was achieved through films and videos, field trips, guest speakers, and informal discussions. Field trips were taken to the Crooked Creek Fish Hatchery, the Pratt Museum of Natural History, Alaska Maritime NWR Headquarters, the Kenai Cultural Heritage Visitor Center, and the Hidden Creek fish weir.

This Refuge has a very successful YCC Program for many reasons however, over the past three years success has been primarily due to the efforts of one person. Scott Slavik was "drafted" into the YCC Leader position in 1990 while serving as an SCA Resource Assistant. While everyone thought he would do a good job in the position, no one had any idea just how well he would perform. He provides the enrolles with excellent supervision, demonstrates a strong work ethic, displays a very real concern for their safety, and is an excellent role model for impressionable youth. Scott received an on-the-spot cash award of $100 this year as an expression of our appreciation of his efforts and devotion; if it had been possible we would have done more. The Service would be wise to hire this young man at the earliest opportunity.

Boardwalk over wet section of Bear Mountain Trail--
another completed YCC project. 7/92/SS

Parking bollards were installed at Dolly Varden
campsites. 8/92/SS

3. Other Manpower Programs

People Count enrolle Joey Steiner receives a State Map memento on his last day of work from Carpenter's Assistant Donna Bartman. 92/JF

4. Volunteer Services

Kenai's volunteer program, which involved 73 people and thousands of volunteer hours in 1992, is comprised of five components: local volunteers, seasonal volunteers, Student Conservation Association (SCA) Resource Assistants, local service groups, and campground hosts.

Volunteers contributed 11,152 hours of service to Kenai National Wildlife Refuge in 1991, the equivalent of over five-and-one-half full-time staff positions. Of the total, the Student Conservation Association Program accounted for half of the work hours with 5600 hours of service.

a. Local Volunteers

Local volunteers assisting in a variety of valuable projects are a vital component of the Refuge program. A group of eight local volunteers, contributing a minimum of twelve-hours of service per month, operated the Refuge Visitor Center and the cooperating association sales outlet, as well as hosting our weekend wildlife media programs. These volunteers contributed significantly to the high level of public service that we could

not have provided without their assistance. In addition, fourteen local volunteers assisted in biological survey projects and in rehabilitating injured wildlife.

In return for their efforts, local volunteers received the following forms of recognition and appreciation:

* Free membership in the Alaska Natural History Association
* 15 percent discount on all cooperating association sales items
* Awards based on hours of volunteer service, including Refuge T-shirts, posters, wildlife books, and air flights over the Refuge
* Specialized volunteer awards and certificates
* Volunteer recognition luncheons and pizza nights

In May, Biological Technician Liz Jozwiak and Refuge Volunteer Veterinarian Bart Richards hosted an information/training session on the care and rehabilitation of orphaned baby birds. Over 40 people attended this lively session where participants practiced feeding baby chicks to prepare for the intensive care needed to sustain baby birds. From this group of people, eight diligently assisted us in May and June caring for baby birds.

b. Seasonal Volunteers

Fall volunteers: University of Georgia Student Charlie Bailey and SCA Resource Assistant Chris Papouchis. Unk

Seasonal volunteers commit to at least three months of continuous 40 hour-per-week service. Generally these volunteers are recruited through the Alaska Region Volunteer Program, coordinated by Bill Kirk at the Regional Office in Anchorage. Seasonal volunteers receive free housing, transportation, and a per diem subsistence allowance for food and essentials. In 1992, seasonal volunteers participated primarily in public use and biological field work, often in conjunction with pursuing undergraduate and graduate degrees.

c. Student Conservation Association Resource Assistant Program

The Student Conservation Association (SCA) Resource Assistant Program continues to expand and remains the backbone of the Refuge's volunteer program. SCA Resource Assistants work with the Refuge for twelve-to-sixteen-week terms, completing a variety of operational tasks while learning about resource agency careers.

In 1992, eleven SCA Resource Assistants collectively contributed 5600 work hours. The 1992 SCA Resource Assistants for biology were Brian Doherty, Melissa Leader, and Laura Olson. Environmental education and interpretation SCA Resource Assistants were Meg Clark, Michael Daleo, Heidi Mouillesseaux, Chris Papouchis, and Cameron Stormes. The SCA Resource Assistants for backcountry were Michael Bank, Wes Field, and Erin Griffeth.

SCA Resource Assistants: Back Row: Daleo, Field, Doherty, Bank, Front Row: Olson, Clark, Griffeth, Stormes. Unknown

SCA Resource Assistants receive a small subsistence allowance and round-trip transportation to the Refuge. In working with the SCA program since 1985, we have been extremely fortunate to have had consistently high-caliber Resource Assistants who accomplish quality work.

SCA Projects included the following:

* Visitor Center and Visitor Contact Station operation
* Interpretive and environmental education programs
* Trail brushing and rerouting
* Wetland rehabilitation through boardwalk construction on canoe portages
* Patrol of foot and canoe trials
* Litter pick-up
* Campground maintenance
* Moose hunter check station operation
* Biological data collection
* Wildlife live-trapping and radio-collaring

Through the receipt of a Challenge Cost Share for the Refuge's "Friendly Trails" program, the Refuge was able to fund the three SCA backcountry Resource Assistants for the summer. The Refuge continued to pursue Challenge Grants to fund much-needed future trail rehabilitation projects and was awarded funding for the continuation of the "Friendly Trails" program in 1993.

d. Local Service Groups

During the spring and summer of 1992, several youth service organizations, such as Scouts, 4-H, Campfire, and church youth, 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.

e. Campground Hosts

The Campground Host Program continued in 1992 with Host Dick Chace returning for his third season at Hidden Lake Campground. Dick's friendly attitude and knowledge of Alaska are greatly appreciated by staff and visitors alike. A new host position is planned for the newly rehabilitated Upper Skilak Campground for the summer of 1993.

5. Funding

We hired six Youth Conservation Corp (YCC) youth and Scott Slavik as YCC leader for $20,000. Many maintenance projects including trails and campgrounds were accomplished.

Table 7. Kenai National Wildlife Refuge funds, Fiscal Year 1988 through 1992.

	Fiscal Year				
	1988	1989	1990	1991	1992
Operating and Maintenance Funds (Thousands of Dollars):					
Wildlife Funds	1324	1181	1093.3	1417	1193
Expense for Sales	82	82	81	90	90
Fire Presuppression and Preparedness	0	0	233	139	154
Wildlife Enforcement	0	0	0	36	0
Subtotal	1406	1263	1407.3	1648	1437
Specific Project Funds (Thousands of Dollars):					
YCC Funds	0	0	10	10	20
Large ARMM*	71	0	0	0	0
Refuge Resource Problem Contaminants	50	40	30	34	29
Refuge Resource Problem Challenge Cost Share	42	168	0	48	25
Refuge Resource Problem Seasonal Employees	0	0	0	46	141
Maint. Management System	0	0	80.5	116	96
Skilak Wildlife Recreation Area	**697	**0	**0	**1000	**831
Subtotal	860	208	120.5	1254	1026
TOTAL	2266	1471	1527.8	2902	2463

*Accelerated Refuge Maintenance Management
**No Year Money (held in Region)

Contaminant funds of $29,000 were used to excavate and test the contaminated soil at the Skilak Guard Station. A plan was submitted by the contractor outlining the appropriate disposal of the soil.

Twenty-five thousand dollars were received in Challenge Cost Share funds; $5000 was spent on backcountry trail maintenance using some of our Student Conservation Association (SCA) volunteers; and $20,000 purchased supplies and material for the rehabilitation of the Outdoor Education Center.

Twelve seasonal employees were funded for $141,000. Four wage grade employees were hired to do various types of maintenance. Six park rangers were hired to deal with the high volume of visitors.

There were four Maintenance Management System projects that shared $96,000. The rehabilitation of the bunkhouse bathrooms was funded for $16,000; however, the work was accomplished for $5300 and, with approval, the balance was used to install the fuel tank at the Kenai airport hangar.

The replacement of the compressor for the heating system in the Headquarters building was funded for $3000. Forty-two thousand dollars covered the replacement of three very well used vehicles. Thirty-five thousand dollars allowed the final replacement phase of our obsolete Wang computer system to take place.

6. Safety

For the first time in several years, the visiting public had a less blemished safety record than Refuge employees. There were no fatalities, only one reported personal injury, and no aircraft accidents -- not even the almost annually predictable "plane falls through ice" story -- to report. Considering both the level of public use and the variety of activities pursued, often with reckless abandon, 1992 was a remarkable year.

The single reported personal injury to the public occurred on the final day of moose season, September 19, when Craig Medred, Outdoor News Editor of the Anchorage Daily News, was attacked by an adult female brown bear while he was moose hunting along the Russian River. The sow, with three yearling cubs, caught Medred in a surprise charge, grabbing his .454-caliber Casull handgun on the first pass. Within seconds she made a second pass, this time grabbing his right leg near the ankle. He managed to fire a single round into the bear's mouth-throat region before the .454 jammed. Fortunately for Medred, the injured sow wandered off into the timber and, despite an exhaustive attempt to locate her later, was never found. In addition to teeth marks left on his Casull revolver scope, Medred received puncture wounds to his right ankle and abrasions to his face -- and plenty of material for his next few outdoor columns.

A twin-engine SouthCentral Air commuter plane, which disappeared on a flight from Kodiak to Kenai in December of 1991, was located in April by bear hunters near the headwaters of the East Fork of Deep Creek. The wreckage was located several miles west of the Caribou Hills off the Refuge. The body of the pilot, the sole occupant on board, was recovered by Alaska State Troopers. Originally, the plane was thought to have gone down on Refuge lands.

The year's final accident/incident tally for the Refuge included one vehicle destroyed (fire), three minor vehicle accidents, and two personal injury accidents resulting in a total of 14 hours of lost time.

The first casualty of the year was none other than Refuge Safety Officer Jim Frates who, on March 2, discovered that the difference between having his finger on Refuge operations and having an operation on his finger was mostly in the degree of pain. Jim, a Refuge Operations Specialist, needed

the services of a specialist in operations when his left ring finger became caught in the track of a 14-foot steel door while the automatic opener was simultaneously activated. The result?...one badly lacerated finger requiring reattachment through creative reconstructive surgery by a female emergency room physician who, fortunately, had had some prior needle-point experience. The net result of the "killer-door caper," in addition to a painful pinkie, was six hours of lost time and a somewhat embarrassed Refuge Safety Officer, who vowed never again to make tongue-in-cheek remarks about a boringly safe staff never providing him material for the Safety Section of the Annual Narrative.

The first day on a new job can sometimes be a memorable, even a rich and emotional, experience. For Seasonal Park Ranger Jean Evanoff, memorable and emotional will probably be how she will remember May 21. Jean's first assignment as a Ranger was to distribute brochures for canoeists using the Swan Lake and Swanson River Canoe Systems. While traveling down the Swan Lake Road, she began to experience problems with the Refuge's 1985 Chevy S-10 pickup. The pickup eventually died, and the smell of smoke prompted a desperate attempt to call Refuge Headquarters on the mobile radio; however, the radio system was apparently already incapacitated from an advancing electrical fire. When the hood mechanism failed to release, Jean began walking toward the Swanson River Road hoping to catch a ride to the Sterling Mini-Mart and the nearest telephone, some 15 miles away.

One "very well-done" S-10 Chevy pickup, the aftermath of an intensely hot fire caused by a rapidly developing electrical fire. 92/JF

In the meantime, the S-10 burst into flames, and the resulting smoke was spotted by workers in the nearby Swanson River Oilfield. The field's fire unit arrived to find the vehicle fully engulfed in an intense fire following rupture of the fuel tank. The crew directed their efforts to containing the fire to the roadway and adjoining vegetation. The Swanson River crew undoubtedly prevented what could have been a major wild fire, as the entire area was under high fire danger at the time.

May 21 was also not a good day for another Seasonal Ranger, Brent Richey. While Brent was loading 4 x 4 posts from a dismantled bulletin board at Swanson River Landing, an errant post broke the rear window of the 1976 Refuge Chevrolet Suburban. Fate was not quite finished with Brent as he headed down Swanson River Road with his load of 4 x 4's. When Brent braked for a moose crossing directly in front of his vehicle, one of the posts rocketed forward, shattering the front windshield. Fortunately, the post missed Brent and the moose.

One of two new emergency eye wash stations installed at maintenance shop. 92/JF

We did not have to wait long for a third vehicle to fall prey to the "terrible three's theory". Just five days later on May 26, Park Ranger Candace Ward backed into a sign post, breaking the rear window of the Refuge's 1987 Jeep Cherokee.

With May(hem) behind us, the staff enjoyed an accident-free period until June 20, when Ranger Jean Evanoff suffered a groin injury while moving a pile of rocks at the Russian River Campground. Medical diagnosis confirmed a hernia, and Jean was placed on restricted duty following a one-day rest.

On August 4, Biological Technician Diana Thomas received a scratch to the right eye while conducting vegetation studies in the Mystery Creek area. On August 31, Refuge Officer Chris Johnson scraped and dented the right side of his 4 x 4 Dodge patrol vehicle while driving through a narrow gate.

Monthly safety meetings were held jointly with personnel from the Kenai Fisheries Assistance Office, with topics generally focusing on a theme of seasonal interest. For the December meeting, Bob Heavlin of the Kenai Borough's Disaster Preparedness Office reviewed emergency planning and implementation of the Borough's overall program for reacting to specific disaster scenarios. He emphasized assistance from other state and federal agencies in the area.

All seasonal and volunteer employees were provided bear and boating safety training in conformance with Region 7 Policy Directives.

First aid training for Refuge SCA and volunteer enrolles. 92/JF

7. Technical Assistance

During the period March 9-16, Biological Technician Liz Jozwiak was detailed to the still winter-bound Selawik Refuge on the Seward Peninsula to assist with their annual moose survey.

Biologist Andy Loranger provided technical and logistical assistance in coordinating a steel shot seminar co-sponsored by ADF&G. The seminar was held at the Cook Inlet Aquaculture Association office and shooting practice at the Snowshoe Gun Club on August 14 and 19 respectively.

On April 14, Equipment Operator Dick Kivi flew to Bethel where he provided heavy equipment training and certification to two Yukon-Delta Refuge employees. During the latter part of June, Dick provided assistance to Chugach National Forest maintenance personnel in the installation of a steel gate at the Schooner Bend Field Camp. He also provided assistance to the ADF&G with spreading gravel at the Sportsman's Lodge/Russian River public access site.

8. Other Items

Nothing to report.

F. HABITAT MANAGEMENT

1. General

On September 10, Refuge Manager Doshier responded to an inquiry received in August from John Torgerson of the Kenai Peninsula Borough Assembly. The inquiry regarded the Refuge's salvage logging policy and our anticipated response to the Peninsula-wide spruce bark beetle infestation. Mr. Torgerson was told that any timber harvesting (particularly on as a large scale as had been suggested) must be done in compliance with various Federal regulations, Service policy, and the Kenai Comprehensive Conservation Plan, and that no harvesting was being contemplated at this time.

2. Wetlands

Nothing to report.

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 public firewood-cutting area remains popular with many local people. Firewood-cutting also serves the purpose of low-cost habitat and fuel management. Funny River Road provides access to the firewood-cutting area. 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 opened an additional access trail. Permits costing $20 were issued to fifty-eight people this year as compared with fifty-four in 1991 and fifty in 1990.

In 1992 the Refuge was opened as usual for free personal-use Christmas tree cutting. 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, but no permits were requested.

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. Six permits were issued this year compared to four last year and five the year before.

In July and August, 50 vegetation sampling plots were conducted at each of the nine permanent plot markers within the 1987 Skilak Loop II prescribed burn. Also, four new permanent plot markers were established off the Kenai River Trail in the Pothole Lake Fire 1991 regrowth area. In addition, two new permanent plot markers were placed near the Doroshin Bay cabin, also

located in the Pothole Lake Wildfire area. Vegetation sampling was conducted at these new plot markers to provide baseline data for continuing wildland fire regrowth monitoring.

4. Croplands

Nothing to report.

5. Grasslands

Nothing to report.

6. Other Habitats

Nothing to report.

7. Grazing

Nothing to report.

8. Haying

Nothing to report.

9. Fire Management

The Alaska Division of Forestry provides fire protection and fire suppression on Refuge lands and surrounding lands under a cooperative agreement with the Bureau of Land Management's Alaska Fire Service. State Forestry provides initial suppression using helitack and engine crews. Refuge fire personnel are usually not involved unless the fire lasts several days and/or grows in complexity and size.

During the 1992 fire season, five fires occurred on Refuge lands, although none developed into anything larger than 1.5 acres.

Table 8. Refuge Fires During 1992.

Date	Area	Size	Cause
5/31/92	Swanson River	.1 Acre	Chainsaw work (spark)
6/18/92	Hideout Hill	.1 Acre	Warming fire
6/21/92	Mile 71 on Kenai River	1.5 Acre	Fireworks
7/30/92	Hidden Creek	.1 Acre	Escaped campfire
8/14/92	Surprise Creek	.1 Acre	Escaped campfire

Refuge Biological Technician Diana Thomas worked on the fire crew that suppressed the fire on the Kenai River island at Mile 71. Refuge Officer

Johnson ferried fire personnel both ways across the Kenai River on the Boston Whaler.

Thomas wrote and issued a Special Use Permit to allow an interagency team to use the Refuge gravel pit to test helitorch sleds and recertify Office of Aircraft Service (OAS) pilots in their use. Thomas oversaw the helitorch operations, coordinating with the Division of Forestry, OAS, the U.S. Forest Service, and the spill prevention response unit.

10. Pest Control

A summary of insect and disease conditions in forests on the Kenai Peninsula is quoted from the U.S. Forest Service report, FOREST INSECT AND DISEASE CONDITIONS IN ALASKA - 1992, Conditions in brief.

> "Forest insect and disease populations and related damage increased throughout Alaskan forests in 1992. This was the fourth consecutive year with warm dry weather in spring and early summer, which allowed insect populations to explode, especially in Southcentral and Interior Alaska. Spruce bark beetle activity increased for the fourth consecutive year. New and ongoing infestations of spruce bark beetle, as determined by 1992 aerial surveys, now affect more than 600,000 acres. This is the greatest known acreage affected by spruce bark beetle in Alaska".
>
> "Spruce beetle activity increased dramatically further south on the Kenai Peninsula on Kenai National Wildlife Refuge lands and adjoining State and private lands. Spruce bark beetle activity was detected on more than 300,000 acres from Point Possession in the northern Kenai Peninsula to Kachemak Bay to the south. This represents a substantial increase over levels (187,842 acres) detected in 1991. It appears that most forested areas of the Kenai Peninsula are experiencing increased spruce beetle activity especially in the Lutz spruce forests north of Homer. For example, 184,799 acres of infested Lutz spruce were detected this year from Skilak Lake south to Ninilchik, from Cook Inlet east to the Harding Ice Field vs. 101,543 acres detected in 1991 vs. 39,033 acres detected in 1990 in the same areas. With respect to the Kachemak Bay area, there appears to be a slight increase in spruce beetle activity over levels detected in 1991: 12,454 acres vs. 6,820 acres."

11. Water Rights

Nothing to report.

12. Wilderness and Special Areas

Annual work on several trails within the Kenai Wilderness occurred during 1992, including maintenance conducted on the Fuller Lakes, Skyline,

Surprise Creek, and Emma Lake Trails, the Swan Lake and Swanson River Canoe Trails, and the Funny River Horse Trail.

Johnston reviewed and prepared a Refuge Special Use Permit for the Department of Army for three helicopter landings within the Kenai Wilderness to conduct a gravimetric survey.

The Alaska Department of Fish and Game was issued a permit authorizing salmon investigations on Tustumena Lake including three major egg takes, salmon escapement, enumeration, fry release, and various monitoring activities. Stipulations designed to minimize impact included guidelines for field camps, egg take, location diversity, and restriction of overall stocking numbers.

