

Noatak River Visitor Use Study, 1988.

by

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INTRODUCTION

The Noatak River is the longest undeveloped waterway in the United States. It passes through country unaltered by man for 365 miles, from it's headwaters to the native village of Noatak. The river's gentle flow, expansive arctic tundra valley, and opportunities for viewing wildlife have attracted large numbers of river-floaters in recent years.

The unique character and pristine condition of the Noatak Valley were the bases for legislation which would insure that these qualities were retained for the enjoyment of future generations. The vast majority of the Noatak River watershed was incorporated into the National Park system with the passing of the Alaska National Interest Land Claims Act (ANILCA) in December 1980 (Figure 1). The river's source and upper headwaters, including approximately 65 miles of river valley, are within Gates of the Arctic National Park and Preserve (GANPP). The remainder comprises the majority of the Noatak National Preserve (NNP). The act also designated this waterway and it's surrounding uplands as wilderness and classified it as a wild river within the National Wild and Scenic River System (NWSRS). The NNP and headwaters have also been given special recognition as a Biosphere Reserve by the United Nations Educational, Scientific and Cultural Organization (UNESCO), a program which is

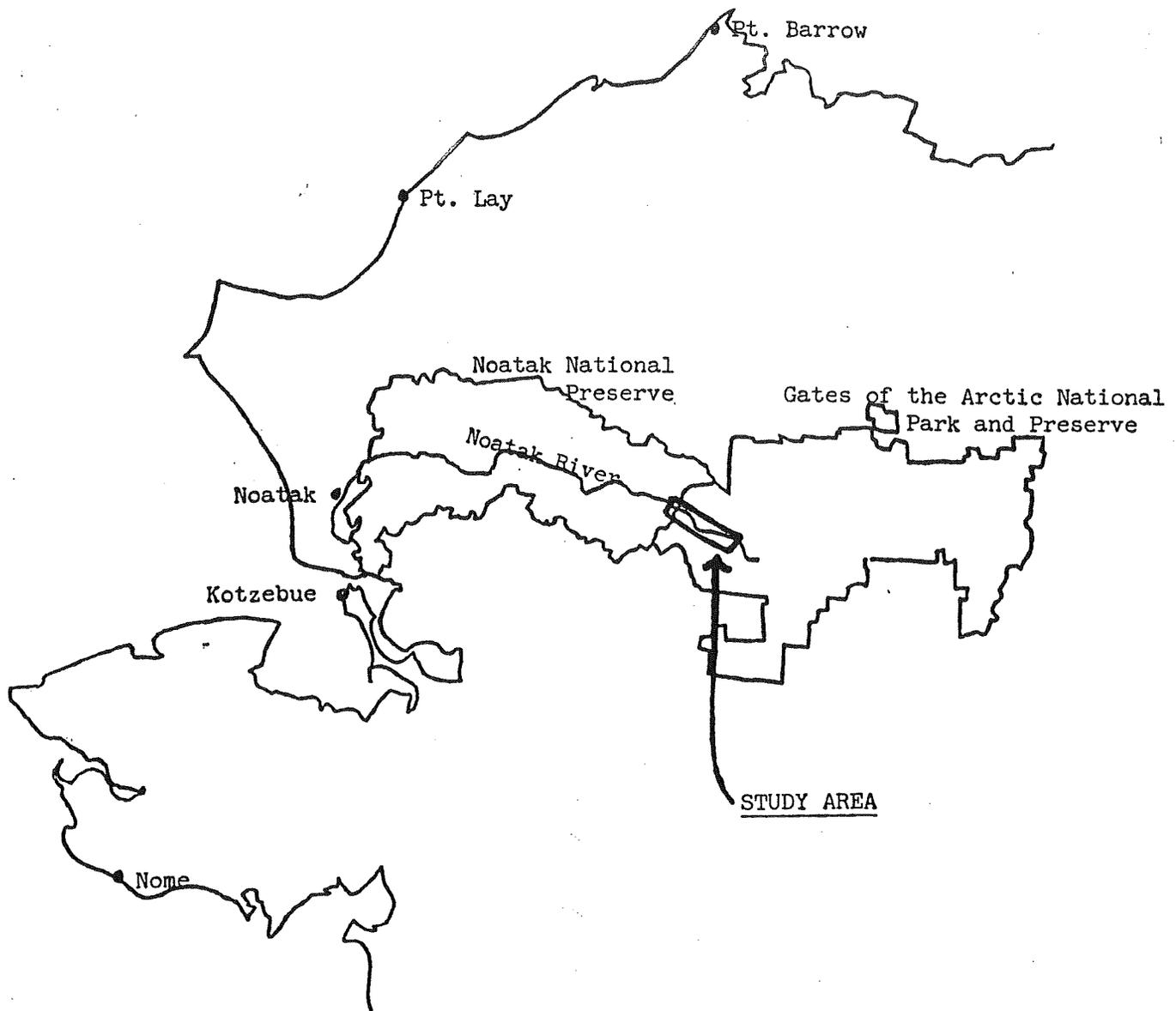


Figure 1. The Noatak River and associated National Park Service lands.

aimed at preserving large landmasses within each of the earth's biogeographical provinces.

The upper Noatak River has been visited and lived in by humans periodically throughout historic and late prehistoric times. Indigenous native peoples have used it's upper reaches for subsistence harvest during both the summer and winter seasons. White explorers first visited the upper Noatak just prior to the turn of the century, and small numbers have ventured there to explore, prospect or hunt since that time. Recreational boating on the river probably first occurred in the late 1960's and early 1970's, with no more than a handful of people floating it during that period. Within the past 15 years, the river has received notoriety and is now floated by a few hundred people each year during it's brief summer period.

Much of the recreational use occurs within the mountainous headwaters. Access by floatplane is excellent there, and people can chose between a short scenic float augmented by hiking and other activities, or an extended trip to Noatak Village, where commercial air service is available.

