TOGIAK NATIONAL WILDLIFE REFUGE

Dillingham, Alaska

ANNUAL NARRATIVE REPORT

Calendar Year 1993

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NATIONAL WILDLIFE REFUGE SYSTEM

REVIEW AND APPROVALS

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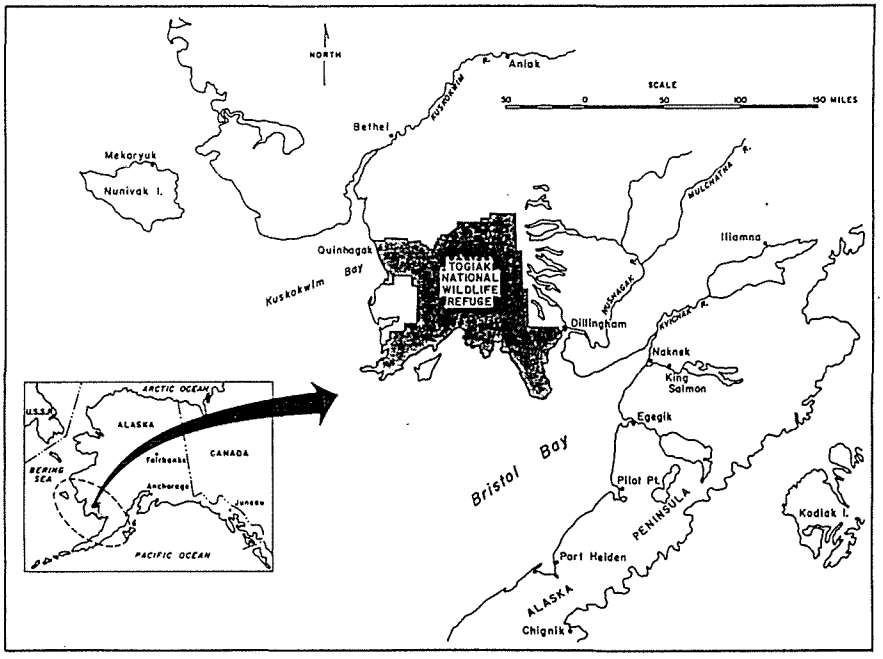
Refuge Manager	Date	Refuge Supervisor Review	Date

Regional Office Approval	Date

INTRODUCTION

Togiak National Wildlife Refuge encompasses 4.7 million acres of land in southwestern Alaska between Kuskokwim Bay and Bristol Bay. The eastern boundary of the refuge is about 400 air miles southwest of Anchorage. The refuge is bordered on the north by Yukon Delta National Wildlife Refuge and on the east by Wood-Tikchik State Park.

The refuge contains a variety of landscapes, including tundra, lakes, wetlands, mountains, and rugged cliffs. The Kanektok, Goodnews and Togiak rivers provide habitat necessary for five species of salmon and other fish that spawn in the refuge. More than 30 species of mammals are present including brown bear, moose, caribou, wolves, and wolverine. Sea lions, walrus, and harbor seals inhabit the Pacific coast shoreline. The refuge's coastal lakes and wetlands are also heavily used by migrating waterfowl.



Southwest Alaska, Togiak National Wildlife Refuge is shaded.

The former Cape Newenham National Wildlife Refuge (created in 1969) became part of the present Togiak National Wildlife Refuge. The northern 2.3 million acres of Togiak Refuge are designated wilderness. Eighty percent of the refuge is located in the Ahklun Mountains, where large expanses of tundra uplands are cut by several broad glacial valleys expanding to the coastal plain. Like the majority of refuges in Alaska, Togiak Refuge is roadless.

Archaeological evidence indicates that the Cape Newenham/Togiak region of southwestern Alaska has been continuously occupied by aboriginal people for at least 2,000 years. One site, at Security Cove near Cape Newenham, shows evidence of possible human occupancy dating 4,000 to 5,000 years ago.

The aboriginal people in this area were of two different descents. Kuskwogmiut Eskimos occupied the area from Chagvan Bay north to the Kuskokwim River. Togiagamiut Eskimos lived within the area south of Chagvan Bay east to Togiak Bay. The people in the Nanvak and Osviak Bay areas were known as Chingigmiut, or Cape People, and were considered a branch of the Togiagamiut.

At the time of the 1880 census, approximately 2,300 Eskimos lived within what is now Togiak National Wildlife Refuge. Elliott (1866) stated that the Togiak River was remarkable with respect to the density of people living along its banks. At that time, 1,926 people lived in seven villages along the river from Togiak Lake to Togiak Bay. The size of this population reflected the great abundance of fish and wildlife that people relied upon as their sole sources of food and clothing.

The Togiagamiuts, unlike most coastal Eskimos, did not depend entirely upon the fish and wildlife resources of the sea for their subsistence. Sea mammals were hunted, but more effort was expended in pursuit of the moose, caribou, and brown bear found in the interior mountains and valleys. From their winter villages along the rivers near the coast, hunters and their families traveled into the interior, where they spent several months in the spring and fall, picking berries and hunting. In midsummer they would return to their villages to harvest salmon. They relied on the food gathered to survive the coldest months of winter, when the frigid weather conditions would prohibit any hunting/fishing activity.

Kuskwogmiuts, who occupied the area west and north of the Togiagamiuts, were more dependent on the sea's resources for their subsistence. They spent little time, if any, hunting land mammals of the interior. The people living in the vicinity of Cape Newenham, for example, obtained their meat, blubber, and oil from seals, beluga whales, and walrus. Walruses were especially prized for its ivory, which was used in the manufacturing of tools or as articles of trade. Seabirds were abundant, furnishing people with meat, eggs, and feathers for clothing. Salmon and trout were also important items in their diet.

Captain James Cook was probably the first white man to see this area. Entering Bristol Bay on July 9, 1778, he continued westward, reaching Cape Newenham on July 16, 1778. Somewhere north of Cape Newenham, possibly in the area of Goodnews Bay, Captain Cook was visited by a group of Eskimos in Kayaks. He believed that these people had not had any previous contact with whites because there were no tobacco or other foreign articles in their possession.

Russian explorers reached Bristol Bay in the 1790s, but the first contact they had with the Togiagamiuts did not occur until around 1818, when a party of Russian American Company traders established a fort on the Nushagak River. It was from this post that trade was established with Togiagamiuts. The area was rich in furs, and the post was soon handling more than 4,000 pelts annually. A great variety of animals were taken, including brown and black bears, wolves, wolverines, beaver, martin, mink, marmots, muskrats, river otters, ground squirrels, lynx, seals, and red and Arctic foxes. Interest in trapping around Bristol Bay did not decline until World War I. Trapping continues today, with fur prices dictating the degree of effort spent.

Of the various other industries created in the area during the 1800s, only the salmon fishery retains its original importance. In 1885, the Alaska Packing Company of Astoria established the "Scandinavian" cannery on the west side of Nushagak Bay. With a capacity of 2,000 cases per day, it operated until the end of World War II. Bristol Bay Canning Company, then called the Bradford Cannery, went into production a few miles from the Scandinavian cannery in 1886, at a site later to become known as Dillingham. By 1897, the fishing industry had invested $867,000 in the bay. By 1908, there were ten canneries operating within the Nushagak Bay area.

Other industries dating from the 1800s were gold mining and reindeer herding. Gold mining declined during World War I. Most of the gold mines closed at the outbreak of World War II; however, platinum mining began in 1926 and continued until 1975. Reindeer herding practically became extinct by the mid-1940's due to near total extermination of reindeer by a series of hard winters.

The discovery of platinum at Fox Gulch near the present village of Platinum caused what was probably Alaska's last big stampede. Miners from all over Alaska and the "Lower 48" came to the mining camp along the tributaries of the Salmon River, which was heralded as the "Dawson of 1937." The platinum stampede was unlike any of those in the Klondike era. Airplanes brought stampeders into Platinum several times a week and a few miners resorted to dog sleds for the long overland treks which were characteristic of "The Trail of '98." Also, power drills and tractors replaced single jacks and horse-drawn wagons. Since 1926, more than 640,000 ounces of precious platinum have been mined from the placers in the Goodnews Bay district.

By 1934, one company, the Goodnews Bay Mining Company had acquired nearly all of the claims in existence. Ownership later changed to Hanson Enterprises, and they worked a dredge continuously until 1975. Since then, the dredge has operated only intermittently. Hanson Enterprises was the only company in the United States that primarily produced platinum, and most of the platinum claims owned by Enterprises were located on lands selected by Native villages.

Prior to 1969, the area that was to become Togiak National Wildlife Refuge was part of the public domain, under the jurisdiction of Bureau of Land Management. On January 20, 1969, the Secretary of the Interior issued Public Land Order 4583, withdrawing 265,000 acres of that area and designating it the Cape Newenham National Wildlife Refuge. With this order, the Fish and Wildlife Service assumed its first refuge management responsibilities in the area to protect and preserve the "outstanding wilderness values" of Cape Newenham.

The majority of lands that were to become Togiak National Wildlife Refuge were withdrawn in 1971 under Section 17(d)(2) of the Alaska Native Claims Settlement Act (ANCSA). The withdrawals covered all forms of appropriation under the public land laws, including selection under the Alaska Statehood Act and the mining and mineral leasing laws. The Settlement Act directed the Secretary of the Interior to study all (d)(2) "national interest land" withdrawals as possible additions to the National Wildlife Refuge, Park, Forest, and Wild and Scenic River Systems.

The Secretary withdrew additional parts of what was to become Togiak National Wildlife Refuge under Section 17(d)(1) of the Settlement Act. These "public interest lands" were also withdrawn from all forms of appropriation under the public land laws, with the exception of metalliferous locations.

Congress failed to take action before the five-year deadline expired for the (d)(2) lands being considered for additions in the National Park, Refuge, Forest, and Wild and Scenic River Systems. So, on November 16, 1978, the Secretary of the Interior invoked his emergency withdrawal powers, under Section 204(e) of the Federal Land Policy Management Act, to protect these lands, and withdrew nearly 110 million acres of land throughout Alaska. Most of the present Togiak Refuge was covered by this Order, including the (d)(1) and (d)(2) lands and lands which had been available to the Natives but had not yet been selected.

Fifteen months later, on February 11, 1980, the Secretary issued Public Land Order 5703, under section 204 of the Federal Land Policy Management Act, establishing Togiak National Wildlife Refuge. This order withdrew all lands subject to existing rights for up to 20 years from all forms of appropriation under the public land laws. As a refuge, Togiak became subject to all of the laws and policies of the Fish and Wildlife Service which govern the administration of the National Wildlife Refuge System.

The Alaska Native Claims Settlement Act of 1971 chose a route vastly different from previous solutions to aboriginal land claims. Departing from "Lower 48" precedents of reservations and government-

subsidized industries, the compromise bill empowered Alaska's Natives with cash and land conveyances. It further provided that corporations would administer this division of wealth.

The settlement act abolished aboriginal title to lands in exchange for forty million acres and compensation totaling almost $1 billion, creating perhaps the largest single transfer of wealth from a government to a group of indigenous peoples. Thirteen regional and 220 village corporations were established in 1981, and after a slow start and further legal wrangling, the majority of land entitlements have been conveyed to them. The Togiak Refuge is separated into part of two regional corporations. The Kuskokwim region is managed by the Calista Corportation and the Bristol Bay region is managed by the Bristol Bay Native Corporation.

On December 2, 1980, Congress enacted the Alaska National Interest Lands Conservation Act (ANILCA). This act, among other things, rescinded Public Land Order 5703 and designated all of the withdrawn land as a refuge. In addition, the Act made Cape Newenham National Wildlife Refuge a unit of Togiak National Wildlife Refuge. The first refuge manager subsequently reported for duty in October 1981.

Section 303(6)(B) of ANILCA sets forth the following major purposes for which the Togiak National Wildlife Refuge was established and shall be managed:

> (i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, salmonoids, marine birds and mammals, migratory birds and large mammals (including their restoration to historic levels);
>
> (ii) to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats;
>
> (iii) to provide, in a manner consistent with purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and
>
> (iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in subparagraph (i), water quality and necessary water quantity within the refuge.

ANILCA Section 101 states that Togiak Refuge and other conservation units in Alaska were established to preserve their "nationally significant" scenic, wilderness, recreational, wildlife and other values for the benefit of present and future generations. It further states that:

> . . . it is the intent of Congress in this Act to preserve unrivaled scenic and geological values associated with natural landscapes; to provide for the maintenance of sound populations of, and habitat for, wildlife species of inestimable value to the citizens of Alaska and the Nation, including those species dependent on vast relatively undeveloped areas; . . . to protect the resources related to subsistence needs; to protect and preserve historical and archeological sites, rivers, and lands, and to preserve wilderness resource values and related recreational opportunities including but not limited to hiking, canoeing, fishing, and sport hunting, within large Arctic and subarctic wildlands and on free-flowing rivers; and to maintain opportunities for scientific research and undisturbed ecosystems.

ANILCA called for the Comprehensive Conservation Plan (CCP) to describe "special values" of the refuge. Special values of Togiak Refuge are the following:

The Togiak Wilderness covers about half of the refuge. The wilderness area includes pristine rivers, clear mountain lakes, and steep sloped mountains. It provides outstanding opportunities for solitude and primitive recreation. The rugged Ahklun and Wood River Mountains, partly within the wilderness area, are noteworthy for their scenic values.

The Kanektok, Goodnews, and Togiak drainages have important subsistence and sport fishery values, containing salmon, Dolly Varden, and rainbow trout among other species. The rivers are free flowing and possess excellent scenic, wildlife, riparian, and recreational values. They are important for subsistence uses. Parts of all three drainages are in the Togiak Wilderness.

Sport fishing is another special value of Togiak Refuge. The refuge attracts fishermen from around the world, including Germany, Japan, France, Denmark, and Canada, as well as Alaskans and other Americans. Sport fishing occurs in most refuge waters, with major concentrations of five species of salmon, grayling, rainbow trout, and Dolly Varden occurring in the Togiak, Kanektok, and Goodnews rivers. These rivers have pristine habitat, excellent freshwater rearing conditions, and limited access.



Photo - One of MANY scenic views of Togiak National Wildlife Refuge

TABLE OF CONTENTS

Page

A. HIGHLIGHTS 1

B. CLIMATIC CONDITIONS 1

C. LAND ACQUISITION

1. Fee Title . . . . . NTR
2. Easements . . . . . NTR
3. Other 2

D. PLANNING

1. Master Plan 4
2. Management Plan 4
3. Public Participation 4
4. Compliance with Environmental and Cultural Resource Mandates 5
5. Research and Investigation 5

E. ADMINISTRATION

1. Personnel 16
2. Youth Programs 17
3. Other Physical Labor Programs . . . . . NTR
4. Volunteer Program 17
5. Funding 18
6. Safety 18
7. Technical Assistance . . . . . NTR
8. Other 21

F. HABITAT MANAGEMENT

1. General 25
2. Wetlands 27
3. Forests . . . . . NTR
4. Croplands . . . . . NTR
5. Grasslands . . . . . NTR
6. Other Habitats 28
7. Grazing . . . . . NTR
8. Haying . . . . . NTR
9. Fire Management 28
10. Pest Control . . . . . NTR
11. Water Rights . . . . . NTR
12. Wilderness and Special Areas 28
13. WPA Easement Monitoring . . . . . NTR

G. WILDLIFE

1. Wildlife Diversity 29
2. Endangered and/or Threatened Species 30
3. Waterfowl 30
4. Marsh and Water Birds 31
5. Shore Birds, Gulls, Terns, and Allied Species 32
6. Raptors and Owls 33
7. Other Migratory Birds 34
8. Game Mammals 35

9. Marine Mammals 37
10. Other Resident Wildlife 39
11. Fisheries Resources 40
12. Wildlife Propagation and Stocking . . . . . NTR
13. Marking and Banding 54
14. Scientific Collections 54
15. Animal Control 55

H. PUBLIC USE

1. General 60
2. Outdoor Classrooms - Students 61
3. Outdoor Classrooms - Teachers 62
4. Interpretive Foot Trails . . . . . NTR
5. Interpretive Tour Routes . . . . . NTR
6. Interpretive Exhibits/Demonstrations 63
7. Other Interpretive Programs 63
8. Hunting 64
9. Fishing 65
10. Trapping 67
11. Wildlife Observation 69
12. Other Wildlife Oriented Recreation 70
13. Camping 70
14. Picnicking . . . . . NTR
15. Off-Road Vehicling 70
16. Other Non-Wildlife Oriented Recreation 70
17. Law Enforcement 70

I. EQUIPMENT AND FACILITIES

1. New Construction 71
2. Rehabilitation 72
3. Major Maintenance 72
4. Equipment Utilization 72
5. Communication Systems 75
6. Computer Systems 75
7. Energy Conservation 76

J. OTHER ITEMS

1. Cooperative Programs 76
2. Other Economic Uses . . . . . NTR
3. Items of Interest 76
4. Credits 77

INFORMATION PACKET (inside back cover)

A. HIGHLIGHTS

- Reintroduced Nushagak Peninsula Caribou Herd increases at a rate of 38% (See Section D. 5c).
- Interagency crew conducts the first radio-collaring project of brown bear (See Section D. 5f).
- River Ranger program in its third successful year (See Section E. 8b).
- Commercial catch of sockeye salmon well above the 10-year average (See Section G. 11c).
- Hagemeister Island Reindeer Remove Project is completed (See Section G. 15).
- An estimated $6,000,000 is spent by anglers to fish Togiak's remote waters (See Section H. 9).
- The bunkhouse receives a new interior look (See Section I. 4).

B. CLIMATIC CONDITIONS

The refuge is located in a climatic transition zone. The primary influence is maritime; however, the arctic climate of interior Alaska also affects the refuge and the Bristol Bay coastal region. Prevailing winds are from the north and northeast October through March, and from the south and west April through September. The wind blows almost continuously along the coast, frequently reaching gale force velocities.

Recorded temperatures in Dillingham, Alaska, have ranged from -53° F to 92° F, with an average of 24.4 inches of rain and 73.5 inches of snow. Cape Newenham, by comparison, has recorded minimum temperatures of -28° F; maximum temperatures of 75° F; and an average of 37 inches of rain and 81 inches of snow. The frost-free period is approximately 120 days; ponds and smaller lakes usually freeze in October and thaw in May.

Fall is the wettest season in this area, while spring is the driest. The varied topography on the refuge creates microclimates which affect local temperatures, types of precipitation, and wind conditions.

Table 1. 1993 Weather Data

MONTHLY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
PRECIP.	3.6	2.1	0.4	1.3	2.7	1.9	2.0	4.5	6.5	2.4	4.6	3.8	35.80
MAX. TEMP.	36	38	41	54	73	73	77	71	59	49	44	36	
MIN. TEMP.	-34	-32	8	27	30	41	39	38	27	16	-3	-7	
AVERAGE TEMP.	12	21	28	39	47	52	57	54	46	37	27	22	

C. LAND ACQUISITION

1. Fee Title

Nothing to report

2. Easements

Nothing to report

3. Other

There were no major land status changes during 1993. The following table shows the current land status acreage.

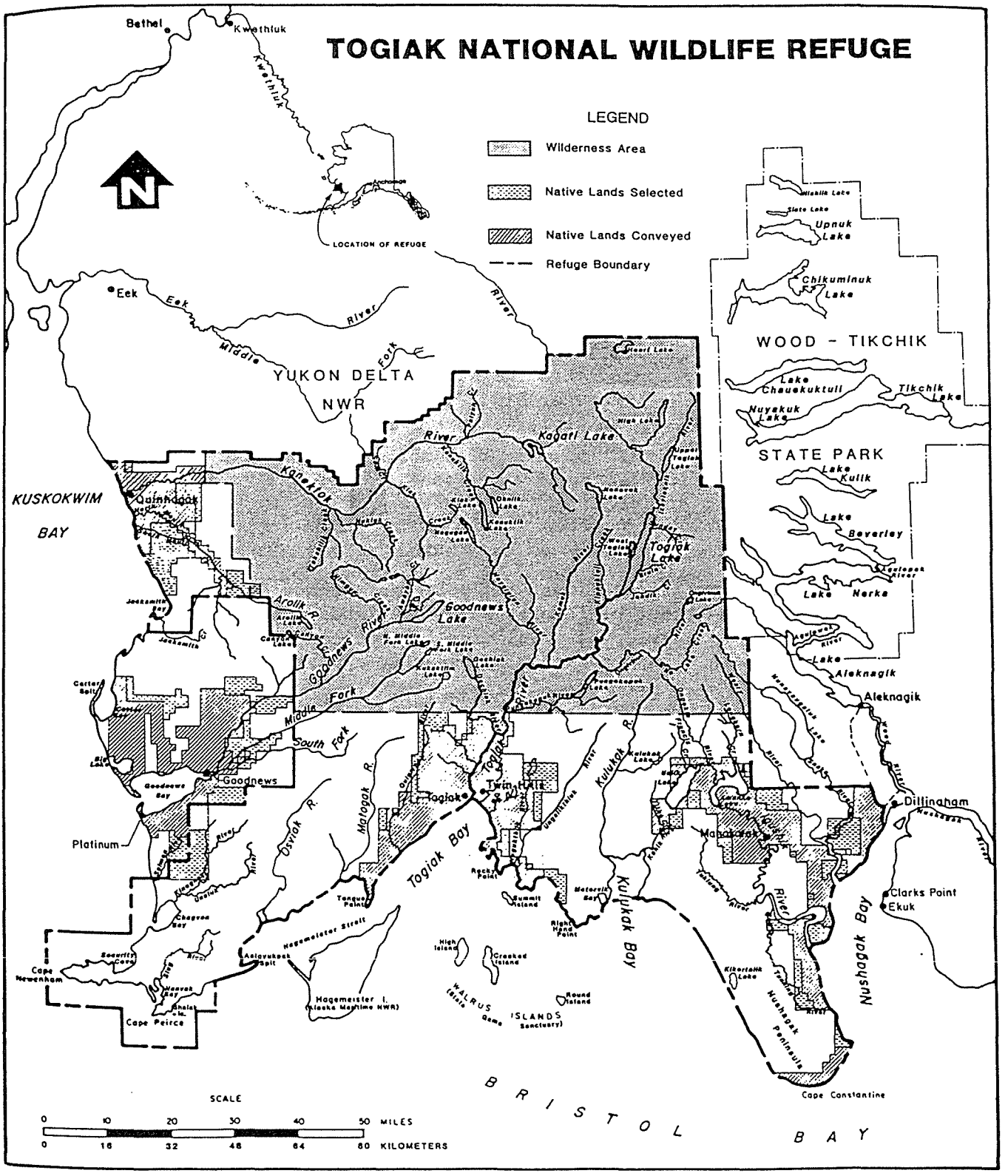
Table 2. Land Status of the Togiak National Wildlife Refuge [1]

Ownership	Acres	Percent of Refuge
FEDERAL	4,011,000	85%
NATIVE VILLAGE CORP/GROUP:		
*Selections	151,000	3%
*Conveyances	480,000	10%
REGIONAL CORPORATIONS:		
*14(h)(1) Selections	12,000	≤1%
*14(h)(1) Conveyances	0	0
*14(h)(8) Selections	5,000	≤1%
*14(h)(8) Conveyances	0	0
NATIVE ALLOWANCES:		
*Applications	11,000	≤1%
*Conveyances	33,000	≤1%
PRIVATE PARTIES:		
*Selections	0	0
*Conveyances	600	≤1%
TOTALS	4,704,000	100%

[1] Acreage is approximate as identified in the Comprehensive Conservation Plan (1986). This table does not include submerged lands.

Of the 4,704,000 acres of land within the refuge boundary, approximately 4,011,000 acres (85%) are under Federal jurisdiction. About 513,000 acres (approximately 11%) have been patented or conveyed to eight Native corporations [Clark's Point (Sagayak), Ekuk, Dillingham (Choggiung), Manokotak, Platinum (Arviq), Quinhagak (Qanirtuuq), Togiak, and Twin Hills], individual Natives, private parties, and one Native group (Olsonville). About 150,000 acres in the refuge have been selected, but they are still under Federal jurisdiction; some of these lands may or may not be interim conveyed.

Figure 1. Map of Togiak National Wildlife Refuge



D. PLANNING

1. Master Plan

The Togiak National Wildlife Refuge Comprehensive Conservation Plan with Environmental Impact Statement (CCP) was completed in June of 1986. The CCP designates areas within the refuge according to their resources and values, outlines programs for conserving fish and wildlife resource values, and specifies uses within each area that may be compatible with the major purposes of the refuge. In addition, the plan discusses opportunities that will be made available for fish and wildlife oriented recreation, ecological research, environmental education and interpretation, and economic use of refuge lands.

In addition to presenting the Service's long-range management strategies for Togiak Refuge, the CCP evaluates the effects of proposed management alternatives on subsistence uses and needs, as required by Section 810 of Alaska National Interest Lands Conservation Act (ANILCA).

2. Management Plan

Management of Togiak Refuge is guided by a series of documents. As with all refuges in Alaska, ANILCA provides the primary direction. In addition, several other national, regional, and site plans and advices provide directives and guidance. The following documents have been approved for Togiak Refuge:

Biological Program Review - Wildlife (1992) - This document represents the recommendations of the review team and the decision document that establishes the future of the wildlife program at Togiak Refuge.

Fishery Management Plan (1990) - This document provides the management direction necessary to insure conservation of refuge fishery resources and habitat. In addition, the plan provides for continued use of refuge fishery resources by subsistence, commercial and recreational users which is consistent with the purposes for which the refuge was established and is managed.

Public Use Management Plan (1991) - This plan was prepared to implement certain provisions of the Togiak Refuge Comprehensive Conservation Plan and to outline the management of public use on the refuge. The plan also includes guidelines for the management of State of Alaska shorelands within the refuge and along the lower Goodnews River.

3. Public Participation

Substantial public involvement has been incorporated into refuge biological programs and public use planning efforts. Village meetings and media resources are the primary methods for outreach. Villages most affected by refuge management include, Dillingham, Aleknagik, Manokotak, Togiak, Twin Hills, Quinhagak, Goodnews Bay, and Platinum.

4. Compliance with Environmental and Cultural Resource Mandates

When making environmental and cultural compatibility determinations, Togiak Refuge relies on sections of ANILCA other than those delineating the specific refuge purposes. Section 101 of ANILCA established the general purposes of the Act, which included ". . . preserving wilderness resource values and related recreational opportunities including but not limited to hiking, canoeing, fishing, and sport hunting . . . " Compatibility determinations exist for all permitted uses of the refuge and ANILCA Section 810 contains compliance determinations evaluating the effects of refuge activities on subsistence uses.

Determinations exist for the Togiak National Wildlife Refuge Comprehensive Conservation Plan, Public Use Management Plan, guided sport fishing operations, guided big game hunting, guided waterfowl hunting, air taxi operations, set net operations, wildlife viewing at Cape Peirce, and scientific research.

5. Research and Investigation

a. ABUNDANCE AND DISTRIBUTION OF MARINE MAMMALS IN NORTHERN BRISTOL BAY

Togiak Refuge's rocky coast and sandy beaches support a diverse and abundant marine mammal population. The Cape Peirce/Cape Newenham area and the Walrus Islands State Game Sanctuary are two areas particularly rich in marine mammals, providing haulout areas for walrus (Odobenus rosmarus divergens), harbor seals (Phoca vitulina), spotted seals (Phoca largha), and Steller sea lions (Eumetopias jubatus).



Photo 1. Cape Peirce walrus participating in the typical daily activity.

Round Island and Cape Peirce are the only two regularly used land-based haulouts for Pacific walrus in the United States. Walrus periodically haul out at Cape Seniavin and Cape Newenham; however, these areas are not used every year. Female and young walruses that winter in and near Bristol and Kuskokwim Bays migrate north in the spring. Many of the males remain behind and haul out at Cape Peirce and/or Round Island. Cape Peirce was historically used as a haulout site but was abandoned sometime during the first half of this century. Walruses began reusing the haulout in 1981 and have returned every summer since.

In 1993, the marine mammal program focused on monitoring the abundance and distribution of walruses, seals and sea lions in northern Bristol Bay and southern Kuskokwim Bay. Ground counts of walruses at Cape Peirce, Cape Newenham, and Round Island produced peak numbers of 7,530, 993, and 5,104, respectively. The peak count at Cape Peirce is the highest since the 1986 peak of 9,494. The greatest number counted on any one day in northern Bristol Bay was the peak count at Cape Peirce on August 22 of 7,530; this does not represent a complete census of the area's haulouts, as monitoring at Cape Newenham and Round Island had ceased by this date. High total counts of the northern Bristol Bay-southern Kuskokwim Bay area occurred on July 6 with 7,466 walruses counted at the three haulouts, and on August 2 with 7,492 walruses counted at Cape Peirce and Round Island (Cape Newenham was not censused). Fluctuations in numbers at these haulouts from 1987-1992 may be caused, in part, by the presence of the yellow-fin sole fishery in northern Bristol Bay.

Nanvak Bay near Cape Peirce continues to be one of the largest seal haulouts in northern Bristol Bay. A peak count of 679 seals was recorded there on August 22, the same date as the peak walrus count. Though higher than any peak seal count of the last five years, when regular daily censusing took place, this year's peak is still much lower than the peak count of 3,100 in 1975. This decline parallels harbor seal population trends throughout Alaska. The causes of the decline are unknown and must be further investigated. Both spotted and harbor seal pups were observed, with a high of 15 pups recorded on July 3.

Sea lion monitoring at Cape Newenham continued in 1993. The haulout was surveyed eight times from the air and ground between mid May and late July. The peak aerial count of 800-900 occurred on May 12, and the peak ground count of 508 occurred on June 19. The percentage of juveniles at the haulout remained relatively constant during the ground survey period from mid June to late July, ranging from 14.8% to 28.2%.

b. STATUS OF KITTIWAKES, MURRES, AND CORMORANTS AT CAPE PEIRCE AND CAPE NEWENHAM, BRISTOL BAY

Staff at Togiak Refuge has monitored populations and reproductive performances of Black-legged Kittiwakes (Rissa tridactyla), Common Murres (Uria aalge), and Pelagic and Double-crested Cormorants (Phalacrocorax pelagicus and P. auritus) in the Cape Peirce area since 1984 and in the Cape Newenham area since 1990. The objectives of this annual monitoring program are to detect changes and determine causes of changes in population size and reproductive performance of these ledge-nesting seabirds for comparison with similar efforts elsewhere in Alaska.

At Cape Peirce in 1993, shore-based populations (adult and nests) of kittiwakes, murres, and cormorants were similar to numbers recorded in 1985-1992. At Cape Newenham, shore-based populations (adults and nests) of kittiwakes in 1993 were similar to those in 1992 and higher than those in 1991. Common Murre populations (adults) in 1993 were similar to those in 1991 and 1992.

In 1993, Cape Peirce kittiwakes, murres, and cormorants started their reproductive season earlier than in 1989-1992. Kittiwake productivity in 1993 was lower than in 1986, 1987, and 1992, but similar to productivity in all other years. Murre reproductive success was similar to past years. Cormorant productivity in 1993 was similar to productivity in 1987, 1988, 1991, and 1992, but higher than in 1986, 1989, and 1990.

Cape Newenham kittiwakes and murres also started their reproductive season earlier in 1993 than in 1991 and 1992. Kittiwake productivity in 1993 was lower than in 1992 and similar to productivity in 1991. Kittiwake productivity at Cape Newenham was higher than productivity at Cape Peirce in 1993. Murre productivity in 1993 was similar to productivity in 1992, and Cape Newenham productivity was similar to Cape Peirce productivity.