The most significant wilderness management issues on the Refuge continue to be mechanized access (snowmachine, motorboats, and airplanes) and salmon enhancement.

Several observation flights were conducted during 1992 to determine the overall amount and character of snowmachine use on designated wilderness lands within the subalpine and alpine areas of the Caribou Hills. Snowmachine use within Refuge portions of the Caribou Hills appeared to be exceeding historical levels. A reconnaissance flight on January 23 by Refuge Manager Doshier and Park Ranger/Pilot Johnston revealed numerous tracks, mostly in treeline areas near Trophy Lake, along the north fork of Deep Creek, along Cytex Creek, and near Ptarmigan Head. The snow appeared to be much deeper than normal, with a few wind-blown clear areas. A few moose were observed at or above 1800-foot elevation during the flight.

Although a general literature review indicates that the volume of snowmachine activity observed would be adverse to wildlife and wilderness resources, no specific studies have been conducted within the Caribou Hills.

Overall, snowmachine use is expected to increase within the Caribou Hills due to private land becoming available in the area, new access roads bringing snowmachine trailheads closer to Refuge lands, snowmachine technology improving, and recreational interest increasing in the Caribou Hills from non-local persons.

A request was received from the organization "EARTH" for sockeye salmon carcasses from Tustumena Lake to distribute for food. The salmon in question were those used by Alaska Department of Fish and Game for hatchery egg collection, and then dumped into the lake. The request was denied in writing on August 14, 1992. The primary reason for the denial was that the removal of the nutrients from the carcasses of the spawned sockeye from the wilderness ecosystem was incompatible with Refuge purposes. The EARTH organization was unsuccessful in seeking a court-ordered stay of the Refuge's administrative determination.

Alpine portions of the Kenai Wilderness in the upper Funny River area provide important habitats for many species of Refuge wildlife. Unknown

13. WPA Easement Monitoring

Nothing to report.

G. WILDLIFE

1. Wildlife Diversity

To obtain information on the impact of various disturbance factors (fire, insects, climatic change) on the Refuge's ecosystems, approval and funding were acquired in late 1992 to recruit an ecologist for the Refuge staff. Two of the priority issues to be addressed by the ecologist will be the roles of fire and of bark beetles in forest dynamics on the Refuge. As mentioned in the 1991 annual narrative, the changes in wildlife communities resulting from spruce mortality from bark beetles remain unknown.

2. Endangered and/or Threatened Species

No known endangered or threatened species were observed on the Refuge during 1992.

3. Waterfowl

Systematic surveys of waterfowl on the Refuge in 1992 included aerial surveys of trumpeter swans observed in the nesting, early productivity, and late productivity process and counts of waterfowl observed during winter bald eagle float surveys on two sections of the Kenai River. Refuge staff also monitored spring migration and staging of snow geese and other waterfowl on the Kenai River Flats.

Trumpeter Swan on the Refuge. Unknown

a. Trumpeter Swans

Table 9. Summary of nesting and early and late productivity swan surveys on and adjacent to the Kenai National Wildlife Refuge, 1992.

Attribute	Survey		
	Nesting	Early Productivity	Late Productivity
Single Swans	5	1	5
Pairs	13	9	18
Flocked Swans	28	6	27
Single + Nest	1	-	-
Pair + Nest	44	1	-
Single + Brood	0	0	0
Pair + Brood	0	30	30
Tot. Active Territories	46[1]	31	30
Total Broods	0	30	30
Total Adults	148	87	128
Total Cygnets	0	115	97
Avg. Brood Size		3.8	3.2
Nest Success	-	0.7	-
Total Swans	148	202	225

[1] One of these active territories (Lonesome Lake) was not discovered until the late productivity survey. Total active territories in 1992 was therefore 46.

$$\text{Nest success} = \frac{\text{Active territories observed in early productivity survey} \times 100}{\text{Active territories observed in nesting survey}}$$

The trumpeter swan nesting survey was conducted on May 27, 28, and 29, the early productivity survey on July 8 and 9, and the late productivity survey on August 28. During the spring nesting survey, a total of 148 swans, including 44 nesting pairs, 1 single adult with nest, 13 non-nesting adult pairs, 5 single adults and 28 flocked adults were observed (Table 9 above). Only the active territories discovered during the nesting survey were included in the early productivity survey. Of the 45 territories, 31 remained active. Of the 14 territories no longer active, 7 contained paired swans without young, and 7 contained no swans. Brood size ranged from 1 to 7 cygnets and averaged 3.8 cygnets for 30 broods. One active territory (Moose River East of Swan Lake) observed during the early productivity survey apparently was a re-nesting attempt because the swans were incubating at a new nest location, approximately 0.3 km from the nest observed during the nesting survey. This pair of swans did not produce a brood in 1992.

Table 10. Trumpeter swan nesting locations and productivity on and adjacent to the Kenai National Wildlife Refuge, 1992.

Location	Wilderness	1992 Active Territory	Early Prod. Adults	Early Prod. Cygnets	Late Prod. Adults	Late Prod. Cygnets
North of	Inside	Kuguyuk Lake	2	4	2	4
Kenai R.	"	Camp Island Lake	2	5	2	5
(Inside	"	Grebe Lake	2	6	2	3
Refuge)	"	Greycliff Lake	2	4	0	0
	"	Moose R (E Swan Lk)	2	0[1]	0	0
	"	E Fork Moose River	0	0	0	0
	"	Scenic Lake	2	0	2	0
	"	Scenic Lake Creek	2	3	2	3
	"	Creek S Scenic Lake	0	0	2	0
	"	Warbler L. (Pond E)	2	4	4	0
	"	Moosehorn Lake	2	5	2	5
	"	Chickaloon River (N)	2	3	2	3
	"	Chickaloon River (S)	0	0	0	0
	"	Fish Lake	2	5	2	4
	"	Meadow Lake (lake S.)	2	6	2	6
	"	Lonesome Lake	-	-	2	3
	"	Phalarope Lake	0	0	0	0
	"	Wild Lake (Pond NE)	2	0	0	0
Subtotal			26	45	26	36
North of	Outside	Beaver Lake	2	4	2	4
Kenai R.	"	Curlew Lake	2	3	2	3
(Inside	"	Quill Lake	2	0	2	0
Refuge)	"	Scaup Lake	2	3	2	2
	"	Swan Creek	2	5	2	4
	"	Trapper Joe Lake	2	7	2	7
	"	Two Island Lake	2	0	2	0
	"	Mink Creek Lake	2	0	0	0
	"	Otter Creek (pond S)	2	0	0	0
	"	Bill Besser Lake (SE)	2	2	2	2
	"	Pipeline Lake	0	0	2	0
	"	Crane Lake (Pond SW)	2	2	2	2
	"	Gooseneck Lake Bogs	2	4	2	4
	"	Donkey Lake	2	0	0	0
	"	Finger Lks (Pond E)	2	4	2	2
	"	Nest Lake	2	3	4	1
	"	Torpedo Lk (Lake E)	0	0	0	0
Subtotal			30	37	28	31
North of	Outside	Bishop Creek	2	2	2	2
Kenai R.	"	Timberlost Lake	2	2	2	2
(Outside Refuge)		Tony's Lake	2	3	2	1
Subtotal			6	7	6	5
South of	Inside	Fox Lake	2	5	2	3
Kenai R.	"	Fox River	2	3	2	3
(Inside	"	Killey R. Oxbow	2	3	2	3
Refuge)	"	Harvey Lake	2	3	2	3
	"	Glacier Creek	2	5	2	5
Subtotal			10	19	10	17
South of		Bay Lakes Bogs	2	4	2	3
Kenai R.		Brown's Lake Bogs	2	3	2	3
(Inside Refuge)						
Subtotal			4	7	4	6
South of		Gas Field Bogs	2	0	0	0
Subtotal			2	0	0	0
TOTAL			78	115	74	95

[1] Switched nest sites and renested approximately 0.3 km from first nest site.

A total of 225 swans (128 adults, 97 cygnets; 43 percent young) was observed during the late productivity survey, including 30 pairs with broods, 18 paired adults, 5 single adults, and 27 flocked adults (Table 9). One additional nesting territory, identified by the presence of a brood, was added during the late productivity survey, bringing the minimum number of active nesting territories on and adjacent to the Refuge in 1992 to 46. Nesting success (the total active territories observed during the early productivity survey divided by the total active territories observed during the nesting survey times 100) was 69 percent (30 of 44 nests).

Average brood size declined 12 percent between the early and late productivity surveys, from 3.8 to 3.2 cygnets. Reductions in the number of cygnets from early to late brood rearing occurred in 10 of the 29 broods (35 percent) which were observed during both surveys. The average cygnet loss per brood in these 10 broods was 1.9. The number of cygnets actually fledging and successfully migrating from the Kenai Peninsula was probably lower than in most years. Abnormally low temperatures in mid-to-late September froze many smaller wetlands, and numerous reports were received of juvenile swans unable to leave icebound lakes.

b. Wintering Waterfowl on the Kenai River

Common goldeneye, common mergansers, and mallards are the most common wintering waterfowl on the Kenai River. Other duck species occasionally observed during winter bald eagle float surveys include bufflehead and harlequins. Sixteen trumpeter swans were observed near the outlet of Skilak Lake on December 19. Historically, several hundred swans overwinter in this area. Waterfowl observations during 1992 surveys are summarized in Tables 11 and 12.

Table 11. Waterfowl observed on the upper Kenai River (Kenai Lake outlet to Jim's Landing) during bald eagle float surveys, 1992.

	Species				
Date	Goldeneye	Merganser	Mallard	Bufflehead	Unidentified
01/15/92	64	10	85	0	0
02/13/92	137	29	33	0	0
03/16/92	29	46	77	0	0
11/17/92	92	8	69	0	0
12/17/92	146	15	191	0	11

Table 12. Waterfowl observed on the lower Kenai River - Skilak Lake outlet to Bing's Landing - during bald eagle surveys, 1992.

Date	Species				
	Goldeneye	Merganser	Mallard	Bufflehead	Unidentified
01/17/92	343	38	129	0	0
11/16/92	273	48	22	0	0
12/19/92	614	8	67	0	0

c. Snow Geese - Spring Migration and Staging on the Kenai River Flats

Table 13. Waterfowl observed during spring migration and staging on the Kenai River Flats, 1992.

Date	Snow Goose	Canada Goose	Northern Pintail	Mallard	American Wigeon
04/07/92	0	75	100	0	0
04/13/92	106	400	500	0	0
04/14/92	120	430	500	0	0
04/5/92[1]	120	-	-	-	-
04/16/92	400	500	1000	0	0
04/17/92	1060	720	2000	25	0
04/18/92[1]	1500	-	-	-	-
04/19/92[1]	1500	-	-	-	-
04/20/92	2570	2100	5000	500	0
04/21/92	6000	1720	4100	150	0
04/22/92	1300	1500	2600	270	0
04/23/92	540	1800	4825	195	0
04/24/92	102	400	2300	200	45
04/25/92[1]	1200	-	-	-	-
04/26/92[1]	1500	-	-	-	-
04/27/92	900	650	1800	400	100
04/28/92	1028	300	2500	250	50
04/29/92	0	150	2000	200	100

[1] Data supplied by Jim Faro, ADF&G.

Snow geese were first observed by Refuge staff on the Kenai River Flats on April 13, and reports from the public confirmed this date as the 1992 arrival date. Canada geese and northern pintails were present when surveys began on April 7 (Table 13 above). Peak use of the Kenai River Flats by snow geese occurred from April 17 to 22; a smaller peak occurred on April 25 and 26. Snow goose use of the area continued until April 29. The maximum number of snow geese observed was 6000 on April 21. Many of the

geese remained on the Flats less than 24 hours. Concentrations exceeding fifteen thousand snow geese were documented during the 1980's, and the number of geese observed in 1992 continued the trend of decreased use of the Kenai Flats by snow geese during spring migration. Because surveys of all staging areas in Cook Inlet were not conducted in 1992, it is unknown whether total numbers of snow geese using the Inlet have declined. In addition to monitoring numbers and chronology, Refuge staff monitored for radio-marked snow geese and northern pintails, providing assistance to ongoing research on these species being conducted by the Alaska Fish and Wildlife Research Center.

4. Marsh and Water Birds

No loon or other water bird surveys were conducted in 1992.

5. Shorebirds, Gulls, Terns, and Allied Species

Table 14. Cormorants observed on surveys at Upper Skilak Rocks colony in Skilak Lake 1986-1992.

Year	Date	Minimum Active Nests	Young of Year	Adults	Total
1992	7/10/92	---	26	17	43
1991	7/18/92	Unk	---	22	22
1990	7/19/92	22	43	54	97
1989	---	---	No	Surveys	--
1988	6/07/88	17	15	36	51
1987	7/31/87	12	10	18	28
1986	7/03/86	---	---	---	27
1986	7/30/86	8	3	15	15

Cormorants were surveyed by boat on July 10, 1992, at the "Upper Skilak Rocks" colony in Skilak Lake. Very windy conditions and rough weather made for poor counting conditions. Numbers should be viewed as minimum numbers. A total of 43 cormorants were counted, including 26 young and 17 adults. This was higher than the 22 counted in 1991, but lower than the 97 counted in 1990 (Table 14 above).

6. Raptors

a. Nesting Bald Eagles

Two bald eagle nesting territories were discovered for the first time in 1992, bringing the total number of known nest site locations (those active in recent years) on and near the Refuge to 82. New nests were also found in five traditional territories. Nests were searched for, but not found,

at 11 of the known locations and may no longer be present. At the remaining sites, 44 nests were determined to be active (incubating adults or eggs present) during the aerial nesting survey conducted May 11, 12, and 14. Twenty-eight and 15 active nests were located on and off the Refuge, respectively. The early productivity survey, timed to coincide with the early brood rearing period, was conducted on July 6 and 9. Three additional nests which had adults nearby during the nesting survey were determined active, bringing the total of active territories to 47. Nest failure rate was high (46.8 percent) during the period between the nesting and early productivity surveys. Only 25 of the 47 nests remained active by early July. These nests contained a total of 35 eaglets. Thirteen of the nests still active contained 1 eaglet each and 11 nests contained 2 eaglets each. One nest was not relocated until the late productivity survey; it contained at least 1 eaglet.

Twenty of the 25 nests active during the early productivity survey remained active on August 5, when the late productivity survey was flown. The fate of eaglets in the nests changing from active to inactive status between surveys is unknown, but it is believed that many or all had already fledged. A summary of bald eagle nesting and productivity on the Refuge is shown in Table 15.

Osprey nested at the Bernice Lake power pole site. An adult was still incubating during the early productivity survey, but no osprey were present during the late productivity survey, and it is doubtful that any young fledged. The results of the 1992 surveys by nest site location are presented in Table 16.

Table 15. Summary of bald eagle production by land-use classification on and near the Kenai National Wildlife Refuge, 1992.

			On Refuge	Off Refuge	
Productivity	Wilderness	Out. Wilderness	Total	Total	Total
Active Nests	17	14	31	16	47
Failed active nests	7 (41%)	8 (57%)	15 (48%)	7 (44%)	22 (47%)
Eaglets/active nest - early survey	1.4	1.5	1.4	1.4	1.4
Eaglets/active nest - late survey	1.4	1.5	1.5	1.3	1.4
Maximum number of eaglets fledged[1]	11	11	22	13	45

[1] Eaglets present during early productivity survey.

Table 16. Bald eagle nesting locations and production on and near the Kenai National Wildlife Refuge, 1992.

Nesting Location	Nesting Status	Survey Early Productivity Status	Early Productivity No. Eaglets	Late Productivity Status	Late Productivity No. Eaglets
I. Game Management Unit 15A (N. of Kenai River)					
A. On Refuge					
1. Outside Wilderness					
Torpedo Lake	A	A	1	EG	-
Afonasi Lake	A	A	2	A	2
East Fork Moose R.	A	I	-	-	-
West Fork Moose R.	A	A	2	A	2
Coyote Lake	A	A	1	EG	-
No Name Creek	DL	-	-	-	-
Big Indian Creek	DL	-	-	-	-
Pincher Creek	A	I	-	-	-
Beaver Lake	DL	-	-	-	-
North Beaver Lake	A	I	-	-	-
Mink Creek Lake	A	I	-	-	-
Campfire Lake	A	A	1	A	1
Chickadee Lake	I	-	-	-	-
Chickaloon R. Inh.	A	I	-	-	-
Akula Lake	DL	-	-	-	-
Barabara Lake	A	I	-	-	-
East Elephant Lake	DL	-	-	-	-
Kuguyuk Lake	I	-	-	-	-
Crane Lake	A	I	-	-	-
2. Inside Wilderness					
Jim's Landing	A/NB	I	-	-	-
Camp Island Lake	I	-	-	-	-
Loon Lake	A	A	2	A	2
Clam/Moosehorn Rdg.	A	I	-	-	-
Swan Lake	A	A	2	A	2
Rock Lake	I	-	-	-	-
Spruce Lake	I	-	-	-	-
Bear Lake	A/NB	A	1	A	1
NE. Moose Lake	A	I	-	-	-
Grouse Lake	I	-	-	-	-
Bedlam Creek Bluff	A/NB	I	-	-	-
Gene Lake	A	I	-	-	-
Canoe Lake[1]	A	I	-	-	-
Swanson Lake[1]	A/NB	I	-	-	-

Table 16 continued

B. Off Refuge

Kenai R./Gwin's	A	I	-	-	-
Juneau Creek	A	I	-	-	-
Kenai R./E. Juneau C.	A	I	-	-	-
Moose Point Lake	I	-	-	-	-
Otter Creek Outlet	DL	-	-	-	-
Bishop Creek Outlet	DL	-	-	-	-
Suneva Lake/Drained	A	I	-	-	-
Daniel's Lake	I	-	-	-	-
Kenai R./Bing's	A	I	-	-	-
S. Swanson R. mouth	A	A	2	A	2
Kenai R./up. Bing's	A	A	2	A	2
Soldotna Creek[1]	A	I	-	-	-
Bernice Lake (Osprey)	A	A	?	I	-
Peterson's Pond	A	A	1	A	1

II. Game Management Unit 15B (S. of Kenai River and Skilak Lake, N. of Kasilof River and Tustumena Lake)

A. On Refuge

1. Outside Wilderness

Headquarters Lake	A	A	2	A	1
Killey R. - N.	I	-	-	-	-
Lower Killey R. - S.	A	I	-	-	-

2. Inside Wilderness

S. Shore Skilak Lake	A	A	1	-	-
Killey/Harvey Lake	A	A	1	-	-
Skilak Lake Inlet	A	I	-	-	-
Skilak Glacial Fl.	A	I	-	-	-
Russian River Burn	A/NB	A	2	A	2
Bear Creek	A	A	1	A	1
Killey Headwaters	A	A	?	A	1
Upper Funny River	I	-	-	-	-
Kenai R./downstream of Russian R. Burn	I	-	-	-	-

Table 16 continued

B. Off Refuge

Kenai R./Ciechanski	DL	-	-	-	-
Kenai R./Salamatof	A	I	-	-	-
Kenai R./Browns Lake	I	-	-	-	-
Russian River[1]	A/NB	I	-	-	-
Kenai R./Bluff	A/NB	I	-	-	
Kenai R./KPCC Isl.	I	-	-	-	-
Kenai R./Funny R. Rd.	A	A	2	A	2
Kenai R./Russian R.	A	A	1	A	1
Kasilof River/Bridge	A/NB	A	1	A	1
Coho Road/Gas well	I	-	-	-	-
Quartz Creek	A	A	2	A	1
Echo Lake Road	I	-	-	-	-
Moose Meadows Subd.	DL	-	-	-	-
Kenai R./W. Killey R. mouth	I	-	-	-	-

III. Game Management Unit 15C (S. of Kasilof River and Tustumena Lake)

A. On Refuge

1. Inside Wilderness

Nikolai Creek	A	I	-	-	-
Upper Fox River	A	A	1	-	-
Mid Fox River	DL	-	-	-	-
Lower Fox/Clearwater	A	A	2	A	1
Lower Fox/Powerline	DL	-	-	-	-

B. Off Refuge

Sheep Crk./Fox River	A	A	1	A	1
Bradley River Outlet[1]	A/NB	I	-	-	-
Fox R. Flats - Rock	A	A	1	A	1

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[1] Nests moved to new sites in 1992 (Sucker Lake to Canoe Lake, Camper's Lake to Swanson Lake, Sevena Lake to Soldotna Creek, new nest site on Russian River, and new nest site at Bradley River outlet.)