Park rangers have floated the river within Gates of the Arctic National Park 2 to 3 times each year since the park's creation. The rangers have, among other things, monitored human use along the river corridor and documented human impacts on the terrain.

Concern has been voiced by Park Service personnel and local commercial operators regarding overuse of the upper Noatak within the last few years. Two of the park staff reported seeing 50

people at one time at a popular drop-off point on the river, and determined that over 100 people were on a 45 to 60 mile stretch of river at once in July 1985. A similar report was made in

1987. Individuals began expressing concern over large groups of boaters, frequent aircraft sightings and messy campsites. Money was appropriated to look more intensively at visitor use on the upper Noatak for fiscal year 1988. This information would be used to lay groundwork for a management plan which would attempt to keep visitor use consistent with the maintenance of this unique watershed in it's undisturbed state.

The objectives of this study were 1) to summarize knowledge concerning that portion of the Noatak River watershed lying within Gates of the Arctic National Park through a) review of pertinent literature, and b) interviews with persons knowledgeable with the area; 2) to document visitor use and identify problems occurring on the river during the 1988 floating season; and 3) prepare a report for the park staff which summarizes this information and includes suggestions for management of the Noatak headwaters.

METHODS

The author spent from 8 May through 1 June in Fairbanks obtaining background information from the literature and persons knowledgeable with the area. Documentation of past visitor use was obtained from NPS commercial operator files and park ranger trip reports. Pertinent literature on the Noatak River was found in the office library, University of Alaska's library and the Alaska Resources Library in Anchorage. Several persons, including present and past NPS staff, persons involved in the planning of the park and preserve boundaries and commercial operators were contacted in person or by phone (Appendix 1).

Prior to the field season, an effort was made to contact all commercial operators who may fly persons to the Noatak headwaters. Forms were given to or mailed to each operator to list the drop-off and pick-up dates and locations for all parties. Follow-up contacts were made during the next few months to obtain the information.

Five float trips were made within the Noatak River headwaters between June 15 and August 18. Each trip lasted from 9 to 10 days, for a total of 49 days spent in the headwaters. Three to 5 day gaps occurred between trips.