Kittiwake, murre, and cormorant populations have been stable during the past ten years at Cape Peirce and during 1991-1993 at Cape Newenham. At Cape Peirce, years of high productivity punctuate years of low productivity for kittiwakes, and murre productivity is stable from year to year. These three seabird species appear to have healthy populations.

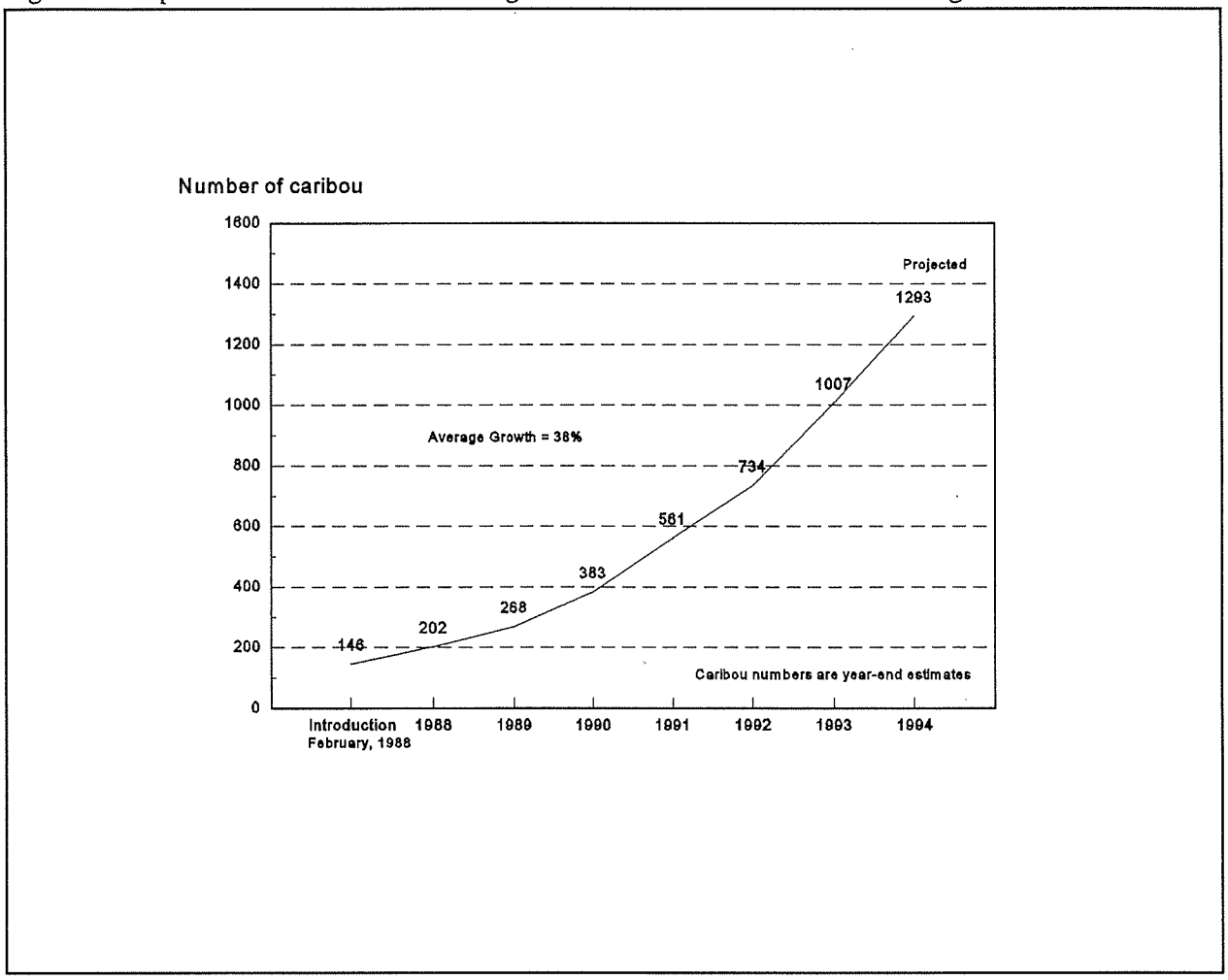
c. NUMBERS, COMPOSITION, RECRUITMENT, MOVEMENTS, AND SEASONAL DISTRIBUTION OF THE REINTRODUCED NUSHAGAK PENINSULA CARIBOU HERD

Historically, a large caribou herd roamed the coast of the Bering Sea from Bristol Bay to Norton Sound. Archaeological excavations near the village of Togiak in 1960 suggested that caribou were important to the Native population (Kowta 1963). Presumably, caribou once concentrated in the mountains upriver from Togiak Bay and in the rocky headland toward Cape Newenham. Large caribou herds were also observed "roaming over the mountains of the Nushagak Peninsula" (Petrov, 1900). Petrov (1884) noted that caribou were virtually absent from the lower Yukon-Kuskokwim River area by 1880. While still numerous in the upper Kuskokwim drainage (Capps, 1929), caribou were absent in the Togiak and Goodnews drainages as early as 1900. Alaska Game Commission noted only small scattered herds in the Kilbuck Mountains by the mid 1930s. Caribou disappeared during a period of human population growth, which included an influx of Caucasians and intense commercial trade.

Caribou were reintroduced to the Nushagak Peninsula in February 1988, after an absence of more than 100 years. The purpose was to reestablish caribou in the area which would eventually provide local residents with the opportunity to hunt caribou. The Nushagak Peninsula caribou herd has grown rapidly from 146 reintroduced caribou to over 1,000 in six years, a rate of increase of about 38% per year. The dramatic growth of the herd has been attributed to the initial high percentage of females in the herd, high calf production and survival rates, the pristine condition of the range, a lack of predators, and the fact that no hunting has been allowed. The abundance of high quality forage on the Nushagak Peninsula is probably responsible for the enhanced body condition of the animals and the high natality rate, even among 2-year-olds, and it has most likely contributed to the high calf survival and recruitment rates. The lack of predators and the prohibition hunting have allowed calf and adult mortality to remain low.

Although the size of the herd has grown steadily over the past six years, no significant dispersal from the peninsula has occurred. The population density of the herd was estimated to be 1.0/km^2 in 1993. We believe the herd will continue to grow and could reach a density of 2.3/km^2 by 1998, even with a 10% harvest beginning in 1995. While the current growth rate of the herd makes the reintroduction a success, the increasing density of animals, the lack of dispersal, and the potential for over-grazing present managers with hard decisions.

Figure 2. Population Growth of the Nushagak Peninsula Caribour Herd following reintroduction.



d. RANGE INVENTORY AND MONITORING FOLLOWING CARIBOU REINTRODUCTION TO THE NUSHAGAK PENINSULA

Caribou were reintroduced to the Nushagak Peninsula in 1988. The herd increased rapidly from an initial 146 animals to more than one thousand in six years. The anticipated population of caribou may not result in the overgrazing that has occurred with introduced reindeer in other areas of Alaska, but range condition and trend needs to be monitored.

A range inventory and monitoring study proposal was approved in 1988. Land cover mapping, range description and enclosure construction was initiated in 1989. Specific objectives of this study include:

* Map and classify the vegetation on the Nushagak Peninsula using LANDSAT multi spectral-sensor data.

* Describe the floristic composition and structure of the vegetation to determine the variety of plant communities and their relationship to major ecological factors.

* Establish permanent vegetation plots to monitor changes in lichen browse and plant cover following caribou reintroduction.

* Involve the members of the local towns and villages with the reintroduction project and establish an understanding of the Service's role in habitat and game management in this part of the State.

ROS Johnson spent the spring of 1993 working cooperatively with Range Specialist, Dave Swanson, from the Soil Conservation Service. They evaluated the range studies done to date and prepared methodologies to accomplish field work necessary to evaluate the range condition and trend, prepare ecological site classifications, complete the vegetation mapping efforts and gather additional data to aid in estimating the carrying capacity of the study area. Field work completed during the 1993 field season included gathering additional cover data, productivity data, and average lichen height at all permanent plots; preparing the ecological site classification; collecting plants from various habitats within the study area; collecting reconnaissance utilization data within the Intensive Mapping Areas (IMA's); and ground truthing within the IMA's to aid in preparation of the preliminary stratification classification of the Landsat photo imagery purchased during the fall of 1993.

Twenty-six different ecological sites were established on Nushagak Peninsula. Dominant sites include sedge shrub wet meadow (33B), sedge wet meadow (52), lichen-sedge tundra (63A), and sedge-lichen tundra (63B).

The average lichen height at the three exclosure sites was 4.9 cm, 3.6 cm and 5.6 cm (Tuklung, Kikertalik and Banding respectively). The corresponding line transects had an average lichen height of 8.0 cm, 4.2 cm, and 4.2 cm respectively. At the additional line transects not associated with exclosure sites, the average lichen height was 6.3 cm, 4.4 cm and 5.4 cm (Sites 4, 5 and 6 respectively).

The nine productivity plots studied in 1993 represented three dominant ecological sites on the Nushagak Peninsula: dwarf shrub lichen uplands, lichen-sedge tundra, and lichen tundra uplands (Site 25B, 63A and 61 respectively). Out of these three dominant ecological sites represented, the lichen tundra uplands (Site 61) had the highest lichen biomass and the highest vascular plant annual production. Although there were two exclosures and three line transects representing Site 61, the highest production of both lichens and vascular plants was recorded for the line transect at Site 1 (lichen tundra uplands). The lichen biomass at Site 1 was 9,427.04 kg/ha and annual vascular plant production was 2,545.76 kg/ha. Several of the dwarf shrubs within the plots were producing berries at the time these data were collected. Berries were also calculated as annual production. Moss production was highest at Sites 4 and 5 (dwarf shrub/lichen uplands) with a biomass of 722.4 kg/ha and 456.96 kg/ha respectively. At Site 1, the lichen production and vascular plant production were both higher along the line transect than within the exclosure site. The variability was 2,535.68 kg/ha for lichens and 331.52 kg/ha for vascular plants. At Site 2 (lichen tundra uplands), the opposite was observed and both lichen and vascular plant production were higher within the exclosure sites. The variability was 1,370.88 kg/ha for lichens and 248.64 kg/ha for vascular plants. At Site 3 (lichen-sedge tundra), the lichen production was greater along the line transect than within the exclosure, yet the vascular plant production was greater within the exclosures. The variability was 287.84 kg/ha for lichens and 209.44 kg/ha for vascular plant production.

Reconnaissance data, collected at 82 locations on Nushagak Peninsula, concluded that only trace utilization was observed and only in very sensitive areas, such as lichen tundra uplands.

Climax lichen communities, used primarily for winter feed, were found to be the most sensitive to grazing caribou.

Trailing has been observed throughout the Peninsula, caused by daily and seasonal movements. Trails are most observable in the sedge wet meadows and sedge-lichen tundra. Even with the additional utilization caused by trailing, the level of utilization remains at trace levels.

Preliminary results indicate the Nushagak Peninsula range is in excellent ecological condition and shows very little range degradation occurring. Monitoring will be continued to assist in management of the Nushagak Peninsula Caribou Herd.

e. NUMBERS, COMPOSITION, RECRUITMENT, MOVEMENTS, AND SEASONAL DISTRIBUTION OF MOOSE ON AND ADJACENT TO THE REFUGE

Historically, moose have existed on the refuge in low densities. Low moose numbers have been attributed to the lack of escape cover during the winter when moose areas are easily accessible by hunters on snowmachines. Examination of winter habitat on the refuge revealed an abundance of willows (Salix spp.) showing little evidence of having been browsed by moose. The availability of browse during the winter months indicates that food resources are not a limiting factor to moose population survival or expansion. The refuge vegetation is ideal for supporting a moose population several times greater than what currently exists.

In 1989, 22 female and eight male moose (Alces alces) were captured and radio-collared in southwest Alaska. Twenty-four aerial surveys were flown from 1989 through February 1994 to determine distribution, seasonal movements, and immigration into the Togiak drainage. Reproductive information was also collected during the surveys.

In 1989, 64.3% of the radio-collared females were observed with calves; the twinning rate was 11%. In 1990 and 1991, 70.0% and 80.0% of the collared females produced calves; twinning rates were 64.3% and 66.7%, respectively. High twinning rates in 1990 and 1991 suggest that moose had sufficient food resources during those years. In 1989 no surveys were conducted during the calving season; this may have resulted in fewer observations of calves. Also, the more severe weather during the winter of 1988-1989 may have affected the twinning rate. Minimum recruitment rates were 50, 75, and 73 calves: 100 females for 1989, 1990, and 1991, respectively. Average annual mortality of radio-collared moose with known fates was 12.2%.

Moose ranged from the northern end of Amakuk Arm in the north to upper Wood River in the southeast to Kulukak River in the west. The majority of moose were concentrated in Sunshine Valley; Youth, Killian and Ice creek drainages and the Weary River drainage. Seasonal movements were subtle; there were no obvious, well-defined movements during calving or rutting.

Contrary to expectations, recent tracking flights do not show a pattern of moose immigrating to the Togiak drainage. However, recent increases in the number of moose observed in the Togiak and Kulukak drainages have been documented. This increase may be due to a population increase in the study area (possibly due to mild winters the past several years) resulting in younger animals dispersing out of the area. Movement by younger animals would not be documented by the tracking flights. Other possibilities include a southerly

movement from either the upper lakes in the Wood-Tikchik State Park or the Aniak River drainage.

The study was completed during 1993, and the final report will be completed in early 1994.

f. BROWN BEAR DENSITY, MOVEMENTS, AND POPULATION PARAMETERS IN THE SOUTHWESTERN END OF THE KUSKOKWIM MOUNTAINS AND ADJACENT RANGES, WESTERN ALASKA

An interagency crew conducted the first capture, tagging, and radio-collaring of brown bear (Ursus arctos) in the Kuskokwim Mountains in June 1993. Thirty-nine brown bears (13 males and 26 females) were captured by helicopter darting. Radio collars were deployed on 4 males and 22 females. Collars were shed by 2 males during the capture and by 2 males and 1 female later in the year, but all radios were retrieved. Two mortalities are known to have occurred during 1993. During 87 hours of survey flight time, 237 radio telemetry relocations were made during 22 flights. Results of this 6-year project may be used to set harvest levels and explore the potential for less intrusive methods for monitoring the status of brown bear populations in the future.

g. AROLIK RIVER RAINBOW TROUT SAMPLING

One sampling trip was conducted on the Arolik River this field season. This trip was from August 19-23 with 163 rainbow trout sampled. Seventeen of these fish were recaptures. For each trout sampled, the sex was determined if possible, length and weight were measured, and scales were collected from the preferred area.

Rainbow trout having a length of 200 mm or greater were marked with individually numbered Floy™ spaghetti tags. Scale ages from this trip ranged from a three-year-old fish to a ten-year-old fish. Following is a breakdown of the number of rainbow trout sampled from each scale age:

Table 3. Trout Sampled on the Arolik River in 1993

Age	Number of Fish
Unknown	31
3	1
4	12
5	27
6	49
7	24
8	13
9	5
10	1
Total	**163**

h. GECHIAK CREEK RAINBOW TROUT SAMPLING

One sampling trip was conducted on Gechiak Creek this field season. The trip was on May 20 with 9 rainbow trout sampled. There were no recaptures. For each trout sampled, the sex was determined if possible, length and weight measured, and scales were collected from the preferred area. Rainbow trout having a length of 200 mm or greater were marked with individually numbered Floy™ spaghetti tags. Scale ages from this trip ranged from a 5-year-old fish to a 9-year-old fish. Following is a breakdown of the number of rainbow trout sampled from each scale age.

Table 4. Trout Sampled on the Gechiak River in 1993

Age	Number of Fish
Unknown	4
5	1
6	2
7	1
9	1
Total	**9**

i. PUNGOKEPUK CREEK RAINBOW TROUT SAMPLING

Three sampling trips were conducted on Pungokepuk Creek this field season. The first trip was from May 17-23 with 51 rainbow trout sampled. Six of these fish were recaptures. The second trip was from 26-28 June with 45 rainbow trout sampled. There was one recapture on this trip. The third trip was from 13-15 July with 36 rainbow trout sampled. Three of these fish were recaptures. For each trout sampled, the sex was determined if possible, length and weight measured, and scales were collected from the preferred area. Rainbow trout having a length of 200 mm or greater were marked with individually numbered Floy™ spaghetti tags. Scale ages from this trip ranged from a 2-year-old fish to a 9-year-old fish. Following is a breakdown of the number of rainbow trout sampled from each scale age:

Table 5. Trout Sampled on Pungokepuk Creek in 1993

Age	Number of Fish
Unknown	21
2	1
3	1
4	16
5	29
6	31
7	25
8	7
9	1
Total	**132**

j. REFUGE SALMON SPORT AND ESCAPEMENT SAMPLING

Refuge river rangers stationed on the Togiak and Kanektok rivers collected sport and escapement age-sex-length (ASL) samples from chinook and coho salmon. The Togiak River rangers collected 73 sport caught coho salmon samples. The Kanektok River rangers collected 63 sport caught coho salmon samples, 106 sport caught chinook salmon samples, 256 chinook salmon escapement samples and 2 sport caught rainbow trout samples. The escapement ASL data will be used by the Alaska Department of Fish and Game. The age composition of the chinook escapement can be used to build brood year tables and to forecast future runs if all components are consistently collected. The sport caught samples are not needed for building brood year tables or forecasting run strengths and will not be collected in the following field seasons.



Photo 2. ARM Stovall and PR Rowland collecting chinook salmon escapement samples.

k. GENETIC STOCK IDENTIFICATION SAMPLING

Genetic Stock Identification (GSI) is an important technique used for the identification of fish populations. Resulting data is applicable for managing commercial fishing operations. The State of Alaska has been increasing their GSI work in recent years. This field season Togiak Refuge personnel assisted in the collection of samples for the statewide database.

BTF MacDonald has two and a half years experience working with and collecting GSI samples and played an important part in assisting ADFG with their collection of samples. From June 29 to July 11, BTF MacDonald and PR Doyle collected 100 juvenile chinook salmon GSI samples, 42 adult chinook salmon GSI samples and 15 adult chum salmon GSI samples on the Kanektok River. For the adult samples, sport harvested fish were dissected upon the fisherman's approval. Eye, heart, liver and muscle tissue samples were taken and immediately frozen in liquid nitrogen to prevent enzyme breakdown. Chinook salmon juveniles were collected using minnow traps and then placed whole into the liquid nitrogen.

While operating the Goodnews River weir for the Alaska Department of Fish and Game, BTF MacDonald collected 150 juvenile chinook salmon samples and 11 adult chinook salmon samples from July 22 to August 1. Minnow traps were used to collect chinook juveniles. For the adult samples, spawned-out chinook salmon were collected and sampled. Liquid nitrogen was used to store all samples.

l. ANGLER SURVEYS

Refuge river rangers conducted angler surveys on the Goodnews, Togiak and Kanektok rivers. The angler surveys consisted of interviewing as many anglers as possible on a daily basis during the chinook and coho salmon runs. Fishermen were asked how many hours they had fished so far in the day, how many fish were caught and how many fish were kept. From this information the catch per unit effort and harvest per unit effort were calculated. The results were reported to Dillingham during daily radio checks. The information was then turned over to the ADFG Sport Fish Biologist. This angler survey data was used to assess the level of sport fishing effort and success on each river and indicated movement of salmon into the river. By looking at the performance of the commercial and sport fishing effort, in river management can be undertaken when necessary. Other than aerial surveys and the weir on the Middle Fork of the Goodnews River, these angler surveys provide the only indicator of in river abundance.

On the Goodnews River, eight angler surveys were conducted during the chinook salmon run interviewing 45 anglers from June 28 to July 15. An average catch per unit effort (CPUE) of 0.98 or nearly one fish for each hour fished was documented. During the coho salmon run nine angler surveys were conducted interviewing 90 anglers from August 8-17 with an average CPUE of 0.86, meaning an angler would have to fish approximately 70 minutes per fish caught.

On the Togiak River, 22 angler surveys were conducted during the chinook salmon run interviewing 182 anglers from June 29 to July 22. An average CPUE of 0.70 or one fish per 86 minutes was documented. During the coho salmon run 17 angler surveys were conducted interviewing 154 anglers from August 9 to September 10 with an average CPUE of 1.37 or one fish per 44 minutes.

On the Kanektok River, 14 angler surveys were conducted during the chinook salmon run interviewing 380 anglers from June 21 to July 6. An average CPUE of 0.75 was documented which is about one fish every 80 minutes. During the coho salmon run 11 angler surveys were conducted interviewing 243 anglers from August 8-20 with an average CPUE of 2.18 or one fish every 28 minutes.

m. GOODNEWS RIVER WEIR

The Alaska Department of Fish and Game operates a salmon counting weir approximately three miles upriver on the Middle Fork of the Goodnews River. This weir was in operation from June 22 to August 18. The counts are used to regulate in season fishing times by allowing adequate salmon stocks to return upriver to spawn. The Togiak Refuge provided two weeks of staff time to the weir project to encourage ADFG to continue operation through August to monitor the coho salmon run. BTF Rob MacDonald and a King Salmon Fisheries Resources Office biological technician operated the weir from July 15 to August 1. High water washed out the rigid weir which didn't allow coho run monitoring. While operating the weir BTF MacDonald performed various age-sex-length sampling: 210 commercially

caught sockeye salmon on the tender Cape Beluga, 210 escapement chum salmon at the weir, 150 juvenile chinook salmon for Genetic Stock Identification (GSI) work, and 11 adult live, spawned-out chinook salmon for GSI work.



Photo 3. BTF MacDonald sampling chum salmon on the Goodnews Weir.

n. KUSKOKWIM BAY COMMERCIAL FISHERIES CATCH MONITOR

The Alaska Department of Fish and Game office in Bethel conducts monitoring projects on the Kanektok and Goodnews rivers. A State technician was stationed in Quinhagak from June 12 to August 15. This technician was responsible for monitoring commercial and subsistence catches, collecting age, sex, and length samples; dissemination of fisheries information to the public; assisting Fish and Wildlife Protection with enforcing regulations; and compiling historical data on the fishery. Similar duties were performed by personnel stationed at the Goodnews River weir.

o. RAINBOW TROUT SCALE READING

BTF MacDonald and PR Doyle participated in the Alaska Department of Fish and Game's study Precision of Ages Estimated from Scales for Rainbow Trout in Bristol Bay, Alaska. The study was conducted due to concern over the quality of the age information available for rainbow trout. Training on aging rainbow trout scales was undertaken as well as actual aging of a standard set of scales. In this study the precision of aging the scales in three replicates among six readers was estimated. The mean modal ages varied significantly among readers but the variation was not related to experience. A procedure for reading rainbow trout scales was proposed that attempts to minimize both between and within reader aging error.

E. ADMINISTRATION

1. Personnel

The following table identifies permanent staff members. With an increase in staff, projects, and issues, the manager's position was reclassified as a GS-13. Personnel changes included AT Boykin's resignation on May 1 to care for her newborn, AT Andrew came on duty June 1 after volunteering a week prior to attend the administrative workshop, and Togiak resident Pete Abraham entered on duty as a Refuge Information Technician on August 26. We gladly welcomed both new staff members.

Table 6. Permanent employees at Togiak National Wildlife Refuge

NAME	TITLE	GRADE	EOD
Aaron M. Archibeque	Refuge Manager	GS-13	06/29/90
Donna Stovall	Assistant Refuge Manager	GS-11	03/23/92
Heather Johnson	Refuge Operations Specialist	GS-09	05/05/92
Michael T. Hinkes	Wildlife Biologist/Pilot	GS-12	01/22/90
Mark J. Lisac	Fisheries Biologist	GS-09	02/14/85
Robert MacDonald	Biological Technician - Fisheries	GS-06	04/19/92
Jonathan A. Dyasuk*	Interpreter	GS-09	09/02/87
Lauri A. Jemison*	Biological Technician - Wildlife	GS-07	05/06/90
Rebecca Boykin*	Administrative Tech.	GS-05	12/15/91
Lee Ann Andrew*	Administrative Tech.	GS-05	06/01/93
Pete Abraham*	Refuge Information Tech. - Togiak	GS-06	08/26/93
Charlie Evans*	Refuge Information Tech. - Quinhagak	GS-06	02/22/88
Cathy Cleveland*	Refuge Information Tech. - Quinhagak	GS-06	02/11/88

*Local hire employees

Table 7. Seasonal employees at Togiak National Wildlife Refuge.

NAME	TITLE	GRADE	EOD
Robert Doyle	Park Ranger	GS-05	05/19/91
Jennifer Culbertson*	Park Ranger	GS-05	06/02/91
William S. Harper*	Park Ranger	GS-05	06/02/91
Joan Mitchell*	Park Ranger	GS-05	06/01/93
Jacquline Erion	Park Ranger	GS-05	06/01/93
Mark Rowland*	Park Ranger	GS-05	07/11/93
Cameron Stormes	Park Ranger	GS-05	06/18/93
Joe Alexie*	Park Ranger	GS-05	06/13/93
John Moran	Biological Technician - Wildlife	GS-05	05/02/93
Carol Wilson	Biological Technician - Wildlife	GS-05	05/26/92
Lisa Haggblom	Biological Technician - Wildlife	GS-06	05/06/89
Andrew Brown	Biological Technician - Wildlife	GS-05	05/24/93
Beverly E. Short	Biological Technician - Wildlife	GS-05	07/08/91

*Local hire employees

2. Youth Programs

The Youth Conservation Corps program was not funded during 1993. The refuge did participate in an On the Job Training (OJT) program through Dillingham High School. Under this program, the school district pays the student's salary, and the student works during school hours. Broady Johnson was this year's OJT student. Broady assisted with environmental education projects and proved to be a tremendous asset by preparing a display case, making classroom presentation materials and creating a caribou capture/collaring display. OJT gives students an opportunity to learn about the Fish and Wildlife Service, gain work experience, and find out about various job opportunities. We stress creativity and independence in each job task to increase the students' confidence and self esteem.

3. Other Physical Labor Programs

Nothing to report.

4. Volunteer Program

Togiak Refuge received assistance from several volunteers in 1993 for a total of 682 hours. The following table identifies the individuals that participated in this year's volunteer program.

Table 8. Volunteers at Togiak National Wildlife Refuge

NAME	FROM	SERVICE DATES
Trish Brady	Dillingham, AK	April 15 - 17
Phil Caswell	Roxbury, NY	April 20 - May 19
Lee Andrew	Dillingham, AK	May 17-31
Valerie Chabot	Anchorage, AK	September 20-21
Andy deValpine	Dillingham, AK	April 15-30
Don Graber	Dillingham, AK	October 1, 1992 - September 30, 1993
Bob King	Dillingham, AK	April 15-17
Joan Mitchell	Dillingham, AK	November 10, 1992 - January 7, 1993

5. Funding

Table 9. Funding history For Togiak National Wildlife Refuge

FY	1261	1262	1331	1971	1120/1210	TOTAL
1986	322,000	-	60,000	-	-	382,000
1987	501,000	-	60,000	-	1,500	562,000
1988	675,000	-	60,000	-	-	735,000
1989	377,000	225,000	60,000	-	-	662,000
1990	434,000	255,000	79,000	-	-	768,000
1991	609,000	330,000	59,000	3,000	5,000	1,006,000
1992	541,000	347,000	80,000			968,000
1993	738,000	411,000	80,000			1,229,000

6. Safety

Monthly safety meetings were conducted and reports sent to the Regional Safety Officer. The topics varied, and the staff benefited from each topic presented. Other safety issues were shared at weekly staff meetings.

BTF MacDonald and ROS Johnson attended Arctic Survival on January 18-22 at Fort Eielson AFB near Fairbanks. Temperatures hit the -50 degree mark and set new cold temperature records for course sessions. ARM Stovall attended the same course February 22-16 but experienced vacation weather of blue skies and 10-30 degrees. All three attendees were voted by group participants to be "Polar Bear" award recipients. So far, all Togiak Refuge employees who attended the training have received the award.

BTF MacDonald and PR Rob Doyle attended the Region 7 Basic Watercraft Operator Instructor Certification Course. The training was held in Homer October 26-29. Kevin Bell, the Ship Operator and First Mate of the USFWS M/V Tiglax taught the course. The refuge now has three

instructors certified to train refuge staff for Watercraft Safety as FB Lisac was previously certified in 1992.

Training packets were completed for summer Park Rangers. A two-week training session was scheduled this year, with a 36-hour Wilderness 1st Aid/CPR Course incorporated. Other topics covered were watercraft safety, bear and firearm safety, aircraft safety, ranger ethics, cross-cultural training, and radio operations. This year medical equipment was purchased to assemble extensive first responder kits. A kit was placed at each permanent or semi-permanent camp established.



Photo 4. Staff participation in Wilderness First Aid - an excellent course! (Left to Right: Lisac, Brown, Stovall, Jemison, Moran, Johnson, Archibeque, and Carlson in the center)

Over the course of the summer, two watercraft incidents occurred involving river rangers. On the Goodnews River PR Mitchell hit a rock in the river, causing both rangers to be thrown from the boat. The water was shallow enough that they were able to get out of the water quickly with no further incident. PR Mitchell did not have the emergency kill-switch strapped on (as instructed), but luckily, the boat turned into a gravel bar and was retrieved idling on the bank. Only minor

scrapes and bruises were sustained during the accident. The second incident occurred when PR Doyle (third season on the Kanektok River) glanced an Alaska West sport fishing boat coming from the opposite direction. This occurred in one of many sharp bends in the river. Again, luckily no one was hurt and only minor boat damage was sustained. Even with experienced boat operators accidents can happen; these rivers are not easy to navigate. This is one of many reasons we must stress the importance of boating skills when hiring seasonal rangers.

During the Hagemeister Island reindeer removal detail, safety was stressed constantly. Even though the project was very hazardous in nature (both environmental and physical), no major accidents occurred. There were several bruised and cut hands, noses, legs, faces, etc. after running hundreds of reindeer through shoots and loading them in planes. WB Gene Peltola (Seliwik National Wildlife Refuge) was taken to Togiak to treat a hand wound which had gotten infected. After treatment, he was given a "purple heart" and sent home.

While attempting to take off on a sharp bend in Togiak River, a local air taxi (Freshwater Adventures) ended up in the trees on August 13. Rangers Harper and Stormes were at the scene and provided immediate first aid. There were five passengers and one pilot aboard the plane. The only injury sustained was a cut across one of the passenger's forehead which required stitches. There were no other injuries. Substantial damage was done to the nose, propellers, wings, and left float located below the wing. The refuge later received a letter of appreciation complementing the rangers on the scene. (The Wilderness First Aid course paid off - especially when help is hours away!)