Key: New nests located in 1992 are underlined.
A = active; I = inactive; DL = searched, not located;
A/NB = adult nearby; EG = eaglets gone; NS = no search

b. Wintering Bald Eagles

More eagles were observed wintering along the Kenai River in 1992 than in 1991, but the reasons for the higher numbers are uncertain. A milder winter (1992-93) and a larger run of late coho salmon into the Kenai River are suspected.

Table 17. Numbers and ages of bald eagles observed during boat surveys along the Kenai River during winter-spring and fall-winter months, 1992.

Survey Dates	River Route: Upper River* Ad	Upper River* Juv	Lower River** Ad	Lower River** Juv	Total Ad	Total Juv
***01/15&17/92	79	23	170	53	249	76
***02/13/92	108	29	N/S	N/S	108	29
***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

* Kenai Lake to Jim's Landing
** Skilak Lake outlet to Bing's Landing
*** Aerial
N/S Not surveyed

7. Other Migratory Birds

Table 18. Birds recorded on the Swan Lake Route, Alaska Breeding Bird Survey, June 12, 1992.

Species	No.	Species	No.
Myrtle Warbler	43	Swainson's Thrush	42
Slate-colored junco	30	Alder Flycatcher	26
Northern Waterthrush	14	Common Redpoll	13
Olive-sided Flycatcher	11	Orange-Crowned Warbler	8
American Robin	7	Gray Jay	7
Varied Thrush	7	Yellow Warbler	7
Greater Yellowlegs	6	Ruby-crowned Kinglet	6
Boreal Chickadee	4	Blackpoll Warbler	4
White Crowned Sparrow	4	Common Loon	2
Trumpeter Swan	2	Sandhill Crane	2
Boreal owl	2	White-wing Crossbill	2
Common Snipe	1	Savannah Sparrow	1
Tree Swallow	1	Golden-Crowned Kinglet	1

The Swan Lake Route was completed on June 12, 1992. Commonly encountered birds included the myrtle warbler (43) and the Swainson's thrush (42) (Table 18 above). A total of 243 identified birds of 26 species were observed along this route.

The Seven Lakes Route was surveyed on June 16. The most commonly observed birds were the Swainson's thrush (40) and the American Robin (24) (Table 19). A total of 178 identified birds of 26 species were observed along this route.

Table 19. Birds recorded on the Seven Lakes Route, Alaska Breeding Bird Survey, June 16, 1992.

Species	No.	Species	No.
Swainson's Thrush	40	American Robin	24
Slate-colored Junco	19	Myrtle Warbler	19
Gray-cheeked Thrush	16	White-crowned Sparrow	12
Varied Thrush	10	Hermit Thrush	6
Blackpoll Warbler	5	Gray jay	4
Common Redpoll	4	Northern Waterthrush	3
Alder Flycatcher	3	Boreal Chickadee	1
Ruby-crowned Kinglet	3	Herring gull	3
Great-horned owl	2	Tree Swallow	2
Townsend Warbler	1	Orange-crowned Warbler	1
Unidentified Woodpecker	1	Scaup Sparrow	1
Yellow Warbler	1	Fox Sparrow	1
Greater Yellowlegs	1	Common Loon	1
Olive-sided Flycatcher	1	Barrows Goldeneye	1

8. Game Mammals

a. Moose

Moose population composition was sampled in two count areas in Game Management Unit 15A by the Refuge staff on November 19 and 20, 1992. The composition observed during these surveys is shown in Table 20 and Table 21.

Table 20. Results of moose composition surveys in Alaska GMS 15A, 1992.

Count	Bulls				Cows					Total
Area	Small	Med.	Large	Total	Single	w/1	w/2	Total	Lone	Moose
15A-1	9	9	3	21	167	88	8	263	2	390
15A-8	4	13	2	19	41	7	1	49	0	77
Total	13	22	5	40	208	95	9	312	2	467

Table 21. Moose population composition in Alaska GMU 15A, 1992.

Unit	Bull: 100 Cow	Yrl. Bull: 100 Cow	% Yrl. Bull in Herd	Calf: 100 Cow	Twins: 100 Cow w/ Calf	% Calf in Herd	Moose per Hour
15A *	12.8	4.2	2.7	36.8	8.6	24.6%	55.1

*Only areas counted in GMU 15A.

b. Caribou

Table 22. Caribou observed on and adjacent to the Kenai National Wildlife Refuge by the Alaska Department of Fish and Game, 1992.

Date Surveyed	Herd (GMS)	Adults	Calves	Cows	Bulls	Total Obs.	Aircraft
06/05/92	Lowland (15A)	56	18	-	-	74	Supercub
10/30/92	Lowland (15A)	53	3	-	-	56	Supercub
10/30/92	Twin Lakes (15B)	-	-	-	-	29	Supercub
11/11/92	Killey River(15B)	177	45	106	71	222	Helicopter
11/11/92	Fox River (15C)	40	10	23	17	50	Helicopter
11/11/92	Kenai Mt. (7)	289	55	234	101	390	Helicopter

The Alaska Department of Fish and Game (ADF&G) surveyed the caribou herds on and adjacent to the Refuge in 1992 (Table 22), placing radiocollars on ten adult females in the lowland herd. Calves were born from May 18 to June 5, with the peak between May 22 through May 27, 1992. Data suggest a high calf mortality rate on the lowland herd.

c. Dall's Sheep and Mountain Goat

An extensive survey of Dall's sheep and mountain goats was conducted throughout their potential habitat on and immediately adjacent to the Refuge in 1992. The survey was a cooperative study with ADF&G. Lyman Nichols, Billy Wiedicker, and Vern Lofstedt piloted the three PA-18's used. ADF&G Biologists Ted Spraker and Dave Harkness and Refuge Biologist Loranger were the observers. The survey covered a total of 889 mi^2 of potential sheep and goat habitat. A total of 3974 minutes (66 hours) of flight time was logged by the three aircraft.

A primary objective of the survey was to compare the use of two double-sampling aerial survey techniques (sampling the same area only hours apart using two different flying techniques), both of which allow estimation of visibility bias (number of sheep missed during the aerial survey). One survey, the traditional ADF&G standard PA-18 single survey of sheep and

goats was compared to a higher altitude survey of the same area. Double sampling and a logistic regression model have been used by Dr. Lyman McDonald and his associates in recent years to estimate sheep numbers in Arctic National Wildlife Refuge and Wrangell-St. Elias National Park. Double sampling and ratio estimators as developed by Dr. Bill Gasaway and associates of the ADF&G have been used extensively to estimate moose numbers in Alaska.

Sheep and goat survey units were divided into low, medium, and high density strata based on previous knowledge of sheep and goat distribution in the study area. All units were then surveyed with a high altitude "standoff" survey, which did not attempt to count all animals present and did not disturb sheep and goat groups. A more intensive "standard" survey, which approximates the traditional ADF&G survey and attempts to count and classify all animals present was conducted immediately after the "standoff" survey. A third, most intensive survey was conducted in all high and medium density units and a random sample was conducted in the low density units immediately following the standard survey. The logistic regression model will be used to calculate the visibility bias associated with the standoff survey. A Jackknife technique will then be used to calculate a population estimate. Ratio estimation will be used to calculate the visibility bias associated with the standoff and standard surveys by comparing the standoff to standard and standard to intensive survey results, respectively.

Table 23. Dall's sheep surveys on/adjacent to the Kenai NWR, 1992.

Count Area	Legal Rams	Sub-Legal Rams	Ewes	Lambs	Unid.	Total
Closed Area	23	16	34	9	0	82
831	5	37	102	18	0	162
837	1	7	15	5	0	28
853	1	16	48	12	0	77
855	3	18	27	18	0	66
856	11	117	272	98	0	498
857	2	22	86	15	0	125
858	3	7	57	11	0	78
Totals	49	240	641	186	0	1116

Data analyses to estimate sheep and goat populations from this study and to compare the precision of estimates and the cost associated with the three techniques are ongoing. Presented in this report are the maximum number, or "best count", of sheep and goats observed in all units. The majority of best counts were obtained with the intensive survey, although not always. Sheep and goat groups were missed at all three survey intensities, and the

"best count" of animals observed is a conservative estimate of actual populations.

A total of 1116 Dall's sheep was observed in the study area (Table 23). This total included 289 rams, 49 of which were full curl or better, 641 ewes and 186 lambs. Ram/100 ewe and lamb/100 ewe ratios were 45/100 and 29/100, respectively; 17.7 percent of the observed sheep were lambs.

Table 24. Mountain goat surveys on/adjacent to the Kenai NWR, 1992.

Count Area	Adults	Kids	Total
Closed Area	2	0	2
831	34	12	46
837	60	18	78
842	71	25	96
843	80	29	109
854	70	28	98
855	16	4	20
856	50	15	65
857	52	19	71
858	87	28	115
859	147	54	201
860	180	48	228
861	107	33	140
862	67	21	88
Totals	1141	367	1508

A total of 1508 mountain goats was observed in the study area (Table 24). This total included 1141 adults goats and 367 kids (24.3 percent kids).

d. Wolves

In accordance with the "Wolf Management Operational Plan" (Plan) for Alaska Game Management Subunit (GMU) 15A, a fall census of the wolf population in this management area is to be conducted by the U. S. Fish and Wildlife Service (USFWS) and ADF&G by December 20 of each year.

Because of unfavorable snow conditions and logistical problems associated with aircraft, pilot, and observer availability, we were not able to conduct the interagency aerial track/direct count survey while at the same time monitoring known packs with radio-collared individuals prior to the required December 20, 1992, deadline. Most of the data is therefore based on the continuous monitoring of radio-collared wolves in 4-5 packs and on incidental visual observations of uncollared wolves in other packs while monitoring identified packs. We were thereby unable to generate a minimum 1992 pre-season wolf population estimate, as required in the Operational Plan.

There are several uncertainties in reporting the wolf packs and their numbers. The relatively new Moose River Flats Pack now occupies portions of pack territories formerly occupied by the Point Possession Pack, the Big Indian Pack, the Bear Lake Pack, and the Skilak Lake Pack. One of the founders of the new pack was a radio-collared female from the Point Possession Pack who was recently found dead. The Big Indian Pack, if it still exists, apparently spends most of its time outside the census area and the area used by the Moose River Flats pack in 1992. Previously, this pack's territory was primarily in the Kenai Mountains. We believe the former Skilak Pack no longer exists. However, there are probably wolves using the southern portion of the former Skilak Lake Pack territory in the Skilak Loop area. We lost radio contact with the small Skilak Loop Pack during the spring of 1992 and we believe the pack no longer exists.

As per the Plan, the wolf population estimate is comprised of three parts: 1) totaling the number of wolves visually observed in packs (pack = > 3 wolves); 2) adding 15 percent (to the above number) to account for loners and pairs, and 3) adding known wolf mortality that occurred after September 1 but prior to the census.

Part 1: Table 25 presents our best information on the five wolf packs (pack = > 3 wolves) in GMS 15A in the late fall to mid-winter of 1992. The observed pack sizes are based on monitoring the four packs that had radio-collared members and on visual observations of another pack without radio-collared individuals, assumed to be the Bear Lake Pack.

Table 25. Wolf population estimate for northern (GMS 15A) Refuge, early winter 1992.

Pack	No. of Radios	Minimum Count	Date	Agency
Elephant Lake	1	13	12/92	ADF&G
Swanson River	2	7	11/10/92	USFWS
Pt. Possession	1	4	11/10/92	USFWS
Moose River Flats	3[2]	7	12/92	ADF&G
Bear Lake	0	6	1/12 & 28/93	USFWS
Sub-total	7[3]	37	--	--

[2] One radio-collared wolf died near Trapper Joe Lake; the cause of death is unknown. The second radio-collared wolf has become a loner outside the pack territory, and the status of the third radio-collared wolf in this pack is uncertain.

[3] The total number of radio-collared wolves in packs as of February 25, 1993, is three.

Part 2: The addition of 15 percent to account for pairs and loners:

$$[(37)(.15)] + 37 = 43 \text{ wolves}$$

Part 3: The addition of all known mortality occurring after September 1 and before the fall census:

Moose hunter kill (September) = 1
(1) + (43) = 44 wolves

Note: There were five wolves taken by trappers/hunters as of February 22, 1992, but most of these were taken after the visual counts of wolves shown in Table 25.

We lost radio contact with the Bear Lake Pack after the last radio-collared individual dispersed. However, while that radio was still functioning, we discovered that the entire pack (ten wolves) had left its pack territory. It was monitored and seen near Chickaloon Bay to the north in January and February 1992. In April, seven wolves were again seen in the traditional Bear Lake Pack territory near Porcupine Lake. On April 20, four of the wolves were seen north of Watson Lake. Shortly thereafter, the only radio-collared male we had in the pack apparently dispersed. It was last located with the Mountain Pack outside the census area on July 14. During subsequent monitoring of the Mountain Pack, this male's signal was no longer detected. During the winter survey, we twice visually observed six wolves in a pack back in the Bear Lake Pack territory and assumed it to be the Bear Lake Pack.

In summary, the above information indicates our minimum pre-season fall wolf population estimate in GMU 15 was 44 wolves. This was above the minimum 38 wolves required to open a season on wolves on the Refuge.

9. Marine Mammals

Nothing to report.

10. Other Resident Wildlife

a. Snowshoe Hare

Hares were monitored in five live-trapping grids in 1992 (Table 26). A new grid in the Skilak Loop Road area was added this year. Hares are still relatively low in numbers compared to their peak in the early 1980's. In fact, a decrease was observed in the Funny River Road grid between 1991 and 1992.

Table 26. Capture success and pellet densities in five permanent snowshoe hare study grids on the Refuge, 1983-1992.

	Swanson River Grid				Funny River Road Grid				Campfire Lake Grid				69 Burn Grid				Skilak Loop Road			
Year	Indiv AD	Indiv Juv	Tot. Capt	Pellets M^2	Indiv AD	Indiv Juv	Tot. Capt	Pellets M^2	Indiv AD	Indiv Juv	Tot. Capt	Pellets M^2	Indiv AD	Indiv Juv	Tot. Capt	Pellets M^2	Indiv AD	Indiv Juv	Tot Capt	Pellets M^2
1983	23	11	64	65	27	76	232	60[1]												
1984	34	20	85	51	47	79	216	35												
1985	30	10	113	52	49	25	159	44												
1986	23	8	95	28	19	15	115	20												
1987	10	2	31	14	16	15	63	9	13	11	77	20[1]								
1988	4	5	11	11	2	2	5	7	5	7	39	10								
1989	2	2	4	5	1	2	3	2.1	5	4	18	3.2	1	0	1	7.5[1]				
1990	2	1	6	1.9	1	0	3	2.6	4	1	12	4.1	0	1	1	3.1				
1991	1	2	4	1.1	13	13	46	1.1	4	2	17	3.0	1	1	4	1.0				
1992	2	0	4	3.2	2	5	11	2.4	5	5	23	3.4	2	1	12	1.3	5	9	23	12.5[1]

[1] Previously deposited snowshoe hare pellets were removed from these square meter [M^2] plots for the first time; pellets were removed from other plots after they were counted.

Total captures are the numbers of initial captures and recaptures of all hares in the grid.

b. Beaver

An early fall beaver lodge and food cache aerial survey was conducted in the Swan Lake and Swanson River Canoe Systems, the Finger Lakes area (1969 burn), and the Vogel Lake area (mature forest) (Table 27). Results of the survey indicated fewer lodges in the Swan Lake Canoe System and the Vogel Lake area in 1992 than in 1991.

Table 27. Results of fall aerial beaver lodge and cache surveys on the Kenai National Wildlife Refuge, 1992.

Survey Area	Act. Lodges w/ Caches	Act. Lodges w/o Caches	Total Act. Lodges
Swan Lake C.S.	20	2	22
Finger Lake area	20	1	21
Vogel Lake area	18	4	22
Swanson River C.S.	12	7	19
Totals	70	14	84

c. Spruce Grouse

Fewer spruce grouse were observed along roadside survey routes in 1992 than in 1991 and 1990 (Table 28).

Table 28. Results of early morning roadside surveys of spruce grouse surveys on the Kenai National Wildlife Refuge, 1987-1992.

Year	Route	Length (miles)	Number Surveys	Total Grouse	Grouse/ Survey	Grouse/Survey Mile
1987	Skilak Loop	19.4	8	31	3.8	0.20
	Swanson River Rd.	15.6	6	0	0.0	0.00
	Swan Lake Road	12.8	6	0	0.0	0.00
1988	Skilak Loop	19.4	8	24	3.0	0.15
	Swanson River Rd.	15.6	10	2	0.2	0.01
	Swan Lake Road	12.8	10	22	2.2	0.17
	Mystery Creek Rd.	11.1	4	11	2.7	0.25
1989	Skilak Loop	19.4	18	160	8.9	0.50
	Swanson River Rd.	15.6	7	9	1.3	0.08
	Swan Lake Rd.	12.8	7	25	3.6	0.28
1990	Skilak Loop	19.4	7	151	21.6	1.11
	Swanson River Rd.	15.6	5	27	5.4	0.35
	Swan Lake Rd.	12.9	5	19	3.8	0.29
1991	Skilak Loop	19.4	10	271	27.1	1.40
	Swanson River Rd.	15.6	10	39	3.9	0.25
	Swan Lake Rd.	12.9	10	67	6.7	0.52
1992	Skilak Loop	19.4	3	57	19.0	0.98
	Swanson River Rd	15.6	3	3	1.0	0.06
	Swan Lake Rd.	12.7	3	5	1.7	0.13

d. Small Mammal Population Trend

Small mammal populations were sampled in the summer of 1991 in the snowshoe hare grids using Museum Special snap-traps. The type of traps used to sample small mammal population trends in the late summer/early fall of 1992 was changed to Sherman live-traps in an attempt to use a more humane technique. A total of 909 red-backed voles and 76 shrews was captured in the five snowshoe hare grids during the summer. The comparative results of the late summer-early fall surveys in 1991 and 1992 are shown in table 29.

Table 29. Late summer-early fall small mammal live trapping summary and comparison with 1991 snap trapping success.

	47 Burn		Mature Forest		Crushed Area		Total	
	91	92	91	92	91	92	91	92
Red Back Vole Individuals	49	45	38	90	30	8	117	143
Red Back Vole Captured	49	48	38	101	30	8	117	157
Red Back Vole Recaptures (1992)[1]	-	3	-	11	-	0	-	14
Tundra Voles	0	1	0	2	4	2	4	5
							2 died	
Shrews	9	0	24	0	30	0	63	0
Squirrels	0	2	0	0	0	0	0	2
Traps visited without capture	?	223	?	133	?	258	?	?

[1] Recaptures were not possible prior to 1992 because snap-traps were used.

11. Fisheries Resources

The estimated sport harvest of sockeye salmon in the Russian River system was 30,512 for the early run and 26,101 for the late run. Escapement numbers through the Russian River weir for the early and late runs were 37,117 and 63,478, respectively. Estimated late run spawning in the Russian River below the weir for 1992 was 4980 sockeye. Total escapement through the sonar counter into the lower, main stem of the Kenai River was 994,760.