The river was scanned from the air during each drop-off and pick-up day, from Twelve-mile Slough to Douglass Lake (see Figure 2). The location, and boat type and number were recorded for each group seen on the river.

The author and 1 other person floated the river during each trip. Nelson Walker Lake and Twelve-mile Slough were used as starting points, while pick-ups were at Lake Matcharak or Douglass Lake. A Redshank raft, Grumman aluminum canoe or Metzeler inflatable canoe was used on each of the floats.

During each trip, we attempted to maximize our contacts with other floaters. When we encountered a group, we identified ourselves as NPS employees, explained the purpose of our work and asked if they would mind answering a few questions concerning their trip. Questions were interspersed with casual conversation and were tailored to the situation. The minimum information requested from each party was the length of their trip, put-in and take-out points, and who had flown them to the river. Other questions concerned their camping methods, encounters with others, wildlife seen and their personal feelings regarding the quality of the trip.

Campsites used by others and observed by us from the ground or air were examined within 2 weeks from when they were occupied.

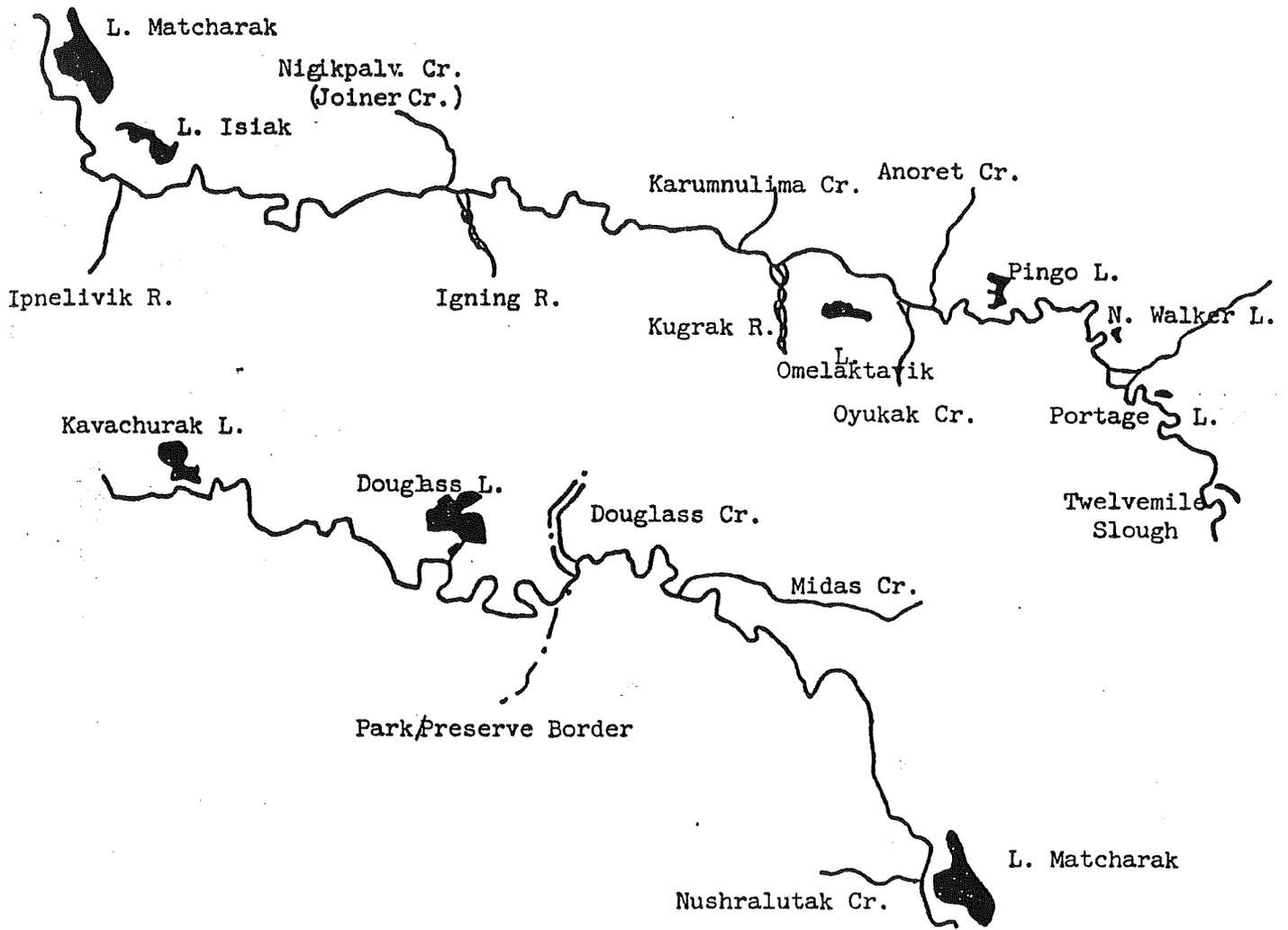


Figure 2. Stretch of the Noatak River headwaters surveyed during this study.
 A. Upper stretch B. Lower stretch

Other old and fresh campsites were found by searching lakeshores, the mouths of rivers and streams, and other attractive areas. Notes were taken on each campsite and included any short-term or long-term damage to the vegetation, litter and other visual disturbance other than footprints. Certain sites which had received repeated use and showed disturbance which would not be erased by periodic flooding were identified as Human Impact Sites (HIS). Standard HIS forms which are used park-wide to document these sites, were used for recording the types and degree of disturbances. Each site was assigned a number and a small, metal tag was placed in an inconspicuous location at the site. We also resurveyed several of these sites which had been identified during previous years. Drawings were made of each site and photographs were taken to document the disturbance.

Air traffic was noted during each trip. Date, time, height above valley floor, aircraft type, location and direction of travel were recorded.

Notes were kept on the wildlife and wildlife sign observed during the trips. Numerous side trips were made to mountain peaks and through side-valleys for this purpose. A bird species list was compiled and documentation was made for selected bird and mammal species.

The literature search and phone interviews were continued from