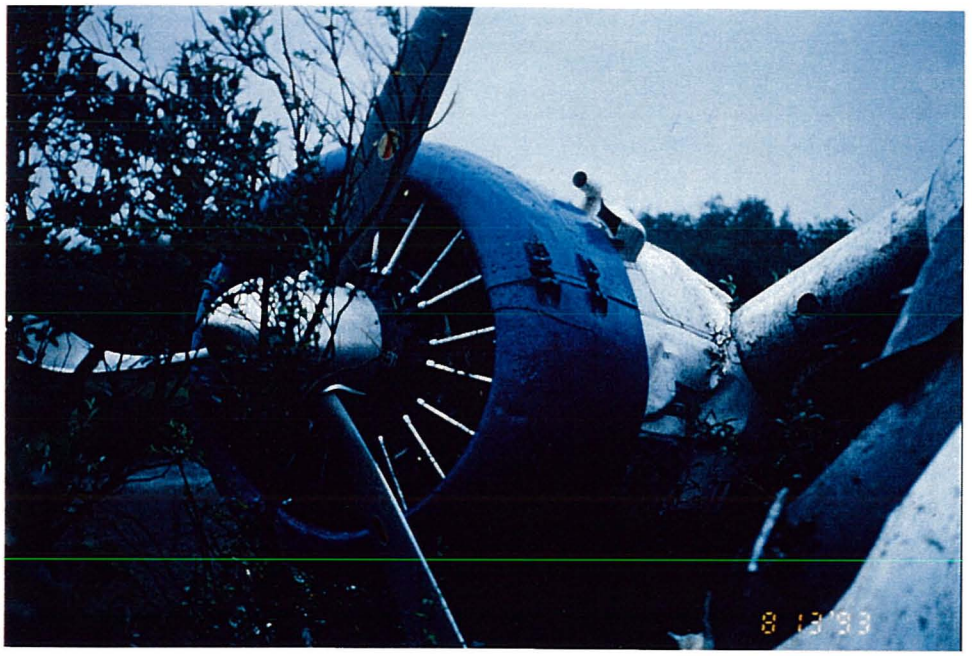


Photo 5. Results when props and trees meet.

7. Technical Assistance

Nothing to report.

8. Other

a. Special Use Permits

As identified by Service policy, all commercial operators authorized to conduct activities on refuge lands and waters do so via Special Use Permits. In 1993, there were 36 Special Use Permit operators. Several of which had multiple permits depending on services provided. Of those, there were 23 sport fishing guides, three big game guides, eight air taxi operators, and two commercial set netters.

Table 10. Commercial operators authorized by Special Use Permit

No.	Permit Type	Permittee	Business
T-64	Sport fishing	Rod Arno	Alaskan Sojourns
T-15	Sport fishing	Chuck Ash	Hugh Glass Backpacking
T-23	Sport fishing	Bus Bergman	B&B Fishing Adventures
T-65	Sport fishing	Burt Bomhoff	Alaskan Adventures
T-06	Sport fishing	James Broady	Aleknagik Mission Lodge
T-21	Sport fishing	Mike Cusak	King Salmon Lodge
T-22	Sport fishing	Dave Duncan	Dave Duncan and Sons
T-66	Sport fishing	Terry Eberle	Sport Lodges, Ltd.
T-08	Sport fishing	Mike Edwards	Riverbound Float Trips
T-24	Sport fishing	John Garry	Alaska West
T-25	Sport fishing	George Heim	Alaska River and Ski Tours
T-20	Sport fishing	Bud Hodson	Tikchik Narrows Lodge
T-01	Sport fishing	Ron Hyde	Alaska River Safaris
T-10	Sport fishing	Barry Johnson	Alaska Fishing Adventures
T-19	Sport fishing	Fuminori Kindaichi	Golden Horn Lodge
T-08	Sport fishing	Rene Limeres	Kobuck River Guides II
T-18	Sport fishing	Bill Martin	Fish Alaska
T-17	Sport fishing	Ron McMillan	Bristol Bay Lodge
T-62	Sport fishing	Charles Miknick	Alaska Adventures
T-63	Sport fishing	Robert Nanalook	Togiak Fishing Adventures
T-16	Sport fishing	John Ortman	Wood River Lodge
T-09	Sport fishing	Lou Rosgen	Frontier River Adventures
T-07	Sport fishing	Mike Trotter	Beyond Boundaries
T-05	Big Game	John Peterson	
T-04	Big Game	Chris Goll	Rainbow River Lodge
T-02	Big Game	N.E. Hautanen	
T-30	Air Taxi		Yukon Aviation
T-37	Air Taxi		AK Seaplane Operation
T-32	Air Taxi		Starflite
T-34	Air Taxi		Yute Air Alaska
T-28	Air Taxi		AK Air Adventures
T-35	Air Taxi		Peninsula Air
T-51	Air Taxi		Branch River Air Service
T-58	Air Taxi		Fresh Water Adventures
T-45	Set Net Site	Theodore Bavilla	
T-53	Set Net Site	Tom Schlagel	



Photo 6. Sport fishing guide camp on Kanektok River which is virtually hidden.

In response to the Prospectus and Request for Proposals (October 15, 1992), 22 written proposals to conduct commercial guided sport fishing services within the Togiak Refuge were received and evaluated for three offerings. Proposal evaluators consisted of two Togiak staff members, ARM Stovall and FB Lisac and ARM Munoz from Kodiak National Wildlife Refuge. Permits were awarded as follows:

* Guided Motorboat-based Sport Fishing - Upper Kanektok River (June 1, 1994 through December 31, 1998). In alphabetical order:

  Dave Duncan, dba Dave Duncan and Sons, LTD.
  Bill Martin, dba Bill Martin's Fish Alaska, Inc.

* Guided Float Boat Sport Fishing - Upper Kanektok River (June 1, 1994 through December 31, 1998). In alphabetical order:

  Paul Allred, dba Ouzel Expeditions, Inc.
  Bus Bergman III, dba B&B Fishing Adventures, Inc.
  Michael Cusack, dba Mike Cusack's King Salmon Lodge
  Dave Duncan, Dba Dave Duncan and Sons, LTD.
  John Harkey, dba Alaska Rafting and Outfitting
  Rene Limeres, dba Ultimate Rivers
  John Ortman, dba Wood River Lodge
  Daniel Rawding, dba Silver Highlander
  Michael Trotter, dba Beyond Boundaries Expeditions

* Guided Fly-in Sport Fishing - Wilderness Lakes (June 1, 1993 through December 31, 1995). In alphabetical order:

  Michael Cusack, dba Mike Cusack's King Salmon Lodge
  Fuminori Kindaichi, dba Golden Horn Lodge, Inc.
  John Ortman, dba Wood River Lodge

b. River Ranger Program

The river ranger program was conceived during the public use management planning process and was first implemented in 1991. The program serves many purposes. River rangers are the main contact source for sport fishermen and local residents. Knowledge obtained or distributed through these contacts is essential if resources are to be properly managed. Information distributed to the public includes Service policies, regulations, resource management practices, State sport fish regulations, bear safety, wilderness ethics, low impact camping, and information about private Native lands to prevent trespass. Information rangers document includes the level of sport fishing and subsistence use occurring on the river along with the location and timing of activities, conflicts between recreational and subsistence users, conflicts between different recreational users, sport fish catch/harvest per unit effort, neotropical bird sightings and other wildlife sightings. In addition, they contact all float parties, patrol campsites for litter, dispose of abandoned set nets, monitor compliance of commercial sport fishing operators, collect water samples, and offer assistance as needed.



Photo 7. Rangers pull out an abandoned net to prevent additional fish and birds being caught.

River rangers collect information which is instrumental in developing fishery management strategies. Angler surveys conducted by river rangers during the king and coho sport

fisheries provide an instantaneous look at angler success/harvest and strength of the salmon run. This information is shared with State fishery managers. There has been an increasing need for any piece of data concerning the status for coho runs. In the past, coho salmon sport fishery bag reductions have been implemented by emergency order. Rangers also collect scale samples from spawned king salmon to be aged in the Dillingham office to be entered into a data base identifying long-term trends.

Prior to going into the field, all rangers were provided instruction regarding the Public Use Management Plan, ranger ethics, duties and conduct, emergency procedures, watercraft safety, aircraft safety, and bear and firearm safety. By mid June, they were ready to set up camp at designated sites. Rangers worked in teams of two, lived in remote field camps and alternated camps between the Kanektok, Goodnews, and Togiak rivers. Their means of transportation was via boat (16-18' skiff) with 40 hp outboard motor. Camp consisted of a weatherport for a cook tent/office and personal tents for sleeping quarters. On a regular basis, fresh food and supplies were flown in from Dillingham.

This was the third season for three rangers, Jennifer Culbertson, Stephens Harper, and Robert Doyle. New hires consisted of Joan Mitchell, Jacquline Erion, Mark Rowland, and Joe Alexie. Joe Alexie was a local hire from Quinhagak and unfortunately resigned after spending a week in the field camp. He was replaced by Mark Rowland.

By the end of the season, mid September, rangers know every river bend and gravel bar and become as one with their outboard motor and skiff. After camp is broken down, gear is cleaned and put away, and information obtained throughout the summer is documented in a River Ranger Summary Report. Visitor use is calculated and graphed.



Photo 8. PR Doyle performs daily maintenance to keep the motor running smoothly.

Rangers have the opportunity to meet and get acquainted with many different types of individuals on the river. They contact sport fishermen from all over the United States and around the world. Native villages located at the outlet of each of the rivers consist of mostly Yup'ik Eskimos who provide a unique source of historical and cultural information. Reports received from the public, sport fishing guides, and local residents regarding river ranger personnel and the overall program are very positive.

F. HABITAT MANAGEMENT

1. General

The refuge includes a variety of land forms, including mountains, U-shaped valleys with sheer walls, beaches, sea cliffs, glacial lakes, and moraines. Most of the Refuge's interior is dissected mountainous uplands, stretching from the Ahklun Mountains in the west to the Wood River Mountains in the east. The Wood River Mountains rise in elevation from 1,000 feet in places around Kulukak Bay to more than 5,000 feet in the northeastern corner of the refuge. In the northeastern Ahklun Mountains, elevations rise above 4,000 feet, but summits in the southwest are more widely separated and taper down to lower, smoother hills.

The refuge coastline includes precipitous cliffs, sand and gravel bars, lagoons, beaches, estuaries, and littoral and pelagic waters. The most notable lowland areas are adjacent to Jacksmith, Chagvan, Osviak, and Nanvak bays, as well as the Nushagak Peninsula. These lowlands rise from sea level to a maximum of 560 feet near the mountains. Plateaus and benches found on these lowlands contain many small lakes and sloughs. Local relief of the lowlands varies from 50 to 360 feet.



Photo 9. Togiak's rugged coastline along Cape Newenham.

Drainages tend to flow to the southwest, parallel to the grain of the mountains. The wide Togiak River Valley below Togiak Lake marks an otherwise indistinguishable separation of the Ahklun and Wood River mountains. Many of the broad U-shaped glacial valleys interspersed throughout the mountains contain large, deep glacial lakes and snow-melt streams.

Vegetation on the refuge includes plants common to both arctic and subarctic regions. Tundra, which occurs on nearly all of the refuge, is classified into three general types:

Moist tundra is found on approximately 50% of the refuge and usually forms a complete ground cover. This is the most productive of the tundra habitats. It consists of cotton grass, sedges, mosses, grass tussocks, and shrubs, which include willow, Labrador tea, mountain cranberry, and bog blueberry.

Alpine tundra is the second most common type and is found on the higher mountains and ridges. It consists of low-growing mats of lichens and of herbaceous and shrubby plants, interspersed with patches of barren shelf or broken rock. Plant species found here will primarily include crowberry, dwarf willow, Labrador tea, mountain cranberry, bearberry and blueberry.

Wet tundra, which comprises only about 2% of the area, is the least common type of tundra on the refuge. It is mostly found in low coastal zones, in drainages with shallow lakes, and in extensive marsh areas with standing water. The vegetation is made up of a mat of lichens, mosses, and sedges and may include a few woody species, such as bog cranberry and bog rosemary. On the drier portions of this type of tundra, dwarf birch and dwarf willow may occur.



Photo 10. Ranger Harper and Volunteer Caswell adding to the herbarium collection.

2. Wetlands

Most of the coastal areas, and to some extent the low lying interior valleys, are pristine wetlands. Coastal wetlands include brackish and fresh water lakes, ponds, and marshes with both stabilized and active dunes. Large inland areas of wide, shallow valleys are studded with shallow lakes, ponds, marshes, and wet meadows, interspersed with dry uplands on buttes, hills, and plateaus.

To determine water quality, samples were collected from specific locations within Togiak, Goodnews, and Kanektok rivers (including lake outlets/inlets, wilderness boundaries, and river outlets). Samples had to be analyzed in Anchorage within 24 hours of collection. This will help to determine public use impacts and water quality trends on major rivers.



Photo 11. WBP Hinkes collects water samples for analysis.

3. Forests

Nothing to report.

4. Croplands

Nothing to report.

5. Grasslands

Nothing to report.

6. Other Habitats

Willow and alder thickets occur along creek drainages up to elevations of 1,900 feet msl (mean sea level). Scattered stands of cottonwood, and a few well scattered white spruce trees are found along the Togiak River drainage. Cottonwood, willow, birch, and alder thickets occur along the Goodnews and Kanektok river drainages.

The eastern portion of the refuge, between the Togiak River drainage and Dillingham, has several relatively large stands of white spruce and birch. These stands are islands of trees representing areas free of permafrost, surrounded by moist or wet tundra plains.

7. Grazing

Nothing to report.

8. Haying

Nothing to report.

9. Fire Management

The refuge is divided into two fire management districts: the Yukon/Togiak Planning Area and the Kuskokwim/Iliamna Planning Area. With cool rainy summers, wildfire occurrence is normally not a problem.

10. Pest Control

Nothing to report.

11. Water Rights

Nothing to report.

12. Wilderness and Special Areas

The Togiak Wilderness (approximately 2.3 million acres) covers about half of the refuge and is included as one of the refuge's "special values" in the Comprehensive Conservation Plan. The wilderness area includes pristine rivers, clear mountain lakes, and steep sloped mountains. It provides outstanding opportunities for solitude and primitive recreation. The rugged Ahklun and Wood River mountains, partly within the wilderness area, are noteworthy for their scenic values.

The wilderness area provides opportunities for local residents to engage in traditional subsistence activities such as hunting, fishing, berry picking, wood gathering, and trapping. The unique clear water rivers with diverse and abundant fisheries result in ever increasing demands for recreational sport fishing opportunities.

Wilderness additions proposed in the preferred alternative of the refuge Comprehensive Conservation Plan would add approximately 357,000 acres to the already existing wilderness acreage. The proposed area includes the old Cape Newenham Refuge area and lands surrounding the headwaters of the south fork of the Goodnews River. This proposal would bring the remainder of the Goodnews River drainages, found within the refuge boundary, under the extra management protection afforded through wilderness designation. It would also provide the same protection to the watershed areas of Cape Newenham and Cape Peirce. This could become extremely important in the future in protecting the segment of the ecosystem which helps to support walrus, sea lions, and seal haulout areas, as well as the extensive seabird nesting colonies found at both Cape Newenham and Cape Peirce. The natural diversity protected by wilderness designation will serve as an invaluable source of data for scientific investigations for future fish and wildlife needs.



Photo 12. We consider the entire refuge to be a "special area".

13. WPA Easement Monitoring

Nothing to report.

G. WILDLIFE

1. Wildlife Diversity

Togiak Refuge is a crossroads for waterfowl and shorebirds coming from wintering areas as far away as Russia, Japan, Mexico, South America, New Zealand, and several of the South Pacific

Islands. Bristol Bay, which forms a portion of the southern boundary of the refuge, has been described as the southern terminus of the Arctic Bird Migration Route. Birds from the Asiatic Route, Mid-Pacific Route, and North American Pacific Flyway funnel through the area.

The diversity of habitats within Togiak Refuge, from coastal cliffs to alpine tundra, attracts a wide variety of wildlife. Two hundred and fifty species of resident and migratory wildlife are believed to occur on or adjacent to the refuge: 33 fish; 169 bird; 31 terrestrial mammal, and 17 marine mammal species. A list of all wildlife species inhabiting the area can be found in the refuge Comprehensive Conservation Plan.

2. Endangered and/or Threatened Species (Also See Section D.5)

Threatened or endangered species present within the refuge include the American Peregrine Falcon, the gray whale, and the Steller sea lion. Gray whales can be seen from April through July along the northern Bristol Bay coastline as they migrate from wintering grounds to the Bering and Beaufort seas. Up to 100 whales per day can be seen in the Togiak Bay area in May, and smaller numbers are seen in the Cape Peirce/Cape Newenham area. Cows with calves, as well as single adults, are regularly seen.

Steller sea lion populations have been declining rapidly. The cause of this decline is unknown, but State and Federal agencies are researching possible causes. Refuge staff began working cooperatively with National Marine Fisheries and Alaska Department of Fish and Game in 1990 to collect sea lion population counts along the coastal regions of the refuge.

A few pairs of Peregrine Falcons nest along the Cape Peirce and Cape Newenham peninsula.

Other endangered species that historically occur in this area include the Aleutian shield-fern, Aleutian Canada Goose, Eskimo Curlew, Short-tailed Albatross, and several whale species (blue, bowhead, finback, humpback, right, sei, and sperm).

3. Waterfowl (Also See Section D.5)

Because of its location along the coast in southwestern Alaska, Togiak Refuge is host to a wide variety of migrant and resident waterfowl. Lakes, rivers, tundra ponds, and coastal wetlands offer nourishment and resting areas for staging, breeding, and molting waterfowl. The refuge serves as the apex of a funnel for waterfowl on the Pacific Flyway corridor, heading to or from nesting grounds of the Arctic coast and the Yukon-Kuskokwim River Delta. As many as a quarter-million waterfowl have been counted in bays, lagoons, and lakes along the coast of Togiak Refuge, one of the last stopping areas for waterfowl awaiting spring breakup in the Arctic.

Large eel grass beds in the saltwater lagoons of Osviak Slough, Nanvak Bay, Jacksmith Bay, and Chagvan Bay are important staging and feeding areas. Nanvak and Chagvan bays are the two most important spring and fall staging areas on the refuge; the latter contains an estimated five square miles of eel grass beds. Other areas of importance to waterfowl include the Nushagak Peninsula, Kulukak Bay, and Carter Bay.

During spring breakup, early migrants began to appear. Sandhill Cranes, Northern Pintails, and Tundra Swans are usually the first to arrive. Open water is usually scarce at this time causing

early arriving waterfowl to congregate on available water bodies consisting of overflows on lakes and coastline tidal pools.

Subsistence uses of waterfowl, including Arctic nesting geese, are important to residents in most rural villages and camps where people have long relied upon them.

a. Swans and geese

All four species of arctic-nesting geese (Pacific Black Brant, Emperor Geese, Canada Geese, and Greater White-fronted Geese) use the refuge as a primary spring and fall staging area.

Pacific Black Brant are the most prevalent species in Nanvak and Chagvan bays. Numbers usually peak at 50,000 in April and/or May. Movements and concentrations of Brant within the bays vary with tides. During high tide, flocks tend to congregate in the marsh and then disperse into the bays to feed in the eelgrass beds as the tide recedes.

More prevalent during the fall migration, Emperor Geese and Canada Geese are often observed in mixed flocks on mud flats, eelgrass, and marsh areas. They are also commonly observed feeding in berry patches in the tundra surrounding the sloughs. Peak numbers of each species normally range around 2,000. Canada Geese often show a preference for an overland migration route when exiting the bays. Greater White-fronted Geese are the least numerous of the four species with peak numbers around a few hundred.

Tundra Swans are common breeders in southwest Alaska and nests can be found scattered throughout the refuge.

b. Ducks

Mallards can be seen in small numbers regularly through May in Nanvak and Chagvan bays. Northern Pintails are commonly seen through spring and early summer; numbers are greatest during fall migration. Green-winged Teals are common local breeders. In late April and May, small numbers of American and Northern Shovelers are seen. Greater Scaup are observed regularly in small numbers throughout the spring. Oldsquaws are seen regularly from late April through the beginning of June, then infrequently until late August, when they are seen regularly again. Harlequin Ducks are common in water at the base of the cliffs throughout the season. Steller's Eiders are common during spring and fall migration. Common Eiders are seen regularly through the beginning of August. King Eiders are common throughout the season. Black Scoters are more common than White-winged Scoters in spring and summer; White-winged Scoters are more frequent in the fall. Surf Scoters are infrequently seen in July and August. Red-breasted Mergansers breed locally and broods are commonly seen on rivers.

Other waterfowl normally observed at some time during the spring migration include American Wigeon, Barrow's Goldeneye, Common Goldeneye, Spectacled Eider, Gadwall, Common Merganser, Bufflehead, and Eurasian Wigeon.

4. Marsh and Water Birds

Sandhill Cranes are usually the harbingers of spring. Consequently, their arrival is closely watched for. During the spring and fall, Sandhill Cranes are frequently found in groups of 10-30,

in moist tundra habitat, tidal sloughs of the coastline, and along coastal water bodies. During the period of May through July, these birds disperse to establish their breeding territories.

Other species in the marsh and waterbird category that utilize the refuge as a migration stop over, feeding area, or breeding ground include Pacific Loons, Common Loons, Red-throated Loons, and Red-necked Grebes. The Red-throated Loon is predominately found using the refuge coastal and tidal area. The other species are usually found on freshwater lakes and wet tundra on the refuge.

5. Shorebirds, Gulls, Terns, and Allied Species (Also See Section D.5)

a. Shorebirds

Of the 22 species of shorebirds known to pass through the refuge, the following have been observed during the nesting season, either with broods or exhibiting nesting behavior: Black-bellied Plover, Lesser Golden Plover, Semipalmated Plover, Bar-tailed Godwit, Whimbrel, Black Turnstone, Ruddy Turnstone, Greater Yellowlegs, Red-necked Phalarope, Common Snipe, Short-billed Dowitcher, Western Sandpiper, Pectoral Sandpiper, and Dunlin. In addition, groups of Bristle-thighed Curlews have been observed feeding in tidal mud flats along the refuge coastline. Many shorebird species using the refuge are migrants, stopping in to feed and rest for short periods before continuing their migration. Some of these species come from wintering grounds in New Zealand, Japan, and the South Pacific Islands. Most shorebirds begin arriving upon spring break up (mid-to-late April) and head south again by mid-September.

b. Jaegers, Gulls, Terns and Allied Species

Glaucous Gulls are common in Chagvan Bay in the spring and less common in Nanvak Bay. Glaucous-winged Gulls are common breeders, particularly on Shaiak Island and Bird Rock. Mew Gulls are common, possibly breeding in the area. Herring Gulls are common spring migrants, particularly in Chagvan Bay, and can be seen in July and August near Nanvak Bay. Bonaparte's Gulls are common fall migrants, and Black-legged Kittiwakes are common breeders.

Arctic Terns range widely over the refuge, nesting along coastal zones and gravel bars, as well as on islands in freshwater lakes and rivers. They nest singly or in colonies.

Parasitic, Pomarine, and Longtail Jaegars can also be found migrating along the coast, rarely coming ashore except to nest; the exception being the Pomarine Jaegar which is not known to nest on the refuge at all. Nesting occurs in low, wet tundra or tidal flats and beaches. Jaegars are predatory birds and sometimes appear to be parasitic on gulls and terns, by chasing them until they drop or disgorge food items.

c. Alcids and Cormorants

The steep sea cliffs along the coast, between Togiak Bay and Chagvan Bay, provide valuable nesting habitat for numerous seabird colonies; one of the most outstanding wildlife features on the refuge. The population of mainland nesting seabird species (Black-legged Kittiwake, Common Murre, Glaucous-winged Gull, and Pelagic Cormorant) using these cliffs is approximately 650,000. Black-legged Kittiwakes (numbering over 100,000) and Common Murres (over 500,000) are predominate.

Staff at Togiak Refuge has monitored populations and reproductive performances of kittiwakes, murres, and cormorants from shore-based plots at Cape Peirce annually since 1984 and at Cape Newenham since 1990. Boat-based population monitoring of kittiwakes and murres began in 1990 and also included Shaiak Island and Bird Rock. Together, these four colonies seasonally support more than a million seabirds and together comprise one of the largest mainland seabird colonies in the Bering Sea.

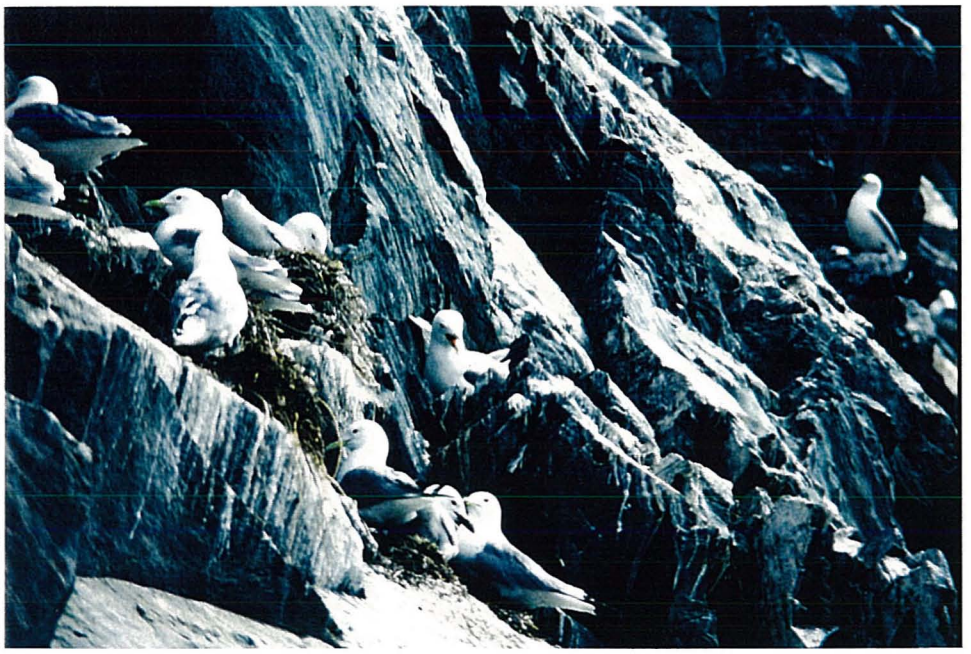


Photo 13. Black-legged Kittiwakes are common cliff nesters.

Black-legged Kittiwakes, Common Murres, and Pelagic Cormorants are long-lived species that serve as indicators of fluctuations in the marine environment. Kittiwakes feed on prey near the ocean surface, while murres and cormorants dive for prey. If adequate prey is not available either before of during the breeding season, reproductive performance can be low. Climatological factors and disturbances can also affect reproductive performance. Monitoring the Bering Sea ecosystem has been identified as a high priority task within the Service.

Other seabirds known to commonly nest on these cliffs are Double-crested and Red-faced Cormorants, Pigeon Guillemots, Parakeet Auklets, Horned Puffins, and Tufted Puffins. Horned and Tufted Puffins are both eloquent and awkward residents of the cliffs, and nest in rock cavities and grassy burrows. Puffins roost in the uppermost regions of the cliffs leaving the lower portions to the other seabirds.

6. Raptors and Owls

Raptors are predators at the top of complex food chains and are sensitive indicators of the health of the environment. Therefore, they are an important species to monitor. At least 13 raptor species have been identified on the refuge including the threatened American Peregrine Falcon. The Bald Eagle and the Northern Harrier are the most visible raptors on the refuge.

Nine raptor species that nest within the refuge are: Bald Eagle; Golden Eagle; Peregrine Falcon; Gyrfalcon; Northern Harrier; Rough-legged Hawk; Osprey; Great Horned Owl; and Short-eared Owl. Other raptors such as the Merlin, Hawk Owl, Boreal Owl and Snowy Owl are regular visitors, but no nesting activity has been observed within the refuge.

The first effort at locating and mapping bald eagle nest sites for annual production surveys took place during the winter of 1983-84. This effort was continued during the winters of 1984 through 1988. Follow-up nesting and production surveys were partially completed during the 1984, 1985, and 1986 field seasons. Only a partial was completed in 1989. There were no raptor surveys conducted since 1989, although incidental observations have been made in association with other field work.



Photo 14. Though common, Bald Eagle sightings are always enjoyed.

At Cape Peirce and Cape Newenham, Rough-legged Hawks and Bald Eagles are common local breeders. Northern Harriers are seen regularly in early spring and late summer/early fall, primarily in the Nanvak Bay area. Short-eared Owls are seen regularly, particularly in the spring and fall around Nanvak Bay.

7. Other Migratory Birds

Passerine or landbirds are an important component of the avian diversity in Alaska. Within the United States, more than 75% of the breeding range of several species that migrate to the Neotropics occurs in Alaska. Nine species of songbirds, or 10%, that nest in Alaska and migrate to the Paleotropics breed nowhere else in the United States.

Recent evidence suggests that some landbird species are declining in abundance, fueling much speculation upon the causes of these declines, the species involved, and their habitat preferences.

Principle to the management of migratory landbird resources is an understanding of their occurrence within the landscape. Baseline information of bird distribution is a primary need to preserve a natural diversity and abundance of fauna and flora on refuge lands.

Very little work has been done on migratory landbirds in southwest Alaska. Petersen et al. (1991) assessed the relative abundance, seasonal occurrence, distribution, and habitat use of birds in the Kilbuck and Ahklun mountain region.

Species known to migrate to and breed on the refuge include several species of sparrows (predominately Savannah, Golden-crowned, White-crowned, and Fox sparrows), Black-capped Chickadee, Boreal Chickadee, American Dipper, Dark-eyed Junco, American Pipit, Lapland Longspur, Common Raven, Snow Bunting, Rosy Finch, Common Redpoll, Hoary Redpoll, Gray Jay, five species of thrushes (Varied, Gray-cheeked, Swainson's, Hermit, and American Robin), Arctic Warbler, Wilson's Warbler, Yellow-rumped Warbler, Yellow Warbler, Ruby-crowned Kinglet, Yellow Wagtail, and Rusty Blackbird.

Tree Swallows are uncommon local breeders, but are common spring migrants. Bank Swallows are common local breeders; Barn and Cliff Swallows are uncommon and rare spring migrants, respectively.

8. Game Mammals (Also See Section D.5)

a. Moose

Moose are new inhabitants in the Bristol Bay area, possibly having immigrated to the area from the Kuskokwim River drainages during the last century. Little written information on moose abundance on or near the refuge is available prior to the 1970's. In 1971 the ADFG began surveying moose in Unit 17. In 1981 the first major survey of Unit 17A was conducted. (The majority of Unit 17A lands are in Togiak Refuge.) During 5.5 survey hours, only three moose were observed, resulting in the Board of Game's decision to close the hunting season. To date the season has remained closed.

Moose are often observed throughout the eastern portion of the refuge during the summer months. Some have even been observed in the vicinity of Cape Peirce and Cape Newenham. During the winter months, moose are the most common in the Killian Creek, Youth Creek, Sunshine Valley, Weary River areas. However, moose numbers appear to be increasing and sightings are becoming more common west of the Wood River and outskirts of Dillingham.

Each year, snow and ice conditions exist during February, March, and early April which allow easy access to the refuge interior by local villagers on snow machines. Moose are taken illegally each year during this period.

b. Caribou

In February 1988, caribou were reintroduced to the Nushagak Peninsula under a cooperative agreement between the Service, ADFG, Choggiung Limited, and the villages of Togiak, Manokotak, and Dillingham. The reintroduction was intended to reestablish caribou in an area where they had been an important subsistence resource for area residents. The principle objective was to establish a population large enough to sustain a reasonable hunt, while still allowing the herd to grow.