12. Wildlife Propagation and Stocking

The Cook Inlet Aquaculture Association under contract with the Alaska Department of Fish and Game collected eggs in 1992 from spawning sockeye salmon returning to Hidden Lake and Bear Creek in the Tustumena Lake system. The eggs were taken to trail Lake and Crooked Creek Hatcheries respectively, and the resulting fry were released into Hidden and Tustumena Lakes. The level of stocking in Tustumena Lake remained at six million fry/year. Hidden Lake was managed to return a maximum of 30,000 adult salmon to the system.

13. Surplus Animal Disposal

Nothing to report.

14. Scientific Collections

Nothing to report.

15. Animal Control

Nothing to report.

16. Marking and Banding

All wildlife which was ear-tagged, radio-collared, or leg-banded during 1992 was reported to the U.S. Fish and Wildlife Service Law Enforcement Division or the Migratory Bird Banding Laboratory. Those reports are summarized in Table 30.

The following animals were either brought into the Refuge or retrieved by Refuge personnel and are stored in the Kenai National Wildlife Refuge freezers.

Three bald eagles: two adult males found dead in Soldotna area on May 7, 1992, and July 22, 1992, and one female juvenile which died in Ninilchik on January 4, 1993; one great gray owl; one great horned owl; two hawk owls; one sharp-shinned hawk; one saw-whet owl; one pigeon guillimont; three kingfishers; two mink; one ermine; one river otter.

Table 30. Report of mammals/birds taken under Federal Fish and Wildlife Permit #692350 and State of Alaska Permit #92-47 in 1992.

Species	Date	Activity	Age	Sex	Weight	Status	Area
Wolf	01/22/92	Recaptured	Ad	M	108.0 lbs	Released	Stormy Lake
Wolf	01/22/92	Radiocollared	SA	F	82.0 lbs	Released	Stormy Lake
Wolf	01/22/92	Eartagged	Ad	M	112.0 lbs	Released	Stormy Lake
Wolf	01/29/92	Recaptured	Ad	M	110.0 lbs	Released	Beaver Lake
Wolf	01/30/92	Radiocollared	Pup	F	86.0 lbs	Released	Bedlam Lake
Wolf	01/30/92	"	Ad	M	105.0 lbs	Released	Bedlam Lake
Wolf	01/30/92	"	Old	M		Released	Bedlam Lake
Wolf	01/31/92	"	Pup	M	82.0 lbs	Released	Lower Ohmer Lk
Wolf	01/31/92	Recaptured	Ad	F	94.0 lbs	Released*	Lower Ohmer Lk
Wolf	08/12/92	Dead in trap	Ad	F	62.0 lbs	Had been shot	Mystery Ck Rd
Wolf	08/12/92	Radiocollared	Ad	M	85.0 lbs	Released	Myst Ck Pipel
Wolf	08/16/92	"	Ad	F	72.0 lbs	Released	Mystery Ck Rd
Coyote	05/01/92	Eartagged	SA	M	21.0 lbs	Released	Swan Lake Rd
Coyote	06/15/92	"	Ad	F	22.0 lbs	Released	Beav.Ck Gas Fd
Coyote	07/23/92	"	Ad	M	26.0 lbs	Released	Beav.Ck Gas Fd
Coyote	08/17/92	"	Pup	F	8.0 lbs	Released	Mystery Ck Rd
Lynx	01/07/92	Injur. during capture 11/3/91	Ad	F	25.0 lbs	Released after rehab	
Lynx	05/05/92	Radiocollared	Ad	F	24.2 lbs	Released	W. end Sk. Rd
Lynx	05/10/92	"	SA	M	19.2 lbs	Released	Sterling
Lynx	10/15/92	"	Ad	F	20.0 lbs	Released	Blizzard Lake
Lynx	10/15/92	"	Ad	F	22.7 lbs	Released**	E of Atkins Rd
Lynx	10/16/92	"	Ad	M	30.5 lbs	Released	Skookum Lake
Lynx	10/17/92	"	Ad	M	26.0 lbs	Released	Blizz./ Sk.Lks
Lynx	10/19/92	"	Ad	M	22.5 lbs	Released@	SW Sunken Lk
Lynx	10/20/92	Recapture #4	7+	F	22.0 lbs	Released	Sk.Is/SwansRRd
Lynx	10/21/92	Radiocollared	Old	M	27.0 lbs	Released	1 mi Portag Lk.
Lynx	10/21/92	Recaptured	Ad	F	18.5 lbs	Released	Mystery Ck Rd
Lynx	10/24/92	Recaptured	7+	F	24.8 lbs	Released	Birch Lake
Lynx	11/21/92	Recapture #5 Same lynx as on 10/20/92, with kitten.				Moved. Sterling area.	
Lynx	11/30/92	Radiocollared	Kit	M	11.5 lbs	Bait for mother (above).	
Lynx	12/01/92	Recapture #6 Mother darted next to captive kitten. Both moved farther.					

* Found dead in March 92.

** E of Atkins Rd

@ SW Sunken Lk

Ages: A = adult, SA = subadult (estimated 1-2 years old), Pup = < 1 year old.

Table 31. Report of Mammals/Birds taken under Federal Fish and Wildlife Permit #692350 and State of Alaska Permit #92-47 in 1992.

Species	Date	Activity	Status	Area
Snowshoe Hare	6/12-8/20/92	Live Trapped	36 Eartagged/Released	KNWR Hare
			4 Died in Recapture	Grids
			2 Died 1st Capture	
			2 Killed by Predator inside trap	
			2 Escaped untagged	
			42 Total Snowshoe Hare	
		Non-target Captures	5 Squirrels (1 Died), 2 Grouse	
Small Mammals	6/12-08/20/92	Snap-trapped	909 Red-Back Voles	KNWR Hare
			76 Masked Shrews	Grids
		Non-target Captures	17 Birds (Died)	
Small Mammals	9/18-10/03/92	Live-trapped	143 Red-Back Voles	Swan Lk Rd
			(90 Lived, 53 Died)	
			(14 were Recaptures)	
			5 Tundra Voles	
			(3 Lived, 2 Died)	
			0 Shrews	
			1133 Total Small Mammals	
		Non-target Captures	2 Squirrels	

17. Disease Prevention

No disease outbreaks were known among fish or wildlife populations on the Refuge in 1992. To minimize the influence of the biting dog louse on wild canids, all live-captured wolves and coyotes handled in 1992 were routinely given intermuscular injections of the anti-parasitic drug Ivermectin.

18. Injured Wildlife

For several years the Refuge has maintained a rehabilitation program, primarily for migratory and resident birds. This program has been well accepted by the public, and the Service has gained much public support and positive feedback because of the Refuge's efforts and those of local veterinarian Bart Richards. However, because of limited Refuge personnel, efforts were made in 1992 to minimize staff time responding to and caring for injured wildlife.

The Refuge was involved in 20 reported cases of injured wildlife involving 23 individuals in 1992. Most individuals were obtained in June (9), followed by July (5), May (5), February (2), and March and April (1). Identified species included the bald eagle (1), great horned owl (5), goshawk (1), Canada goose (1), gray jay (1), swallow (7), robin (3), redpoll (1), flycatcher (1) and pine siskin (1). Final disposition of these reported cases, were: released back in the wild (8), held in permanent display (1) or rehabilitation (3), shipped to the Anchorage Tender Loving Care rehabilitation facility (2), died (4), or had to be humanely euthanized (2).

H. PUBLIC USE

1. General

Compared to 1991, this year was decidedly less hectic. No dipnet fishery, no wildfire-caused campground evacuations, nor anything similar occurred this year. We had just the normal "Kenai krush" during the summer; hunters in the fall; trappers, skiers, snowmachiners, and ice fishermen during the winter; and canoers, light aircraft, recreational vehicle "road warriors," search and rescues, and tourists throughout the year.

Bicyclists on Skilak Loop Road deciding where they will head next. 8/92/WCK

Overall visitation for 1992 was estimated at 530,000 visits. This is a slight increase from 1991 and mirrors the Peninsula-wide increase in tourism for the year.

2. Outdoor Classrooms - Students

a. Visitor Center Program

Fall use of the Visitor Center program increased slightly over 1991. Spring field trip numbers decreased because heavy snow pack discouraged teachers from bringing their classes. All available spaces for May field trips were booked by the third week of April, however, the shortened field trip season helped make May the busiest month again this year.

Two-thousand-three-hundred-ninety-five (2395) students participated in the Refuge's Environmental Education (EE) program in 1992. 9/93/CP

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.

Kindergarten students enjoy activities on the "Keen-Eye" nature trail. 9/93/93

Eagles, loons, and moose are often sighted by school groups using the viewing platform at Headquarters Lake. 9/93/93

b. Outdoor Education Center

In 1992, the Refuge's Outdoor Education Center (OEC), located off Swan Lake Road, was utilized by 523 youth for a total of 1690 user days. 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 (called the "Bear Den"), a campfire ring, outdoor benches and picnic tables, an outhouse, and a water pump.

In June, 40 Girl Scouts with a $700 environmental education grant from Arco repainted the cabins, the outhouse, and the "Bear Den". They constructed and installed new benches for the campfire ring. In August, the Refuge was awarded a Challenge Grant to refurbish the sleeping cabins, improve the restrooms, rehabilitate the "Bear Den", and upgrade access to the facilities for use by physically challenged groups. Despite competition from the demands of the fall hunting season, our co-operator, the Latter Day Saints (LDS) church, assisted in removing damaged and rotten materials from the "Bear Den". Remaining work is planned for completion during the spring and summer of 1993.

3. Outdoor Classrooms - Teachers

In 1992, one-hundred-thirty-one educators were introduced to the Refuge's EE program through teacher orientation sessions and EE credit courses taught by Refuge and Regional Office EE staff. This is an increase of 300 percent over 1991. 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. The dramatic increase in educators trained in 1992 resulted from the arrival of many new teachers in the school district and from additional training sessions made possible through the efforts of Ranger Ward, Regional Education Specialist Bev Farfan, and Fire Technician Thomas.

In March, SCA Resource Assistant Mouillesseaux and Ranger Ward distributed National Wildlife Week packets and Alaska Wildlife Week materials to all Kenai Peninsula Borough elementary teachers. The Regional Office, Alaska Wildlife Week Program, and Refuge staff collectively assembled an endangered species kit to use with the wildlife week projects. Teachers took advantage of the kits and checked them out for classroom use throughout the spring.

In April, Mouillesseaux and Ward revised an Educator's Guide to Kenai National Wildlife Refuge, a 145-page resource guide to help teachers prepare their classes for field trips and to assist them during the trip. Also included in the guide are follow-up classroom activities designed to bring closure to the field trip experience and to help students dig more deeply into subject areas they learned about during their visit.

Ward completed an environmental education planning document in November, outlining the next three years' needs and planning the direction of the Refuge EE program. The long-term results of this planning effort are tremendously important for the future of the Refuge EE program. A major finding of this planning process was the need for a full-time environmental education specialist position for the Refuge.

Ward attended the Region-wide environmental education meeting in September. Not only were the training sessions extremely well presented and helpful, but networking with other Refuge staff and Alaskan educators was invaluable.

4. Interpretive Foot Trails

Nothing to report.

5. Interpretive Tour Trails

Nothing to report.

6. Interpretive Exhibits/Demonstrations

On March 1, Good Displays of Toledo, Ohio, completed rehabilitation of the Refuge Visitor Center exhibits. They created a new exhibit on salmon stream ecology and one on Alaskan Refuges. In addition, they did a partial rehabilitation of the co-operating association sales outlet. Sprucing up the outlet was completed by Laborer Marrs in July. The facelifts to the exhibit and the sales area were enthusiastically received by the public.

In April, for the fifth consecutive year, the Refuge public use staff participated in the Kenai Peninsula Sportsman's Show. Ward, Refuge Officer Johnson, Planner Dekker-Fiala, and Mouillesseaux set up and staffed the three-day show. The Regional Office Branch Resource Support lent an eye-catching, professional traveling exhibit to the Refuge for this show. Our booth made contacts with over 1200 of the 2500 people who visited the show.

In June, Laborer Bartman created a partition system for storage of interpretive and informational materials at the Visitor Contact Station information desk. This addition has been of tremendous value to the entire staff in readily finding information for the public.

In preparation for the September moose hunting season, Marrs and Ward worked to dramatically upgrade an elaborate mobile display depicting legal and illegal moose antler configurations. The exhibit, built in 1989, has become so popular that both the Peninsula and Kenai Malls compete for it each summer and fall. The public is fascinated by the display, and people enjoy quizzing one another on "which racks are legal".

Good Displays of Toledo, Ohio,
completed rehabilitation of Refuge
Visitor Center displays in March, 1992.
4/92/CW

7. Other Interpretive Programs

The year-round weekend wildlife film series continued to be one of our most popular programs, attracting 5235 of the Visitor Center's 24,000 visitors in 1992. Local newspaper and radio stations have provided excellent, free advertising for the series. While film viewing increased in 1992 due to the addition of 20 new titles, visitation overall decreased perhaps due to the phone company accidently dropping our listing. October through November visitation decreased by 50 percent from 1991.

During the summer, 1400 people watched the Refuge video, "Wild Refuge: Fortune and Future of the Kenai". This video is instrumental in

introducing the public to the Refuge's wildlife viewing and recreational opportunities.

Nearly 1250 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.

Over 6700 visitors signed the Visitor Center guest log. States with the greatest visitation were California, Oregon, Washington, Minnesota, and Michigan (in order of greatest visitation). Foreign visitation was greatest from Canada, the Soviet Far East, Germany, and England. Surprisingly, of the 4300 visitors using the Visitor Contact Station at mile 58 of the Sterling Highway, over half signed the guest log. At this location, states with the greatest visitation were Washington, California, Oregon, and Texas. Foreign visitation was greatest from Canada, Germany, and Japan.

Administrative and public use staff responded to 585 public informational inquiries by sending out Refuge brochures and orientation materials.

From May through June, Refuge staff and volunteers assisted in orientation and training of summer seasonal staff. We conducted a two-week training session for our own seasonal staff and summer volunteers, as well as a one-week training session for Youth Conservation Corps enrolles. Refuge staff also provided orientation programs to train seasonal staff for the Soldotna Visitor Information Center, Elder Hostel, Chugach National Forest, Kenai Fjords National Park, Alaska Maritime National Wildlife Refuge, and Alaska State Parks. Ward and Thomas added a new segment on natural history interpretation to the SCA training session.

SCA Resource Assistants Meg Clark, Michael Daleo, and Cameron Stormes with Seasonal Rangers Heidi Mouillesseaux and Denise Teghtmeyer led the Refuge's summer interpretation program. They conducted nature walks, children's programs, and campfire programs. Four-hundred-and-fifty visitors attended their entertaining and informative sessions.

In July, Ranger Ward, Planner Fiala, and Biological Technician McAvinchey assisted scout leaders in preparing for a week of Cub Scout Day Camp hosted by nearby Skyview High School. Eighty scouts hiked to the Refuge for environmental education and canoe skills training.

In November, Ward and SCA Resource Assistant Chris Papouchis completed a revised aquatic education segment for the Educator's Guide to Kenai National Wildlife Refuge. During spring 1993, this unit will be field tested, and the final edited version will be included in the guide during fall 1993. Papouchis did an outstanding job of creating and organizing activities for this unit.

Seasonal Ranger Heidi Mouillesseaux leads an interpretive activity on a Refuge nature walk.4/92/CW

Refuge seasonal staff and volunteers participate in firearm familiarization and bear safety training. Unk.

8. Hunting

Small and big game hunting seasons attracted hunters at numerous Refuge locations in 1992. Three special use permits were issued to mobility impaired hunters for entry on Refuge roads otherwise closed to vehicles. These special access areas were all on oilfield roads in the Marathon and Swanson River Road areas. All three hunters were successful in harvesting moose.

Sheep, goat, and small game seasons opened on August 10. Full-curl ram restrictions were in effect for the third year. Thirty-three full curl rams were taken in GMUs 7 and 15; another nine sub-legal rams were also harvested. Open registration hunting in selected areas opened October 15. Goat hunters harvested 134 animals on the Peninsula. The total includes 99 males, 34 females, and one of unknown sex.

Brown bear harvest in GMU 15 included six sows and three boars during spring, and four sows and seven boars in the fall. These brown bears were taken in defense of life and property (DLP) and are included in the totals found in Table 32. A total of nine bears were taken in GMU 7 (spring and fall), including one DLP case.

Table 32. Big game harvest on the Kenai Peninsula, 1992 (includes spring 1993).

	Game Management Unit					Total
Species	15A	15B	15C	Total 15	7	Harvest
*Brown bear	-	-	-	18	8	26
Black bear	29	16	112	157	72	229
Caribou	1	-	-	-	15	16
Mountain Herd	-	-	-	-	15	15
Lowland Herd	1	-	-	1	-	1
Dall's sheep	-	-	-	20	13	33
Mountain goat	-	-	-	-	-	134
Moose**	152	81	188	421	127	548
General	146	50	185	381	55	436
Drawing	6	31	3	40	72	112

*Includes defense of life and property kills and illegal kills.
**Preliminary data - harvest report returns not complete
Source: Alaska Department of Fish and Game

Black bear harvest in GMUs 7 and 15 totalled 229 animals. The Refuge issued 63 special use permits for black bear baiting stations; 60 reports (95 percent) of activity were returned (see Table 33). Twenty-two (37 percent) of those reporting actually hunted, and four hunters harvested six

bears, consisting of five sows and one boar. The harvest was concentrated in the last part of the season, May 26 through June 14.

Table 33. Black Bear Baiting Permittees: harvest methods, totals, time spent.

Method	Total Hunters	No. Successful	Total Harvest	Avg. Days per Hunter	Avg. Hours per Hunter	Avg. Hours per Bear
Bow	7	2 (29%)	3	7.6	51.7	120.7
Gun	11	2 (18%)	3	7.1	26.7	098.7
Both	4	0 (00%)	0	3.5	14.5	-
TOTAL	22	4	6	-	-	-

Spruce grouse hunting took good numbers of birds, generally adjacent to Refuge roads; one hunter reported taking nearly 200 birds in September and October.

General moose hunting season ran from September 1 through September 20. Moose hunting in GMS (Game Management Sub-unit) 15A continued the return to normal activity levels after a drop-off in 1990. GMS 15B activity continued at normal levels. In this "trophy" hunt area, which is conducted under lottery permits by ADF&G in late October, twenty-one trophy animals were taken. GMS 15C activity increased over 1991 levels.

Moose hunters in all areas reported seeing few yearling animals, probably as a result of the near-record heavy snows of the 1991-92 winter. Personnel at Refuge check stations collected tissue samples for ADF&G.

Table 34. Numbers of hunters and bull moose checked at check station.

Dates Checked	Resid of hunting parties				Bull Moose Observed		
	Local	Anch	Non-resid.	Total	Legal	Protected (at)	Station
Sept 1-7	298	16	6	320	28	35	8
Sept 12-13	59	2	0	61	3	3	2
Sept 17	12	0	0	12	0	0	0

The GMS 15B east late season moose hunt continued until October 15. Twelve trophy moose were sealed during October for a total of twenty-one trophy moose taken in GMS 15B east.

The limited entry cow moose hunt in the Skilak Wildlife Recreation Area had 18 permittees reporting six cows harvested; two permittees did not return a hunt report.

Waterfowl hunting in September was very good at several locations. Opening day hunters enjoyed some of the best hunting in six years. A steel shot seminar was conducted on August 14 and 19; Refuge Biologist Andy Loranger assisted in the presentation by Tom Roster.

Table 35. Moose harvest sample from Swanson River Check Station.