Fairbanks beginning August 29, in addition to data summary and report writing. The report was completed on September 30.

RESULTS

General Description of Study Area

Physiography

The study area was entirely in that portion of the Noatak River Valley lying within the Schwatka Mountains, a portion of the Brooks Range. The adjacent peaks are among the highest and most rugged in the park. The river's source flows northwest from the slopes of Mount Igikpak, the highest peak in the park at 8,500'. The peaks on the south side are jagged and are dissected by U-shaped, glacier-carved valleys. The peaks immediately north are more gentle and lower in elevation. The valley bottom is about a mile across at its upper end, with mountains rising abruptly on either side. The bases of the mountains within the lower third of the study area are 4 to 5 miles apart, with rolling, morainal terrain in between. The river is relatively slow-moving and meanders widely across the valley bottom. Meander scars, oxbow lakes and flood plains are common. Sediments are silty, which promotes bank erosion and accounts for the typical cloudiness of the river during the summer. The basin is underlain with permafrost. A detailed description of the geology

of the region can be found in Smith (1913).

Weather and climate

There is no long-term climatic data available from the upper Noatak. A daily summary of weather conditions were kept throughout this study (Appendix 2). During the early part of the summer, the sky was typically clear in the morning. Clouds would build up around the mountains in late morning and the entire valley would often be overcast by late afternoon. Weather systems would pass through frequently, with local showers often only lasting a few hours. Overcast skies and persistent rains were much more common in late July and August. Moderate winds were common, usually occurring in the afternoon. Winds typically blew up-river, but occasionally were from the east.

Vegetation

The Noatak Valley lies along the southernmost border of the true Arctic. Much of the valley floor is densely vegetated with willow parkland-tundra and willow/dwarf birch brushland. Cottonwood thickets occur in a few of the creekbottoms and better-drained sites. Scattered brushland thickets are common on the north-facing slopes, interspersed with low-growing tundra vegetation. The drier south-facing slopes are dominated with low-growing vegetation. Unstable soils on this side support

scattered grasses and sage. Wet sedge/moss meadows are common throughout the valley bottom and on gentler slopes. Higher elevations are dominated by rock fell-fields and talus slopes with low-growing, matted plant species. Descriptions of vegetation types and species lists for the headwaters region can be found in Young (1974).