The Nushagak Peninsula Caribou Herd has grown rapidly from the reintroduced caribou to almost 500 animals at an average rate of increase of 36%. The dramatic growth of the herd was attributed to the initial high percentage of females in the herd, high calf production and survival, pristine range, few predators and no hunting. Abundant high quality forage on the Nushagak Peninsula is the probable reason for the enhanced body condition and high natality rate even among 2-year-olds, and it has allowed calf and adult mortality to remain low. At the current rate of growth, the herd could exceed 2000 animals by 1998. Although the herd has grown steadily, it has not expanded its range much beyond the Nushagak Peninsula. The success of the reintroduction is due largely to the cooperation that has occurred between resource agencies and area residents.

The Kilbuck Caribou Herd is a small resident herd that is found most of the year in Unit 18, south and east of the Kuskokwim River within the Yukon Delta National Wildlife Refuge. Since 1981, the Mulchatna Caribou Herd (east of Togiak Refuge) has increased at an annual rate of approximately 17%. This increase can be attributed to a succession of mild winters, low predation rates, and since 1971, an annual harvest rate of less than 5%. The herd has begun to expand its range and has encompassed over 40,000 square miles. Large portions of the herd have used new winter, calving, and summer ranges, all of which contain good to excellent caribou habitat. Recently animals from both herds have begun to use Togiak Refuge lands. It is anticipated that eventually the ranges of all three herds will overlap. It has been approximately 100 years since any significant numbers of caribou have moved through the Togiak River drainage.

c. Bear

During the summer, brown bears are the most abundant big game animal found on the refuge. They have been found ranging from coastal beaches inland to high mountain ridges. Most of the bear observations occurred during flights over the refuge for other missions. Black bears are uncommon to rare.



Photo 15. Fishermen commonly observe brown bears along drainages.

The density, key denning areas, and other aspects of the brown bear population are not well understood. Bears are seasonally abundant along salmon spawning areas, particularly along tributaries of the Togiak and Kulukak rivers and the eastern portion of the refuge. Bear observations by sport fishermen are common in these areas. Bears have also been seen in the vicinity of moose and caribou during calving periods. The incidence of bear predation on these ungulate populations is unknown.

Brown bears in Togiak Refuge are generally neither as abundant nor as large as those on the Alaska Peninsula, so there has not been as much hunting pressure on this population. Harvest records maintained by ADFG indicate the average annual harvest in Game Management Unit 17A has been 5.4 (1985-1990). Not included in this total are illegally killed bears. Subjective data suggest that the number of unreported kills may greatly exceed the number of reported kills in this area.

9. Marine Mammals (Also See Section D.5)

The marine estuaries of Bristol and Kuskokwim bays constitute one of the most productive marine systems in the world. Nutrient laden waters from the Bering Sea, marine upwellings, and ground water run off from the major river systems contribute to the high productivity of the bays and the Bering Sea. Rich in plankton and forage benthos, the bays support an intricate food chain of which marine mammals are at the top. Bristol Bay is a migration corridor for most of Alaska's marine mammals.

Togiak's 600 miles of rocky coast and sandy beaches support a diverse and abundant marine mammal population. The Cape Peirce/Cape Newenham area and the Walrus Islands State Game Sanctuary are two areas particularly rich in marine mammals, providing haulout areas for walrus, harbor seals, spotted seals, and threatened Steller sea lions.

Spotted and harbor seals inhabit the coastal waters throughout the year. During the winter, bearded, ringed, and ribbon seals are occasionally found along the ice edge. Walrus and Steller sea lions haul out on Cape Newenham and Round Island during the spring, summer, and fall. Gray, orca, minke, and beluga whales and harbor porpoises are also found in Bristol Bay.

a. Seals

Associated species include the ringed, bearded, spotted, harbor and ribbon seals. These species occur from the northern Chukchi Sea to the Bering Sea. In the winter, all of these species occur along the ice edge adjacent to the refuge coastline. During the spring, when the ice recedes, only the spotted and harbor seals do not follow the ice northward and can be observed on haulout sites in Nanvak Bay. Much of the refuge's coastline is also utilized by these two species as they follow the concentrations of spawning herring, capelin, or smelt. Spotted seals generally maintain a more northern range, with Bristol Bay serving as the overlap area of the two species.

Harbor and some spotted seals haul out along the refuge's coast, with highest concentrations at Nanvak Bay and Hagemeister Island. Nanvak Bay is the northernmost pupping area for harbor seals and the largest seal haulout in northern Bristol Bay. The number of seals hauling out in Nanvak Bay has declined significantly. This decline parallels population trends observed in many parts of Alaska since the mid 1970's.

b. Sea Lions

About 70% of the worldwide Steller sea lion population resides in Alaska. Counts of Steller sea lions between the mid-1970's and the present indicate about a 70% decline in the Alaska population. The causes of the decline are unknown, but may include disease, environmental change, and the effects of commercial fisheries, including direct mortality and reduction in the availability of sea lion food. The 1989 estimate for the Alaska portion of the Steller sea lion population is about 64,000 animals. In 1990, the Steller sea lion was listed as a threatened species.

The two largest sea lion haulouts in northern Bristol Bay occur at Cape Newenham and Round Island. Sea lion populations have been monitored by ADFG staff with funding from National Marine Fisheries Service beginning in 1990.

Sea lions gather annually at traditional haulouts to pup and breed. Sea lions usually begin using the haulout area in April and are seen feeding along the coast and in the bay channels during the herring spawning migration which usually occurs in May. They normally feed heavily on herring in Chagvan Bay during May and June.



Photo 16. The midnight sun shines upon sea lions in Chagvan Bay.

c. Walrus

The majority of the Pacific walrus population inhabits the shelf waters of the Bering and Chukchi seas. Female and young walruses that winter in and near Bristol and Kuskokwim bays migrate north to the Chukchi Sea in the spring but many males remain behind and haul out in Bristol Bay. Cape Peirce and Round Island (State Game Sanctuary) are the primary haulout areas for walruses in Bristol Bay. Walruses periodically haul out at Cape Seniavin and Cape Newenham, however, these areas are not used every year.

Cape Peirce was historically used as a haulout but was abandoned sometime during the first half of this century. Walruses began reusing the haulout in 1981 and have returned every summer since. The number of walrus using the Cape Peirce haulout steadily increased from 1981 to 1985, when a high count of 12,500 walrus was recorded. In 1987 and 1988, the number of walrus hauling out at Cape Peirce and Round Island declined. During this time, fishing for yellow-fin sole in northern Bristol Bay began, with fishing activities concentrated in the Round Island area. Concern that the decline in numbers of walrus hauling out might be related to the initiation of the yellow-fin sole fishery resulted in the North Pacific Fisheries Management Council's (NPFMC) decision to restrict the activities of the yellow-fin sole fishery. In August of 1991 the NPFMC voted to continue indefinitely the 12-mile closure around Cape Peirce and Round Island with a three-mile transit zone around Right Hand Point. The Fish and Wildlife Service has verbal agreements with NPFMC, National Marine Fisheries Service and ADFG to continue monitoring walrus at Cape Peirce as part of the effort to assess the effects of the fishery.

d. Whales

The endangered gray whale (Eschrichtius robustus) migrates through Unmiak Pass and follows the Bristol Bay shoreline on its way north. These animals are often observed in the summer feeding offshore in the near-coastal waters of the refuge. Group sizes range from singles to 20 whales, with several groups containing calves. Cow/calf groups generally hold over in coastal waters feeding and resting before continuing their journey up the coast.

This year, groups of grey whales (1-9 individuals) were sighted 38 times traveling north along the coast of the Cape Peirce and Cape Newenham peninsulas during May and June. At least 16 females with calves were sighted. As many as 23 whales were seen in one day (June 1) off the coast of Cape Peirce. An adult and subadult were observed feeding, stirring up mud and "head standing" off South Firebaugh Cove on June 24. During a May 12 aerial survey, two grey whales were sighted northeast of Tongue Point, near Hagemeister Island.

Other whales passing through Bristol Bay along the refuge coastal area, en route to the Bering Sea, are the minke and on rare occasions the Baird's beaked whale. Beluga whales, orcas, harbor porpoise, and Dall porpoise are relatively common throughout the summer.

Beluga whales are one of the most abundant cetaceans in the North Pacific and are commonly found in areas of fish concentrations like the mouths of rivers and in bays with high tidal fluctuations. When herring and capelin hit the beaches to spawn, salmon smolt make their annual out migration, and/or adult salmon begin to migrate to near shore waters and river mouths, the belugas are not far behind.

Conflicts occur from mid June to late August between belugas and float planes utilizing the public dock near the mouth of the Wood River. This area is often used as a loading point for float planes as well as a boat launch. On occasion, landings must be aborted to avoid hitting feeding whales.

10. Other Resident Wildlife

Willow Ptarmigan are common on the refuge. Flocks of several thousand birds are commonly observed in dwarf willow and alder thickets on mountainsides and in alder thickets along interior rivers and lakes.

Fur-bearing animals of the refuge include: red fox, muskrat, mink, beaver, river otter, marten, lynx, and wolverine. Mink occur throughout the lake and stream systems. Wolf, wolverine, and lynx, although uncommon, are occasionally seen on refuge lands. Parka squirrels, hoary marmots, porcupines, and snowshoe hares are common throughout the refuge. Rare occurrences of southwest Alaska resident species are the tundra hare and Arctic fox.

The occurrence and distribution of small mammals (lemmings, voles, shrews) are not well understood on the refuge. Tundra hares, Arctic ground squirrels and red squirrels are present in varying numbers.

11. Fisheries Resources

Refuge waters contribute significantly to the salmon stocks in Bristol Bay and Kuskokwim Bay. Refuge streams and rivers support anadromous runs of five species of Pacific salmon: king or chinook (Oncorhynchus tshawytscha), coho or silver (O. kisutch), chum or dog (O. keta), sockeye or red (O. nerka), and pink or humpback (O. gorbuscha). One of the State's largest herring fisheries also occurs in Togiak Bay. The vessel commercial value, or the value of catches to commercial fishermen of all Bristol Bay salmon, refuge-bound Kuskokwim Bay salmon, and near shore spawning herring in 1993 was $161,850,296.

In addition, anadromous runs of Dolly Varden (Salvelinus malma) and resident populations of rainbow trout (Oncorhynchus mykiss), lake trout (Salvelinus namaycush), Arctic grayling (Thymallus arcticus), Arctic char (Salvelinus alpinus), pike (Esox Lucius), burbot (Lota lota), and whitefish (Coregonus spp.) contribute to both subsistence and sport harvests from refuge waters. The sport fishery occurring in refuge waters is estimated to generate more than $6,000,000 in annual cash flow to the various service industries.

Populations of sticklebacks, blackfish, pipefish, and other species (32 total) exist in the refuge's thousands of unnamed lakes, rivers, tundra streams, sloughs, ponds, and bays. Little or no information is known about their numbers or distribution.

a. Subsistence Fishing

On July 1, 1990, the Federal government assumed responsibility for the management of subsistence fishing on Federal public lands in Alaska. Navigable waters are still managed by the State with the exception of those areas that were withdrawn for Federal purposes before Alaska's statehood. Appeals and court filings have brought about actions by the Federal Subsistence Board to change or review some regulations related to Federal/non-navigable waters. Other court cases are pending which contend that the Federal government must exert management authority over all waters and resources within the refuge.

Residents of six villages within refuge boundaries and others living in rural areas adjacent to the refuge utilize the fishery resources for subsistence purposes. Subsistence users harvest both anadromous and resident species, but they primarily rely on rich salmon runs.

Under Alaska National Interest Lands Conservation Act (ANILCA), creation of national parks and refuges was not to change the subsistence lifestyle in rural Alaska. The act specifically addresses this issue in Section 804:

> "...the taking on public lands of fish for non-wasteful subsistence uses shall be accorded priority over the taking on such lands of fish and wildlife for other purposes."

Therefore, in the event that it became necessary to restrict the harvest of fish and wildlife on refuge lands, subsistence users are to be afforded the priority use of all surplus not needed to maintain viable healthy populations. Currently, ADFG permits and regulates subsistence fishing activities on navigable waters within the refuge. It has become necessary to regulate some subsistence practices to maintain a separation between commercial and subsistence practices. Subsistence fishing activities are restricted directly before, during and after commercial fishery openings to discourage commercial fishing in subsistence zones. The practice of catching fish further up the rivers and selling them in the bay has occurred and is the purpose behind most subsistence regulations.

Subsistence fishermen harvest during specific periods of the year. Generally, these harvests coincide with the availability of salmon as they enter the rivers. Resident freshwater species are most often sought for fresh protein during the winter. Very little information is available on the number of each non-salmon species harvested from the refuge for subsistence.

Some of the fishermen in the villages of Togiak, Twin Hills, and Manokotak (Bristol Bay side) obtain the required subsistence permit from ADFG, Subsistence Division, or from agents in each village. The permit is returned at the end of the season with the number of fish taken by date for each species. Subsistence personnel from ADFG also travel to the villages to collect permits that were not returned and to interview permittees. Kuskokwim Bay villages (Quinhagak, Goodnews, and Platinum) by contrast are not required to have subsistence permits. They are surveyed during the season by ADFG Commercial Fisheries Division personnel. Data collected is extrapolated to provide an estimate of the subsistence salmon harvest for an entire village as seen in Table 11.

Data for Togiak and Manokotak is extrapolated to the number of permits issued and may not reflect the actual harvest. Data for Quinhagak, Goodnews and Platinum is expanded data to reflect village harvest.

Federal Subsistence Management on public lands has not included the regulation of uses targeting fisheries stocks. Currently the State maintains management authority over navigable waters and the resources contained within. Appeals and court filings have brought about actions by the Federal Subsistence Board to change or review some regulations related to Federal/non-navigable waters. Other court cases are pending which contend that the Federal government must exert management authority over all waters and resources within the refuge.

Table 11. 1993 Subsistence Salmon Fishery Harvest*

Village	Sockeye	Chinook	Coho	Chum	Pink	Total
Togiak	2,139	784	743	571	8	4,245
Manokotak	1,147	235	20	5	77	1,484
Quinhagak	801	2,726	1,381	703	NA	5,611
Goodnews	540	438	796	133	NA	1,907
Platinum	32	50	18	0	NA	100
Totals:	4,659	4,233	2,958	1,412	85	13,347

* Twin Hills information not available

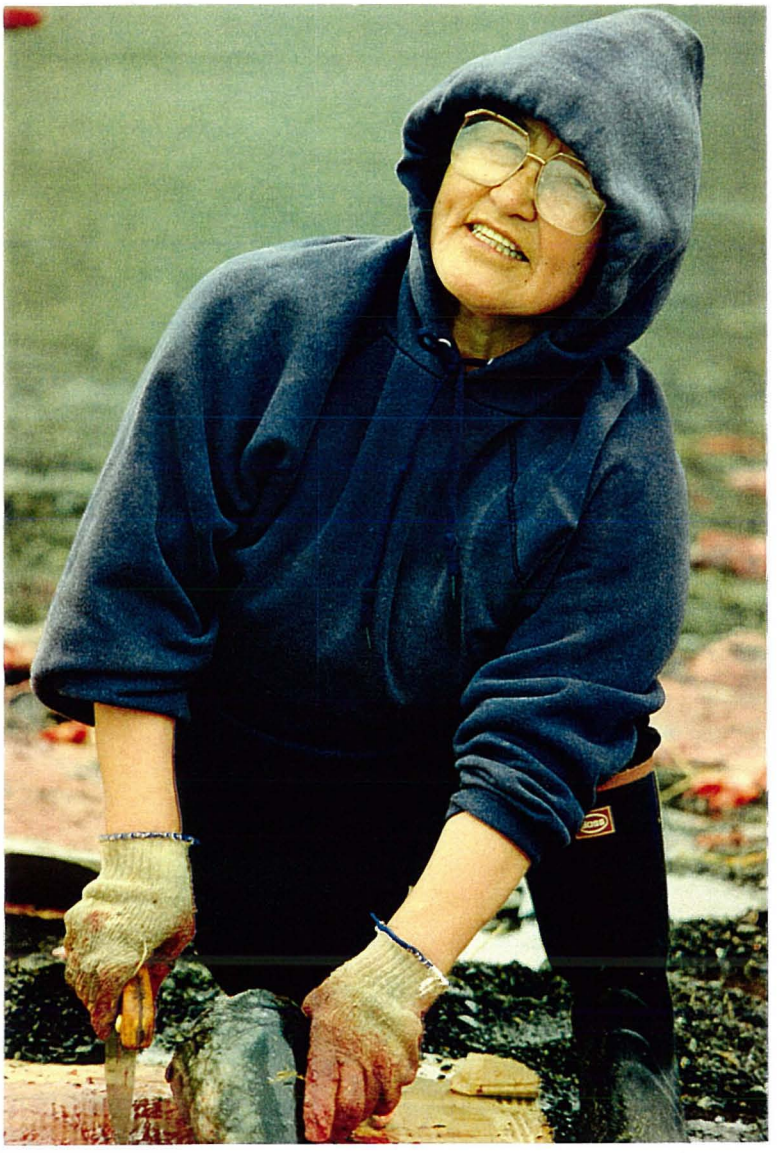


Photo 17. A Togiak resident prepares her subsistence catch with the traditional ulu.

b. Sport Fisheries

Most sport fisheries occurring within the refuge target peak runs of chinook and coho salmon. Other characteristics of refuge fisheries which make sport fishing popular are the variety of anadromous and resident fisheries, the high density of rainbow trout, the refuge's location at the northern edge of the rainbow trout range, the anadromous char (Dolly Varden) runs consisting of large numbers and large individual sizes, the presence of lake trout in the Kuskokwim Bay drainages, the largest coho salmon in Bristol Bay are in the Togiak River, and the small clear water systems with abundant fish resources. A more complete description of the recreational sport fisheries is included in Section H.9. Public Use - Fishing.

Sport fisheries on the refuge are primarily volunteer catch and release. Consumptive use of salmon and to a lesser extent of resident species occurs primarily in the lower rivers where shorter trip length and easier access allow for timely processing and transport. Harvest levels are relatively low for all species, but they are greatest for chinook and coho salmon. Use reports provided by sport fish guides operating under Special Use Permits and a statewide harvest survey administered by ADFG provide the only estimates of sport fish harvest of each species by river system. For the years when complete estimates are available, the sport fish average harvest has constituted between 0.1% and 5.0% of the total runs of salmon. This harvest is considered insignificant.

In 1993, sport fish guides reported catching 24,588 salmon, 24,677 char (spp.), and nearly 5,000 resident species (Arctic grayling, rainbow trout, and lake trout). Of these, 3,374 salmon, 266 char (spp.), and 5 resident species were harvested.

c. Commercial Fishing

Since the late 1800s, commercial fishing has been the mainstay of the economy in communities adjacent to the refuge. Recently, this economy has spread to all villages located within the refuge and has become their primary source of income.

Salmon stocks bound for refuge waters are harvested on a terminal fishery basis (runs are targeted for catch at or near the mouth of a river system). This insures that individual runs are afforded maximum management protection. Achieving the escapement goal (desired number of spawners) into individual rivers is possible if data is collected on a timely basis and used to regulate the commercial fishing seasons.

Commercial fisheries which target refuge salmon stocks are managed by two ADFG Division of Commercial Fisheries offices. The Bethel office manages the commercial harvest of species bound for the western portion of the refuge in the Kuskokwim Management Area. This area is divided into District 4, Quinhagak (includes the Kanektok, Arolik and Oyak Rivers) and District 5 (Goodnews Bay). Both districts are fished on a set schedule dictated by date and day of the week. These fisheries are regulated by comparison of the relatively short historical data base to aerial survey point observations of escapement numbers, escapement numbers past a weir on the Middle Fork of the Goodnews River, and a daily monitoring of the commercial harvest sold to buyers/processors. Only if a particularly poor run is indicated, is there any modification to the fishing schedule.

The Dillingham office manages the commercial harvests of fish stocks bound for the Togiak and Nushagak districts bordering the southern portion of the refuge. The Togiak district includes all the waters from Cape Newenham to Cape Constantine (Togiak, Kulukak, Osviak,

Quigmy, Matogak, Ungalikthluk and Negukthlik rivers). Only two sections of the Nushagak District (Igushik and Snake rivers) target fish bound for refuge waters. Togiak and Kulukak sections are managed by scheduled fishing times during most of the season and by emergency order during critical or peak times. A counting tower at Togiak Lake, catch reports as reported by local processors, and frequent aerial surveys allow for a closely monitored salmon escapement and management.

Commercial fishing in the Nushagak District is primarily by emergency order, dictated by escapement monitoring through a sonar counter on the Nushagak River, counting towers on the Wood and Igushik rivers, and aerial surveys. The historical database for Bristol Bay drainages dates back to the 1800s and provides a more accurate picture of salmon escapements for these larger runs.

The two Kuskokwim fishing districts which target refuge fishery stocks are relatively new, and commercial harvest records do not exist prior to 1968 for Goodnews and 1960 for Quinhagak. The fishery in Goodnews was opened by emergency order due to public pressure and the determination of a harvestable salmon surplus by ADFG surveys.

The commercial catch bound for these rivers was worth $1,337,296 to participating fishermen in 1993 (Tables 12 and 13). The wholesale value of these fisheries is probably worth several million dollars more, making them economically important for the region and to the country as a large proportion is exported to Japan.

Quinhagak (W-4) Commercial Fishing District

Chinook, coho and sockeye salmon make up the majority of the Kanektok River fishery. A total of 193,485 fish worth $896,161 were harvested by commercial fishermen in the Quinhagak District in 1993 (Table 12). This fishery accounts for approximately 20% of the total Kuskokwim Area commercial harvest of fish and total dollar value.

The total chinook commercial catch in the Quinhagak District was 15,784 in 1993, which was below the ten-year average of 17,803. Chinook salmon fetched a total price of $142,918 ($0.61 per pound) and accounted for 16% of the total commercial fisheries value. The average chinook salmon weighed 14.8 pounds. An aerial survey on July 12 documented 4,670 chinook salmon in the Kanektok River which is below the escapement objective of 5,000. For the past ten years chinook escapements have averaged 6,998 and have been below the objective for five of those years.

The commercial harvest of 80,934 sockeye salmon in 1993 is the second highest harvest on record. Only the 1990 catch of 83,681 exceeded it. A total of $402,910 ($0.70 per pound) was paid for sockeye which accounted for 45% of the total commercial fishery value. An aerial survey found 23,128 sockeye salmon in the Kanektok River which is higher than the escapement objective of 15,000 and slightly below the ten-year average of 25,186. The objective was lowered from 30,000 to 15,000 in 1990. Peak aerial live counts of sockeye have been at or above the desired objective for nine of the last ten years.

Chum salmon are caught incidentally to the chinook and sockeye salmon commercial fisheries. A total of 40,943 chum salmon was commercially harvested in 1993. A total of $104,347 ($0.39 per pound) was paid out to fishermen for chum salmon which accounted for 12% of the total commercial fishery value. An aerial survey documented 1,285 chum salmon in the Kanektok River which is below the ten-year average and well below the escapement

objective of 30,500. Observed escapement has been below the objective for nine of the last ten years. The chum salmon harvest is usually tied to the sockeye salmon run.

Pink salmon runs occur during even numbered years and are harvested incidentally during the season. In 1993, 7 pinks were caught. No escapement objective or estimates exist for pink salmon in this district.

Coho salmon begin dominating the commercial fishery harvest around the end of July and continue as long as a buyer is interested, usually early September. The 1993 coho salmon commercial harvest of 55,817 was slightly below average. A total of $245,982 ($0.58 per pound) was paid to commercial fishermen for their coho catch, which accounted for 27% of the value of this district's commercial fishery. Weather and aircraft availability prevented a coho salmon escapement survey in 1993.

Table 12. District 4 - Quinhagak, 1993
Commercial/Subsistence Salmon Catch/Escapement

	Sockeye	Chinook	Coho	Chum	Pink	Total
Com. Harvest	80,934	15,784	55,817	40,943	7	193,485
5-Year Average	48,077	17,803	53,820	48,834	19,584	188,118
Subsistence	801	2,726	1,381	703	NA	5,611
Escapement[1]	23,128	4,670	--------	1,285	NA	29,083
Esc. Objective	15,000	5,000	--------	30,500	NA	50,500
Total Run[2]	104,863	23,180	57,198	42,931	7	228,179
Ex-Vessel Value	$402,910	$142,918	$245,982	$104,347	$4	$896,161

ADFG Data, Bethel - Encompasses the Oyak, Kanektok, and Arolik Rivers
[1] Escapement based upon aerial surveys flown for index counts; not expanded to escapement estimates
[2] Total run conservative due to low escapement estimates.

Goodnews Bay (W-5) Commercial Fishing District

Coho and sockeye salmon make up the majority of the Goodnews River commercial fishery. A total of 92,081 fish worth $441,135 was harvested by commercial fishermen in the Goodnews Bay District in 1993. This fishery accounts for approximately 9% of the total Kuskokwim Area commercial harvest of fish and 11% of the total dollar value. The Goodnews River weir is located on the Middle Fork of the Goodnews River and was operated from June 22 to August 18.

The total chinook commercial catch in the Goodnews Bay District was 2,117 in 1993, which was below the ten-year average of 3,135. Chinook salmon fetched a total price of $21,351 ($0.65 per pound) and accounted for 5% of the total commercial fisheries value. The average chinook salmon weighed 15.5 pounds. An escapement of 2,491 chinook counted at the weir fell short of the 3,500 desired count. For the past ten years chinook escapements have averaged 2,859 and have been below the objective for all but two years, 1983 and 1990.

The commercial harvest of 59,293 sockeye salmon in 1993 is the highest harvest during the past twelve years for this district and well above the 10-year average of 24,128. A total of $296,437 ($0.70 per pound) was paid for sockeye which accounted for 67% of the total commercial fishery value. Sockeye escapement past the weir is estimated to be 26,044 which is slightly greater than the escapement objective of 25,000, but is below the ten-year average of 30,528. Weir counts of sockeye salmon have been at or above the desired objective for seven of the last ten years.

Chum salmon are caught incidentally to the sockeye salmon commercial fisheries. In 1993 a catch of 10,657 chum salmon was commercially harvested. A total of $28,304 ($0.41 per pound) was paid out to fishermen for chum salmon which accounted for 6% of the total commercial fishery value. Chum salmon escapement of 14,287 at the Goodnews River weir was slightly below the goal of 15,000 fish and the ten-year average of 16,433. Observed escapement has been below the objective for three of the last ten years.

Pink salmon runs occur during even numbered years and are harvested incidentally during the season. In 1993, no pinks were caught. An estimated 253 pink salmon passed upstream of the weir in 1993. No escapement objective exists for pink salmon in this district.

Coho salmon begin dominating the commercial fishery harvest in early August and continue as long as a buyer is interested, usually early September. The 1993 coho salmon commercial harvest of 20,014 is below the ten-year average of 20,734. A total of $95,043 ($0.58 per pound) was paid to commercial fishermen for their coho catch, which accounted for 22% of the value of this district's commercial fishery. The Goodnews River weir (and earlier years the tower) is traditionally closed prior to the completion of the coho run. No escapement objective has been set for Goodnews River coho salmon. The aerial survey index of 19,000 was the fourth highest on record.

Table 13. District 5 - Goodnews Bay, 1993
Commercial/Subsistence Salmon Catch/Escapement

	Sockeye	Chinook	Coho	Chum	Pink	Total
Com. Harvest	59,293	2,117	20,014	10,657	0	92,081
5-Year Average	34,104	3,135	20,734	18,857	4,112	80,942
Subsistence[1]	572	488	814	133	NA	2,007
Escapement[2]	100,169	4,700	-------	102,050	NA	206,919
Esc. Obj.	20,000	2,400	-------	-------	NA	22,400
Total Run[3]	160,034	7,305	20,828	112,840	------	301,007
Ex-Vessel Value	$296,437	$21,351	$95,043	$28,304	0	$441,135

ADFG Data, Bethel

[1] Includes harvest estimates from villages of Platinum and Goodnews Bay.

[2] Escapement is only an index and may only represent 1/4 to 1/2 of actual escapement.

[3] Total run conservative due to low escapement estimate.

Togiak Commercial Fishing District

The Togiak, Kulukak, Osviak, Matogak, Quigmy, Negukthlik and Ungalikthluk rivers are included in this management district. Sockeye salmon, and to a lesser degree chinook and coho salmon, are the prime management species within this district. A total of 721,007 fish was harvested by commercial fishermen in the Togiak District in 1993. This fishery accounts for approximately 2% of the total Bristol Bay Area commercial harvest of fish. The commercial fishery and salmon escapement is managed using information gathered by a counting tower at Togiak Lake, tabulated catch delivered to processors, and aerial surveys of individual river systems.



Photo 18. Commercial fishing boats fill Togiak Bay during the season.

Togiak District

The total chinook commercial catch in the Togiak District was 11,649 in 1993, which was well below the ten-year average of 19,268. The average chinook salmon harvested in Bristol Bay weighed 17.4 pounds. Bristol Bay chinook salmon fetched a price of $0.76 per pound. There is no escapement goal for the entire fishing district, just the Togiak River. For the first time since 1985, the chinook salmon escapement in the Togiak River was above the goal of 10,000 fish.

The commercial harvest of 543,451 sockeye salmon in 1993 is well above the 10-year average of 414,623. Bristol Bay sockeye salmon fetched a price of $0.62 per pound. Sockeye escapement is estimated to be at 242,475 which is greater than the escapement objective of 150,000.

Chum salmon are caught incidentally to the sockeye salmon commercial fisheries. In 1993 a catch of 152,871 chum salmon was commercially harvested. Bristol Bay chum salmon

fetched a price of $0.21 per pound. Chum salmon escapement of 98,470 was below the goal of 200,000 fish. Observed escapement has been below the objective for five years of the last decade.

Pink salmon runs occur during even numbered years and are harvested incidentally during the season. In 1993, 330 pinks were caught. Bristol Bay pink salmon fetched a price of $0.11 per pound. No escapement objective exists for pink salmon in this district.

Coho salmon begin dominating the commercial fishery harvest in early August and continue as long as a buyer is interested, usually early September. The 1993 coho salmon commercial harvest of 12,706 is well below the ten-year average of 35,727. Bristol Bay coho salmon fetched a price of $0.52 per pound. There was no estimated escapement for coho salmon in the Togiak District for 1993 though the escapement objective was 50,000 fish.

Table 14. Togiak District, 1993
Commercial/Subsistence Salmon Catch /Escapement

	Sockeye	Chinook	Coho	Chum	Pink	Total
Com. Harvest	543,451	11,649	12,706	152,871	330	721,007
10-Year Avg.	408,874	16,479	36,454	257,909	39,586	759,302
Subsistence[1]	2,139	784	743	571	8	4,245
Escapement	242,475	16,035	-------	98,470	NA	356,980
Esc. Obj. Togiak	150,000	10,000	50,000	200,000	NA	410,000
Total Run	788,065	28,468	13,449	251,912	338	1,082,23
Ex-vessel Value[2]	-------	-------	-------	-------	-------	-------

ADFG data, Dillingham; includes Togiak, Kulukak, Quigmy, Matogak, and Osviak Rivers
[1] Subsistence data from ADFG permits issued in Togiak and returns. Data does not represent total harvest figures for the village.
[2] Ex Vessel Value cannot be calculated. ADFG reports total Bristol Bay numbers and do not have data for only refuge bound salmon in the Togiak District.

Igushik Section of the Nushagak Fishing District

The Alaska Department of Fish and Game does not record complete data from the Igushik Section of the Nushagak Fishing District on a yearly basis and in 1993 only sockeye data is present.