Antlers	# Taken
Spike/Spike	1
Spike/Fork	2
Fork/Fork	3
Fork/3 Point	3
Fork/Paddle	1
3+ Brow Tines	1
Total	11

9. Fishing

Sport fishing is the most popular activity on the Kenai National Wildlife Refuge. While fishing occurred year-round during 1992, the most challenging management situations -- congestion, facilities maintenance, and law enforcement -- occurred during peak summer weekends.

The Kenai National Wildlife Refuge absorbs a tremendous portion of the overall sport fishing effort within the State of Alaska. The Refuge has by far the highest angler effort on any Federal conservation system unit in the State. Intensive sport fisheries management and responsive regulatory changes by ADF&G appear to be protecting fish populations, but Refuge riverbanks, facilities, and wildland experiences are being affected by the pressure. Riverbanks have been denuded of vegetation; previously low density angling areas approach urban densities on peak weekends. Although new parking facilities have improved parking at some prime fishing areas, several others are in crisis. Many sections of the middle and lower Kenai River, including both on and off Refuge locations, appear to have angler effort levels nearing the intensity of the Russian River "combat fishery". Bank damage associated with the increased angler effort was significant by season's end.

Angler use of the Upper and mid-Kenai River was above average in 1992, with the Lower Skilak Campground and boat ramp particularly crowded. Jim's Landing also received a high level of use, with the parking area congested at the level of previous years. Guided angler use also appeared to be above the averages of the 1988-1991 seasons.

In the spring, State and Refuge officers posted "no fishing" signs on the Upper Kenai River to inform the public of a new emergency closure. The closure was implemented to protect spawning rainbow trout. Most members of

the public appeared to be supportive of the April 15 to June 15 closure. The emergency fishing closure on the Upper Kenai River significantly decreased May and June fishing activity. Use of the Upper Kenai River was primarily non-fishing prior to June 15.

Guided fishing is only one of the opportunities for piscatorial pursuits. Unknown

The Russian River early run escapement of sockeye salmon was 37,117. The early Russian River sport sockeye harvest was 30,512, with approximately 37,484 man-days of effort. The catch-per-hour ratio during 1992 was .212. Approximately 18,051 sockeyes were harvested at the confluence area or below.

The Kenai/Russian River experienced a strong second run. The Russian River second run totaled 93,891 sockeyes as of August 18 when censuring was discontinued. The sockeye harvest was 29,646, and the escapement was logged in at 63,478. The catch-per-hour ratio was .306, slightly up from the historical average. The second run man-days of effort totaled 23,015. (See Table 36.)

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 Kenai River experienced a strong sockeye

salmon run, although it was smaller than the historically large runs of recent years (Table 37). The 1992 run was strong enough to support a record bank fishing effort on the Refuge portions of the Kenai River.

Table 36. Estimated sockeye salmon harvest, effort and success rates on Russian River, 1973-1992.

	Harvest			Total Effort	Catch	Census
Year	Early Run	Late Run	Total	(Man-Days)	Per Hour	Period
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	06/08-08/20
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	.238	06/12-08/18

*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.

Angler use on Refuge lands during late September and October was historically high, particularly sport fishing use on the upper and middle sections of the Kenai River. Refuge officers reported unusually high numbers of drift and bank anglers between the Refuge boundary and Skilak Lake. Rainbow fishing was reported to be excellent, and water conditions were nearly perfect. Several guides reported multiple daily catches of large rainbow trout. Field checks and interviews with anglers indicated that fly fishermen made up a large part of the late season effort and that catch-and-release fishing for rainbows was predominant.

Lake fishing angler effort for trout species remains very low in comparison to anadromous fisheries and to stream fishing opportunities for trout. Lake fishing effort appears to be focused on several Refuge lakes with vehicular access and facilities. In general Refuge lakes with non-vehicular access have minimal angler effort and represent less than five percent of overall Refuge use. Availability of lakes with vehicular or non-vehicular access (trail, defacto trail, aircraft, boat) appears to have no noticeable effect on congestion or effort at anadromous or popular stream fishery locations.

Table 37. Kenai Peninsula Freshwater Sport Fisheries, 1991.

	Days Fished (non-guided)	Days Fished (guided)	Est. % occur. on KNWR
Kenai River: (Soldotna Bridge to Moose River)	71,318	11,234	10%
Kenai River: (Moose River to Skilak Outlet)	40,090	4,977	15%
Kenai River: (Skilak Inlet to Kenai Lake)	39,535	4,622	70%
Russian River	6,433		70%
Kasilof River	39,980		5%
Swanson River	5,830		90%
Other Rivers	3,595		20%
Swanson River/Canoe Lake System	2,586		100%
Swan Lake/Canoe Lake System	2,830		100%
Other Lakes	8,391		40%
Tustumena Lake	1,596		100%
Skilak Lake	4,120		100%
Hidden Lake	4,426		100%
*Hidden Lake Dipnet	11,125		100%

The statistics in Table 37 represent survey data for 1991 published during 1992.

Ice fishing remained quite popular throughout 1992, with lakes within one mile of Refuge roads receiving most of the use. Hidden Lake was unsafe for vehicular travel during late 1992, so most Hidden Lake fishermen were walking to locations near the boat ramp.

Catch and release fishing appeared to be gaining in popularity in 1992 at several Refuge locations. Catch and release fishing is highly promoted by most Refuge Special Use Permittees and appears to be gaining in popularity with non-guided anglers as well.

A draft catch and release fishing poster was received from the U.S. Forest Service's Seward Ranger District during October. The proposed joint

venture between U.S. Fish and Wildlife Service, U.S. Forest Service, and Trout Unlimited would create a high-quality poster for displaying at several Refuge fishing locations. Comments on the poster were sent to Mark Wenger of the Forest Service.

10. Trapping

Three trapper orientation programs (January 21, October 8, and October 22) were held during 1992. Thirty-four trappers attended the mandatory sessions, bringing the total number who have completed this one-time requirement since 1989 to 250. In addition, two wolf-snaring seminars (January 21 and November 5) were presented cooperatively with the Alaska Department of Fish and Game in 1992. Trappers attending this seminar and using only snares on their traplines are exempt from the three-day trap check requirement in the portions of the Refuge in GMS 15A and 15B west. Eighty-two trappers attended the wolf-snaring seminars. Reported furbearer harvests are shown in Tables 38, 39, and 40.

Table 38. Total reported aquatic furbearer harvest and average per permit holder on the Kenai National Wildlife Refuge, 1960-93.

		Aquatic Furbearer Reported harvest							
		Beaver		Otter		Muskrat		Mink	
Season	Total permits	Tot	Mean per Permit holder	Tot	Mean per Permit holder	Tot	Mean per Permit holder	Tot	Mean per Permit holder
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	63	31	0.77	11	0.27	6	0.15	27	0.67

Table 39. 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 15A	Subunit 15B	Subunit 15C	Total	Land and Shoot Shoot[9]
1973-74	1	0	0	1	2[1]	
1974-75	1	0	1	4	6	
1975-76[2]	7	3	1	8	19	
1976-77[2]	3	5	2	3	13	
1977-78[2]	16	5	7	8	36	6
1978-79[2]	12	24	5	14	55	10
1979-80[2]	6	15	13	12	46	3
1980-81[2]	12	18	1	11	42	0
1981-82[2]	12	28	15	7	62	3
1982-83[2]	8	27	10	3	48	0
1983-84	10[2]	27[3,4]	5	8	50	3
1984-85	5[2]	32[3]	3	7	47	-
1985-86	13[2]	24[3,5]	15	12	64	-
1986-87	20[2]	9[3]	13	8	50[6]	-
1987-88	3[2]	8[3]	9	5	25	-
1988-89[7]	2	6	6	4	18	-
1989-90[7]	3	5[8]	10	1	19	-
1990-91	2	4	2	0	8	-
1991-92	0	0	0	0	0	-
1992-93	0	7	0	0	7	-

1 Two non-sport kills.
2 Trapping season November 10-March 31.
3 Trapping season November 10-March 31.
4 Western portion of 15A closed to trapping and hunting February 12 due to lice control efforts.
5 Trapping and hunting closed February 15, 1986 (quota set at 20).
6 One non-sport kill in Unit 7 and one non-sport kill in Subunit 15B.
7 Trapping season November 10-February 28.
8 Season extended 31 days, no harvest during extended season.
9 Land and shoot hunting of wolves was prohibited on the Kenai Peninsula beginning with the 1984-85 season.

Table 40. Total reported land furbearer harvest and average per permit holder on the Kenai National Wildlife Refuge, 1960-1993.

Season	Total permits	Lynx Tot	Lynx Mean per Permit Holder	Coyote Tot	Coyote Mean per Permit Holder	Wolverine Tot	Wolverine Mean per Permit Holder	Weasel Tot	Weasel Mean per Permit Holder	Wolf Tot	Wolf Mean per Permit Holder
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	63[4]	0	0.0	21	0.53	1	0.03	0	0.0	7	0.18

[1] Includes lynx radio-collared and released for study.
[2] Includes four wolves radio-collared and released for study.
[3] Two permits revoked - calculations based on 50 trapping permittees.
[4] Only 40 harvest report forms returned.

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 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 claw marks on trees. Black bears are occasionally seen along the Skilak Loop Road and the Swanson River/Swan Lake Roads.

bears are occasionally seen along the Skilak Loop Road and the Swanson River/Swan Lake Roads.

A black bear quietly fishes along the bank of the Upper Kenai River as evening comes to the Kenai. Unk.

Beavers on the Upper Kenai River were not intimidated by a large cottonwood in Jim's Landing Campground. Unk.

Beaver viewing has been significantly enhanced as a result of trapping restrictions at roadside lakes and day-use trails. A spotting scope along 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.

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. We expect wildlife observation opportunities to be excellent here, and, as funds become available, we will install interpretive signing and spotting scopes to aid visitor 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 "opener" for summer activities, Memorial Day weekend, saw all Refuge launch sites, campgrounds, and canoe trails at capacity. The traditional end of the "crazy time", Labor Day, was also quite busy with similar activities, but it was augmented by moose hunting activity.

Two adventurers in Skilak Lake, after taking their canoe through the Kenai River Canyon. 8/92/WCK

The Swan Lake and Swanson River Canoe Trails continue to be popular areas for Refuge visitors; an estimated 6000 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 September moose season).

Applications for renewal of the canoe trails' status as National Recreation Trails was submitted in June of this year. We later received notification that the National Recreation Trails designation will continue.

The coalition of volunteers who assisted with the rehabilitation of the canoe trails and the construction of boardwalk sections on the Swan Lake and Swanson River Trails in 1991 and 1992 received the second highest award for volunteer work under the Take Pride in America Program. Certificates and letters of appreciation were sent out to the various organizations, and a news release on the recognition was sent out by the Regional Office.

Two canoeists paddle their way through a shallow section of the Swanson River. Unknown

13. Camping

This year, more than 65,000 visitors spent the night on the Refuge in campgrounds or backcountry areas. Although our 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 River 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.

Canoe party heading down the Swanson River through the oilfields. 6/92/WCK

Hidden Lake Campground continued to be a popular destination for visitors in 1992. There were $8403 in Recreation User Fees collected this year, an increase of 20 percent over 1991. 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 for 3319 vehicles to camp at this area during his 60 days of operation. No fees were collected after the concessioner ceased operation of the ferry.

Upper Skilak Campground was closed for the entire summer for rehabilitation. The improvements will provide more camping sites, divided between vehicle sites (15) and walk-in tent sites (10). We anticipate the facility will be very popular, especially the walk-in sites, which provide a new opportunity in our developed campgrounds. The vehicle sites will not be open for use until a recreational vehicle dump station for the Skilak Loop is completed in the early spring/summer of 1993, in compliance with a State Department of Environmental Conservation requirement. The Upper Skilak entrance road is also under contract for rehabilitation. As of this writing, there are funds to complete only one-third of the road. We

anticipate additional funding in Fiscal Year 1993 to complete the entire road.

Fish-cleaning table for disabled at Russian River Ferry. 8/92/WCK

Initial planning for rehabilitation of Jim's Landing Campground began this year. This popular boat launching/recovery site on the Upper Kenai River has shortcomings at both the campground and the boat ramp area. Preliminary designs allow for relocation of the entrance road, slightly increased and more efficient parking, easier traffic flow at the ramp, and walk-in camping 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 spring of 1993.

The Alaska Recreation and Parks Association held its annual meeting in the City of Kenai in September. A part of the activities was an accessibility evaluation of the Hidden Lake and Upper Skilak Campgrounds by Chuck Freyer, Accessibility Coordinator in the Portland, Oregon, Regional Office of the U.S. Forest Service. The evaluation was of great benefit to the Refuge staff and others in attendance. Although there were shortcomings in some areas, Chuck was very complimentary about the level of accessibility achieved.

Upper Skilak Campground construction gets underway with a newly completed boat ramp, gravel road bed construction, and new toilets, 1992. Unknown

Chuck Freyer (USFS) assessing picnic table design and materials at rehabilitated Upper Skilak Campground. 9/92/WCK

Chuck Freyer contemplating new restroom design at Upper Skilak parking area.
9/92/WCK

As we proceed with rehabilitation of other facilities on the Refuge, we will strive for ***universal accessibility*** in all of our campgrounds, waysides, and other facilities. The concept of universal accessibility makes much more sense than designating specific areas or sites as "accessible". By making all tables, fire rings, toilets, etc., accessible to all segments of the population, the "stigma" of a disability will be lessened, and every visitor will hopefully have a Refuge experience of the highest quality.

Wheelchair-bound USFS Accessibility Coordinator Chuck Freyer expresses dismay over section of ***accessible*** path in Upper Skilak Campground. 9/92/WCK

4. Picnicking

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

15. Off Road Vehicles

A near record snowpack throughout the winter of 1991-92 made for excellent snowmachining conditions. Aerial observations and interviews with regular Refuge users indicated that snowmachine users took advantage of the ideal conditions. The result was generally increased snowmachine activity throughout the Refuge, especially in the Caribou Hills, where use was greater than ever. Snowmachine tracks converged on almost every accessible alpine or subalpine area in the Caribou Hills.

During a January radio telemetry flight, numerous snowmachine tracks were seen above treeline in the area closed to snowmachines in the Fuller Lakes/Round Mountain area. Unauthorized snowmachine use above treeline (appearing to be primarily recreational in nature) was also observed during a late February flight. Retired Alaska Department of Fish and Game Sheep Biologist Lyman Nichols also observed and reported the snowmachine use. He was concerned about the disturbance factor for wintering sheep.

Snowmachine season continued at a record pace until mid-April and was closed by public notice on April 27.

Park Ranger/Pilot Johnston and Refuge Manager Doshier attended a State Division of Lands advisory land planning meeting in Homer on January 23. The meeting was the State's second advisory meeting related to the trespass cabins and other land issues within the Caribou Hills. Johnston gave a presentation on Refuge resources and concerns to approximately 35 members of the public, State representatives, and advisory board members. The presentation discussed the increasing snowmachine use of the Caribou Hills and the potential influences that increasing trespass cabins have on that use.

Late November and early December thaws melted the entire lowland snowcover, and less than one foot of new snow fell during the remainder of December 1992. As of year's end, snowcover was not sufficient to open the Refuge to snowmachiners; however, several roadside ice fishing lakes, otherwise safe for travel, were opened up for snowmachine-supported ice fishing.

Ice cover on most Refuge lakes was safe and adequate for ice fishing and other activities throughout December. Skilak Lake froze in mid-December, providing limited ice skating and ice fishing opportunities.

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.

17. Law Enforcement

The Refuge had two collateral duty permanent refuge officers, one permanent full-time refuge officer, and two seasonal commissioned officers in 1992. John Gahr returned as a seasonal law enforcement officer and split his time between ranger duties and working with Assistant Refuge Manager Jim Frates on oil and gas operations. Rob Barto, an SCA at the Refuge in 1991, completed his law enforcement training and returned to the Refuge as a seasonal park ranger, receiving his commission in June 1992. Supervisory Park Ranger Bill Kent and Park Ranger\Pilot Rick Johnston were commissioned, but other duties prevented them from getting out in the field as much as they would have liked. Full time Refuge Officer Chris Johnson worked closely with State Protection Officers, coordinating patrols to maximize coverage.

The Kenai River was closed to all fishing from April 15 to June 10 under an emergency order from the Alaska Department of Fish and Game. The existing regulations prohibited fishing for rainbow trout in the Kenai River during the spawning period but allowed for fishing of other species of fish. There was a large increase of people fishing for rainbow trout under the guise of fishing for Dolly Varden. The illegal fishing activity placed increased stress on the fish during the critical spawning period, leading to fishing-related mortality and loss of reproductive potential. Notices

of the closure were posted at various locations along the river. State and Federal officers patrolled the river regularly during the closure. This approach was very successful, with only one violation notice having to be issued for fishing while the river was closed.

There were 190 violation notices issued in 1992, down from 220 issued in 1991. Fifty-eight percent of the notices of violation were for fishing-related infractions. Seasonal officers issued 70 violation notices. Several major cases were handed over to the State for prosecution in State Court (see Table 41 for a breakdown of the violations issued).

Table 41. Kenai National Wildlife Refuge violations 1982-1992.

Violation	82	83	84	85	86	87	88	89	90	91	92
Snagging fish	24	26	23	10	1	15	14	20	26	7	21
Fishing closed waters	4	13	4	3	3	3	1	8	15	36	15
Overlimit fishing	3	6	3	4	1	4	8	4	24	17	16
Fishing without a license	4	1	1	2	1	1	10	14	8	11	9
Other fishing violations	0	7	4	2	0	2	1	29	51	69	51
Snowmachine violations	4	6	2	0	0	2	1	0	0	0	3
Motor boat closed area	0	0	0	0	0	1	4	2	0	4	1
Unauth. use of motor veh.	10	9	20	28	15	13	9	2	4	7	8
Illegal parking	13	2	12	2	0	3	3	2	5	19	19
Illegal aircraft landing	4	6	0	0	0	4	2	0	1	0	0
Illegal fireworks	1	4	2	2	0	2	0	0	1	1	2
Weapons violation	0	0	0	2	6	3	1	0	0	3	0
Violation of hunting regs.	0	1	1	0	0	4	0	7	7	10	5
Migratory bird act	0	10	2	2	1	2	4	2	1	4	18
Littering	0	3	2	3	4	1	1	0	4	3	1
Unauthorized structure	1	0	0	0	2	0	2	0	0	0	1
Illegal woodcutting	4	5	2	9	3	4	4	0	1	4	2
Speeding	0	5	3	0	2	1	1	1	1	1	4
Unattended fire	0	0	0	0	0	0	1	1	2	3	0
Interference with officer	0	0	0	0	0	1	0	0	0	1	0
Destruction of property	1	0	0	0	0	0	1	0	2	0	0
Permit violations	1	2	2	2	1	3	2	1	2	1	4
Violation Coast Guard regs	0	5	0	0	0	0	0	14	8	8	3
Violation Refuge regs	0	0	0	2	1	5	0	3	5	5	2
Trapping violations	0	0	0	4	4	2	0	1	2	5	2
Violation of bear baiting	0	0	0	0	0	0	0	0	0	1	2
Theft	0	0	0	0	1	5	0	0	0	0	0
Violation of traffic code	0	0	0	0	0	0	0	0	5	5	0
Total	74	111	83	77	46	81	70	111	175	225	190

Seasonal officers are the backbone of the Refuge law enforcement program; without the seasonals, the Refuge would be swarmed during the busy summer season. Seasonal law enforcement positions at this Refuge have proven to

be great training and stepping stones for officers looking to become full-time officers in the field of natural resource law enforcement.