Mammals and Birds

A description of the more visible species observed during this summer is provided. Studies specific to mammals and birds were conducted by Dean and Chesemore (1973), Gardner (1974) and Manuwal (1974).

Caribou

Caribou found in the Noatak River headwaters are part of the Western Arctic Caribou Herd. Scientific data and anecdotal information show that the species has fluctuated in it's size and distribution greatly over the past 2 centuries. Davis and Valkenburg (1978) provide an excellent review of the history of this herd and it's use by native people.

Current population estimates are around 230,000 animals (P. Valkenberg pers. comm.). The main calving grounds are within drainages on the Arctic coastal plain. A large proportion of the

animals tend to winter on the southern slopes of the Brooks Range, passing through the mountains during the spring and fall. Others remain in the Colville River drainage to the north. Migration routes extend from the western coast to Anaktuvuk Pass and concentrations in any one location may vary drastically from year to year.

In recent years, the Noatak headwaters have been used primarily by a small proportion of the herd passing through during fall migration. Numerous shed antlers indicate that a portion of the population are in the headwaters through late fall. Windswept areas offer adequate food supplies for some animals to spend the entire winter. The animals move north again in early spring and females are on their calving grounds in early June. Small groups of bulls can still be seen in the Noatak headwaters at that time. Those animals present in the spring had wintered there, since the headwaters are not part of the spring migration route (P. Valkenburg pers. comm.).

We found numerous fresh caribou sign and sighted a single adult female caribou in mid-June, during our first float. We began seeing groups of from 10 to 80 in late July and saw approximately 2,000 animals between Portage Creek and Douglass Lake between then and mid-August.

Dall's sheep

Dall's sheep are abundant on the slopes of the Noatak headwaters. We regularly saw large groups of feeding and bedded animals on the upper slopes of the mountains on the north side of the river. We counted close to 200 within 1 ten-day float. This is a very conservative estimate. We saw a group of 90 on the slopes above Pingo Lake during 1 count.

Very few were seen on the south slopes, although abundant sign on certain ridges suggest that these may be used more at another time of year. Sheep sign on the lower ridges adjacent to creeks on both sides of the river indicated that these are windswept and used as winter range.

Moose

Moose sign is abundant throughout the lower elevations in the headwaters. Thick stands of tall willows, such as those along Joiner Creek and Between Portage Lake and the river were heavily-browsed, indicating winter use. Moose were seen several times this summer, along creekbottoms and in sedge-filled sloughs.

Brown bear

Brown bear tracks were seen frequently in June on the riverbanks and along tributary creekbottoms. Four different adult bears, including a sow with a first-year cub were seen within a 24-hour period in mid-July. Several other floaters reported seeing bears along the riverbottom. Four other family-groups were seen by us and others between Twelve-mile and Douglass Creeks, including 2 sows each with 2 cubs, a sow with 2 yearlings and a sow with 3 yearlings.

Wolves

At least 2 wolf packs were active in the Noatak headwaters this summer. One pack consisting of 6 adults and 9 pups was seen by a party in the upper headwaters. We observed a pack containing at least 3 adults and 7 pups in the vicinity of the Igning River. Old caribou and sheep remains were commonly encountered during exploratory hikes.

Red fox

Red fox are common in the Noatak headwaters and we would see 2 to 3 foxes during each trip. Almost all other floaters we spoke with mentioned seeing fox. Fox were seen carrying both ground squirrels and ptarmigan in their mouths. One den littered with

ptarmigan remains was found on a small mound above Pingo Lake in July.

Other carnivores

A wolverine was seen traversing a ridge above Joiner Creek in early August. Gardner (1974) reported seeing a lynx in the vicinity of Pingo Lake, coyote tracks near Pingo Lake and an ermine near Kipmik Lake.