The 1993 commercial harvest of sockeye salmon in the Igushik Section was 1,192,843 fish. The estimated escapement of sockeye salmon in the Igushik Section was 405,564 which is well above the escapement objective of 200,000.

The value of the commercial harvests of all salmon species bound for the refuge in the Togiak and Nushagak Districts is no longer recorded by the State of Alaska. The wholesale value, which includes distribution, canning, freezing, etc., of this renewable resource may exceed 154 million dollars in 1993.

Table 15. Igushik Section, 1993
Commercial/Subsistence Salmon Catch/Escapement

	Sockeye	Chinook	Coho	Chum	Pink	Total
Com. Harvest	1,192,843	-	-	-	-	1,192,843
Subsistence	1,147	235	20	5	77	1,484
Escapement	405,564	-	-	-	-	405,564
Esc. Objective	200,000	-	-	-	-	200,000
Total Run	1,599,554	-	-	-	-	1,599,554

ADFG data, Dillingham - This table is incomplete. ADFG does not record complete Igushik data on a yearly basis.

Runs of chinook, coho, and chum are small in comparison to sockeye runs. A comparison of the salmon harvest in Bristol Bay in 1993 is shown below in Table 16. A late season fishery for coho has developed in the Togiak District. Late season markets became available in Bristol Bay in 1977 and fishermen started actively targeting coho. From 1977 to 1985 coho catches have almost tripled those of early years 1883 to 1922 peak level periods. During this time period the Togiak District has produced approximately 28% of the total coho harvest in Bristol Bay. The 1987 run was very weak and the commercial fishery was canceled. Again in 1988 indicators pointed to the possibility of a weak run and the fishery was again closed to commercial fishing to meet the lower end of a minimum escapement goal of 25,000 fish. Sportfishing was left open. Chinook and chum salmon bound for the Togiak District also produce a major portion of the Bristol Bay harvest.

Table 16. Bristol Bay Salmon Harvest, 1993
District Comparison for Coho, Chinook, Chum, and Sockeye

District	Coho	%	Chinook	%	Chum	%	Sockeye	%
Naknek/Kvichak	1,798	2	7,088	8	38,970	5	8,866,866	22
Egegik	40,791	57	1,412	2	49,480	7	21,819,814	54
Ugashik	2,432	3	2,754	3	67,565	9	4,285,069	10
Nushagak	14,244	20	62,294	73	414,879	57	5,327,435	13
Togiak	12,706	18	11,649	14	152,871	22	543,451	1
Totals	71,971		85,197		723,765		40,842,635	

*ADFG data, Dillingham

d. Herring

Pacific herring spawn in various coves and bays along the refuge coastline. This species is an important link in the Bristol Bay food chain, although it is not well understood. Subsistence users have long utilized these fish, but more recently, herring have been commercially exploited. Togiak Bay, Goodnews Bay, and Security Cove are the three major

herring spawning areas with associated commercial fisheries that lie along the refuge coastline.

The Togiak Bay area adjoins the southern coast of the refuge and is the only commercial herring fishery in Bristol Bay. This fishery began in 1967 and maintained a low profile for several years. Through 1975, it averaged only one to three processors, 24 gill net operators, and an occasional purse seiner.

The interest in harvesting Alaska herring stocks increased significantly in 1977 due to a decline in world herring stocks and the subsequent reduction in offshore foreign trawling, as well as the elimination of the Alaska coastal near-shore Japanese gill net fishery. As a result of this increased interest, the Togiak District experienced such an increase in effort that the Alaska Board of Fisheries responded by creating commercial fishing districts at Security Cove and Goodnews Bay.

Herring were first observed by the State biologists in the Togiak District on the 6th of May, and the first spawn was observed on the 25th of April. A total of 53.3 linear miles of spawning was observed by ADFG during aerial surveys. The majority of the spawning occurred on April 26-30. The fishing comprised of nine openings for gill nets, totaling 144.5 hours, and 17 openings for purse seiners, totaling 33.8 hours. A total of 17,925 tons of herring was harvested, worth 5.2 million dollars (Table 17).

Table 17. Togiak District, 1978-1993
Estimated Biomass & Commercial Harvest of Pacific Herring

Biomass Year	Harvest Est(st)	Waste Catch	Total (st)	Harvest/ gear(st)	Gill Nets	Purse Seines	Roe %	Dollars (1000s)	Exp. Rate
1978	190,300	7,734	-	7,734	08	92	8.2	1,300	4
1979	239,000	11,558	-	11,558	40	60	8.6	6,700	5
1980	68,700	18,886	5,700	24,586	16	84	9.2	3,055	35
1981	158,600	12,542	30	12,572	18	82	9.1	3,989	8
1982	97,900	21,489	380	21,869	31	69	8.8	6,175	22
1983	141,800	26,287	600	26,887	19	81	8.8	10,517	19
1984	114,900	19,300	170	19,450	25	75	9.8	7,211	18
1985	131,400	25,616	250	25,886	17	83	9.6	13,696	20
1986	94,800	16,260	50	16,310	21	79	9.7	8,660	19
1987	88,400	15,204	-	15,204	17	83	8.8	8,663	19
1988	134,717	13,986	-	13,986	25	75	10.3	14,451	13
1989	98,965	12,258	-	12,258	24	76	8.4	4,983	18
1990	88,105	12,253	-	12,253	25	75	9.6	6,523	17
1991	83,229	14,970	-	14,790	79	21	9.9	6,577	21
1992	156,955	25,808	-	25,808	19	81	9.2	8,818	19
1993	193,847	17,925	-	17,925	20	80	9.7	5,218	12

ADFG data. (st) - Short ton. Exp. rate - exploitation rate

A spawn-on-kelp fishery, associated with the herring fishery has also developed along the refuge coastline. This fishery is regulated by State emergency order. The Board of Fisheries adopted a management plan in 1984 which allows a harvest quota of up to 350,000 pounds or the equivalent of 1,500 short tons of spawning herring, with a 2-3 year rotational harvest of kelp beds. The roe-on-kelp (rockweed) harvest during 1993 yielded 383,000 pounds of harvestable kelp valued at $268,000 (Table 18).

Table 18. Togiak District, 1968-1993
Commercial Roe-on-Kelp Harvest

Year	Processors	Number of Fishermen	Pounds Harvested	Short tons Harvested	Ex Vessel Value
1968	1	1	54,600	27.3	NDA
1969	1	3	10,125	5.1	"
1970	1	5	387,885	19.4	"
1971	1	12	51,795	25.8	"
1972	1	12	64,165	32.0	9,000
1973	1	10	11,596	5.8	2,000
1974	3	26	125,646	62.8	19,000
1975	2	44	111,087	55.5	22,000
1976	5	49	295,780	148.0	127,000
1977	5	75	275,774	38.0	116,000
1978	11	160	329,858	164.9	120,000
1979	16	100	414,737	209.3	$248,000
1980	21	78	189,000	95.0	$95,000
1981	7	108	378,207	190.0	$250,000
1982	8	214	234,924	117.0	$176,000
1983	4	125	270,866	135.0	$284,000
1984	6	330	407,587	203.0	$203,000
1985	canceled	canceled	canceled	canceled	canceled
1986	3	143	374,396	187.2	$187,000
1987	5	187	307,307	153.6	$166,000
1988	10	259	489,320	244.6	$346,000
1989	11	487	559,780	279.9	$448,000
1990	7	481	413,844	206.9	$360,000
1991	7	532	348,357	174.2	$383,000
1992	5	386	363,600	181.8	$254,000
1993	2	173	383,000	191.5	$268,000

ADFG data

Total value of the herring sac roe, capelin, roe-on-kelp, and food bait fishery from the southern shore of the refuge was valued at over 5.4 million dollars (Table 19).

Table 19. Togiak Herring Fishery Ex-Vessel Value, 1993

Product	Value
Herring Sac Roe	$5,218,000
Capelin [1]	-------
Roe-on-Kelp	$268,000
Food/bait	$3,000
Total Estimated Ex-vessel Value	$5,489,000

ADFG data.

[1] There was a capelin fishery in 1993. However no Ex-vessel value is available.

Capelin, a member of the smelt family is also an important food source. In the past, this fish has been thought to be just abundant as the herring and has experienced some commercial interest in the Togiak District. Spawning capelin were observed in 1993 and a fishing season was conducted for this species. However, no commercial value of this catch is available. The previous capelin harvest was in 1987.

Kuskokwim Bay herring are harvested on the west coast of the refuge in the Goodnews Bay and Security Cove Districts (Table 20). Since 1978, after the first season, the use of purse seiners has been prohibited; no roe-on-kelp harvest is allowed.

The herring fishery has been relatively unrestricted, and fishermen are allowed to transfer from the Togiak District to the Security Cove District in Kuskokwim Bay. On the other hand, the Goodnews Bay District was established for the exclusive use by local commercial fishermen from the villages of Quinhagak, Platinum, and Goodnews Bay; transfers are not allowed.

The herring season in Goodnews Bay and Security Cove opened on May 12.

As noted from these tables, the biomass of harvested herring is very large and financial return great. No research has been done on what impacts this is having on the local seabird population, nor on marine mammals. Impacts to salmon smolt and anadromous char populations that feed upon herring fry are also unknown. Another unknown impact is that of the lost herring nets. These continue to ghost-fish for a long time, inflicting mortality not only on fish but on marine birds and mammals.

Table 20. Goodnews/Security Cove District, 1978-1993
Estimated Biomass & Commercial Harvest of Pacific Herring

Year	District	Short ton Biomass	Harvest Catch	Waste	Total	%Roe	Value x 1000	Exploit
1978	GN	400	-	-	-	-	-	-
	SC	1,300	286	-	286		78	22
1979	GN	7,400	90	-	90	4.7	39	
	SC	21,500	424	-	424	8.5	327	2.0
1980	GN	1,200	448	-	448	9.5	97	37.3
	SC	2,100	697	-	697	8.2	151	58.1
1981	GN	4,300	657	0	657	7.7	196	15.3
	SC	8,300	1,173	0	1,173	8.1	347	14.1
1982	GN	2,600	486	0	486	9.5	188	18.7
	SC	5,100	812	0	813	9.3	271	15.9
1983	GN	3,200	435	0	435	9.4	185	13.6
	SC	6,400	1,073	0	1,073	9.4	443	16.8
1984	GN	4,100	667	50	717	10.1	168	17.5
	SC	5,100	325	10	335	11.8	110	6.6
1985	GN	4,300	724	13	724	8.7	309	16.8
	SC	4,900	703	30	733	10.1	355	15.0
1986	GN	3,000	557	0	556	10.4	325	18.1
	SC	3,700	751	0	751	11.2	535	20.3
1987	GN	2,000	321	0	321	7.1	133	16.0
	SC	2,300	313	0	313	9.7	242	13.4
1988	GN	4,479	483	0	483	8.0	463	10.7
	SC	4,906	324	0	324	9.3	324	6.6
1989	GN	4,040	616	0	616	8.4	335	15.2
	SC	2,830	554	0	554	9.4	265	19.6
1990	GN	2,577	455	0	455	12.2	314	17.7
	SC	2,650	234	0	234	8.7	94	8.8
1991	GN	4,387	263	0	263	8.9	93	6.0
	SC	4,434	570	0	570	9.3	208	12.9
1992	GN	5,572	740	0	740	9.5	286	13.3
	SC	7,773	824	10	834	9.2	285	10.7
1993	GN	6,221	954	0	954	10.3	293	15.4
	SC	6,995	5	0	5	12.8	2	0.1

ADFG data GN = Goodnews SC = Security Cove

12. Wildlife Propagation and Stocking

Nothing to report.

13. Marking and Banding

No goose banding was completed on the refuge as has been the case in recent years. Cooperative studies with Research have been completed and no future banding projects are planned.

Thirty-nine brown bear were captured in June, and 24 radio-collared were deployed through an interagency effort. This is the first project of its kind in the Yukon Delta region (See Section D.5. Research and Investigations).

14. Scientific Collections

During the 1993 field season, fisheries samples were collected during refuge fisheries surveys on the Arolik River, Pungokepuk Creek and Gechiak Creek and were collected by the refuge river rangers on the Togiak and Kanektok rivers. The following is a list of fisheries samples collected.

Table 21. Fisheries Samples Collected - 1993

River/Creek	Species	Fishery	Number
Arolik River	Rainbow trout	Survey	163
	Arctic grayling	Survey	25
Gechiak Creek	Rainbow trout	Survey	9
Kanektok River	Rainbow trout	Sport	2
	Chinook salmon	Sport	106
	Chinook salmon	Escapement	256
	Coho salmon	Sport	63
Pungokepuk Creek	Rainbow trout	Survey	132
	Arctic grayling	Survey	33
	Char	Survey	1
	Northern pike	Survey	5
Togiak River	Coho salmon	Sport	73

All sampling efforts include collecting scales to determine age, length and weight measurements, and determining sex if possible. Sport fishery samples are collected from angler harvested fish. Escapement samples are collected from spawned out salmon carcasses. Fisheries survey samples are collected by hook and line. After sampling, these fish are then released. Most, if not all, rainbow trout are tagged with an individually numbered Floy™ spaghetti tag.

15. Animal Control

The Hagemeister Island Reindeer Removal Project was completed in 1993. The following is a brief synopsis of the operation.

In May 1992, we learned that approximately 300 reindeer had recently starved on Hagemeister Island and that the survivors were in poor health. Subsequent review of numbers of animals on the island indicated a total of almost 800 reindeer had starved during the winters of 1990-1991 and 1991-1992. The island under Alaska Maritime National Wildlife Refuge was temporarily placed under administration of the Togiak National Wildlife Refuge because of the proximity of the island to Dillingham and because the refuge had a close working relationship with the village of Togiak, based on the successful reintroduction of the Nushagak Peninsula Caribou Herd. A team consisting of a Soil Conservation Service (SCS) range scientist, a University of Alaska - Fairbanks (UAF) veterinarian, and a Service employee (PR Doyle) was sent to the island for a week in June 1992, with helicopter support. The team confirmed the late winter die-off by observing 276 reindeer carcasses and examining 54 of them. They surveyed the island's vegetation and documented that the lichen component of the island's vegetation was virtually destroyed by overgrazing.

The Service acquired the Hagemeister Island reindeer herd from the Native herder in Togiak. The Bureau of Indian Affairs (BIA) offered these animals to all qualified applicants to the reindeer loan program, and met with interested applicants in June 1992. It has been standard practice under the loan program that new reindeer recipients must travel to the origin of the reindeer. Costs of transporting the reindeer are borne by the recipient. Hagemeister Island reindeer were offered under these terms, provided animals were removed by October 15, 1992. That date was selected in order to avoid Service aircraft operations during the shorter days and more hazardous flying conditions of late fall and winter, in the event loan program applicants did not remove all the animals. The Service prepared to shoot any animals not removed by loan applicants. At the request of the applicants, who asked for more time to secure financing and arrange logistics, the date was postponed until November 15, 1992.

One of the applicants, Dr. Olson said he could meet the deadline and on September 8, 1992, he was authorized to remove reindeer as a part of a group called South Central Reindeer Farms. The Service offered aircraft assistance to help scout landing areas on the island. Neither Dr. Olson nor the group took immediate action. On November 2, 1992, at his request and with concurrence of other members of South Central Reindeer Farms, Dr. Olson was issued a separate special use permit to remove reindeer. On November 16 and 17, he asked for two day delays in Service removal operations, which were granted. On November 19, he asked for additional delays; these were not granted. The Service began shooting reindeer on November 16 and 17 on the south end of the island, away from Dr. Olson's corralling activities. The Service began hauling salvaged carcasses to Togiak and other nearby villages. Salvage of carcasses ceased on November 28 when the chartered DeHavilland Otter struck its propeller in soft sand on the island and no other suitable aircraft could be found for hauling carcasses off of the beach. Dr. Olson's permit was terminated on November 30, after he had transported 120 live reindeer off the island. Forty of those animals subsequently died of starvation.

Service operations were temporary halted by winter storms on November 30. In response to concerns expressed by the village of Togiak, the Service put on hold further reindeer removal. The Service camp was removed December 5, 1992. The Service estimated that at least 200 animals remained on the island. Approximately $120,000 was expended on field operations through November 1992. Those costs included the field and aircraft costs during the November

removal, transportation between Dillingham and Togiak for several meetings, and cost to place the SCS/UAF/Service team on the island in June.

In December 1992, the Council requested that we provide them with 50 animals from the island for a herd on Native-owned lands on the mainland. The Service discouraged this proposal because, without fencing, the animals would range on refuge lands and probably mingle with the reintroduced Nushagak Peninsula Caribou Herd. The Council then requested that 50 animals remain on the island. The Service prepared an environmental assessment and a compatibility determination. The draft SCS report of the previous June survey stated that most lichen biomass on the island had been removed by grazing. Of the lichen producing areas, plant communities that previously supported abundant quantities of lichens had been reduced to less than 5 percent. The remaining lichen biomass was almost dead. Bare ground from reindeer cratering was found in many areas and soil erosion was evident. Therefore, the Service determined that continued reindeer grazing on the island would be incompatible with the purposes of the refuge and selected the alternative to remove all remaining animals as soon as weather allowed. In February 1993, the Service and the BIA participated in the "Hagemeister Reindeer Conference" in Togiak. The conference resulted in the "Togiak Cooperative Reindeer Management Plan."

The plan was an agreement for the Service, the BIA, and the Council to remove all remaining animals from the island and transfer them to the Council under the reindeer loan program, but to wait until September. The Service had planned to remove the animals in late winter as soon as flying conditions were favorable. In the plan, the Service agreed to remove all suitable animals alive from the island and to transport them, at Service expense, to Togiak or as far as Palmer, Alaska. At the conference, we discussed that mature bulls, old cows, stragglers, and sick animals would not be removed alive. However, this was not detailed in the plan. The Service had $30,000 available for the cooperative removal effort. The Council requested that $10,000 of this be made available for a study of the reindeer by UAF, and the Service agreed. The concept discussed was that all four entities -- the Service, BIA, UAF, and the Council -- would work together in the field during the removal operation.

The plan called for an early August planning meeting in Togiak. The Council canceled one scheduled meeting with only a few hours notice, after the BIA reindeer specialist had already traveled from Anchorage to Dillingham. Instead of meeting to plan the removal operation, the Council requested that the plan be amended to leave 50 animals on the island and to postpone operations until November. The original plan represented a compromise by all parties and the proposed amendment would have essentially gutted the agreement. The Service denied this request. When Secretary Babbitt (Secretary) visited Togiak on August 19, 1993 he was also asked by local villagers to leave 50 reindeer on the island and to delay the removal until November. The Secretary concurred with the Service's position. The Council sued the Secretary over issues of ownership of the herd, timing of its removal, and the request to leave 50 animals. On September 7, 1993, U.S. District Judge John Sedwick denied the Council's request for a temporary restraining order against the Service. The Service and the BIA proceeded with the removal.

The first 155 reindeer captured were herded into a corral by helicopter. Dr. Don Tomlin, the BIA Anchorage Agency Reindeer Specialist, designed and provided the corral material. He was on site continuously during this part of the operation and provided technical supervision of the corralling and animal processing. Dr. Tomlin had extensive experience in working in the field rounding up and processing reindeer with Alaska herders. At first, herding was successful with one helicopter but as the animals became accustomed to the helicopter and increasingly wary of the corral, a second helicopter became necessary. Success of aerial herding continued to decline to the point where only a few animals would enter the corral after extensive aerial herding. The helicopter was

switched to accommodate a skid-mounted net gun and over a two-and-a-half week period, another 140 reindeer were captured, one at a time. A second helicopter was still necessary to carry captured animals back to the corral. Also, a Super Cub was essential to spot animals. Extensive aerial herding was still necessary in order to move reindeer down from steep slopes to areas where they could be safely captured in the net. Four reindeer were killed during the net capture and one during net slinging. This is well below the minimum 10 percent mortality estimated for this type of capture operation by Alaska Department of Fish and Game.



Photo 19. Corralled reindeer waiting to be loaded into the DC-3

During the net capture operation we learned from the Department of Corrections that 14 mature bulls had died from fighting in the pens at Point MacKenzie and they requested that no more be sent. All but one bull caught or encountered after that were shot. Also, a cow and a separate calf which successfully eluded numerous attempts to capture them by net gun were also shot. The mountain tops usually were obscured by clouds and windy conditions existed. Net capture became increasingly hazardous because of rain on the helicopter bubble. Usable daylight on the island had decreased to between the hours of 9:00 a.m. and 7:00 p.m.

Fair weather periods when aircraft could be safely operated on the island were few and short during most of the operation. Also, removing live reindeer from the island could only be carried out when low tides exposed enough beach to allow the DC-3 to land, load, and depart. This window was further shortened because it also depended on good weather at the island and along the route to the Goose Bay Airstrip near Palmer, AK (about 400 air miles) to ensure loaded animals could be delivered in a timely manner. Stops en route could cause severe overheating of the animals. Landing the DeHavilland Otter on the beach for fuel resupply and to remove carcasses also required low tides and reasonable flying conditions at Dillingham, the island, and at

Togiak. Frequently, this did not occur simultaneously. Periods suitable to herd or capture reindeer by helicopter were also short or infrequent, because the reindeer frequented the highest mountain tops on the island, while cloud ceilings were commonly below 800 feet. Cloud free periods were frequently accompanied by high winds, which made spotting from the Super Cub hazardous in the mountains.



Photo 20. A UAF veterinarian and PR Doyle collect tissues for UAF study.

The operation was successfully concluded on October 17, 1993. A total of 415 live reindeer and 294 carcasses were removed from the island. This includes delivery of 289 live animals to the Goose Bay Airstrip near Point MacKenzie, and 6 live calves to the village of Togiak. This total also includes 120 animals removed alive by Dr. Don Olson in November 1992. The animals delivered to Goose Bay will be managed for a year or more by the State of Alaska, Department of Corrections, at the Point MacKenzie Project Hope Prison Farm, on behalf of the Traditional Council of Togiak (Council) and the Bureau of Indian Affairs (BIA). Carcasses were distributed and were delivered to Togiak (159), Twin Hills (36), Dillingham (35), Goodnews (26), Manokotak (17), Platinum (15) and Quinhagak (6).

Photo 20. One by one, 140 reindeer were slung by helicopter to the corrals.

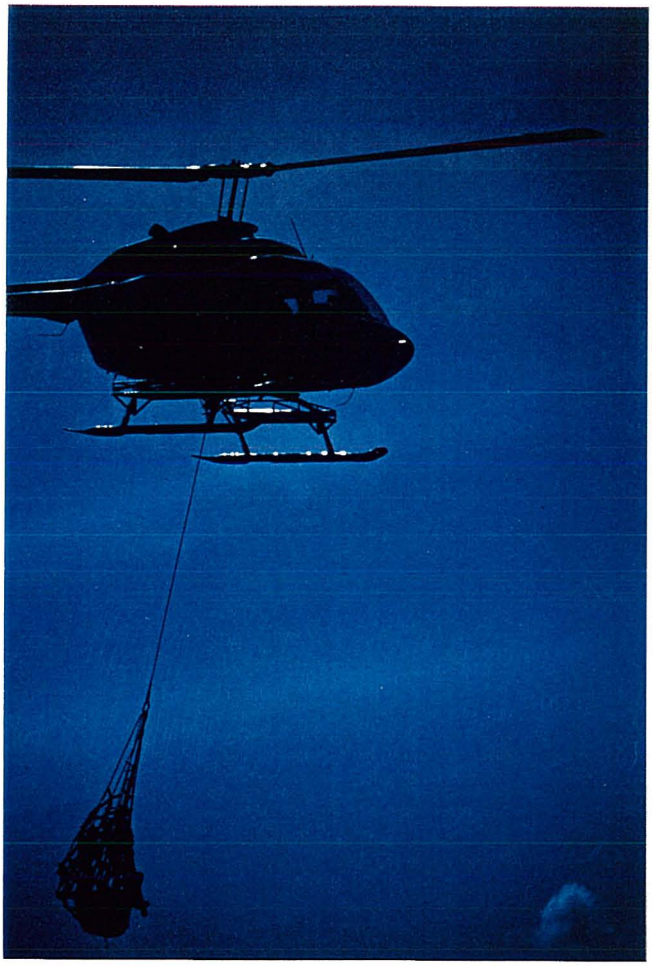




Photo 21. RIT Evans prepares a carcass for delivery into a local village.

The Service spent approximately $41,000 for DC-3 flights in Fiscal Year 1993 (FY 93). Costs for chartered helicopters and the Otter were $157,000, not including fuel. All aircraft were chartered from Alaska businesses. Operational costs for Service aircraft totaled $6000. Total costs for this activity in FY 93 were $264,000. Contrary to what was discussed at the February conference, the Service and the BIA received no help from Togiak Council, other than distribution of carcasses in the village.

For the 18 days of the operation in FY 94, costs totaled $149,000. This included $20,000 for DC-3 aircraft, $87,000 for helicopters and the DeHavilland Otter, and $5000 for Service aircraft. An additional Alaska helicopter company was chartered. An Alaska private veterinarian was contracted to test animals and assure humane care of captured reindeer on the island, at a cost of $4500. Service costs also included maintaining and supporting a multi-agency crew, averaging 16 workers, from the BIA, UAF, and U.S. Department of Agriculture, Animal and Plant Health Inspection Service, which provided an inspector and a veterinarian during FY 93.

Removing the reindeer from Hagemeister Island was a highly controversial issue. After entering an agreement with the Service and the BIA to cooperate in removing all reindeer from the island this September, the Council first requested that we abrogate the agreement, then petitioned the Secretary, then sued him and requested a temporary restraining order, and when that was denied, they continuously provided inaccurate statements to the media. Official representatives of the Council threatened to arrest Government employees and attempted to physically interfere with field operations. While the media routinely reminded the public of last year's control operations, there was no mention that over the previous two winters over 800 reindeer slowly starved to death on Hagemeister Island.

The Service made a sincere and extraordinary effort to balance the interests of the Alaska Natives living in Togiak with the very great public cost of capturing and removing animals alive from a remote island. In this case the responsibility fell to the Service and BIA to reconcile a poor situation in the field when the private sector was unable to effectively or humanely control these introduced animals on this remote island.

This program cost the Service hundreds of thousands of dollars, but we have achieved a good balance between conflicting views about reindeer management and the need to follow the law and to protect refuge resources. It is difficult to compare the high costs of field operations in a remote area of Alaska with the intangible values of restoring a large island ecosystem through humane removal of an unmanaged reindeer herd which suffered high starvation losses. It is fitting that a failed project that unsuccessfully tried to maintain a reindeer herd on a remote island with difficult access, has been relocated to a new farm setting.

H. PUBLIC USE

1. General

There are seven villages located either within the refuge boundary or in close proximity. Quinhagak, Goodnews Bay, and Platinum border Kuskokwim Bay; Togiak, Twin Hills, Dillingham, and Manokotak are on the Bristol Bay side.

Kuskokwim Bay villages concentrate their commercial fishing and subsistence activities north of Cape Newenham, utilizing Bethel as their transportation, service, social, and political center. The Bristol Bay communities usually focus their subsistence and commercial fishing activities from east

of Cape Newenham to the Nushagak River. These villages utilize Dillingham as a center for transportation, service, political, and social needs.

The majority of non-rural resident public use on the refuge, which occurs primarily from May through September, consists of either guided or non-guided sport fishing, big game hunting, and river rafting. A few visitors utilize coastal portions of the refuge for photography, wildlife observation, and waterfowl hunting.

Refuge Program Specialist Dave Patterson arrived in Dillingham June 28 for Togiak's Public Use Review. Public use requirements and goals were discussed along with new ideas for public awareness. Patterson and ARM Stovall left for Cape Peirce on June 29 to evaluate the feasibility of further promoting a watchable wildlife program at Cape Peirce. Potential disturbance to walrus and seals along with harsh weather conditions are major factors when considering this area for a public viewing program. Patterson witnessed first hand weather extremes as the first day was partly cloudy and sunny only to be followed by 60 mph winds and rain the next day. Weather delayed their departure almost two days canceling plans to visit Togiak River Ranger camp.

A great trip brochure for non-guided visitors was developed in-house and is available for distribution. The brochure discusses subsistence use, fishing regulations, minimum impact camping, access and general information on the refuge. It also provides helpful hints when planning a non-guided trip. Graphics for the brochure were provided by BTW Wilson who is an excellent artist.

2. Classrooms - Students

ROS Johnson and BTW Jemison assisted ADFG Biologist Larry Van Daele dissect a (Hagemeister) reindeer carcass for 25 Dillingham High School science students in January. The students were shown all of the reindeer's internal organs and taught the primary functions of each. The class project regarding anatomy and physiology gave them a hands on experience. Teachers were very appreciative of the unique opportunity.

ROS Johnson, BTW Haggblom and volunteer Andy deValpine did bird presentations for Roanoke preschool and Dillingham Headstart in April. Different types of nesting materials were brought in to discuss where birds nest and which birds lived where. Migration and bird adaptations were also discussed. They helped kids make paper birds and did bird songs with charades. ROS Johnson played the autoharp, deValpine played the flute, and BTW Haggblom assisted the kids with charades. There was no lack of creativity or talent!

In May, the environmental education program focused around breeding bird activities for the Dillingham 4th graders. On May 13, ROS Johnson, BTW Haggblom, and BTF MacDonald gave them an overview of avian ecology. ROS Johnson discussed nesting, Haggblom discussed sea birds and MacDonald discussed anatomy and physiology of birds. On May 14, ROS Johnson gave the children a slide show on identification of various bird species by sight and sound. On May 19 the finale of the program consisted of a bird walk field trip outside Dillingham to get first hand experience.

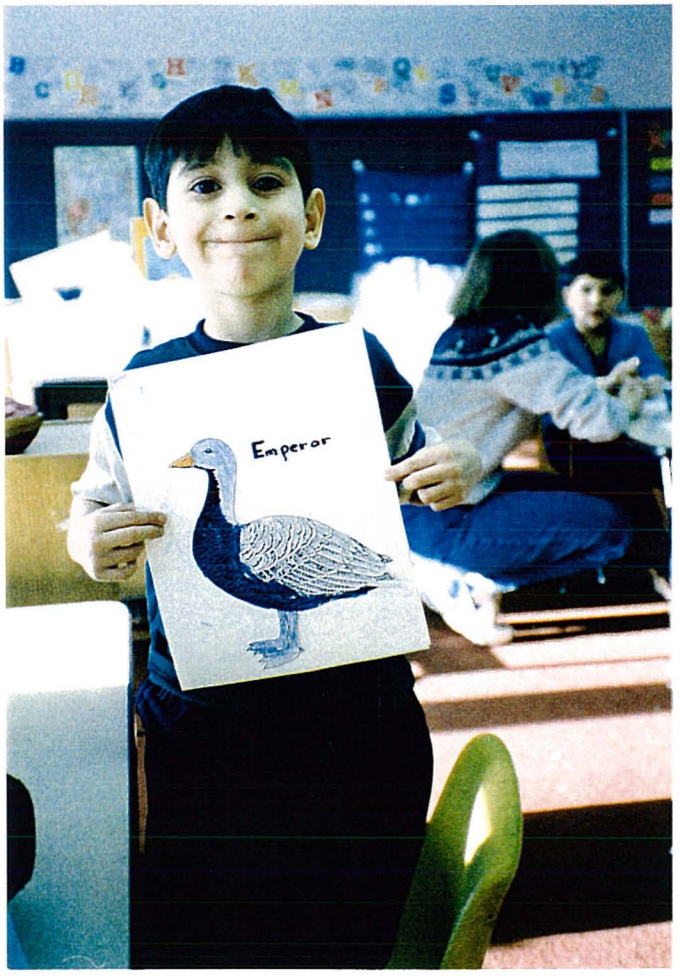


Photo 23. In support of the Goose Management Plan a Dillingham student draws a Emperor Goose.