Refuge Officers Johnston and Johnson assisted Service Special Agents with "Operation White Out". The operation involved numerous subjects trading illegal walrus ivory for drugs. Violations of Federal drug and conspiracy statutes as well as the Lacy and Marine Mammal Protection Acts were involved. In May, Johnston again assisted the Division of Law Enforcement with the Yukon-Kuskokwim Delta Goose Management Plan compliance patrols.

Significant incidents and cases during 1992 were as follows:

The State of Alaska, Division of Parks, enacted several policy changes regarding law enforcement river patrols, management authority, and future management emphasis. The changes were a result of a Division of Parks Policy decision to significantly curtail the Kenai River District's law enforcement and management scope. Most noticeably affecting Refuge operations was the resulting lack of State Park Rangers to enforce fishing and boating regulations on the river, impacting enforcement of regulations on Refuge waters.

For several nights, Barto and Johnson set up a videotape surveillance on the Swanson River, which is closed to all fishing April 15 through June 15. They made several cases and received very few complaints from the subjects caught fishing. Seeing themselves on video reduced arguments significantly.

Refuge Officers and State Protection Officers coordinated patrol efforts on the Upper Kenai River during the first run of sockeye salmon, maximizing personnel available for coverage of the river. Many people commented that this was the best season they have seen for coverage and compliance on the upper river.

In May, a hiker was walking on the trail to Ice Lake when he observed an injured black bear on the trail. The hiker later discovered a bear bait station near the trail and reported it to the Refuge. Upon investigation, Johnston discovered the individuals who had set up the station did, in fact, have a Refuge Bear Baiting Permit for the area but were in violation of several permit stipulations.

Johnson heard a gunshot while on patrol down through the Kenai Canyon one evening. He went to investigate and discovered three men standing over a dead black bear. The area in which the bear was shot was in the Skilak Loop Special Management Area and is only open to the taking of small game with a bow and arrow. The men were charged with taking a bear in an area closed to bear hunting. The gun and bear were seized, and the bear meat was donated to charity.

While investigating a subject for illegal guiding, Officers Barto and Gahr discovered that the subject had a revoked driver's license. The Alaska State Troopers requested that the subject be taken into custody the next

time the subject was observed operating his vehicle. Barto and Gahr placed him under arrest and later turned him over to the Alaska State Troopers.

Black bear seized by Officer Johnson. 7/92/CJ

During sheep hunting season, the Refuge set up field camps on Green Lake, Round Mountain, and Clear Creek. Seventeen hunting parties were observed accessing the high country from Green Lake, and six full-curl rams were reported legally taken. There was one report of a hunter shooting an illegal ram and leaving it. In another case, a hunter turned himself in for taking a sub-legal ram south of Tustumena Glacier.

In June, a party from Sweden reported a member of their party missing near where the upper part of the Kenai River flows into Skilak Lake. Search teams were sent down the Kenai River Trail and the Hidden Creek Trail. A fixed-wing aircraft and a helicopter from the Alaska State Division of Forestry were used on the search. The subject was found, a little wet, tired, and dehydrated, on a small island where the Kenai River enters Skilak Lake.

In May, the Hidden Lake Campground recreational vehicle water system building was broken into. Four gell-cell batteries, a charging unit, and a solar panel control unit were taken. Refuge Officers questioned campers at the campground and checked local pawn shops for the merchandise, but no leads were discovered.

In September while on aerial patrol, Johnson and Johnston observed some illegal all-terrain vehicle use taking place in the Chickaloon Flats area. Unable to land the plane anywhere in the vicinity, they radioed the Refuge Office and requested that a helicopter meet them at King Lake. The helicopter picked up Johnson and transported him to the Chickaloon Flats. Once on the flats, Johnson contacted six hunters. He issued one violation notice for unauthorized use of a motor vehicle, two notices for unplugged shotguns while waterfowl hunting, and one citation for possession of lead shot while waterfowl hunting.

Successful rescue of lost Swedish tourist. 6/92/CJ

In September while on patrol on the Swanson River, Barto encountered a hunting party that had just taken a cow moose. Barto seized the moose and issued a violation notice to one of the men in the group for illegal take. The next day the same party was observed shooting a cow moose in the same area. This time they left the moose and took off. They were later contacted at Captain Cook State Park and admitted shooting another cow moose and leaving it. We decided to take them through the State Court System, where they were convicted. One of the subjects was given a sentence of 60 days in jail with 56 days suspended, a fine of $3000 with $1500 suspended, and the loss of his rifle.

In September while on routine aerial patrol, Johnston observed a party on horseback packing out a moose. Johnston radioed Johnson and informed him

of the party. Johnson met the party at the woodcut area off of Funny River Road. The party was packing out one legal bull moose. After Johnson talked to the party for a while, they admitted that a second moose had been taken, and they planned to pack it out later. After further questioning, they admitted that the second moose was a cow moose. Johnson issued them a violation notice for illegal take of a cow moose. The moose meat was packed out the next day and donated to charity.

Johnston assisted USFWS Agents with "Operation Brooks Range", a two-year joint operation conducted by the USFWS and the State Division of Fish and Wildlife Protection. Six licensed guide-outfitters or assistants were charged with numerous offenses taking place in the Brooks Range. Johnston assisted with the seizure of an airplane and the arrest of one of the subjects in Kotzebue.

On September 19, well known Anchorage Daily News Outdoors Writer Craig Medred was mauled by a sow brown bear with two cubs while moose hunting near the Russian River. Medred was not injured seriously but did have to receive medical care. The mauling ended after Medred shot the bear with his .454 handgun. The bear went down but got back up and fled the area. The next day a helicopter went up to look for the injured bear, but it could not be located.

An unauthorized airstrip developed at Mile 6 of the Chickaloon River as a result of numerous illegal aircraft landings. Officers posted the strip with X's and contacted several pilots. Unknown

In October, one of the Refuge's radio-collared lynx was taken in the Sterling area. The hunting and trapping season for lynx has been closed for a number of years. The radio-collar was found under a junked car at the end of Atkins Road. Johnson interviewed all the people who lived in the area. One person's name came up frequently, but no solid proof was provided. Fortunately, the subject is now working with the Refuge to live-trap lynx that are regularly visiting his rabbits and chickens.

An investigation of illegal guiding on Refuge lands which occurred in 1991 continued throughout 1992. The investigation involved several hunters in GMS 15B near Harvey Lake. Several interviews were conducted during September and October by Johnston, Johnson, Special Agent Roger Parker, and State Investigator Bruce Lester. The investigation included both permitted and non-permitted big game guides and transporters and involved illegal take of wildlife, wanton waste of wildlife, State and Federal guiding violations, as well as special use permit infractions. By year's end, new violations which occurred in September 1992 were included in the investigation.

Wanton waste of a moose in the Harvey Lake area.
10/29/Albrant

A total of 155 waterfowl hunters were contacted in the field during waterfowl season. Eighteen violation notices were issued for violations of the migratory bird treaty act.

Table 42. Kenai National Wildlife Refuge incidents 1988-1992.

Incident/Violation	Number of Incidents				
	1988	1989	1990	1991	1992
Low flying aircraft	15	8	15	8	20
Violation of a Refuge SUP	12	8	8	7	7
Vandalism	28	23	26	21	35
Altercation/disturbance	3	-	-	3	5
Theft	6	2	7	15	5
Drunk and disorderly	2	-	3	6	8
Unattended or abandoned property	10	5	4	8	15
Unauth. taking of wildlife/in. wildlife	40	33	29	31	21
Violation of trapping permit	3	4	2	5	12
Violation of wood cutting permit	5	2	-	1	-
Assist to public involving injury	10	7	8	6	5
Assist to public not involving injury	45	48	60	61	72
Unauthorized use of motor vehicle	21	17	18	15	31
Coast Guard violation/boating	60	70	75	54	42
Unauth. cutting green trees/timber removal	27	10	15	15	28
Unauth. fireworks	1	3	2	4	10
Unauth. park./block. Refuge road/facility	17	30	35	36	28
Target shooting/unauth. use of firearms	7	5	8	6	5
Search and rescue	13	8	6	9	5
Drowning	3	-	-	-	-
Miscellaneous fishing violations	33	37	39	53	47
Unattended fire/wildfire/unauth. fire	24	10	12	8	3
Disposal of waste/littering	23	25	29	22	15
Other Refuge regulations	17	15	18	41	42
Assist to Ak State Troopers/traffic acc.	23	17	19	20	15
Assist to Ak F. & W. Protection Officers	18	28	23	37	50
Miscellaneous traffic violations	8	15	15	4	3
Bear baiting permit violation	4	2	2	3	3
Bear encounter	3	3	5	7	8
Aircraft violation	43	10	8	13	12
Eagle Act	-	-	-	4	5
Lacy Act	-	-	-	-	2
Arrests	-	-	-	1	1
Assists to F. & W. Agents (Off Refuge)	30	25	27	19	20
TOTAL	562	470	578	543	579

18. Cooperating Associations

Final 1992 sales for the Refuge's Alaska Natural History Association cooperating sales outlet (Kenai branch) totaled $23,800. Sales increased $2500 from 1991. The increase resulted from upgrading our Visitor Center sales display area and offering 18 new items. The Visitor Contact Station

also improved its sales display area and maintained a consistent schedule, contributing to this year's sales increase.

Proceeds from cooperating association sales were used for volunteer awards and were especially instrumental in creating honorariums for outstanding volunteer contributions in 1992. Association funds were used for conducting teacher environmental education workshops and for the purchase of computer software for the public use program's Macintosh SE30 system. Using this software, we have begun to improve our ability to design quality brochures, environmental education materials, temporary exhibits, volunteer training materials, and other public outreach materials.

Ward attended the Alaska Natural History Association Annual Meeting and Workshop in December. Ward presented 1992 accomplishments to the Board of Directors and submitted the 1993 Kenai branch budget. She received a Distinguished Service Award from the Board of Directors for her continued improvements in branch operations, consistent fiscal responsibility, and creative management of the Kenai branch.

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 13,533 vehicles were accommodated and $52,246 in camping fees were collected. The concessioner's ferry transported 35,885 passengers for user fees of $102,540...not a bad bit of business for two months (see Table 43). 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.

Most Refuge Special Use Permits for various outdoor recreation services were issued by May 1, 1992. A total of 63 individuals or businesses obtained annual Refuge Special Use Permits for commercial visitor services. An additional 23 individuals obtained three short-term visitor permits for the Upper Kenai River. (See Table 44).

In compliance with the Regional Policy established in 1989 on guide/outfitter permits, no new big game permits were issued during the spring of 1992. However, after waiting several years for the State to reimplement a program to allocate guide/outfitter areas, the Service completed work on a new Regional guide/outfitter policy and an accompanying environmental assessment.

The new guide/outfitter policy reallocated the three Refuge use areas and changed annual permit issuance to a five-year permit. Kenai Refuge use areas, designated Ken 01, 02, and 03, were generally consistent with State game management subunits (i.e., 7 and 15A, 15B, and 15C, respectively).

RUSSIAN RIVER CONCESSION GROSS RECEIPTS

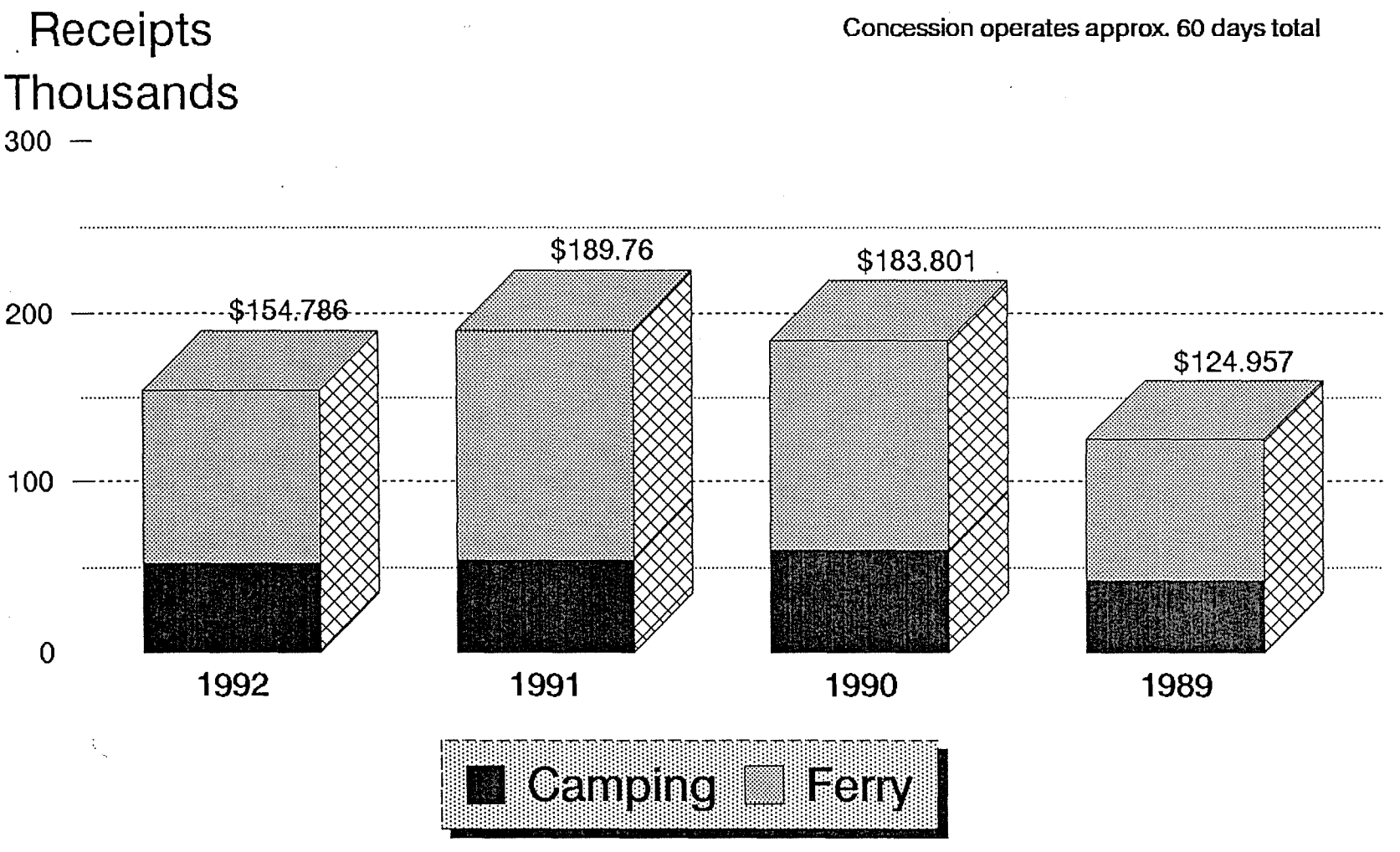

Table 43. Russian River Concession Gross Receipts for 1989-1992.

A Refuge rafting permittee makes a pick-up at Jim's Landing Campground after a one-half day float through Refuge lands. Unknown

A Refuge Special Use Permittee searches for a campsite along the shore. Overnight float trips increased in popularity in 1992. Unknown

Tent camp permits were issued to four Anchorage air taxi businesses to operate fourteen tent camps on remote Refuge lakes. Reported angler use for those lakes appeared to be stable and consistent with previously reported figures (see Table 45).

The Peninsula Sled Dog Racing Association conducted three scheduled weekend sled dog races on Refuge lands. All participants reported the Refuge trails to be excellent, and the races appeared to be in compliance with all permit stipulations.

Refuge Manager Doshier denied a request to reopen the downhill ski area near Refuge Headquarters on Ski Hill Road. Doshier noted that the activity was incompatible with Refuge lands and would be a violation of the Refuge Recreation Act. Doshier also noted that the Refuge was not interested in a land exchange for the area formerly used for a downhill ski area.

The Refuge received a verbal request from Richard Pepper of Kenai to place 20 to 100 beehives on Refuge lands near the Funny River Road wood cutting area. Mr. Pepper was asked to submit a written proposal for evaluation. At year's end a formal proposal had not been received.

A permit was issued to the University of Alaska to continue helicopter-based geologic field work in the southern Kenai Mountains area of the Refuge. Field trips were conducted in July and August.

Table 44. Guided recreational visits occurring on Kenai National Wildlife Refuge, 1992.

	# Permits	Number Visitors	Total Visits
Upper Kenai River Sport Fishing	20	2,200	3,150
Upper Kenai River Scenic Floats (Rafting)	14	3,200	3,650
Lower Kenai River Sport Fishing	39	2,200	2,400
Fly-in Tent Camps	4	734	1,912
Guides/Outfitter/ Big Game/Transports	12	190	850
Other	19	850	1,121
*TOTAL	62	9,374	13,083

* Several permittees utilized multiple Refuge areas, so column total exceeds total 1992 permits issued.

A special use permit was reissued to Interior Telephone Company for a line to the Kenai/Russian River Access area.

The Refuge received a letter January 23, 1992, from Lieutenant Rod Mills of the Alaska Department of Fish and Wildlife Protection requesting permission to conduct limited floatplane operations on Headquarters Lake during 1992. A permit was issued, and use of Headquarters Lake occurred on several occasions during the floatplane season.

Table 45. Tent camp use from 1985 to 1992.

	1985	1986	1987	1988	1989	1990	1991	1992
KETCHUM								
Snag	64	60	70	69	76	70	32	36
(3)	180	173	210	207	218	183	86	118
camps	540	519	630	621	654	549	258	450
McLain								
(2)	30	29	67	62	58	53	28	45
camps*	468	348	807	603	630	588	154	350
Wilder.	44	53	47	41	49	42	23	31
	140	149	126	116	127	112	61	85
	420	447	378	348	381	336	183	245
RUST								
Bird	NR?	36	19	9	21	31	41	35
	NR?	149	65	35	78	108	115	92
	NR?	447	103	70	156	216	230	166
Tangera	NR?	12	11	4	10	13	11	13
	NR?	41	30	10	32	35	25	36
	NR?	123	60	20	64	70	50	75
AK AIR GUIDES								
King	60	54	48	30	25		31	25
(3)	180	150	200	90	78	31	69	75
camps	540	400	600	290	170	157	200	150
AK BUSH CARRIER								
Mull	38	33	36	42	35	44	38	41
(2)	135	125	138	144	130	135	112	120
camps	338	250	276	288	266	278	224	240
Bedlam	35	37	39	38	35	36	26	29
(2)	103	115	118	124	115	134	116	118
camps	206	230	295	248	230	258	232	236

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

A request was received from Kenai Air regarding commercial recreational helicopter sight-seeing trips on the Refuge. Doshier sent a letter to Kenai Air denying the request for helicopter sight-seeing landings within the Refuge. Current Refuge regulations do not authorize helicopter landings for other than emergency, administrative, or management purposes.

Special use permits were issued for the following activities: firewood (54), trapping (51), guide/outfitter (37), 3-day incidental (23), cow hunt (20), use OEC (18), air taxi (14), tent camps (4), transporters (4), cut poles (4), mobility impaired hunters (3), fish studies (2), use Headquarters Lake (1), salmon study (1), egg take (1), dog-sled racing (1), obtain bark (1), land helicopter (1), gravel use (1), helitorch testing (1), stickleback study (1), inholder firewood (1), mapping (1), volcanic ash study (1), take pictures (1), core sample (1), collect rocks (1), hunt guide (1), and install telephone (1). The total number of permits issued in 1992 was 251.

I. EQUIPMENT AND FACILITIES

1. New Construction

a. Aviation Fuel System-Kenai Hangar

A new 1000-gallon steel, concrete-encased aviation fuel tank, purchased with Fiscal Year 1991 contaminant funds, was finally put in place on August 6. A large industrial crane deposited it near the Fish and Wildlife Service hangar in Kenai. The 24,000-pound above-ground behemoth required obtaining a variance in the City of Kenai's Fire Code, which mandates that all tanks be buried on airport property. Because of the tank's exceptional safety features, this requirement was waived. Mechanic Al O'Guinn, using the Refuge's backhoe, dug a 100-foot trench from the service meter to the tank in preparation for burying the underground cable. Electrician Ralph Zieglmeier from the Regional Office's Division of Engineering completed the final installation, including the pump, meter, hose, and hose reel. Refuge Carpenter Bud Marrs constructed an 8' x 10' frame building to provide winter protection for the entire fuel dispensing system. At year's end, we were still waiting for Office of Aircraft Services personnel to make a final inspection of the entire system.