Hares, rodents and shrews

Arctic ground squirrels are abundant and dens are common in areas where soils are soft enough to permit burrowing. They are most abundant on high riverbanks and sparsely-vegetated slopes. Snowshoe hares were seen on 2 occasions in the willows adjacent to Joiner Creek. Hare pellets were seen occasionally in thickly-vegetated creekbottoms. A single beaver dam was seen at the end of a marshy lake about 2 miles up-river from the mouth of the Igning River. A solitary muskrat was seen swimming in a small pond at the northeast end of Pingo Lake. A hoary marmot was seen in a rock outcrop on a 4000' ridge below Oyukak Mountain. Other rodents found in the Noatak headwaters by Dean and Chesmore (1973) include brown lemmings, red-backed voles, tundra voles, singing voles and masked shrews.

Birds

We observed 60 bird species during the summer 1988. Mauuwal (1974) reported 57 species within the headwaters, including 11 species we did not identify (Table 1).

Raptors

We observed 7 species of raptors in the Noatak headwaters and all are either known or suspected of nesting there. Several golden eagle nests, including 1 active nest, were observed on rocky ledges. Other birds observed to be nesting or accompanied by young included northern harriers, merlins, peregrine falcons, gyrfalcons and short-eared owls. Rough-legged hawks probably nest there as well. A single large grey owl, thought to be a great grey owl, was seen flying up-river between Twelve-mile Slough and Portage Lake in early August. Another group of floaters reported seeing the same bird, but neither of us made a positive identification.

Noatak National Preserve personnel have conducted raptor surveys throughout the length of the Noatak River for the past 3 years (K. Roney pers. comm.). They plan to continue monitoring known nest sights and surveying for additional sites during the nesting season in the future. All raptor sightings and nest sites located within Gates of the Arctic National Park are kept

Table 1. Bird species observed in the Noatak headwaters during this study and by Manuwal (1974).

Species	1974	1988	Species	1974	1988
Yellow-billed loon	X		Alder flycatcher		X
Arctic loon	X	X	Say's phoebe	X	X
Red-throated loon		X	Gray jay	X	X
Red-necked grebe		X	Common raven	X	X
Canada goose		X	Gray-cheeked thrush		X
Mallard		X	Robin	X	X
Northern pintail	X	X	Wheatear	X	X
American widgeon		X	Bluethroat	X	
Shoveler		X	Arctic warbler	X	
Green-winged teal	X	X	Water pipit	X	X
Greater/lesser scau	X	X	Yellow wagtail	X	X
Oldsquaw	X	X	Northern shrike	X	X
Barrow's goldeneye		X	Bohemian waxwing		X
White-winged scotor	X	X	Fox sparrow		X
Surf scotor	X	X	Savannah sparrow	X	X
Red-breasted merganser		X	Tree sparrow	X	X
Semipalmated plover	X	X	Wh-crowned sparrow	X	X
Lesser golden plover	X	X	Go-crowned sparrow	X	X
Lesser yellowlegs	X	X	Or-crowned warbler	X	
Common snipe	X	X	Wilson's warbler	X	X
Wandering tattler	X		Lapland longspur	X	X
Upland sandpiper	X	X	Smith's longspur	X	
Spotted sandpiper	X	X	Snow bunting	X	X
Bartramian sandpiper	X		Rusty blackbird	X	X
Pectoral sandpiper	X		Rosy finch	X	X
Long-billed sandpiper	X		Common redpoll	X	X
Least sandpiper	X	X	Tree swallow	X	
Baird's sandpiper	X	X	Cliff swallow	X	X
Northern phalarope	X	X	Bank swallow	X	X
Parasitic jaeger	X	X			
Long-tailed jaeger	X	X			
Glaucous gull	X	X			
Mew gull	X	X			
Bonaparte's gull	X				
Arctic tern	X	X			
Golden eagle	X	X			
Northern harrier	X	X			
Rough-legged hawk		X			
Gyrfalcon		X			
Peregrine falcon		X			
Merlin		X			
Short-eared owl		X			
Great grey owl		?			
Rock ptarmigan	X	X			
Willow ptarmigan	X	X			
Northern flicker	X	X			

on file in the Bettles office.