3. Classrooms - Teachers

ROS Johnson completed the Nushagak Caribou Education Packets which were distributed to Dillingham, Manokotak, and Togiak schools. The purpose of the packet was to aid teachers in educating students on the monitoring, biology, and management of the Nushagak Caribou Herd. The final exercise is for the students to create their own (mock) caribou management plan, using the packet to assist them.

4. Interpretive Foot Trails

Nothing to report.

5. Interpretive Tour Routes

Nothing to report.

6. Interpretive Exhibits/Demonstrations

An interagency interpretive display was completed in 1990 and has proven to be a popular attraction with travelers. The project was a cooperative venture between Togiak Refuge, City of Dillingham, Bristol Bay Coastal Resource Service Area Board, village corporations, and the State of Alaska Department of Natural Resources and Department of Fish and Game.

The displays were placed in major terminals at the Anchorage and Dillingham airports are located to help orient visitors to southwest Alaska and delineate land ownership patterns. Two displays are located in each airport, one in the MarkAir terminal and one at Peninsula Airways. Displays in Dillingham have tearsheets stocked on the following subjects: Togiak Refuge; Alaska Department of Fish and Game; Wood-Tikchik State Park; Nushagak and Mulchatna Rivers, and Dillingham. The displays in Anchorage have the tearsheets under clear Plexi-glas™ and are not stocked.

FB Lisac and BTF MacDonald were judges for the Dillingham Middle School Science Fair in March. More than 90 entries were presented by the 6th through 8th graders. The field was narrowed to eight students who will go on to represent Dillingham in the State Science Fair.

7. Other Interpretive Programs

As identified by the Public Use Management Plan (1991), river rangers were placed on the Kanektok, Goodnews, and Togiak rivers. Two rangers on each river patrolled in small power boats in order to contact all visitors, provide information, collect use data and obtain resource data. The emphasis on the river ranger program is educational rather than enforcement.



Photo 24. Ranger Harper offers hospitality to Japanese floaters on Togiak River.

Rangers are the main source of environmental education and/or interpretation for sport fishermen and local residents. Information distributed to the public includes Service policies, regulations, resource management practices, State sport fish regulations, bear safety, wilderness ethics, low impact camping, and information about private Native lands to prevent trespass. Information rangers document include the level of sport fishing and subsistence use occurring on the river along with the location and timing of activities, conflicts between recreational and subsistence users, conflicts between different recreational users, sport fish catch/harvest per unit effort, neotropical bird sightings and other wildlife sightings. In addition they patrol campsites for litter, dispose of abandoned set nets, monitor compliance of commercial sport fishing operators, collect water samples, and offer assistance as needed.

This year camp operations were as follows: Kanektok River (Rangers Doyle and Rowland) June 18 to August 23, 1993; Goodnews River (Rangers Mitchell and Erion) June 16 to August 20, 1993; Togiak River (Rangers Culbertson and Harper) June 16 to August 20, 1993. Unfortunately, all ranger camps were closed about three and one-half weeks early due to personnel being sent to Hagemeister Island for the reindeer removal project. For more information regarding the river ranger program please see Section E. 8b.

8. Hunting

Three big-game guides Chris Goll, John Peterson, and Nelson Hautanen are permitted via Special Use Permit to operate commercial brown bear hunts within the refuge. Hunters, however, are not required to use guided services.

Effort expended by local subsistence hunters varies each year depending on weather, traveling conditions, availability of game, and the success of commercial fishing. On refuge lands, there is no open season for moose by sport hunters or subsistence hunters.

Throughout the year, Native residents of coastal villages within or adjacent to the refuge harvest marine mammals which is a significant subsistence activity. This activity is primarily directed toward harbor seals near coastal fish-spawning grounds with an occasional walrus. This is partly due to the traditional maritime orientation of the village residents and partly to the extremely low moose and caribou populations in the vicinity of these villages. Village residents often travel to areas off the refuge to hunt caribou.

This year, a successful hunt took place at Cape Peirce, on August 11. Two walruses were shot and killed on Maggy Beach, with moderate disturbance to the 4300 walruses hauled out. The hunters processed the blubber, nosecones, flippers, a large amount of muscle, and internal organs from the two walruses. Staff videotaped and photographed the harvest, with the cooperation of the hunters. Another hunt was attempted on September 28, but the 48 walruses on Maggy Beach went into the water after being disturbed by the hunters' boats. The hunters decided the water was too rough to pursue the animals.

A walrus hunt at Cape Newenham occurred on June 8 in Wally Cove. Several shots were fired, and an animal was struck as it entered the water. One of the field staff witnessed the walrus bleeding profusely in the water, but the hunters were unable to retrieve it.

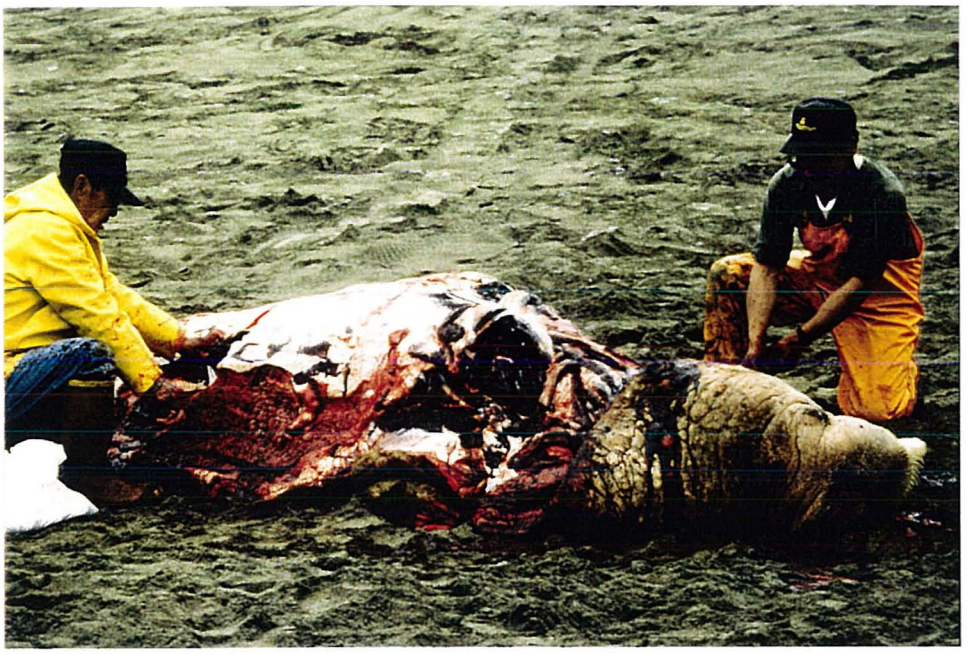


Photo 25. Local hunters process the harvested walrus at Cape Peirce.

Three seal-hunting incidences were observed at Cape Peirce this summer. On May 31, hunters fired in excess of 30 rounds from their boat while in Nanvak Bay and more rounds while in the open water outside the channel. Two seals were killed and retrieved. Two hours later, field staff discovered a newly dead male seal pup on Maggy Beach, probably less than one week in age, with bullet entry and exit wounds in its skull. Another dead pup, a 4-6 week-old female with a bullet hole in its skull, washed up on North Spit on June 11. A hunt was attempted on August 11 in Nanvak Bay. More than 15 rounds were fired by hunters from a boat at seals hauled out and in the water, but no seals were recovered. A newly dead female subadult with its skull fractured by a bullet was discovered two days later on North Spit. Another unsuccessful hunt took place on September 28 when hunters shot several times at seals in Nanvak Bay from North Spit.

One seal hunt occurred at Cape Newenham while staff was present, on May 31. Hunters fired at least 15 times from their boat into a cove at the base of Oracle Mountain, where two seals and 11 sea lions were present. The hunters fired repeatedly in pursuit of one seal as it swam and surfaced in the water, but they did not recover the seal.

9. Fishing

Sport fishing for resident and anadromous fish in rivers and lakes on the refuge is considered excellent and draws the majority of use by visitors from outside the refuge. Fishing opportunities include all five species of Pacific salmon, rainbow trout, pike, grayling, lake trout, Dolly Varden, Arctic char, and others. These fish are sought at different times of the year, with the majority of use occurring during the summer. Of the available species, king and coho salmon, rainbow trout, and char (spp.) are the most avidly pursued by anglers.

Subsistence users from local villages, using various fishing methods, rely heavily on fish harvested from refuge rivers and lakes. The subsistence users catch the majority of their fish using nets

during the ice-free season. Other subsistence methods include ice-fishing, rod and reel, and spears on the Togiak River.



Photo 26. Ice-fishing traditionally.

Both subsistence and sport fishing efforts are concentrated on the Togiak, Goodnews, and Kanektok rivers. Due to the remoteness of the refuge, access is primarily by plane or boat during ice-free months and by snowmachine during frozen periods.

Refuge sport fishing guides offer fishing packages of various types to people from all over the world. These sport fishing packages range in price from $2,000 to $5,000 for a 6-10 day fishing excursion. Packages include float trips, tent base-camps on rivers, or full accommodations at lodges located off the refuge with daily fly-in fishing to refuge rivers and lakes. It is estimated that sport anglers spend more than $3,000,000 to fish within the refuge. This cost does not include airfare to Alaska or fishing tackle and licenses. Costs of all gear and transportation will probably increase the total to over $6,000,000.

Non-guided anglers constitute approximately 30% of the angling visitors. They are primarily river rafters, hiring one of the air taxis permitted to operate within the refuge to fly into the headwater lakes of a major river system. Some non-guided anglers may also fly private aircraft into the refuge to fish. During the chinook and coho salmon sport fisheries, flying scheduled seat fare to Quinhagak and fishing the Kanektok River has become very popular. In the village it is possible to rent a boat and motor or hire someone to give you a ride to a prime fishing spot and

fish for the day. The village corporation in Quinhagak expanded these services by operating their own guide service, Kanektok River Safaris. This is a motorboat operation located in the lower river using tents for base camp.

Estimating use levels for the refuge has always been difficult. Refuge programs such as having rangers on the main rivers, and creel censuses conducted by the refuge, the King Salmon Fishery Resources Office, and the Alaska Department of Fish and Game have begun to provide a better picture of the use pattern. Most of these studies represent minimums and often do not provide complete coverage of an entire river system, nor of all user groups. It has been necessary to rely on use figures reported by the individual permit holders, and staff estimates of non-guided users, to acquire a full range of user estimates (Table **22**).

Table 22. 1993 Estimates of Sport Fishing Use Days on Togiak National Wildlife Refuge[1]

Type of Use	Kanektok River	Goodnews River	Togiak River	Other Rivers[2]	Total
Guided Use	4,258	986	3,557	756	9,557
Non-guided Use	1,748	997	1,842	94	4,681
Totals	6,006	1,983	5,399	850	14,238

[1] From refuge river ranger surveys, air taxi trip reports and sport fish guide reports.

[2] Includes Pungokepuk Creek and Lake, Gechiak Creek and Lake, Ongivinuck River and Lake, Negukthlik River, Ungalikthluk River, Kulukak River, Arolik River, Canyon Lake, Nenevok Lake, Jondik Creek, Heart Lake, and High Lake.

Other information pertaining to the sport fishing opportunities and levels of use can be found in Sections D.5. Research and Investigations and G.11. Fisheries Resource.

10. Trapping

Trapping is an important part of the culture and economy in northern Bristol Bay. Trapping was one of the main sources of cash income before the prices paid for commercially caught salmon increased during the early 1980s. Furs still provide an important source of income for many residents. During late February, trappers come to Dillingham from around the region to seal and sell pelts at the annual "Beaver Round-up." Fur buyers purchase thousands of pelts during the week-long rendezvous and celebration.

Beavers have historically been the most important furbearer in northern Bristol Bay. They are abundant throughout most areas of the refuge. Although beaver dams create inundated areas which enhance waterfowl production, they occasionally impede the movement of migrating salmon and cause siltation in traditional spawning areas. Pelt prices and local travel conditions are significant factors in the size of the annual beaver harvest. Commercial salmon prices also affect beaver trapping effort in the Bristol Bay area; as salmon prices rise, fur trapping effort declines. However, the importance of beaver as a food item for local residents assures a base level of harvest regardless of other factors.

River otters are common throughout the refuge, and many of those caught are taken in conjunction with beaver trapping activities. Mink and muskrat also occur within the refuge; however, little trapping effort is specifically directed toward them.

Red foxes are the second most commonly trapped furbearer on the refuge. Fox populations fluctuate widely, apparently as a result of periodic rabies outbreaks. Arctic foxes are uncommon, probably dispersing from the Yukon-Kuskokwim delta during peaks in their population cycles.

Lynx and marten occur on the refuge but are uncommon. Both species reside in boreal forest, an uncommon habitat type on the refuge. Any effort directed toward these furbearers is probably opportunistic.

Wolves and wolverines occur in limited numbers, due to the low density of moose and caribou. Interest in these valuable furbearers is high, from both a domestic and commercial standpoint. Most wolves and some wolverines are taken in this area by shooting, a legal method of take under trapping regulations. In addition, both are classified as big game and can be taken under hunting regulations.

Other furbearers on or near the refuge include coyote and short-tailed weasel. Coyotes are recent immigrants to this area as they continue to expand west from the Alaska Range. Weasels are common, but little effort is expended in trapping them.

In Alaska, five species of furbearers must be sealed by ADFG personnel or an authorized representative if taken anywhere in the State regardless of their intended use. These furbearers include lynx, river otter, wolf, and wolverine. Beaver hides do not need to be saved so long as the meat is salvaged.

In addition to sealing, ADFG collects harvest information through fur acquisition reports from fur buyers. The regulatory year begins July 1 and ends June 30; thus, calendar year 1993 encompasses the second and first halves of regulatory years 1992-93 and 1993-94, respectively. Furbearer sealing data for the villages in closest proximity to the refuge is presented in the following table. With the exception of wolves, all other furbearers were assumed to have been taken near or on refuge lands. Airplanes are often used to access areas off the refuge containing wolves. Trapping seasons generally reflect the period of pelt primeness and begin in early November and finish at the end of February or March. Most trappers access their trapping areas via snowmachines. Open water or lack of adequate snow may prohibit access and thus reduce trapping effort.

Table 23. Animals Sealed in 1993 Calendar Year

Species by Village	1992-93 Regulatory Year			1993-94 Regulatory Year		Total
	January	February	March	November	December	
Lynx						
Aleknagik	0	0	0	1	0	1
Dillingham	0	0	0	1	0	1
TOTAL						2
Wolf						
Aleknagik	0	7	0	0	0	7
Dillingham	0	0	2	0	0	2
TOTAL						9
Wolverine						
Aleknagik	0	1	0	0	1	2
Dillingham	0	1	0	0	0	1
Quinhagak	1	0	0	0	0	1
Togiak	2	0	0	0	0	2
Twin Hills	1	0	0	0	0	1
TOTAL						7
Otter						
Aleknagik	5	1	0	6	10	22
Dillingham	3	3	0	4	1	11
Goodnews Bay	1	0	0	0	0	1
Manokotak	27	12	0	2	11	52
Quinhagak	3	0	0	6	0	9
Togiak	2	0	0	0	0	2
TOTAL						97
Beaver						
Aleknagik	14	9	0	0	0	23
Dillingham	34	17	0	0	0	51
Goodnews Bay	23	0	0	0	0	23
Manokotak	78	56	0	0	0	134
Quinhagak	1	0	0	0	0	1
Togiak	94	0	0	0	0	94
TOTAL						326

11. Wildlife Observation

This activity is usually associated with sport fishing or hunting within the refuge. Expense and troublesome logistics have prevented Cape Peirce from being a popular wildlife viewing attraction. High winds and low ceilings commonly postpone Cape Peirce arrival and/or departure schedules. Costs for air charters are close to $800 for a drop off or pick up.

12. Other Wildlife Oriented Recreation

This activity consists primarily of wildlife photography. Every year a few outdoor writers and/or photographers visit the refuge. They are usually associated with a sport fish guiding operation and are getting pictures and information to complete articles for outdoor or fishing magazines.

13. Camping

Camping, as related to subsistence activities conducted by local village residents, occurs primarily on the refuge during the fall and winter months. Villagers camp while trapping, hunting, fishing (fall fishing for spawned-out salmon), berry picking, and firewood gathering. Most of the camps are located on Native land allotments within the refuge wilderness area.

Camping by non-rural residents is usually related to sport fishing, hunting, or river rafting. The refuge does not provide any camping facilities. In association with their guiding services, several sport fish guides provide semi-permanent camps on major river drainages. All other camping is primitive tent camping.

14. Picnicking

Nothing to report.

15. Off-Road Vehicling

Snowmachines are the only off-road vehicles authorized for use on the refuge and are for use only during periods of adequate snow cover. Their use on the refuge during the winter is quite extensive and is usually associated with travel from one village to another, trapping, firewood gathering, ice fishing, or hunting.

16. Other Non-Wildlife Oriented Recreation

These are subsistence activities conducted by village residents. These activities consist primarily of firewood gathering and berry picking.

17. Law Enforcement

Special Agents were detailed to Togiak River, September 17-24 to patrol for illegally shot moose. Moose hunting is illegal on the Togiak drainage, due to low population numbers. Special Agents met with PR Harper on the Togiak River September 18. PR Harper served as river guide. On September 19, moose hunters were discovered on the west shore of Togiak Lake. They had poached a moose and were given a citation. During the same trip, Special Agents discovered an individual with fresh parts of moose and two bald eagles in his boat. This individual was also given a citation. The Togiak River has been patrolled two consecutive years now and we plan on continuing this effort because of the obvious need.

Letters of warning were submitted to two sport fish permittees. Golden Horn Lodge was warned for utilizing an area (Togiak Lake) which their Special Use Permit does not authorize. Togiak Fisheries Adventures was warned for using an unauthorized cabin on West Togiak Lake which their permit does not allow overnight camping or permanent facilities. Both permit violations were reported by refuge river rangers.

Robert Nanalook of Togiak received a letter of warning regarding an unauthorized cabin located on West Togiak Lake. Service records indicate that no authorization or approval was granted for the construction. The Nanalook's did not remove the cabin and we are in the decision making process as to what to do with the cabin. We are working with the Division of Realty to see if a land exchange is possible, but the outcome is still pending.



Photo 27. Trespass cabin located on West Togiak Lake.

Another trespass cabin (owner unknown) off of Togiak River was located last summer by river rangers. It was posted and notices will be printed/posted locally in newspapers and at post offices throughout the year. If ownership cannot be determined, the Service will determine what action to take.

I. EQUIPMENT AND FACILITIES

1. New Construction

After many years of requesting, a hanger (60X60) was approved and constructed. This provides basic safety for pilot and passengers. Aircraft use is an integral part of managing the refuge and is routinely used during the summer and winter. Without hanger space, planes are subject to all outside weather conditions. Constant exposure to salt air causes corrosion, and in the winter, ice

and snow accumulation greatly increases the time needed for maintenance and operations. In addition, ice coatings greatly increase wear on the engine, instruments, and other critical parts. The construction contract was awarded to International Steel Erectors from Anchorage who subcontracted with several local contractors. The contract was awarded for almost $474,000. Plans were to complete the hanger in the fall, but were delayed due to receiving defective panels.

2. Rehabilitation

The refuge office space is leased through Choggiung Limited. As of February 1, Bristol Bay Area Health Corporation Alcohol/Drug Program, who shared office space with us in the Kangiiqutaq Building moved to the hospital. The refuge acquired the additional space and expanded. This enabled staff to moved from cramped shared quarters to individual offices and also allowed for a badly needed conference/meeting area.

Prior to the expansion, Choggiung repainted the entire office space and laid new carpet throughout. Vertical blinds were installed over large picture windows alleviating the staff from being baked by the summer sun. The stairwell was also boarded up to make space available for an environmental education room. All changes and expansions have created a very congenial work environment leaving us with a whole new outlook on paperwork . . . almost.

3. Major Maintenance

Through maintenance management funds the refuge was able to improve the sewer system for the bunkhouse facility. During the summer, seasonal employees are provided housing and, in the past, difficulties were experienced in that the sewer line kept backing up. The bunkhouse was on the tail end of a line servicing six houses. The contract was awarded to Nuna Contractors who subcontracted with a local Dillingham contractor, D&J Construction. A new line has been installed and ties in directly to the main sewer line. The cost for the new line cost was approximately $81,000.

4. Equipment Utilization and Replacement

Barge containers were set on leased property at the Togiak, Goodnews Bay, and Quinhagak airports. This will provide secure year-round storage for field equipment and save on transportation costs when setting up summer field camps.

The station received a new Chevrolet extended cab pickup to replace an old fuel truck.

The long search (over a year) to find leased quarters for Interpreter Dyasuk ended. A contract was signed with the Echavarrias to rent their two bedroom home. Because they restricted the maximum number of individuals living in the house to four, ARM Stovall agreed to change quarters moving to the Echavarria house leaving the larger Stiassny lease to the Dyasuk family of six. The Dyasuk family had been living in a trailer which the Service had condemned.

Six refuge employees are currently housed in government quarters which are leased private homes. Housing in Dillingham is very limited and we hope funds will be made available to build permanent government housing. This year we were informed by the Bristol Bay Housing Authority that Housing and Urban Development (HUD) planned to purchase 29 single family

homes in Dillingham. This is a major concern to staff occupying leased quarters because they are all on the market to sell. Listed as high priority needs for FY94 is the following: three, 1-family residences of standard design (estimated $1,185K which includes $125K for land) and one, four-plex residential apartment building to house low to moderate pay grade refuge employees (estimated $1,270K which includes $60K for land).

In preparation for Secretary Babbitt, the bunkhouse furniture was replaced. The old donated furniture was in such bad condition through years of use, the local charity organization almost didn't accept it. The new furniture is of good quality and sturdy fabric and should last a long time while still looking very "homey".



Photo 28. Out with the old . . .



Photo 29. And in with the new - bunkhouse furniture.



Photo 30. The new look makes bunkhouse living bearable.



Photo 31. This is now known as the "Babbitt Room."

5. Communication System

A new refuge VHF radio system was purchased and installed during 1992. The system complete consists of two permanent repeaters (Thumb Mtn. and Kashaiak Mtn.) and one mobile repeater (Pyramid Mtn.), four radio base stations which tie the radio system into the phone system (Quinhagak, Cape Newenham, Togiak and Dillingham), six mobile base radios (camp radios) and 12 handheld radios. The system allows direct communication between the field camps, individuals, refuge aircraft and the refuge headquarters. All radios are capable of accessing the phone system through any of the radio base station, allowing communication with anybody that has a telephone. Solar static is not a problem and communications are excellent at all field camps and throughout most of the refuge.

6. Computer Systems

The refuge received two 486 personal computers and two 386 Laptop computers in 1993. These were much needed pieces of equipment that have helped to eliminate the bottle neck of data processing especially at the end of the field season.

7. Energy Conservation

Staff at Togiak Refuge actively recycles paper, cardboard, magazines, and aluminum. Recycle bins are located in a large hallway of the office. Hats go off to BTW Haggblom who receives most of the credit for not only office recycling but the City of Dillingham's recycling program also. For her efforts in town, BTW Haggblom received the "Beautification Award" at the annual award banquet by the Dillingham Chamber of Commerce.

J. OTHER ITEMS

1. Cooperative Programs

Wildlife programs on the refuge have been cooperative efforts with the Alaska Department of Fish and Game. The working relationship between the two agencies has been excellent, insuring the success of these programs.

2. Other Economic Uses

Nothing to report.

3. Items of Interest

Secretary of Interior Bruce Babbitt arrived in Dillingham August 18. Dillingham was one of his many stops during his visit to Alaska. He was scheduled to take an air tour of the refuge upon arrival, but due to bad weather, the trip was canceled. Other activities included a visit to Togiak where the main topic was Hagemeister reindeer. Babbitt and Assistant Secretary Ada Deer spoke at the Alaska Native Convention held at the high school and participated in a luncheon hosted by Bristol Bay Native Association. Babbitt also met with commercial sport fishing permittees, and the refuge staff hosted a BBQ for him and crew.



Photo 32. As the Grumman Goose loads up the gear, the Togiak crew poses with Secretary of the Interior Bruce Babbitt. (Left to right: Archibeque, Babbitt, Stovall, Mitchell, Dyasuk, Lisac.)

Regional Subsistence staff Peggy Fox, Taylor Brelsford and Moses Dirks were in Dillingham January 26-27 to discuss updates in the Federal Subsistence Management Program. A town meeting scheduled the night of the 26th was postponed until the next day due to a blizzard. An "open house" style meeting was conducted in the refuge office the afternoon of the 27th. The subsistence staff seemed pleased with the visitor turn out and contacts made.

4. Credits

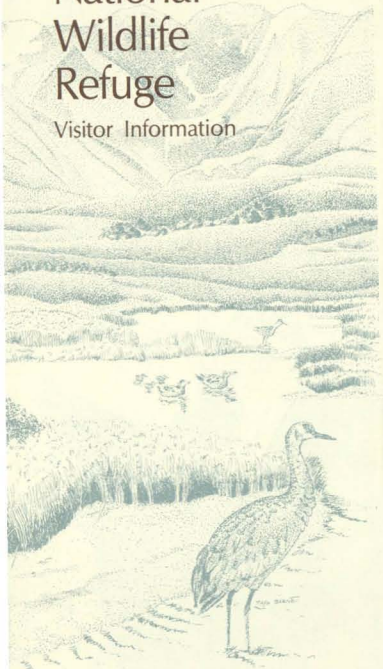
Preparing this report was a combined effort of refuge staff.



Photo 33. As does the southwestern region in the United States, southwestern Alaska has breath-taking sunsets. Adios.

Togiak National Wildlife Refuge

Visitor Information



TOGIAK: A HOME FOR WILDLIFE

With a splash, two brightly colored eiders land on the coastal waters of Chagvan Bay. Around them pintail, scaup, and black brant feed on beds of eelgrass while plovers probe for tiny mollusks on the sandy shore.



THE MANY ENVIRONMENTS AND WILDLIFE OF TOGIAK NATIONAL WILDLIFE REFUGE

Chagvan Bay is one of several coastal bays that interface Togiak Refuge where wildlife can find food and protection from wind, waves, and pounding surf. The bays and estuaries form the base of a food web feeding a variety of wildlife — waterfowl, seabirds, marine, and terrestrial wildlife.

Togiak's landscape comprises wetlands, open water, meadows, tundra, mountains, and forests. The coastline is a rugged assemblage of sea cliffs, offshore pinnacles, and sandy beaches. The scenic Wood River mountains include hanging valleys, cirques, and deep glacial lakes. Togiak Valley is the site of a two-mile long "tuya," — a rare geologic feature formed when lava erupts under a glacier. Many of the features are a result of volcanic action and glacial erosion.

The 4.3 million acre refuge was set aside to protect the diversity of habitats and the many wildlife species that live in them. The northern half of the refuge (2.3 million acres) is a nationally designated wilderness area. The refuge was established by the Alaska National Interest Lands Conservation Act of 1980.



A HAVEN FOR MIGRATING BIRDS

Alaska's wetlands are crucial to the survival of many birds. The eelgrass beds of Chagvan and Nanvak bays and the aquatic invertebrates and berries of adjacent uplands attract eiders, pintails, scaup, brant, emperor, white-fronted, and Canada geese. The wetlands with readily available fish and invertebrates are attractive to a large variety of waterfowl and shorebirds.

The coastal headlands of Cape Newenham and Cape Peirce are host to millions of seabirds — murres, horned puffin, gulls, cormorant, and kittiwakes. The interior portions of the refuge are host to bald eagles who are year-round residents. Other raptors include goshawk, rough-legged hawk, gyrfalcon, osprey, short-eared owl, snowy owl, and peregrine falcon.

....AND OTHER WILDLIFE

Brown bear are the most abundant large mammal. Caribou inhabit the Nushagak Peninsula and occasionally migrate through the northeastern part of the refuge. Smaller mammals include the hoary marmot, beaver, wolverine, otter, mink, red fox, and an occasional wolf in the interior wilderness. Marine mammals include sea lions, walrus, and seals. Grey whales feed close to the shore particularly between Togiak and Cape Newenham. Beluga and killer whales are sometimes seen along the coast.

BRISTOL BAY: A SALMON NURSERY

During the summer salmon swim up the rivers and streams of the refuge from Kuskokwim and Bristol bays to spawn. The fish — king, red, silver, pink and chum salmon — are part of the world's largest salmon fishery. Other fish include grayling, rainbow and lake trout, burbot, Dolly Varden, arctic char and northern pike.





A SENSE OF HISTORY

Archeological evidence supports the fact that Eskimos inhabited some areas of the refuge for at least two thousand years. At Security Cove near Cape Newenham there is evidence of habitation for as long as five thousand years ago.

The lifestyle of the modern Eskimo hangs in a curious balance between the old and the new ways. In the past they maintained a sophisticated hunting and gathering culture suited to the harsh environment. Today — most rural residents still depend on fishing, hunting, berry, and plant gathering.

WEATHER AND CLIMATE

Moist and rainy conditions usually prevail in the summer months. Summer temperatures range between 45° and 73°F. Snow covers the mountains by early October. In November, lakes and rivers develop an ice cover that remains until June. Winter temperatures range from 45° to −10°F, sometimes falling as low as −30°F. The weather is at best unpredictable. It is not uncommon for a warm and summy day to turn into a cold, windy, and wet day.

FISH AND WILDLIFE SERVICE
UNITED STATES DEPARTMENT
OF THE INTERIOR
ALASKA 1992

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. This includes fostering the wisest use of our land and water resources and protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation.

The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better United States — now and in the future.