An all-weather shed was constructed to protect the hose, reel, pump, and meter at the new Kenai Hangar aviation refueling facility. 92/JF

Newly constructed Skilak Lake Overlook will likely be one of the most popular "vistas" within the Skilak Wildlife Recreation Area. 92/JF

b. Skilak Lake/Kenai River Overlook

The long envisioned Kenai River/Skilak Glacier Flats overlook on the Skilak Loop Road between Hidden Lake and the Upper Skilak Campground became a reality during the summer. Over 60 dump truck loads of fill were hauled from the Hidden Lake gravel pit, rock barriers were placed along the outer perimeter, and the Refuge Youth Conservation Corps (YCC) crew raked and seeded the side slopes. A small parking area was constructed across Skilak Loop Road from the overlook. This is probably one of the most scenic vistas on the entire Refuge road system and will undoubtedly be one of the most popular "short visit" stops within the Skilak Wildlife Recreation Area. A special thanks to Operator Dick Kivi for not only supervising the project but exhibiting a great deal of patience hauling numerous loads of gravel during the peak of the public use season. Thanks also to Seasonal Fire Technician Diana Thomas for playing the role of "truck drivin' woman" during a portion of the hauling effort.

c. Skilak Guard Station

A 10' x 12' concrete pad was poured at the Skilak Guard Station, and a frame building was constructed to house that facility's 5KW generating system. The new North Star Model generator is barely audible from the personnel quarters and will be a significant improvement from the old Lamborghini, a vibrating and exceptionally noisy diesel which proved to be anything but user-friendly the past two seasons.

New generator shed constructed at the Skilak Guard Station will house a new 5KW diesel generator to meet the facility's electrical needs. 92/JF

d. Headquarters/Visitor Center Maintenance Management System Project

The Regional Office construction "Swat Team" of Walt Slezag and Harold Shipley built a ridge-top roof ventilation system for the Refuge Headquarters/Visitor Center building. The Maintenance Management System (MMS) project was designed to prevent serious glaciation on the north-facing roof, which had resulted in some interior wall damage. Although snowfall by year's end was probably not sufficient to provide a true test of efficiency, heat loss through the roof appears minimal.

e. Other

Refuge Carpenter Bud Marrs and Laborer Donna Bartman completed a number of projects during their six-month tenure. They constructed frame buildings for the aircraft hangar fuel tank and for the portable generator shed at the Skilak Guard Station, built shelving for book and antler displays at the Refuge Visitor Center, re-paneled the facing of the Visitor Center information counter with laminated cedar, completed a number of routed wooden signs including headquarters sub-entrance signs for Innoko and Selawik Refuges and wilderness boundary signs for Togiak Refuge, and constructed shelving and storage units for the Visitor Contact Station.

f. Outdoor Education Center (OEC)

Following the dismantling of the old central meeting room (Bear Den) at the Outdoor Education Center, the maintenance crew cleared and constructed a 16' x 24' gravel pad for next year's planned construction of a class/meeting room. A 1000-gallon steel tank was buried in preparation for construction of a new restroom at the site. Funds for this project were made available through a Challenge Grant allocated late in Fiscal Year 1992. The Sterling branch of the Church of Jesus Christ of Latter Day Saints volunteered as project cooperator and will provide the necessary work force for future construction, in addition to completing demolition of the Bear Den.

2. Rehabilitation

a. Bunkhouse

The MMS-funded bathroom renovation project at the Refuge bunkhouse was completed in February. Regional Office Carpenter Harold Shipley and Refuge Laborer Brian Kemsley installed new sub-flooring, linoleum, bathtubs and tub-surround, glass shower doors, vanities, medicine cabinets, and exhaust fans. While the project did much to improve the quality of "bunkhouse living", we are still faced with a water system with exceptionally high iron, which eventually degrades our best efforts to maintain a clean appearance. Other work in the bunkhouse included installation of a new exhaust hood over the range, thorough cleaning and polishing of kitchen cabinets, professional carpet cleaning, and repair and realignment of bunkbeds.

b. Refuge Residence

Following Biologist Andy Loranger's vacancy from the residence in November, several hazard trees were removed from near the house. New louvered blinds were installed, as were kitchen sink fixtures and lighting fixtures in the kitchen and dining areas. The carpets were also professionally cleaned.

c. Swanson River Landing

On May 26, Ranger Johnston met with Alaska Department of Fish and Game (ADF&G) Habitat Biologist Muhlberg to discuss the permit application process for the proposed Swanson River rehabilitation project. Application to the U.S. Army Corps of Engineers (CE) was done concurrently. With the required permits approved, the renovation project finally got underway in early August. A silt fence was placed to contain high loads of suspended sediments. Several years' accumulation of landing mat, anchored dead men, piling, cables, and other assorted debris were extracted. Several loads of gravel were brought in, and the area was sloped and seeded. A number of large rocks were placed at the upper end of the old flood plain to restrict vehicle traffic to the river's edge. A special thanks goes to Scott Slavik's Youth Conservation Corps (YCC) crew for supplying youthful exuberance and energy during installation of the silt fence.

Swanson River Landing terminus prior to renovation project. 92/JF

Swanson River Landing after debris was cleaned from parking lot-river interface. 92/JF

Rock barriers were placed to prevent vehicles from driving to the water's edge at the Swanson River Landing. 92/JF

d. Outdoor Education Center (OES)

Bear Den being remodeled. 92/JF

Members of a local LDS Church volunteered to dismantle the old "Bear Den" facility at the OEC. A new facility will be constructed in 1993 by LDS members as part of a Challenge Grant Program. 92/JF

In preparation for construction of a new meeting lodge at the Outdoor Education Center (OEC) in Fiscal Year 1993, the old 16' x 24' Bear Den was dismantled by a group of volunteer laborers from the local LDS Church. Most of the usable lumber was segregated, loaded on a flat bed trailer, and transported back to Refuge Headquarters. Other work at the OEC consisted of cutting a number of hazard trees, repairing individual cabins (doors, windows, steps), and hauling gravel to the site of the new meeting lodge.

e. Swanson River/Swan Lake Road Hydro-axing

Equipment Operator Dick Kivi, taking advantage of an early fall frost and minimal snowfall, completed the hydro-axing project initiated in 1991 along the Swan Lake and Upper Swanson River Roads. Approximately 30 "roadside miles" were cleared in total, with about 20 of those miles completed in 1992.

Approximately 20 miles of roadside along the Swan Lake/Swanson River Roads were hydro-axed by Operator Kivi. 92/JF

f. Upper Skilak Campground

Renovation of the Upper Skilak Campground began in April with M-B Contracting of Anchorage as prime contractor. Work on the boat ramp began on April 14, and on April 16, Regional Office Engineers Sherwood and Egan inspected the partially constructed work camp. A change order was authorized to correct a significant boat ramp design error. On April 24, Park Ranger Johnston assisted Engineering in staking the ten walk-in tent camp sites. Also on that date, M-B Construction received final approval to pick up 110 rocks from the lake shoreline for barriers within the new campground.

Work continued unabated throughout the summer, necessitating closure of the campground and the public boat ramp, except on weekends, for much of the public use season. By September, the facility was ready for paving, and finish work continued on rock work, the tent camping loop, restrooms, and the foot bridge. The area was officially turned over to the Refuge on October 6, with Outdoor Recreation Planner Dekker-Fiala representing the Refuge during a "walk through" with Regional Engineer Berus and staffers Sherwood and Milhollin. Winston Jacobson, Regional Contracting Officer, and M-B Construction representatives rounded out the rest of the review team. Outside of a few minor "punch list" items, the project was largely complete. The renovation project consisted of 15 recreation vehicle campsites, 10 walk-in tent campsites, a new boat ramp, three concrete-cast public restrooms, and asphalting of all interior campground roads.

New foot bridge at the Upper Skilak Campground.
92/JF

Recently completed Upper Skilak Campground parking area.
92/JF

Individual camp sites - Upper Skilak Campground renovation project.
92/JF

Picnic shelter - Upper Skilak Campground renovation project.
92/JF

Memorial dedicating Upper Skilak Campground to two former Refuge employees who lost their lives in a boating accident on Skilak Lake in 1955. 92/JF

An advanced warning sign for visitors using the Skilak Wildlife Recreation Area made for a few "unhappy campers" during the summer, but all in all the closure was accepted quite well. 92/JF

Old military landing mat removed during construction of new Upper Skilak Campground boat ramp. 92/JF

Partially completed boat ramp at Upper Skilak Campground. 92/JF

New "concrete bunker" restrooms at the Upper Skilak Campground are expected to be largely maintenance free. 92/JF

The Upper Skilak Campground is the second campground within the Skilak Wildlife Recreation Area to be renovated. Hidden Lake Campground was completed in 1990, and Jim's Landing is scheduled for major renovation in 1993. Ranger Johnston attended several meetings, as well as on-site inspections of the Jim's Landing area, with Regional Landscape Architect Paul Schrotten. Proposed rehabilitation of the area presents a number of issues, including impacts on natural vegetation, drainage patterns, wetlands, and riparian habitat. After considerable discussion with Refuge staff, a draft design strategy for Jim's Landing was completed and received for staff review on December 7. A public meeting will be scheduled in the local area shortly after the first of the year.

3. Major Maintenance

Mechanic Al O'Guinn completely rebuilt the engine of the 1979 Chevrolet Suburban--a vehicle transferred to the Refuge from the Kenai Fisheries Assistance Office. This vehicle was urgently needed to replace a Chevy S-10 which was destroyed by fire in May. Al pulled off his usual "miracle job" and had the vehicle up and running for the busiest portion of the public use season.

For the third consecutive year, the initial May test of the Tustumena Lake Access Area water well showed an abnormally high concentration of coliform bacteria. As per usual procedures, the well was closed to the public, chlorinated, retested, and put back in operation following a negative post-

treatment test for coliform. As has happened the past three years, the June test again proved positive, and the well was again taken out of service. This heretofore "unsolved mystery" was finally (we think) solved when Al O'Guinn discovered a "drain back" problem with the pump's drinking system reservoir. Once corrected, subsequent monthly tests were negative, and for the first time in several years, the Tustumena well remained in operation throughout the public use season. However, the Alaska Department of Environmental Conservation (DEC) may yet require submission of a detailed engineering plan of the site due to the well's past history of failed tests.

The near-record snowfall in 1992 resulted in a major effort to meet commitments to keep the Swan Lake and Moose Research Center Roads open. Operator Kivi made a record seven runs during the January-March period, logging some 600 miles and nearly 100 hours of grader time. He traveled the ten-mile stretch of the Sterling Highway between Refuge Headquarters and the Swanson River Road during hazardous driving conditions as well as periods of high-volume traffic. Kudos to Kivi for completing a difficult job under even more difficult circumstances while maintaining an impeccable safety record.

4. Equipment Utilization and Replacement

Six older model, 3/4-ton Dodge pickups and a near-antique Chevy station wagon (1973) were finally put on the "auction block" in early January. By early March, all had been driven from the shop compound by new owners, with the exception of one pickup which was sold under a salvage category. Collectively the six vehicles amassed over one-half million miles in support of Refuge operations.

Two 14' x 60' house trailers located at the Schooner Bend Field Camp collapsed sometime during early spring under an unusually heavy winter snow load. One of the trailers was used by the U.S. Forest Service, while the other was used by the Refuge in support of the Russian River fishery and the Visitor Contact Station. Thanks to the Alaska Division of State Parks releasing one of their "extra" 10' x 60' trailers from the Bradley Lake Hydro project, we were able to meet our housing commitments for the summer season. Jackson Construction Company was awarded the transport contract to bring the trailers from Homer to the Schooner Bend site. Both of the damaged trailers were later sold as excess property and removed from the area.

A new 5KW diesel generator was installed at the Skilak Guard Station, replacing the old Lamborghini 5KW. Other replacements at the Skilak Station included a new propane unit heater to replace the old fuel oil heater, and a new 7.5 cubic foot propane refrigerator.

Three new Dodge Dakota extended cab pickups were delivered in time for the summer public use season. Four additional pickups and a "Blazer/Bronco" type vehicle were ordered in 1992, with the first delivery expected in early March 1993 and the second sometime in late summer 1993.

Near-record snowfall during the winter of 1991-1992 proved too much for the fragile roofs of trailers at Schooner Bend Field Camp. 92/JF

Interior damage from collapsed roof of 14' X 60' trailer at Schooner Bend Field Camp. 92/JF

We continued to "whittle away" at our inventory of excess property by conducting three General Service Administration (GSA) sales during the year. Items offered included obsolete WANG and other automated data processing components, tools, and appliances. A flatbed trailer load of salvage lumber from the OEC site was sold through the Small Lot Sales procedure. We have had a problem in GSA sales with "shotgun bidders" from out of state who, in learning they are the successful bidder, call the Refuge office asking, "How can I get this stuff down to Idaho?" Of course that is their problem, but, in essence, it is ours because they either ask for an extension of the removal date or try to resell the items after discovering what "Condition Class Codes" really mean. Two bidders defaulted this year, which means the items must be re-advertised in a subsequent sale. In the meantime, we still have a storage problem, which we tried to alleviate by having a sale in the first place.

Mechanic Al O'Guinn fabricated this 200-gallon mobile, high pressure watersystem for cleaning campground restrooms and for emergency fire fighting. 92/JF

Mechanic Al O'Guinn, starting with a surplus 200-gallon water tank, fabricated a trailer-mounted, mobile, high-pressure water system which can be used for campground maintenance and as an emergency fire fighting unit. We have always been concerned about the lack of adequate fire protection around the Shop/Headquarters complex, not only because it is a high risk area but because we are located in a no-response zone outside of the local fire service area. This new unit will provide us with at least a minimal first line of defense. Again, Al used his unique blend of talents to

produce a high quality, functional product at considerable savings to the Refuge.

Other equipment purchases during the year included a five-yard snow bucket and quick coupler for the Caterpillar 930 front end loader; a glycol recycling unit; a Honda EB 5000 (5KW) portable field generator; a Honda riding lawn mower (Model H3011) with grass catcher; and a Porter Cable saw buck and panel saw. The Jacobson riding mower was transferred to the Kenai Fisheries Assistance Office for use at the old Kenai Administrative Site.

5. Communications Systems

In mid-June, the Refuge was loaned a solar-powered repeater by the fire program to see if it would help our radio coverage problems in the Russian River/Hidden Lake areas. Red Shelton and a technician from Alaska Radio helicoptered from Fairbanks and installed the repeater on Hideout Hill. It has worked well for us, and a permanent repeater has been ordered to replace the temporary one.

6. Computer Systems

In May, the remaining computer equipment arrived, and, by the end of June, the wiring and installation had been completed. For the rest of the year, everyone was busy getting familiar with the system and its various applications. Approximately forty percent of Budget Assistant McCain's time has been spent as system administrator. The job is much more involved than was originally anticipated.

7. Energy Conservation

Table 46. Energy use comparisons 1991-1992.

Product	Unit of Measure	Energy Use Comparisons		% change with 1991
		1991	1992	
Electricity	Kilowatt Hours	172,527	171,677	- 0.5
Natural Gas	100 Cubic Feet	17,213	18,086	+ 5.0
Vehicle Gas	Gallons	14,637	15,814	+ 8.0
Aviation Gas	Gallons	4,244	4,835	+13.9
Propane	Gallons	333	572	+72.7
Diesel Fuel	Gallons	2,602	3,331	+28.0

The general upward trend in energy consumption is attributable to an increase in the level of Refuge operations: more miles driven, more hours flown, and additional seasonal staff with extended appointments. The consumption of diesel fuel is directly related to annual snowfall levels. The winter of 1991-1992 had a near-record snowfall, requiring the plowing of Swan Lake Road a record seven times and contributing to the nearly 30 percent increase in diesel consumption.

8. Other

Nothing to report.

J. OTHER ITEMS

1. Cooperative Programs

Nothing to report.

2. Other Economic Uses

a. Swanson River Field

(1) Unit Operator-Administration and Policy

While rumors had been circulating for several months, it was not until November that Arco Alaska,Inc. (Arco) officially announced they were divesting themselves of several Upper Cook Inlet oil and gas operations. Included in the divestiture was the Swanson River Field, where Arco had assumed the role as Unit Operator in 1986. On December 15, Arco quietly "passed the torch" to the Union Oil Company of California (UNOCAL).

New kid on the block, UNOCAL, took over as the Unit Operator of the Swanson River Field on December 15.
92/JF

Arco's seven-year tenure at the Swanson River Field was one of outstanding attention to detail in the day-to-day management of operations. At the same time, Arco exhibited a very proactive environmental "corporate conscience". In addition to incorporating the latest technologies in petroleum production, they supervised one of the world's largest PCB clean-up operations, bringing that project to successful fruition on June 28 with the incineration of nearly 107,000 tons of contaminated soil. From top level management to field roustabouts, Arco is to be commended for achieving their overall production objectives while maintaining high standards of environmental awareness.

Oil production operations in the Hemlock reservoir of the field, which have historically been supported by gas cycling, are reaching their limits of profitability. As expected, the field is now entering a transitional period from oil to gas production. UNOCAL, because of its extensive gas holdings in the Cook Inlet Basin, was the logical corporate operator to manage the gas extraction effort. By year's end, UNOCAL had requested a redirection of past operational strategy to include both limited volume gas sales and maintenance of current gas injection 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 to maximize economic recoveries from the reservoir.

The Swanson River Field compressor plant, for many years the backbone of oil recovery from the Hemlock Zone, may become obsolete as the field shifts towards gas recovery rather than gas injection. 92/JF

Discussions were held with both Arco and UNOCAL regarding public access to the South Swanson River Bridge. Increased public access would permit a greater range of fishing opportunities in the section of the Swanson River which flows through the southern portion of the field. Under the planned scenario, the present field security station, located at the junction of Swanson River Road and the field access road, would be relocated to near pad 34-9, known as the "four corners area". Pad 34-9 would be used for vehicle parking and river access for canoeists using the portion of the river from Swanson River Landing to the South Bridge. While the UNOCAL Corporation agrees with the conceptual plan and has consented to relocate their security point, they expressed a reluctance to allow use of pad 34-9 as a parking area and trailhead because the high pressure well is still active at that location. They suggested we clear an adjoining site for parking to minimize what they perceive as an "added risk" liability problem. We will continue discussions with UNOCAL in early 1993 in an effort to reach a mutually acceptable plan.

A final closure determination for abandoned pad 22-23 was submitted to the Bureau of Land Management (BLM) and Arco on September 19. Other pads where wells are scheduled for abandonment are being inventoried. Following the inventory, rehabilitation can proceed with some degree of order as the field undergoes conversion from crude production to gas production to eventual "blow down".

(2) Remediation Activities

(a) PCB Cleanup Operations

Incineration of soil contaminated with PCB during the 1972 compressor plant explosion continued through June 28. Following nearly four years of continuous operation of the circulating bed combustor (CBC), the final tonnage of soil processed tipped the scales at just over 107,665 tons. This was probably the largest PCB remediation project ever completed, and it was certainly the most comprehensive program ever conducted on a National Wildlife Refuge. Ogden Environmental Services (OES), Inc., of San Diego, California, provided key leadership personnel and technical support as Arco's subcontractor for the entire remediation project. While the Swanson River soil incineration project had many "firsts", one of its most unique aspects was the fact that it prompted a 1985 Federal-State multi-agency "Order by Consent". The order directed the Unit Operator, at that time Chevron USA, Inc., to proceed with a comprehensive site rehabilitation effort. The agencies involved, in addition to the Fish and Wildlife Service, included the Bureau of Land Management and the Alaska Department of Environmental Conservation (DEC). The Environmental Protection Agency (EPA), while not a signatory to the Consent Order, acted in an advisory capacity.