Waterfowl

Fifteen species of waterfowl were seen this summer, including Canada geese, horned grebes, 2 species of loons and 11 species of ducks (Table 1). We consistently saw 4 to 6 pair of arctic loons and a pair of red-throated loons all summer. Both species nest there. Scaup (unsure of species) were the most common ducks and were found in large groups on several of the lakes. Other ducks seen in large groups on lakes included mallard, pintail, green-winged teal, shoveler, widgeon, oldsquaw and scoters. Oldsquaw and red-breasted mergansers were seen commonly along the river. Female scaup, mallards, shovelers, widgeon, oldsquaw, scoters and mergansers were seen with broods.

Historical Human Use

Native use

Reports of white explorers near the turn of the century and archaeological discoveries within the past 20 years attest to the historical importance of the upper Noatak River to native people.

Eskimos of the Kobuk River say that the upper Noatak was

inhabited prehistorically by a group of Athabascan indians (R. Bane pers. comm.). There were conflicts between them and the people of the Kobuk and the Athabascans were eventually pushed out.

The eskimo people of the unforested upper Noatak Valley were known as Nuatakmiit (Uhl and Uhl 1979). Their numbers were estimated at around 945 in 1850, but this estimate may have included Colville drainage people since their ranges overlapped (Foote 1965). Muir (1917) reported that natives of the Colville and lower Noatak regions used to travel annually over the passes of the rivers' headwaters to trade and socialize.

These people were highly dependant on caribou for winter sustenance. Fluctuating caribou numbers and concentrations over broad time periods meant that the exploitation of this resource often required seasonal movements within the Noatak valley. Smith (1913) reported that natives from the lower part of the Noatak made annual hunting trips to the Aniak lowlands for caribou, which is about 50 miles below what is now the park boundary. Kobuk River people made caribou hunting trips to this region as well, especially when the animals were scarce closer to home (Smith 1913, Uhl and Uhl 1979).

Smith (1913) mentioned that sheep were so abundant in the Noatak headwaters that eskimos from as far away as Kobuk make

annual trips to the area for their winter's supply of meat. He reported seeing such a hunting party in the headwaters in August 1911, and reported seeing many discarded sheep horns in the vicinity of Twelve-mile Creek.

McLenegen (1887) reported seeing caches of eskimo sleds and umiaks as far up-river as the mouth of the Cutler River. He surmised that they abandoned up-river travel at this point because of difficult boating conditions. Stoney (in Ducker 1984) mentions that the mouth of the Aniak River was the highest point on the Noatak reached by natives by boat. Kobuk River eskimos would use dogs to pack their meat and hides back in the early fall. They would reach the Kobuk by descending the Reed, Ambler or Kubaluktuk Rivers in rafts (Ray Bane pers. comm.).

Evidence of winter use of the upper Noatak was provided by Stoney (in Ducker 1984). He stated that in the fall the eskimos would boat to the mouth of the Aniak and wait for snow to sled further into the interior. The reverse trip would be made in the spring to the coast. He also noted that a few families would remain in the mountains year-round.

Investigations by Irving (1962) and Hall (1973), and follow-up studies by National Park Service archaeologists (Kunz 1986) at Kipmik Lake, near the headwaters of Midas Creek, revealed significant archaeological finds. They found several sites

representative of late prehistoric eskimo, indicating both summer and winter use by small groups. Artifacts found at these sites suggest that the area had supported human occupation over at least the last 7 or 8 millennia. Use was probably intermittent in nature and was tied to the productive fisheries and game resources available there.

Anderson (1972) referred to a paucity of archaeological sites in the upper Noatak River Valley, and suggested that it might be attributable to the lingering pressure of glaciation in that area. However, Hall pointed out that sites near Kipmik Lake were habitable at least 4-5,000 years ago and that similar sites may be present in the upper valley as well.