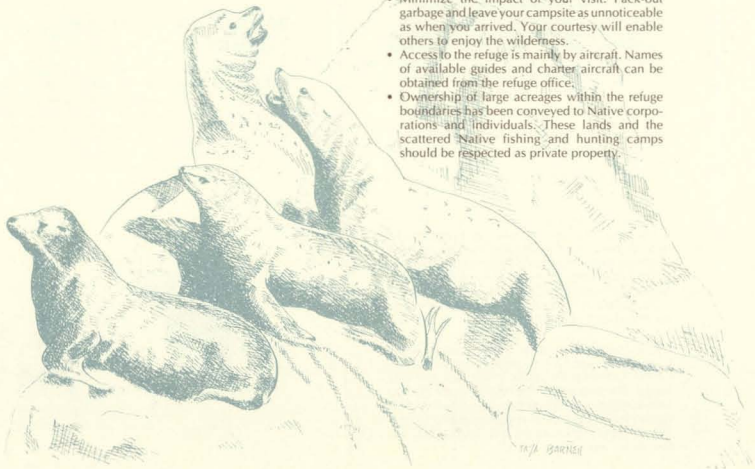
FOR MORE INFORMATION

Refuge Manager
Togiak National Wildlife Refuge
P.O. Box 270
Dillingham, AK 99576
(907) 842-1063

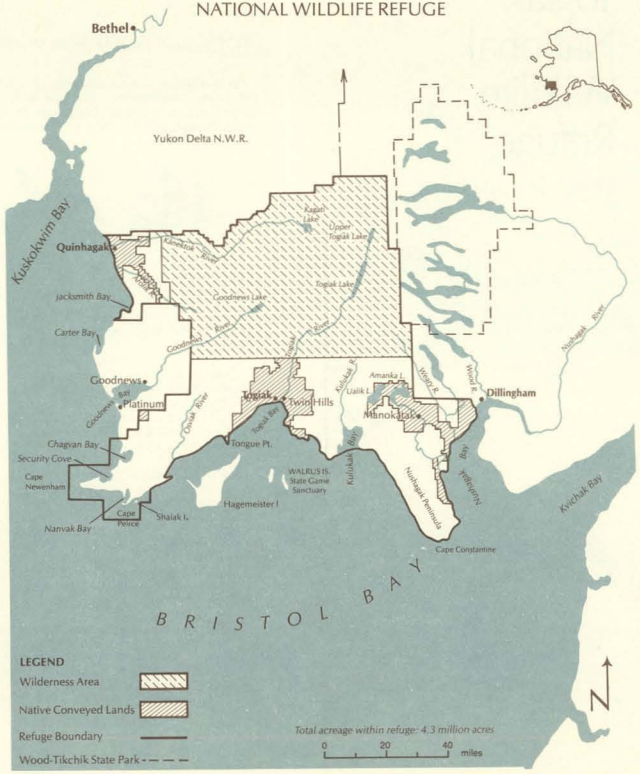
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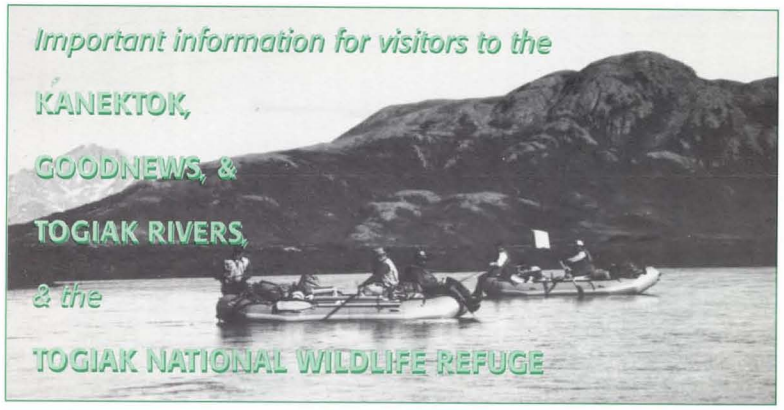
ACCESS AND VISITOR INFORMATION

- Recreational uses may include wildlife observation, hiking, rafting, hunting, and fishing. Information on hunting and fishing regulations is available from the refuge office in Dillingham or the Alaska Department of Fish and Game, Box 199, Dillingham, AK, 99576. Information on topographic maps are available from: U.S. Geological Survey — (telephone: 907-271-4307, Anchorage or 907-456-0244, Fairbanks).
- Several rivers are suitable for river running by kayak, canoe, and rafting – particularly the Goodnews, Togiak and Kanektok rivers. River users are asked to camp on bare gravel bars below the mean high water mark. Additional information on river usage is available from refuge personnel.
- Streams with native populations of trout are becoming rare. In order to maintain these populations so others may enjoy this resource catch and release fishing is recommended for rainbow trout and grayling – and encouraged for other species. Special sport fishing regulations apply to some refuge waters.
- Boil or chemically purify all water before drinking. Giardiasis – a water borne intestinal disease is common in Alaska.
- Minimize the impact of your visit. Pack-out garbage and leave your campsite as unnoticeable as when you arrived. Your courtesy will enable others to enjoy the wilderness.
- Access to the refuge is mainly by aircraft. Names of available guides and charter aircraft can be obtained from the refuge office.
- Ownership of large acreages within the refuge boundaries has been conveyed to Native corporations and individuals. These lands and the scattered Native fishing and hunting camps should be respected as private property.



TOGIAK NATIONAL WILDLIFE REFUGE







This brochure was produced by the U.S. Fish and Wildlife Service. For further information, please write:

Togiak National Wildlife Refuge
P.O. Box 270
Dillingham, AK 99576
(907)842-1063

Alaska Department of Fish & Game
Sport Fisheries or Commercial Fisheries
P.O. Box 230
Dillingham, AK 99576
(907) 842-2427 or 842-5227

Alaska Department of Fish & Game
Commercial Fisheries
P.O. Box 90
Bethel, AK 99652

Dillingham Chamber of Commerce
P.O. Box 348
Dillingham, AK 99576

Bethel Chamber of Commerce
P.O. Box 329
Bethel, AK 99559

Alaska Department of Natural Resources
South Central Regional Office
P.O. Box 107005
Anchorage, AK 99510-7005

Bristol Bay Native Association
Natural Resource Program
P.O. Box 310
Dillingham, AK 99576

Association of Village Council Presidents
Natural Resource Program
P.O. Box 219
Bethel, AK 99559

Welcome

The rivers of the Togiak National Wildlife Refuge attract visitors from around the world. People come especially to catch the five species of salmon, rainbow trout, Arctic grayling, Dolly Varden, lake trout, white fish, burbot, and northern pike that are found in the refuge's lakes, streams, and rivers.

Public use of the Togiak Refuge rivers has increased rapidly since 1980. The purpose of this brochure is to provide you with suggestions to make your visit safe, enjoyable and compatible with the purposes of the refuge.

As mandated by Congress, the purposes of the refuge are to protect the diverse fish and wildlife resources, provide for subsistence use by local residents, and protect the quality and quantity of the water resources.

The entire length of the Togiak and Kanektok Rivers and most of the Goodnews River are within the boundaries of the 4.2 million acre Togiak National Wildlife Refuge established in 1980. The headwaters and upper portions of all three rivers are within the designated Togiak Wilderness Area. There are also private lands within the refuge. Ownership of most of the private land was established by the Alaska Native Claims Settlement Act in 1971. The State of Alaska owns the stream bed and water column of the major waterways, including the non-vegetated shorelands and gravel bars up to the ordinary high water line (usually considered to be where substantial vegetation begins). To avoid trespass problems, please refer to the map on the back of this brochure.

Subsistence Use on Togiak Refuge Rivers by Local Residents

The land within the Togiak Refuge has been continuously occupied by Alaska Natives for at least 2,000 years. These people have traditionally depended on fish, wildlife, and marine resources for survival. Years ago hunters and their families spent winters at villages near the mouths of the rivers and moved up river during the summer and fall months. Around the turn of the century, there were approximately 1,800 people living in seven villages along the Togiak River between Togiak Lake and Bristol Bay. Today the combined population of Togiak and Twin Hills villages is approximately 850 people. On the Kuskokwim Bay side of the Refuge approximately 500 people live in Quinhaghak, 250 live in Goodnews Bay, and 50 live in Platinum.

Traditional seasonal subsistence movements and patterns are practiced today. As you travel the rivers, be aware that while these lands and rivers appear to be wild and undeveloped, they may be culturally significant to people in the region. Each physical characteristic of the landscape, whether it be a bend in the river, a bluff, or a hill, may have some historic importance. Through family and kinship ties, the cultural significance of these rivers is maintained.

While local residents now enjoy some benefits of a cash economy, most local people continue to be economically and culturally dependent on fish and wildlife resources. As you travel the rivers, you may notice dried fish hanging from racks and people using nets to catch fish. As with most coastal areas, fish are the mainstay of the subsistence way of life.

Please Respect Local Residents' Subsistence Culture

It is important that visitors understand the significance of a subsistence lifestyle to local people. Rapid increase in visitor use can be disruptive to traditional patterns. Crowding people for fishing sites is discourteous, and visitors are encouraged to be respectful of local people who may be using traditional fishing sites. Special regulations actually prohibit sport fishing within 300 feet of a legally operating subsistence set gillnet. If you are considerate, people will be friendly and may be more inclined to share their experiences with you.

Some common recreational practices may be unfamiliar or even offensive to local customs. "Catch and release" fishing is a popular method for visitors; however, to some Native cultures this practice is viewed as disrespectful and wasteful of the resource. Many village elders believe that the misuse of, or "playing" with, fish will affect the future availability of the resource and, therefore, the survival of their people. It is recommended that visitors take extra care to practice proper catch and release fishing to minimize mortality. Occasional reports of bright/fresh fish found dead in the water or the practice of releasing fish on gravel bars and "kicking fish" back into the water have contributed to the distrust of catch and release as a productive management philosophy along the rivers of rural Alaska. A catch and release fishing brochure is available through the Refuge Office in Dillingham which will provide you with important tips to successful catch and release fishing.

Visitor Use and Access

Sport fishing is the primary recreational activity occurring on rivers within the Togiak National Wildlife Refuge. Other popular activities include river rafting, sightseeing, camping, wildlife observation and photography.

Most sport anglers use one of nearly thirty commercial guides permitted to operate within the Refuge. Guided recreational opportunities include river rafting, river base camps with daily motorboat access, and daily fly-out fishing from a lodge located outside the Refuge. Most unguided visitors charter an aircraft to one of the many headwater lakes to begin a float trip lasting from four to ten days. Others may fly to the airstrip located at each village and access the river by walking or renting a boat.

Commercial air service is available from Anchorage to Dillingham or Bethel. Chartering a wheel, float or amphibious aircraft to the specific Refuge site you wish to fish is easily done from either community. Private aircraft, motorboats and rafts are permitted throughout the refuge, but helicopters are not permitted for recreational purposes within the refuge.

Most food, basic supplies, commercial lodging and emergency services can be found in Dillingham and Bethel. Each village has at least one grocery store, but food stocks are generally limited. Specialty items are best purchased before you leave home.













Camping and River Recreation

Camping and fishing are permitted on public lands throughout the refuge. There are no designated campsites so you are free to choose a site to meet your own needs as long as it is not on private land. Camping on Togiak Refuge lands or adjacent State-owned lands is limited to three days at one location. At the outlet of Kagati Lake, camping is limited to one day to provide equal access for float parties and anglers. Camping on State-owned lands may be permitted for more than three days by contacting the Alaska Department of Natural Resources at the address provided on the back cover of this brochure.

Campsites on sand or gravel bars provide well drained and durable sites, usually with fewer mosquitoes. Full-scale floods are unusual; however, water levels can rise rapidly if it is raining heavily either where you are or upriver. Water levels are usually high throughout the months of June, late August and September and less predictable the rest of the year. Choose your campsite with these factors in mind. A good idea is to mark the water's edge when you first stop and check it again for changes before retiring for the night.

Gravel bars also make the best place for campfires. Leave the area clean. Remove any unburnable items such as melted foil, plastic, and aluminum cans from the fire spot, scatter the ashes and remaining wood, and return rocks to a natural location with the black side down.

All human waste should be buried at least eighteen inches deep and located away from surface waters. Toilet paper should be burned or carried out, not buried. All members of your party should carry matches or a lighter.

Foxes and bears have a great sense of smell and will generally dig up anything that you try to bury. Litter and large craters filled with garbage left behind by campers not only detract from the beauty of these wilderness waterways, but are illegal.

Good equipment is essential for floating Refuge rivers. Inflatable rafts equipped with rowing frames are recommended. Canoes, kayaks and paddle rafts are also adequate for the experienced user. Although there is no whitewater on the Kanektok, Goodnews and Togiak Rivers, river channels can be braided, and sweepers (overhanging and submerged trees) can pose serious hazards – stay alert. All rivers are icy cold, and life jackets are recommended. Each boat should also carry a throw rope in case someone falls out or the boat needs to be pulled ashore by someone on the bank.

Resource and Public Use Management

Fish are a vital component of the Togiak Refuge ecosystem. Fish also support the local culture and economies of the people of Southwestern Alaska. For the last 100 years these resources have also become important commercially and are the basis for the region's cash economy. More recently (within the last 30 years), sport fishing has increased pressure on the fishery resources. The State of Alaska is responsible for the management and regulation of the commercial, sport and subsistence fisheries occurring within the Refuge. The U.S. Fish and Wildlife Service is responsible for management of public lands and public use occurring within the Togiak National Wildlife Refuge. The Refuge Headquarters are located in Dillingham.

Each river system is managed for the five species of salmon. Numbers of returning spawners (escapement) are controlled to produce the maximum number of fish for the various users. You may encounter biologists conducting research programs which monitor the health and strength of fish populations. Several programs have been established to monitor the escapement of salmon and insure that adequate numbers of each species reach the spawning grounds. Fish in excess of the necessary return are available for harvest by subsistence, sport and commercial fisheries.

Resident fish species are managed to maintain natural population structure and diversity. For most resident fish populations, primarily rainbow trout and grayling, this means managing them under a trophy fish population philosophy.

You may be contacted by Refuge River Rangers stationed on the Kanektok, Goodnews and Togiak Rivers. Purposes of the River Ranger program include: contacting visitors, collecting public use information and informing visitors of various refuge regulations. Throughout the season, River Rangers will also collect angler and fisheries information to aid in responsible resource management. Occasionally, more intensive angler creel surveys are conducted on river areas most heavily fished to assess angler effort, catch and harvest, and demographics. Your cooperation with these efforts is greatly appreciated.

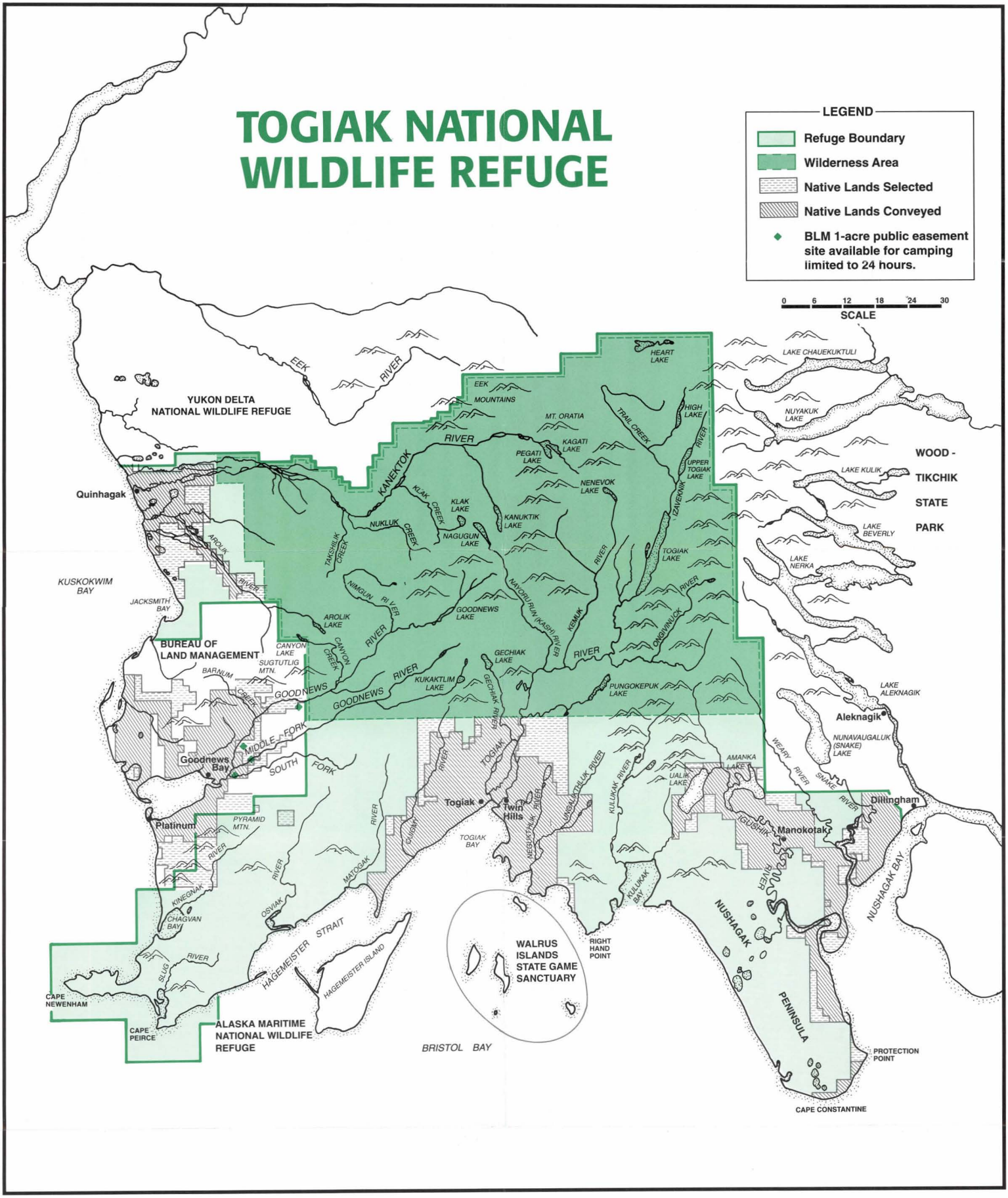
Sport Fishing Licenses and Special Regulations

A State sport fishing license is required annually (each calendar year) and must be in the possession of all persons 16 years of age or older while sport fishing. All State of Alaska fishing regulations apply to Togiak Refuge. Any commercial use of the Refuge requires a Special Use Permit from the refuge office in Dillingham.

Several Refuge drainages have special regulations adopted to maintain or improve high quality sport fisheries. These regulations can change annually. Currently, the Wilderness portions of the Kanektok and Goodnews Rivers are restricted to fishing with single-hook artificial lures only. Consult the current Alaska Sport Fishing Regulation Summary or contact the Togiak Refuge office for updated information concerning the area you plan to fish.

Thank You

For visiting the Kanektok, Goodnews & Togiak Rivers and the Togiak National Wildlife Refuge



PLEASE AVOID TRESPASS ON PRIVATE LANDS

Land ownership patterns on the Refuge are complicated. Hiking and other recreational activities are permitted on public (refuge and state) lands; however, numerous small parcels of privately owned lands or allotments are scattered along the banks of major waterways. These allotments are generally not posted and may not be obvious. You may notice signs of old camps, mounds or other artifacts; any disturbances of these sites is a violation of federal law.

As you leave the Togiak Wilderness Area, you will notice a sign asking you to avoid trespass on private lands. Downstream of the Wilderness Area, most of the uplands above ordinary high water are owned by local village corporations. Trespass on these lands is prohibited. The exposed non-vegetated, sand and gravel bars, however, are publicly owned by the State of Alaska. Therefore, if you limit camp locations to sand and gravel bars, you will not be trespassing on private lands. Read the section above concerning Camping and River Recreation for more information on camp sites and length of stay limitations.

Permission to use privately owned lands is required from the appropriate local village corporation at the address below:

1. Choggiung Limited, P.O. Box 330, Dillingham, AK 99576
2. Manokotak Native Limited, Manokotak, AK 99628
3. Togiak Native Limited, P.O. Box 169, Togiak, AK 99678
4. Twin Hills Native Corporation, Twin Hills, AK 99576
5. Kuitsaruk Native Corporation, Goodnews Bay, AK 99589
6. Arviq Native Corporation, Platinum, AK 99651
7. Qanirtuuq, Inc., General Delivery, Quinhagak, AK 99655

FOR A SAFE AND ENJOYABLE TRIP, REMEMBER

* Respect the cultural heritage and subsistence activities of local residents.
* Avoid trespass on private lands.
* Respect the rights of others to enjoy the beauty and resources of the refuge and pack out trash for proper disposal.
* Camp on exposed sand and gravel bars.
* Make sure you have safe equipment and are prepared for cold, windy and wet weather.
* Leave only footprints on gravel bars; if you pack it in, pack it out; if you see trash others have left, please pack it out as well.
* Bury human wastes away from surface waters, burn toilet paper.
* Know how to properly catch and release fish to ensure their survival, prevent unnecessary fish mortality, and to avoid offending others. It is up to you to responsibly promote the catch and release practice.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1996-791-003

GENERAL INFORMATION

Local villages are "dry" and importing alcohol is a violation and could result in prosecution.

Permits for nonguided, noncommercial parties are not required at this time. It is recommended that you contact the Togiak Refuge headquarters in Dillingham to get more details on a particular trip or river. There are a variety of resources available to you, such as brochures and lists of guides permitted on the Refuge and air taxi operators in the area. Refuge River Rangers monitor the rivers during the summer months. They can answer your questions and provide assistance if necessary. If you would like more information, please contact the Refuge Manager at:

Togiak National Wildlife Refuge
P.O. Box 270
Dillingham, Alaska 99576

(907) 842-1063

U.S. FISH & WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR

Graphics by Carol Wilson

Togiak

UNGUIDED GREAT TRIPS

National Wildlife Refuge
U.S. Fish and Wildlife Service
Department of Interior



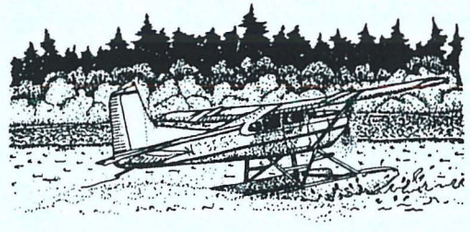
FLOAT BOAT FISHING TRIPS IN THE TOGIAK NATIONAL WILDLIFE REFUGE

Togiak National Wildlife Refuge encompasses about 4.7 million acres (2.3 million acres is designated wilderness) between Kuskokwim Bay and Bristol Bay in southwestern Alaska. The refuge is an area about the size of Connecticut and Rhode Island combined.

Sport fishing is the primary recreational activity in the Togiak Refuge. One of the best ways to experience refuge wilderness fishing is to float a river. Although there are many small rivers and tributaries within the Togiak Refuge, float fishing is concentrated on the Goodnews, Kanektok and Togiak rivers.

Each river is fed by a pristine wilderness lake, which is where most float trips begin. These rivers offer a variety of sport fishing opportunities. The rivers range from 60 to 93 miles in length and require five to ten days to float. Although there is very little white water, the rivers are braided and may have many sweepers (overhanging and submerged trees) that are hazardous if you do not use proper gear and stay alert.

ACCESS



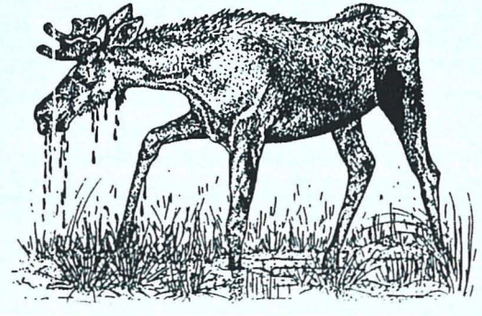
Primary access to Refuge rivers is by chartered aircraft. Charter air services are available in Dillingham and Bethel. Float trips begin within the Togiak Wilderness Area and end in Yupik Eskimo villages. Air charter arrangements should be made to be picked-up at village airports.

The recommended craft to float these rivers is an inflatable raft. Canoes and kayaks can be used, but your boat will need to be flown into a wilderness lake. Canoes or kayaks that are not collapsible are not conducive to this method of transportation. A good sturdy raft is recommended. Do not try to get by with an inexpensive plastic inflatable boat; your life may depend on it! A rowing frame with oars fastened to the raft is also recommended. If you don't want the expense of purchasing equipment, outfitters in the area have all the necessary gear for rent.

WILDLIFE AND HABITAT

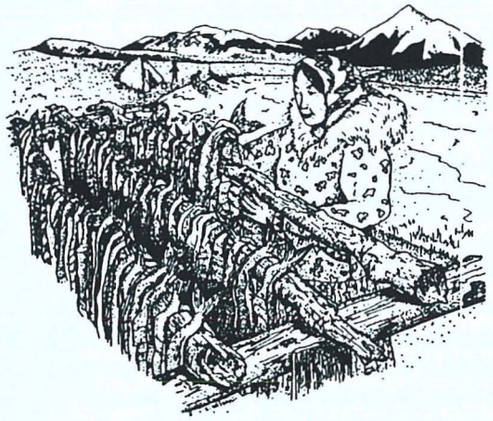
Togiak Refuge is comprised of diverse habitat types. Jagged mountain peaks, broad glacial valleys and tundra wetlands are found throughout the area. Coastal habitat is dominated by rocky cliffs and tidal marshes.

While in the wilderness portion of the refuge, there is an abundance of solitude. Your chances of seeing a variety of wildlife are good. Brown bear, caribou and moose may be seen during your trip. Smaller mammals which include the hoary marmot, beaver, wolverine, river otter, mink, red fox, wolf or coyote may also be seen by the keen observer. Birds of prey, songbirds, waterfowl and sea birds, also inhabit the Togiak Refuge.



SUBSISTENCE

The Togiak Refuge area has been occupied by Yupik Eskimos for at least 2,000 years. Eskimos enjoy some benefits of a cash economy but still live a traditional subsistence way of life, depending on fish and wildlife resources for much of their food. When floating Togiak Refuge rivers, you might observe local subsistence activities.



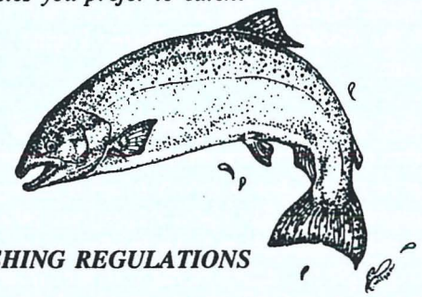
Private lands are located within Togiak Refuge, several of which have cabins, tents and fish racks. Please respect private property and do not trespass. Subsistence activities, and the style of life they support, are very important to the people in this region and should be respected. If shown consideration, local people are very friendly and may share many experiences with you.

The most common subsistence method for obtaining fish is through the use of gill nets. Fish are preserved for consumption throughout the year. There are traditional fishing sites which have been used for many generations. It is important not to crowd someone who is subsistence fishing. On the Kanektok and Goodnews rivers, it is illegal to sport fish within 300 feet of a legally operating subsistence net.

Some recreational angling practices, such as "catch and release" fishing, may be offensive to local residents. Releasing fish is viewed to be disrespectful to the fish. However, a fish that is handled gently and released quickly by a skilled angler has a good chance of surviving.

FISHERIES

The Togiak Refuge is known internationally for its sport fishing. Refuge rivers support world class sport fishing for coho, sockeye, chum, pink and chinook salmon; Dolly Varden/Arctic char; grayling; and rainbow trout. The length of your trip and the time you spend within the wilderness area will vary depending on the type of fishing and/or species you prefer to catch.



FISHING REGULATIONS

All State of Alaska fishing and hunting regulations apply to Togiak Refuge. Licenses and fishing regulations (resident and non-resident) are available from the Alaska Department of Fish and Game, sporting goods stores, and other stores in Dillingham, Bethel and Anchorage. Special regulations apply to various portions of refuge rivers. Consult the state fishing regulations for the particular area you plan to fish.

MINIMUM IMPACT CAMPING

Disposal of waste must be done carefully to avoid contamination of water and aquatic life. Rivers are used as the primary source of drinking water for local village residents. Water can become polluted from the run-off of soaps, food and human waste. Toilet paper and other trash leave unsightly messes. You should pack out solid human waste or carry a camp shovel and bury it at least 150 feet from a water source.

Good wilderness ethics will help insure minimum impacts on the resource. The following is recommended:

* *Camp on gravel bars when possible*
* *Camp in small groups*
* *Avoid creating new trails*
* *Leave no sign of your campfire*
* *Pack out all trash*
* *Bury or pack out all solid human waste*
* *Burn toilet paper*
* *Use biodegradable soap*
* *Do not harass wildlife*

By following these practices, all can enjoy the solitude and pristine beauty of the wilderness.

HELPFUL HINTS

Wood: Small sticks, gathered from the ground, are the best source of wood. Use only dead and down wood. Never cut green trees or branches, they won't burn. Standing dead trees are valuable for cavity nesting birds and aesthetics, and should not be removed. To avoid campfire hassles, bring a camp stove.

Leave No Trace: Make sure your fire is out. Pick out any non-burned trash and scatter the ashes, unburned logs and any rocks from the fire pit before you leave the site. A last minute check of cigarette butts, gum wrappers, etc., will help insure that you leave no trace.

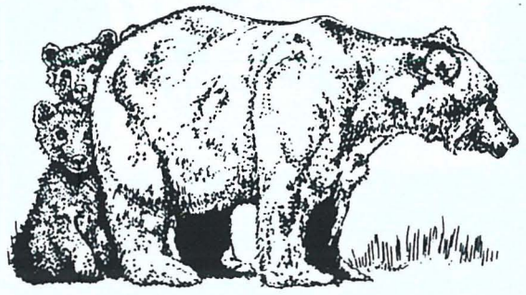
If burning food waste, make sure the fire is very hot to assure a complete burn. Partially burned food attracts bears. It is best to pack out your food waste in plastic sacks and store food and trash away from sleeping quarters.

Water: There are Giardia parasites and other contaminants in many streams, springs and other water sources, so filter or boil all drinking water.

Camp Sites: To avoid trespass on private lands along the river, camp on gravel bars, which are public lands owned by the State of Alaska. Gravel bars are durable sites and are less likely to show effects from camping, than fragile upland sites. By camping on gravel bars you may also escape thick bugs, usually located in tundra and brush. Camping is limited to three consecutive days at one location. ***After three consecutive days, camps must be moved a minimum of one river mile.***

Bear Encounters: Most bears tend to avoid people but can be curious and potentially dangerous animals. By following camping tips listed below, your chances of an unpleasant bear encounter may be minimized.

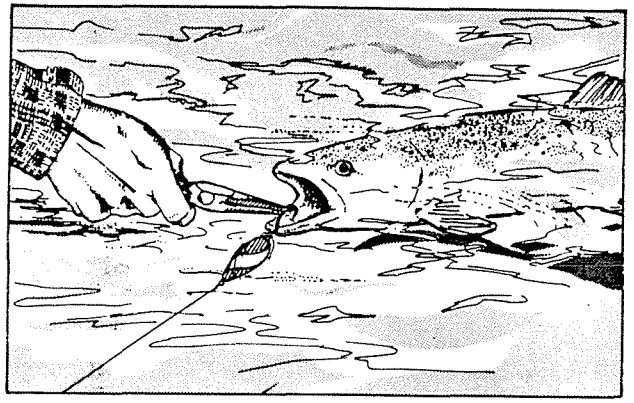
* *Do not get between sow and cubs*
* *Avoid surprising bears*
* *Look for bear sign*
* *Make noise when hiking*
* *Avoid crowding bears*
* *Leave pets at home*
* *Maintain a clean camp*
* *Be alert*



Removing the Hook

Always try to remove the hook quickly and gently, keeping the fish underwater. Firmly grasp the hook with your fingers, or better yet with long-nosed pliers or hemostat, and roll or back the hook out of the fish's mouth. Most of the time it will not be necessary to touch the fish.

When a fish is hooked deeply, never attempt to force or pull out the fly or lure. Cut the leader as close to the eye of the hook as possible and revive the fish as described. The hook will eventually dissolve or rust away.



Reviving and Releasing Your Fish

Never throw, drop, or kick a fish back into the water. Cradle it gently, well behind the gills, and lower it back into the water.

Revive a stream fish by pointing its head into the current until its gills are working and it maintains an upright position. In slow or still water some fish might need to be revived by "walking" them for a few minutes. To walk a fish, move upstream from other anglers, cradle the fish in the water, and gently move it back and forth. As the fish recuperates, its gills will begin to work strongly.