Reclaimed 14-3 gravel pit, site of PCB clean-up operations since 1986. 92/JF

When Arco assumed operatorship of the field in 1986, they also "inherited" all terms and conditions established by the Consent Order. Arco proceeded to meet this challenge head on. The successful completion of this project was the direct result of countless hours of coordinated team effort by both agency and industry personnel.

Demobilization of the CBC unit, the generating plant, and the related administrative facilities began immediately after the last of the contaminated soil was processed and continued on a "fast track" schedule through early October. The multi-stage CBC unit was transported to a storage site in north Kenai, where, according to OES management, it will remain pending decisions on future remediation projects. Nearly 11,000 cubic yards of previously saved topsoil was spread over the original 14-3 gravel pad between October 21 and 23, and by November 1 the entire area had been leveled, fertilized, and seeded.

On October 6, Arco presented the final set of Data Release Packages to the Fish and Wildlife Service, covering samples taken between August 31 and October 31, 1991. Collectively, all samples were either non-detect or below the established 12 parts per million (ppm) threshold set forth in the Consent Order. It would appear that all clean-up objectives have been met for this monumental project. The only cloud on the horizon at year's end was the still-pending results of an August EPA audit of the field analytical lab.

OES's CBC probably holds the world's record for tonnage of incinerated PCB-contaminated soils. 92/JF

Final stages of demobilization of the PCB incineration project at the 14-3 gravel pit. 92/JF

Rehabilitation of the Swanson River PCB site began in earnest during early August. 92/JF

Stockpile of purified soil from the PCB incineration project - a total of nearly 107,000 tons of soil was processed through the incinerator. 92/JF

Demobilization of the PCB remediation site at the 14-3 gravel pit. 92/JF

(b) Pipe and Supply (P&S) Yard Remediation

Air-stripping of aromatic hydrocarbon contamination in the groundwater at the P&S Yard continued throughout the year. Modifications continue to be made to increase the efficiency of the air-stripping system, which was installed in 1991 in response to a 1988 spill discovery at the site. A major development in 1992 was the construction of a new secondary system infiltration gallery to distribute recharged groundwater over a wider area and to serve as a back-up for a primary system failure. While the system continues to achieve long-term effluent clean-up objectives for the aromatic hydrocarbons BTXE, some problems with elevated contaminant levels toward year's end probably resulted in cross-contamination of samples collected inside the Connex tower. Problems were also experienced with residual bacteria fouling the infiltration galleries; evaluation methods for correcting the problem were continuing at year's end. A Soil Treatability Study completed in November concluded that air sparging/vapor extraction technologies were applicable to the P&S site. Monthly monitoring reports and field logs continue to be sent to the agencies signatory to Amendment Number 5 of the Order by Consent.

(c) Flare Pit-Tank Setting Remediation

Consulting firms for Arco conducted encouraging studies on bio-venting treatability tests and in-situ bio-remediation feasibility for crude oil contamination around the seven tank settings and the eight flare pits. As a result of those studies, Arco initiated a full-scale bio-venting project at the 3-9 Tank Setting. The evaluation project was awarded to JMM Engineering of Anchorage, with field operations commencing about mid-November. Approximately 80 percent of the known contaminated plume was subjected to subsurface pressurization treatment and subsequent venting through a series of surface-installed ports. In spite of some excessive hydrocarbon releases inside the 3-9 building and some leakage around the injection vents, the method holds considerable promise as a viable option to excavation and soil processing.

(3) Spills in 1992

A leak in the 2-15 drain line was the source of a major crude spill within the field in March. 92/JF

A majority of the 26 spills reported in 1992 were considered in the "minor" category--10 gallons or less. On January 24, a flow line failed at the 1-27 Tank Setting, releasing approximately 630 gallons of fluid, made up of 90 percent produced water and 10 percent crude. Surface contamination was

vacuumed and cleaned up with a front-end loader and was transported to the solid waste disposal site. On March 24, a crude line from Tank Setting 2-15 ruptured, releasing an estimated 20 barrels of fluid into the right-of-way borrow between Tank Setting 2-15 and the Pipe and Supply Yard. On-site evaluation showed that the fluid was approximately 88 percent produced water and 12 percent crude. Some of the material was recovered with a "super sucker" vacuum and transported to 1-33 recycling center for re-processing. All of the visually impregnated soil was excavated and transported to the solid waste disposal site.

Further integrity testing of the 2-15 drain line revealed a number of critical "metallic erosion" spots and resulted in the replacement of nearly 2500 feet of buried line. Arco spent considerable effort to excavate the contaminated site, and field screening tests under State regulations seemed to indicate that clean-up objectives had been achieved. Lab results from field sampling, however, revealed high levels of residual hydrocarbons. By year's end, the new unit operator, UNOCAL, had been directed to re-excavate during the 1993 field season before final closure from ADEC could be completed.

Completed clean-up of the 1-15 crude line break at Swanson River Field. 92/JF

Excavation for contaminated soils following break in the 2-15 crude transfer drain line. 92/JF

Severe corrosion in the 2-15 drain line prompted an extensive effort to determine the integrity characteristics of other long-buried lines within the field. 92/JF

Field screening for hydrocarbon contamination levels at the remediation sites was an integral part of the overall clean-up effort. 92/JF

(4) Inspections/Tours

On May 13, Assistant Refuge Manager Frates and seasonal Ranger John Gahr accompanied 15 students and three professors from the University of Alaska-Fairbanks on a tour of the field. The tour included a briefing on the PCB remediation project. The group was given an overview and history of oil production/gas cycling by Arco technicians and management and participated in a discussion on the interface between the Refuge and industry.

On June 30, Arco and Ogden Environmental Services (OES) personnel provided a briefing on field operations and on the status of the PCB project for Division of Refuges Chief Rob Shallenberger, Associate Manager George Constantino, and Washington D. C. staffers Steve Chase and Jeff Dempster. The stop at the Swanson River Field was part of Kenai Refuge's Annual Program Review, conducted on June 30 and July 1. OES Project Manager Jeff Dasch led a "walk through" of the remediation site, the Circulating Bed Combustor Unit, and the control room, and he briefly outlined the site demobilization schedule.

A joint meeting of the Fish and Wildlife Service, DEC, and Arco was held at the Swanson River Field Office on June 24 to review the status of on-going spill clean-up projects. Each of the five spill sites was visited, and compliance issues were discussed with Mike Munger of the Soldotna District ADEC Office. The Service and Arco expressed concern over continuing excavation at the 2-15 drainline spill location and its potential threat to a mature birch and spruce stand. It appeared that the "point of

diminishing returns" had been reached, and continuing to excavate to achieve minimal clean-up goals was only compounding the problem. The project was stopped, pending results of soil analyses. Lab results indicated that contaminant levels were still above threshold levels, and ADEC will not issue a site closure without further remediation. However, ADEC expressed a willingness to discuss alternatives to further excavation.

Arco Alaska Petroleum Engineer Brian O'Dell explains oil and gas operations to students from the University of Alaska-Fairbanks. 92/JF

On October 7, Assistant Refuge Manager Frates and Supervisory Ranger Kent conducted a brief tour of the field with Deputy Director Smith and Regional Director Stieglitz.

Frates attended weekly meetings at the field with Arco's On-Site Coordinator and OES' Project Manager during the period when the CBC Unit was in operation and during the demobilization and site restoration phase.

Refuge Manager Doshier explains the high cost of PCB remediation to Associate Manager Constantino (middle left) and Division of Refuges Chief Shallenberger (middle right). 92/JF

b. Beaver Creek Field (Marathon Oil Company)

(1) Diesel Spill Remediation

Marathon Oil Company (MOC) continued to analyze and interpret on-going studies at the site of a rather extensive diesel spill discovered in 1990. The spill originated from a leak in an underground fuel line. The leak had gone unnoticed over a period of several years and was found when the 500-gallon above-ground tank located at the facility generation plant was decommissioned in 1990. Phase I of the remediation project occurred in September 1991 with the excavation and incineration of 1000 yards of contaminated material. Two monitoring wells were installed and soil borings were conducted to delineate the extent of contamination.

The results of the Phase I studies indicated that both soil and groundwater contamination were considerably more extensive than previously thought. A Phase II study was developed, consisting of drilling eighteen additional borings, one additional monitoring well, and 12 temporary water sampling wells. Phase II was completed in June.

Since free product was encountered in one of the downgradient wells, and since discovery was made of a previous and separate diesel spill at a

nearby former generating facility, MOC was faced with conducting further investigations to: (1) define the downgradient boundary of the original diesel spill, (2) define the extent of contamination at the former diesel generating facility, and (3) evaluate groundwater flow patterns. Both the Phase I and Phase II studies were conducted by MOC Consultant Woodward-Clyde, while an evaluation of the hydro-geology was contracted to Terrasat of Anchorage.

Marathon Oil Company's Beaver Creek Production Facility, site of an on-going diesel spill remediation project. 92/JF

While delays in the original clean-up schedule for the diesel spill project have been mutually frustrating, MOC must choose between an extensive excavation project likely to disrupt on-going production operations and some form of in-situ bio-remediation project with minimal impact to the existing infrastructure. Site characterization analyses are expected to be completed early in 1993.

(2) Production Operations

Production of natural gas dropped off drastically during the first quarter of 1992 as excessive water production occurred in well BCU-6. The entire field was shut in on March 31 to correct maintenance problems. About the time those problems were corrected, well number 7 developed a water problem, again lowering production to below contractual obligations. By year's end, Beaver Creek was producing approximately 23 million cubic feet per day of natural gas and 450 barrels per day of crude.

On October 20, MOC hosted a joint BLM-FWS meeting at Beaver Creek to outline plans for a new exploratory well and to review permit application requirements for the respective agencies. MOC hopes to "spud in" the new BCU-9 well by June 1, 1994. When completed, BCU-9 will have a true vertical depth of 8428 feet and will be capable of producing gas from both the Sterling and Beluga formations of the Beaver Creek Unit. BCU-9 is needed to meet the current contractual obligations from the field and will be the first new production well drilled since 1977. Drilling will take place from existing pad number 3 with little, if any, expansion required.

(3) Public Access

Several meetings were held with MOC management personnel to discuss hunting opportunities within the Beaver Creek Unit for mobility-impaired hunters. This resulted in MOC taking a positive leadership role in not only accommodating hunters, but improving access as well. Field personnel fabricated a new "wheelchair friendly" access point through the lease boundary gate on Marathon Road and assisted in locating hunting areas which would have the least impact on field operations. Three permits were issued to hunters and their field aides to hunt moose within the Beaver Creek Unit. Thanks in large part to MOC's cooperation, few problems were encountered. One of the three hunters was successful. This was the first year the State of Alaska permitted qualified (100 percent mobility disabled) hunters to shoot from a vehicle so long as it was not from or over an improved road right-of-way. MOC has pledged their continuing support for this program as long as it can be conducted without compromising safety in their production operations.

Before -

-and after views of Marathon Oil Company's effort to provide wheelchair-bound hunters access through the Marathon Road gate and into the Beaver Creek Production Facility. 92/JF

(4) Tours/Inspections

On April 28, Frates conducted a tour of the Beaver Creek Field for Acting Refuge Manager Gary Sonnevil. MOC personnel provided a briefing on field operations, production problems, and proposed remediation activities.

MOC hosted a joint FWS-BLM field inspection of the pad at BCU-3 exploratory well number 9 in June 1993 to review possible expansion problems during the drilling of proposed. Expansion could take place to the west with only minor surface disturbance.

On November 20, Frates and Supervisory Ranger Kent met with Beaver Creek Production Foreman Brian Policky to review the 1992 moose season and specifically to assess MOC's reaction to the use of vehicles within the lease boundary by mobility-impaired hunters. Mr. Policky's evaluation was extremely positive, although he suggested greater specificity for assigned hunting areas within the field for next year's program.

c. Oil and Gas Exploration (Outside Existing Leases)

On February 11, Arco presented a preliminary request to conduct further tests of the Hemlock Zone in the Finger Lakes Region southwest of the Swanson River Field. The area lies within portions of the Refuge classified as open to oil and gas leasing but includes lands where the subsurface entitlement has been conveyed to the Cook Inlet Regional

Corporation (CIRI). For reasons known only to Arco geologists, interest remains high in this area despite four previous unsuccessful "dry holes" having been drilled in the near vicinity since the early 1960's. It is suspected, however, that Arco is attempting to correlate on-shore data within known geologic structures to their successful off-shore "Sunfish" well drilled in Upper Cook Inlet this past year.

The Galena exploratory well pad in the Finger Lakes Region will be the base of operations for a new exploratory well two miles southwest of the pad. 92/JF

The proposed Stormy Lake East (SLE) well would target geologic structures located in Section 36, Township 7 North, Range 10 West, while the Southeast Swanson (SES) well would target prospects located in Section 34, Township 7 North, Range 9 West. The SLE well would require an approximate two-mile extension of the existing Finger Lakes Road, while the SLE well would require an approximate 500-foot gravel spur from the Finger Lakes Road.

The Environmental Assessment for both wells was completed by JMM Engineering of Anchorage and submitted for internal Refuge review on August 10. Concurrently, Arco made application for a right-of-way permit to cross Refuge land as required by the Alaska National Interest Lands Conservation Act (ANILCA). The permit process was near completion by year's end, and Arco expects to begin road construction during the spring of 1993 with drilling commencing sometime next summer.

Proposed route of new access road for the Stormy Lake East exploratory well scheduled for 1993. 92/JF

In August a U.S. Corps of Engineers Jurisdictional Determination was made of the proposed two-mile road from the existing Galena Pad to the SLE site. A field review by Regional Office Biologists John Hall and Susie Klaxdorff, following the criteria established through the National Wetlands Inventory process, determined that the area involved was not considered as wetlands.

On May 29, Frates accompanied an Arco drilling engineer, a geologist, and a biologist on a helicopter overflight of the area to establish preferred routing of the access road, to ground-truth vegetation at the drilling pad site, and to look for trumpeter swan nesting activity.

d. Contaminant Investigations/Clean up (Outside Existing Leases)

(1) West Fork Gas Field [CIRI 22(g) Lands]

With successful completion of their second gas production well in the summer of 1992, CIRI Production Company (CPC) is now marketing natural gas from the West Fork Field located in the Sunken Island Lake area. The wells are on 22(g) lands owned by the Kenai Native Association (KNA). Since bringing their first well on line in 1991, CPC has been faced with having to dispose of excessive quantities of produced water. Due to the high cost of transporting the water and disposing of it at an off-site location and due to problems with annular injection within the West Fork 1-21 well, CPC applied to the Alaska Department of Environmental Conservation (DEC) for a surface discharge Waste Water Disposal Permit in October 1991. A public

hearing was held in Soldotna on January 17, 1992, however, no action was taken to either approve or deny the application.

West Fork Gas Field operated by CIRI Production Company on Kenai Native Association 22(g) lands in the Sunken Island Lake area. 92/JF

In the meantime, ADEC advised CPC that treating and disposing of water may not be the most practical solution. Through further discussions, CPC decided to pursue subsurface disposal by means of an on-site leach field. CPC's application for a second permit was opened for public review. By year's end, ADEC advised CPC that the permit would be approved with certain restrictions/stipulations.

From the onset, the Refuge has opposed CPC's efforts to discharge produced water by any means other than annular injection, both because of the possible effects of high chloride concentrations on adjoining Refuge ecosystems and because of the precedent-setting nature of the decision. Standard industry practice since the original discovery well in 1957 has been to reinject produced water into downhole formations. The Refuge will receive data reports from all four monitoring wells during the life of the permit and will be watching closely to see that groundwater leaving the site will, as the permit requires, be of drinking water quality.

(2) Aviation Fuel Spill (Kenai Airport Hangar)

Remediation of approximately 200 cubic yards of contaminated soil, discovered during the 1990 removal of a 2000-gallon fuel tank at the Kenai

Hangar, was completed in December 1991. The subcontractor, L.C. Services, Inc., was tagged with numerous violations during the off-site operation of their soil washing facility, and their record keeping was incomplete and careless. For those reasons ADEC refused to issue a "closure notice", despite the fact that cleanup criteria were achieved. A period of accusations, denials, threats of litigation, and heated confrontations ensued. Their soil washing technique was not designed to operate in sub-zero temperatures, but, for reasons not fully understood, L.C. Services failed to initiate operations during the summer or even during the fall period when freezing temperatures would have posed no problems. By withholding the final payment, the prime contractor, Asbestos General, Inc., eventually forced L. C. Services to provide requested documentation, and the project was finally given ADEC "closure" on June 4.

Unfortunately, this project was to have been a demonstration project for the first cost-effective soil remediation attempt on the Kenai Peninsula. Handled differently, it may well have led to an answer to the growing problem of processing contaminated soils in the Peninsula area. However, this experience was probably a death-knell for further contracts for L. C. Services, Inc.

(3) Skilak Drum Storage Site

Stockpile of hydrocarbon-contaminated soil at Skilak Guard Station Drum Repository Facility, 1992. Material will be spread and aerated next summer. 92/JF

Rozak Engineering of Kenai was awarded the contract for developing a Site Assessment and Corrective Action and Disposal Plan for contaminated soils resulting from the storage of 55-gallon drums near the Skilak Guard Station.

Drums containing mostly waste oil, solvents, and glycol, as well as a number of empty aviation fuel drums, had been stored at the site since the 1950's. Excavation got underway on July 22 and continued until field test results indicated that the limits of contamination had been identified. The target material was than segregated and placed on an impervious liner. A total of 300 cubic yards of material was excavated, and laboratory results indicated that land spreading would be a viable means of remediation. The ADEC concurred with the recommendations outlined in the disposal plan, and the stockpile will be spread on location in the spring of 1993. It will be periodically tilled and tested for total hydrocarbon levels.

Skilak Guard Station drum storage/bone yard following excavation and leveling of contaminated soils. 92/JF

(4) Underground Storage Tanks (Old Kenai Headquarters)

Three of the four sites where old underground fuel tanks were removed in 1990 were found to contain sufficient levels of residual contamination to require further remedial action. The sites include those of the diesel and unleaded tanks at the fuel island pump station and that of the home heating tank near the old maintenance shop. Field screening tests indicated that

no contaminated soils remained which exceeded State clean-up levels, and the sites were back-filled. Laboratory test results received later indicated that levels still exceeded threshold standards. The ADEC has requested that further testing be completed before the site is given "closure" status.

A contract will be negotiated with a professional engineering firm to further evaluate these sites in 1993. Included in the evaluation will be a 10' x 13' site where surficial discoloration was noted during removal of an old oil shed in 1991. A field assessment will also be made of the facility's old "bone yard", where fence posts were treated using the now-classified "hazardous" chemical pentachlorophenol (Penta).

(5) Moose Research Center Fence Post Treatment Site

Soil samples were taken last fall at a former fence post treatment site on an abandoned oil pad inside the Moose Research Center. A number of samples came back positive for the now-hazardous chemical Penta. This site has not been used as a treatment facility since the late 1960's, but it has been used as a storage area for steel pipe used in rehabbing perimeter fencing for enclosures at the research center. Contractual field assessment work is expected to get under way during the summer of 1993 to define the levels and extent of contamination.

3. Items of Interest

Nothing to report.

4. Credits

Most staff members were involved in preparation of the 1992 annual narrative report either during the writing, typing, or editing phases of production.

K. FEEDBACK

Refuge Ranger Rick Johnston on the receiving end of Regional Office "FAX Feedback". 92/JF