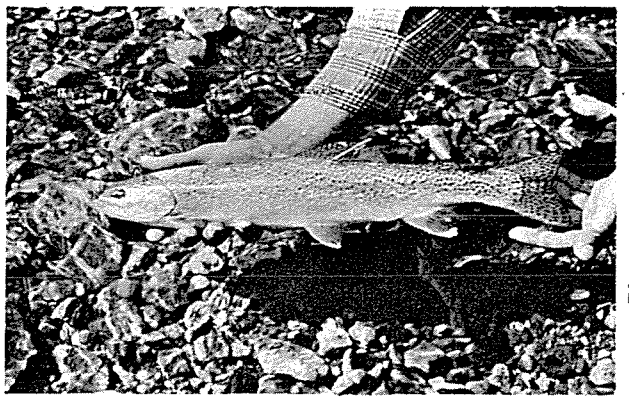
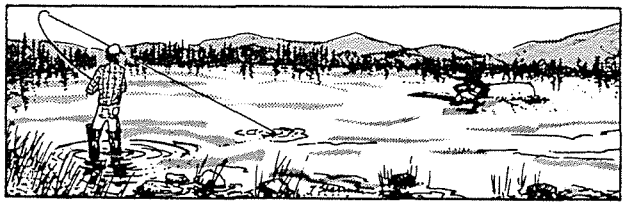


Photo courtesy USFWS

It may take some time to revive a fish. Large fish often require more time since their struggle to escape may have left them exhausted and in shock. When the fish pulls against your hand, release it. Don't be alarmed if the fish swims off slowly. If the fish takes off quickly, so much the better.

Do everything you can to help a fish swim away before you leave it.

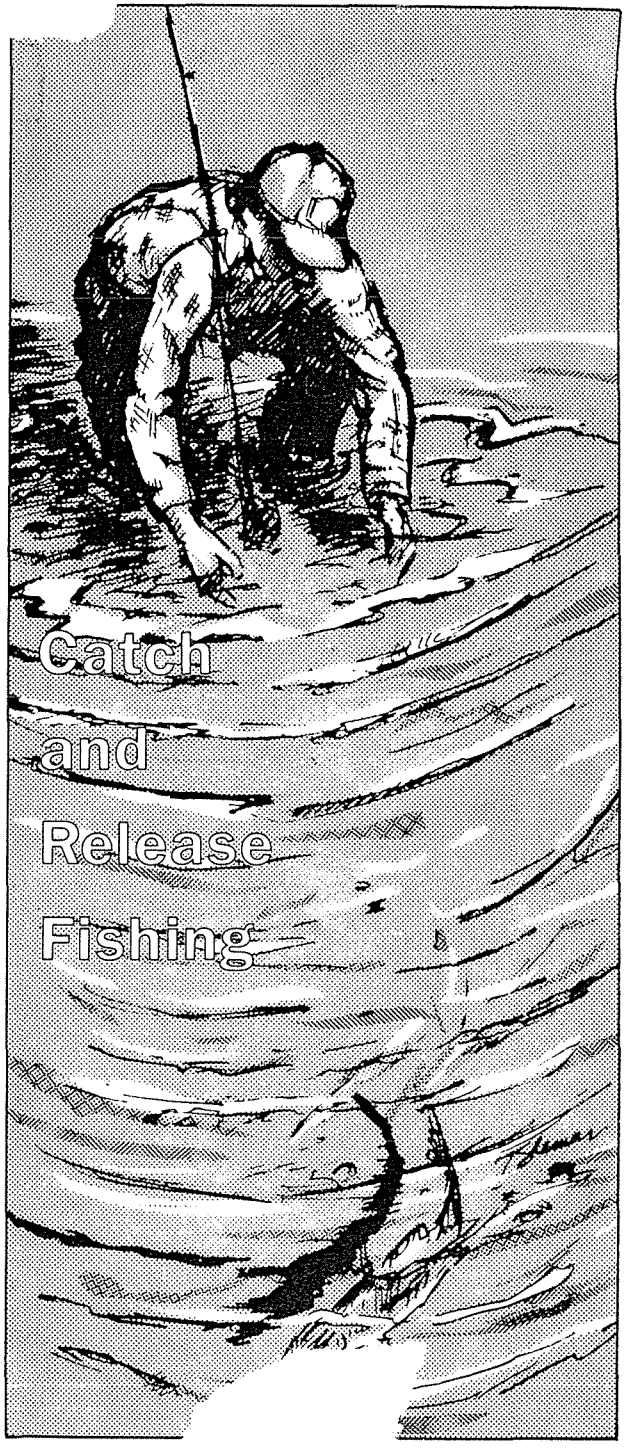




Produced by the University of Alaska Sea Grant College Program, the Alaska Department of Fish and Game, the National Park Service, and the U.S. Fish and Wildlife Service.

Illustration and design by Todd Sherman. Sea Gram #29.

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Catch and Release Fishing

Fish are one of Alaska's greatest renewable resources. The popularity of catch and release sport fishing, which helps protect that resource, is growing along with the size of Alaska's angler population. A fish that is handled gently and released quickly by a skilled angler has a good chance of surviving. By practicing proper catch and release fishing, today's anglers preserve quality fishing for the anglers of tomorrow.

Your Gear

Use artificial flies and lures to catch fish that you plan to release. Hooking mortality in fish is much lower if caught with flies and lures instead of bait.

Take care to select a hook size appropriate for the size of fish you will be catching. Use barbless hooks when you plan to release fish. Pliers can be used to pinch down barbs on conventional hooks. Overly large hooks can cause excessive damage to mouth parts or eyes. Small hooks may be taken more deeply by fish.



Playing Your Fish

Play and release your fish as quickly as possible. A fish that is played to the point of exhaustion may not survive. Use a rod, line, and leader of sufficient strength to easily land a fish.

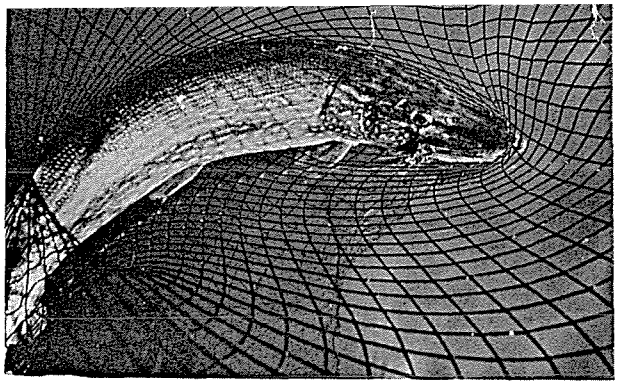


Photo by Silvio Calabi

Landing a Fish

When you are about to land the fish, try to avoid removing it from the water. Keep it in water deep enough to protect it. Do not let a fish flop in shallow water over rocks and never on dry land.

When fishing from a boat or raft, using a net can reduce landing time. Nets made of knotless nylon are the least abrasive to fish.

Handling Your Fish

Keep the fish in the water as long as possible while handling. The longer a fish is out of water, the greater the probability that it will die. Cradle a fish gently with two hands, one supporting the belly and the other hand just ahead of and underneath the tail section. Holding it up side down by its tail may break its back.



Photo courtesy USFWS

Hold the fish in the water and have someone else take your photograph.

Keep your fingers out of and away from the gills of any fish. Gills are delicate and full of blood vessels. Once a fish begins bleeding from the gills, it is likely to die.

Never squeeze a fish. Pressure against a vital organ will often prove fatal. Use soft, wet gloves or at least wet your hands before handling a fish.

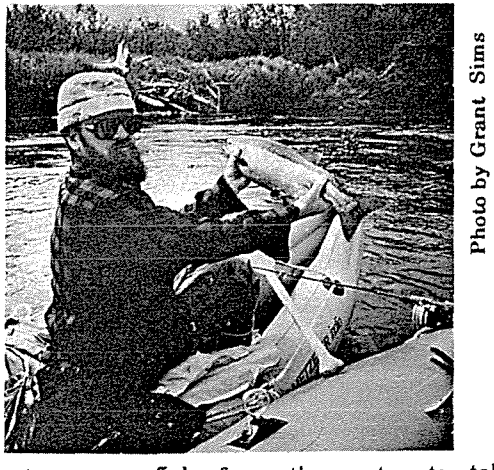


Photo by Grant Sims

Do not remove fish from the water to take photographs if you plan to release it.

It's better to release the fish at the boat without ever attempting to lift it out of the water. A fish can be severely injured when being lifted out of the water or when flopping in the boat. If necessary, it is better to break your line than to needlessly wrestle with a fish.

If you wish to photograph a fish, have a camera ready and do it quickly. Get someone else to take the picture or to hold the fish. If possible, keep the fish in the water by cradling it or by keeping it in a net.

Close Encounters: What to do

If you see a bear, avoid it if you can. Give the bear every opportunity to avoid you. If you do encounter a bear at close distance, remain calm. Attacks are rare. Chances are, you are not in danger. Most bears are interested only in protecting food, cubs or their "personal space." Once the threat is removed, they will move on. Remember the following:

Identify Yourself Let the bear know you are *human*. Talk to the bear in a normal voice. Wave your arms. Help the bear recognize you. If a bear cannot tell what you are, it may come closer or stand on its hind legs to get a better look or smell. A standing bear is usually curious, not threatening. You may try to back away slowly diagonally, but if the bear follows, *stop* and hold your ground.

Don't Run You can't outrun a bear. They have been clocked at speeds up to 35 mph, and like dogs, they will chase fleeing animals. Bears often make bluff charges, sometimes to within 10 feet of their adversary, without making contact. Continue waving your arms and talking to the bear. If the bear gets too close, raise your voice and be more aggressive. Bang pots and pans. Use noisemakers. Never imitate bear sounds or make a high-pitched squeal.

If Attacked If a bear actually makes contact, surrender! Fall to the ground and play dead. Lie flat on your stomach, or curl up in a ball with your hands behind your neck. Typically, a bear will break off its attack once it feels the threat has been eliminated. Remain motionless for as long as possible. If you move, and the bear sees or hears you, it may return and renew its attack. In rare instances, particularly with black bears, an attacking bear may perceive a person as food. If the bear continues biting you long after you assume a defensive posture, it likely is a predatory attack. Fight back vigorously.

Protection

Firearms should *never* be used as an alternative to common-sense approaches to bear encounters. If you are inexperienced with a firearm in emergency situations, you are more likely to be injured by a gun than a bear. It is illegal to carry firearms in some of Alaska's national parks, so check before you go.

A .300-Magnum rifle or a 12-gauge shotgun with rifled slugs are appropriate weapons if you have to shoot a bear. Heavy handguns such as a .44-Magnum may be inadequate in emergency situations, especially in untrained hands.

State law allows a bear to be shot in self-defense if you did not provoke the attack and if there is no alternative, but the hide and skull must be salvaged and turned over to the authorities.

Defensive aerosol sprays which contain capsicum (red pepper extract) have been used with some success for protection against bears. These sprays may be effective at a range of 6-8 yards. If discharged upwind or in a vehicle, they can disable the user. Take appropriate precautions. If you carry a spray can, keep it handy and know how to use it.

In Summary

- Avoid surprising bears at close distance; look for signs of bears and make plenty of noise.
- Avoid crowding bears; respect their "personal space."
- Avoid attracting bears through improper handling of food or garbage.
- Plan ahead, stay calm, identify yourself, don't run.

In most cases, bears are not a threat, but they do deserve your respect and attention. When traveling in bear country, keep alert and enjoy the opportunity to see these magnificent animals in their natural habitat.

For additional information about traveling in bear country, please contact one of the following agencies which participated in publication of this brochure:

Alaska Department of Fish & Game
Alaska Department of Natural Resources, Divisions of Forestry and Parks and Outdoor Recreation
Alaska Department of Public Safety, Division of Fish & Wildlife Protection
Alaska Natural History Association
U.S. Bureau of Land Management
National Park Service
U.S. Fish & Wildlife Service
U.S.D.A. Forest Service

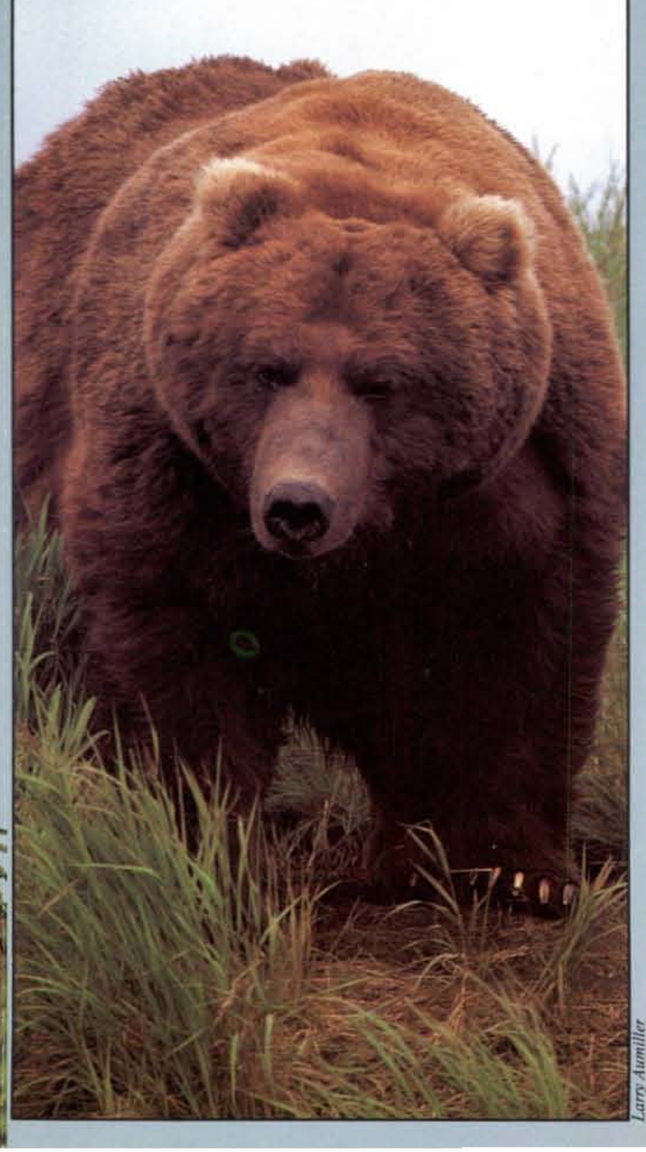
Revised 1/92

Female bears can be fierce defenders of their young. Getting between a female and her cubs is a serious mistake. A female bear may respond aggressively to any threat she perceives to her cubs.

Larry Aumiller

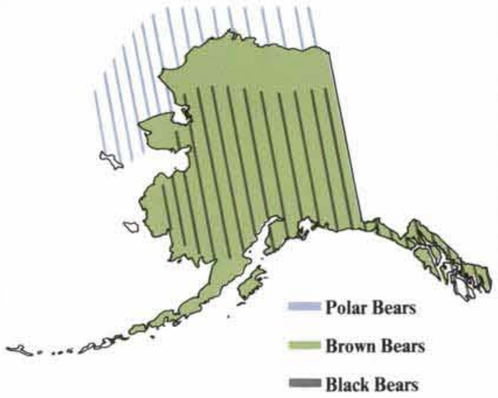
BEAR FACTS

The Essentials for Traveling in Bear Country



Larry Aumiller

Bear Behavior



One of the things that makes Alaska so special is that all three species of North American bears flourish here. There is a chance that you may be lucky enough to see a bear. But even if you don't, you will never be far from one, because Alaska is bear country.

Brown/grizzly bears are found from the islands of southeastern Alaska to the arctic. Black bears inhabit most of Alaska's forests. Polar bears frequent the pack ice and tundra of extreme northern and western Alaska.

Bears are curious, intelligent and potentially dangerous animals, but undue fear of bears can endanger both bears and people. Many bears are killed each year by people who are afraid of them. Respecting bears and learning proper behavior in their territory will help so that if you encounter a bear, neither of you will suffer needlessly from the experience.

Most bears tend to avoid people. In most cases, if you give a bear the opportunity to do the right thing, it will. Many bears live in Alaska and many people enjoy the outdoors, but surprisingly few people even see bears. Only a tiny percentage of those few are ever threatened by a bear. A study by the state epidemiologist showed that during the first 85 years of this century, only 20 people died in bear attacks in Alaska. In the 10 years 1975-85, 19 people in Alaska were killed by dogs.

Most people who see a bear in the wild consider it the highlight of their trip. The presence of these majestic creatures is a reminder of how privileged we are to share some of the country's dwindling wilderness.

Alaska's Three Bears



K. Whitten

Polar Bear
Length: *8-10 feet*
Weight: *Males 600-1,200 lbs.; Females 400-700 lbs.*
Color: *All white*
Alaska Population Estimate: *4,000-6,000*



John Hyde

Black Bear
Length: *5 feet*
Weight: *Males 150-400 lbs.; Females 125-250 lbs.*
Color: *Brown to Black, white patch on front of chest*
Alaska Population Estimate: *More than 50,000*

Brown Bear
Length: *7-9 feet*
Weight: *Males 400-1,100 lbs.; Females 200-600 lbs.*
Color: *Dark brown to blonde*
Alaska Population Estimate: *35,000-45,000*



Larry Aumiller

Bears and People

Bears Don't Like Surprises! If you are hiking through bear country, make your presence known—especially where the terrain or vegetation makes it hard to see. Make noise, sing, talk loudly or tie a bell to your pack. If possible, travel with a group. Groups are noisier and easier for bears to detect. Avoid thick brush. If you can't, try to walk with the wind at your back so your scent will warn bears of your presence. Contrary to popular belief, bears can see almost as well as people, but trust their noses much more than their eyes or ears. Always let bears know you are there.

Bears, like humans, use trails and roads. Don't set up camp close to a trail they might use. Detour around areas where you see or smell carcasses of fish or animals, or see scavengers congregated. A bear's food may be there and if the bear is nearby, it may defend the cache aggressively.

Don't Crowd Bears! Give bears plenty of room. Some bears are more tolerant than others, but every bear has a "personal space"—the distance within which a bear feels threatened. If you stray within that zone, a bear may react aggressively. When photographing bears, use long lenses; getting close for a great shot could put you inside the danger zone.

Bears Are Always Looking for Something to Eat! Bears have only about six months to build up fat reserves for their long winter hibernation. Don't let them learn human food or garbage is an easy meal. It is both foolish and illegal to feed bears, either on purpose or by leaving food or garbage that attracts them.

Cook away from your tent. Store all food away from your campsite. Hang food out of reach of bears if possible. If no trees are available, store your food in airtight or specially designed bear-proof containers. Remember, pets and their food may also attract bears.

Keep a clean camp. Wash your dishes. Avoid smelly food like bacon and smoked fish. Keep food smells off your clothing. Burn garbage completely in a hot fire and pack out the remains. Food and garbage are equally attractive to a bear so treat them with equal care. Burying garbage is a waste of time. Bears have keen noses and are great diggers.

If a bear approaches while you are fishing, stop fishing. If you have a fish on your line, don't let it splash. If that's not possible, cut your line. If a bear learns it can obtain fish just by approaching fishermen, it will return for more.

Togiak National Wildlife Refuge

Established in 1980 by Congress, the Togiak National Wildlife Refuge encompasses about 4.2 million acres of land, 2.3 million of which are designated as a National Wilderness Area. The refuge is about the same size as the states of Connecticut and Rhode Island combined.

The purposes of the refuge are to protect the diverse fish and wildlife resources, provide for subsistence use by local residents, protect the quality of streams, rivers, and lakes, and protect and manage migratory birds.

The Togiak Refuge includes coastal areas in Bristol Bay and the Kuskokwim Bay. Mountainous upland areas define watersheds for several major river systems. The diversity and abundance of the fish and wildlife resources within Togiak Refuge make this area unique and a valuable component of the National Wildlife Refuge System.



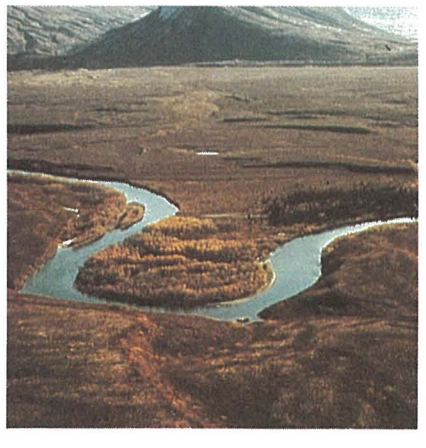
Refuge Habitats

Rivers, Lakes, and Streams

Each year more than one million salmon return to rivers, lakes, and streams within the refuge. The Kanektok, Togiak, and Goodnews Rivers and other river systems have clear water and contain essential fisheries habitat. Five different species - - king, silver, chum, sockeye, and pink - - are found in refuge rivers.

As spawning approaches, the salmon prepare spawning beds (redds), mate, and deposit their eggs. Less than half of the 6,000 eggs in each redd will survive the winter to emerge as fry the following spring. Most of the fry will spend up to two years in the river environment before they migrate out to the ocean as smolts. Only 1 to 3 fish may survive to return and spawn.

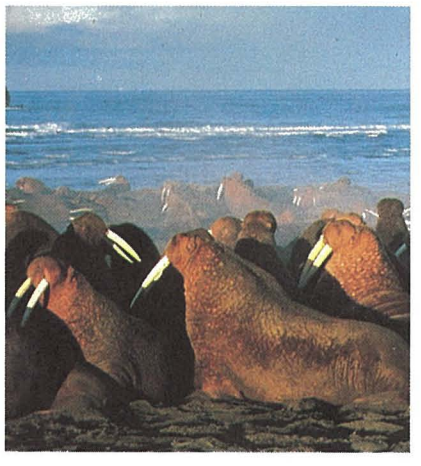
After spawning, the adult salmon die. Salmon carcasses provide food reserves for predators such as brown bears, foxes, gulls and resident fish. The decomposition process releases nutrients, feeding tiny plankton at the base of the food chain.



Coastal Bays and Shoreline

Rocky coastal headlands support several hundred thousand cliff nesting marine birds. The birds nest and roost on the ledges and in cracks of the cliff faces, reducing the chances of predation. Nesting species include common murres, black legged kittiwakes, puffins, cormorants, guillemots, and auklets.

The refuge coastline includes numerous saltwater lagoons and bays. These areas provide protected rest and feeding areas for migrating waterfowl.



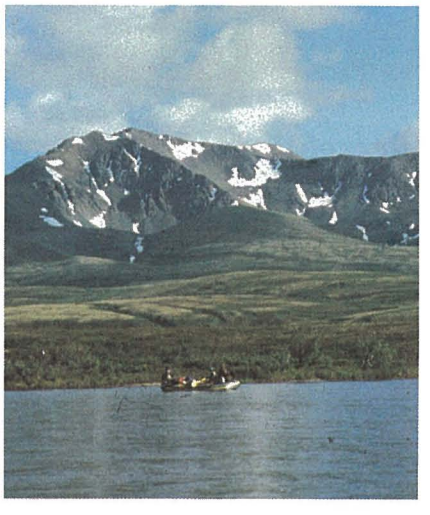
Rocky beaches and dune areas along Cape Newenham and Cape Peirce serve as haul out and resting areas for Pacific walrus, Northern sea lions, and harbor seals. Since 1980, walrus have begun to recolonize traditional haul out areas largely as a result of the increased protection afforded by the refuge.

Endangered grey whales, beluga whales, minke whales and killer whales may be viewed from the coast during spring and fall migrations.

Protecting Resources for the Future

Goose banding projects on Togiak Refuge provide valuable information related to waterfowl populations and migration patterns. Declining waterfowl populations throughout North America has become a serious national wildlife concern.





In 1988, 150 ***caribou*** were transplanted from the Alaska Peninsula to the Togiak Refuge. Overharvest around the turn of the century had resulted in the loss of early caribou herds. With local cooperation and proper management, caribou herds may be restored to harvestable levels.

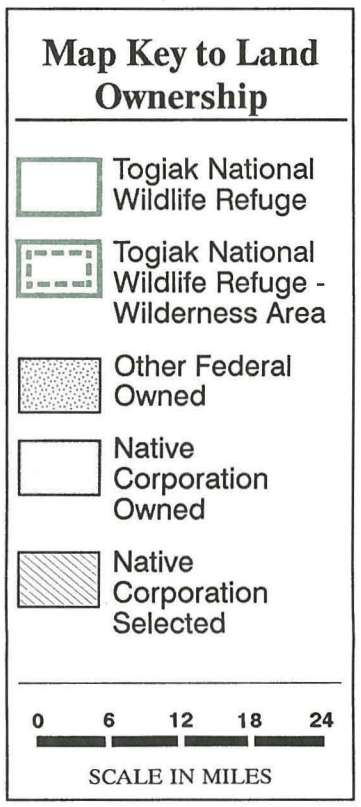
Between 1981 and 1984, ***recreational use*** of Togiak Refuge increased from about 3,000 to more than 12,000 visitor use days. Despite such increasing visitor pressure, refuge managers work to protect wilderness values and maintain high quality recreational opportunities.

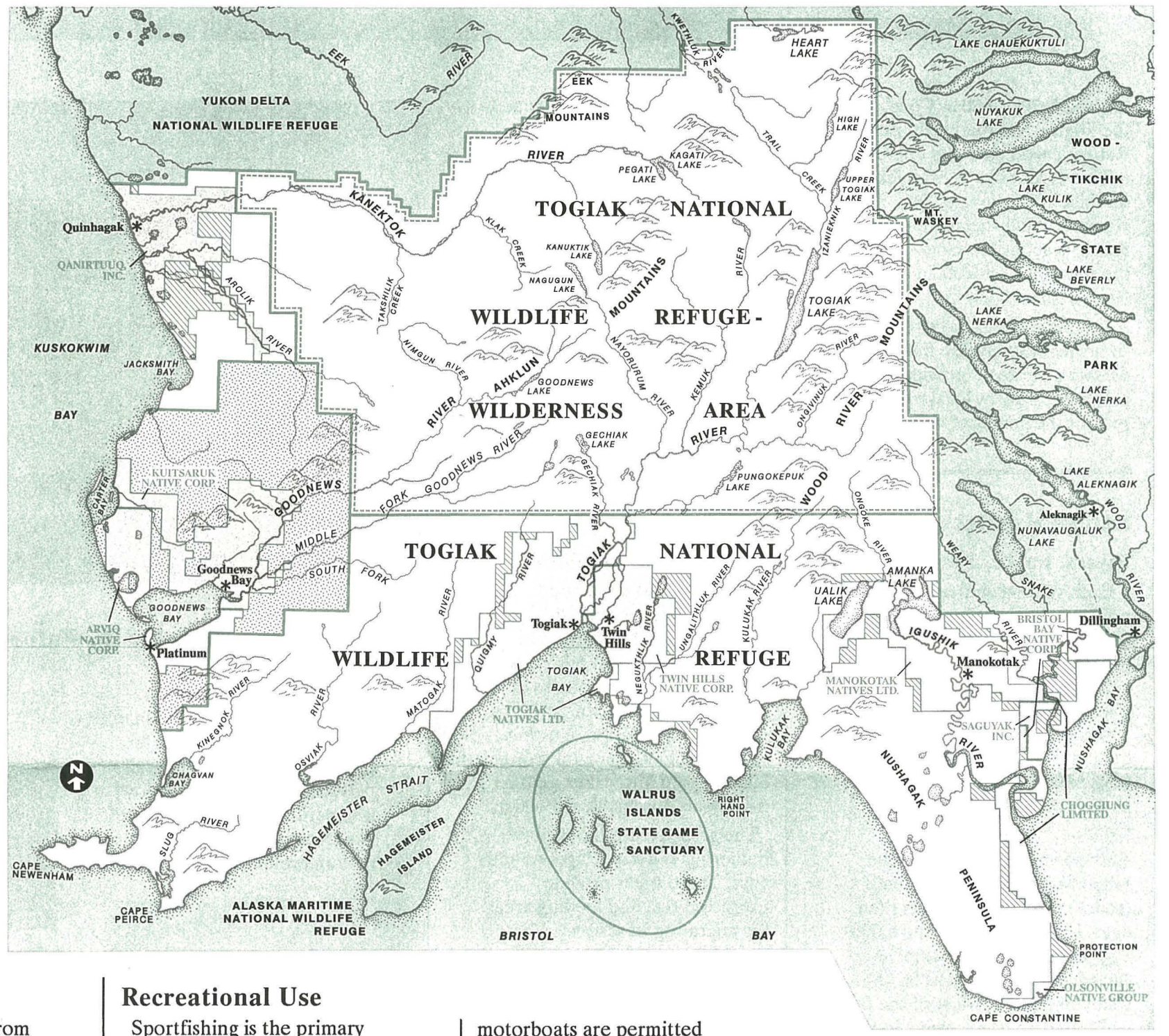


For More Information, Contact:

- Refuge Manager
  Togiak National Wildlife Refuge
  P. O. Box 270
  Dillingham Alaska 99576
  (907) 842-1063

Togiak National Wildlife Refuge





Subsistence Use

More than 2,000 people from six villages live within the refuge. While local residents now enjoy some benefits of a cash economy as a result of the commercial fishing industry, most local people also rely economically and culturally on fish and wildlife resources through subsistence activities.

Residents fish and hunt mainly along the river drainages near communities and on traditionally used coastal sites. In the summer, many families move to camps at commercial salmon set net sites. In the fall, families go upriver to lakes to fish, and to hunt land otter, caribou, moose, and brown bear.

Fish are the mainstay of the subsistence lifestyle. All five salmon species, whitefish, char, smelt, pike, rainbow trout, herring and other fish are harvested.

Recreational Use

Sportfishing is the primary recreational activity by visitors to Togiak Refuge rivers. The predominant fish species sought include king and silver salmon, rainbow trout, dolly varden, and arctic grayling.

Most sportfishing use occurs on the Kanektok, Goodnews, and Togiak Rivers. Opportunities such as wilderness float trips and base camp accommodations are offered by various guide services. Non-guided visitors generally choose to float refuge rivers in rafts, canoes, or kayaks.

Waterfowl and bear hunting occur during various seasons. Sightseeing, camping, wildlife observation, and photography attract many visitors.

The primary means of access to refuge rivers is by boat or air. Commercial air services are available from Bethel or Dillingham. Private aircraft and motorboats are permitted throughout the refuge but helicopters are not permitted for recreational purposes. Food and basic supplies may be purchased in the villages of Quinhagak, Goodnews Bay, and Togiak.

Please Avoid Trespass on Private Lands

Land ownership patterns on the refuge are complicated. Hiking, camping and other recreational activities are permitted on publicly owned refuge lands. Exposed, non-vegetated sand and gravel bars are open to public use.

Permission to use privately owned uplands is required from the appropriate local village corporations:

- Arviq Native Corporation
  General Delivery
  Platinum, Alaska 99651
- Bristol Bay Native Corporation
  800 Cordova St.
  P. O. Box 100220
  Anchorage, Alaska 99510
- Choggiung Limited
  P. O. Box 330
  Dillingham, Alaska 99576
- Kuitsaruk Native Corporation
  Goodnews Bay, Alaska 99589
- Manokotak Natives Limited
  Manokotak, Alaska 99628
- Olsonville Native Group
  Contact Choggiung Ltd.
- Qanirtuuq, Inc.
  General Delivery
  Quinhagak, Alaska 99655
- Saguyak, Inc.
  P. O. Box 4
  Clarks Point, Alaska 99569
- Togiak Natives Limited
  P. O. Box 169
  Togiak, Alaska 99678
- Twin Hills Native Corporation
  Twin Hills, Alaska 99576