During 1962, Hall spent a week conducting archaeological investigations in the area around Pingo Lake and found no sites. He subsequently heard from Noatak people that the mouth of Portage Creek was a locus of historic eskimo activity. Investigation of this area in 1973 revealed nothing and he later suggested that the site may have eroded away (Hall 1974). Kunz (pers. comm.) feels that the Noatak headwaters have been inadequately surveyed and that more thorough work would reveal many sites.

All Noatak River people eventually became village dwellers, either moving to coastal villages, or to Noatak Village, which

was first established in 1908. Some Nuatakmiit eventually settled in Anaktuvuk Pass (Uhl and Uhl 1979).

Today, the upper Noatak is important to the native people of Noatak Village and Kotzebue (popn. 2500 in 1978) as a source of salmon, char, caribou and moose. Summer use is probably restricted to below the Cutler and Aniak Rivers, which is accessible by power boat. The upper Noatak is intermittently used by caribou hunters from the Kobuk, Koyukuk and Arctic coastal areas using snow-machines when caribou cannot be found closer to their home villages. However, these hunts are infrequent because they are expensive and time-consuming (Uhl and Uhl 1979).

Uhl and Uhl (1979) reported that sheep are not hunted much by Noatak residents and that summer backpack hunting trips are no longer made. It is highly unlikely that sheep are hunted for subsistence in the headwaters area due to it's remoteness.

Kotzebue resident Nelson Walker has spent considerable time in the upper Noatak since the late 1940's. He reported seeing very little use of the headwaters area by natives during that time. He claimed that there was no summer use and rarely, a sled-dog team would come through during the winter. He felt that native use increased in the late 1960's when the snow machine became a dependable means of transportation. Apparently, Kobuk eskimo

villagers came through the headwaters to hunt caribou when there were none on the south side of the mountains, which was rare. He estimates that at the present time 35 to 40 snow machines pass through during the winter.

According to former Bettles resident Ray Bane, the people of Anaktuvuk Pass accessed the upper Noatak by snow machine beginning in the early 1970's. They were primarily hunting and trapping wolf, wolverine and fox. The area is not used heavily, but consistently. The drainage is accessed from a winter camp in the upper Nigu, through Midas Creek. They work the area around Lake Matcharak and occasionally get as far as Pingo Lake.

Exploration by whites

S. B. McLenegan was the first white man to explore a considerable length of the river and leave a permanent record of his trip in 1885. He and a companion navigated as far up-river as the Aniak in a month-long period, using a 27-foot kayak (Ducker 1984). They found the river unnavigable above this point due to shallow water. An expedition led by Stoney in 1885 explored parts of the upper Noatak, but details of the trip are meager. He had entered the headwaters from the Reed River and traveled down-river as far as the Aniak (Ducker 1984).

Gold was discovered on Lucky Six Creek in 1898 and from time to

time up until 1911, small parties of prospectors visited the region. Miners accessed the headwaters from the Alatna River via Gull Pass or Portage Creek, or from the Reed River via a pass on the west side of Mount Igikpak. Little effort was spent there because of it's remoteness and lack of timber. Small amounts of placer gold were also found on Midas Creek in 1904 (Ducker 1984).

Smith (1913) mentions that it was doubtful whether more than a few hundred dollars worth of gold had been mined from the entire Noatak basin and the 2 creeks in the headwaters were the only places where placer gold was known to have been found at that time.

During 1911, the first Geological Survey party to visit the Noatak, led by Philip S. Smith, entered the headwaters from the Alatna River via Portage Creek and paddled to the mouth. During this trip, several thousand miles of the Noatak River Basin were surveyed geologically and topographically.

Other travel by boat

The river was described by the U. S. Coast and Geodetic Survey in 1926 as unnavigable for any distance for boats larger than native canoes. A draft Corps of Engineer report of 1953 noted that barges could be taken up-river to within 18 miles of the village of Noatak, after which freight could be carried in small

boats to the village. It also stated that no settlements of any consequence were found further up-river. A 1965 report by the Corps reported that supplies were barged to Noatak (in Ducker 1984).

Mining Claims

Lands within Gates of the Arctic National Park were withdrawn from mineral entry on March 16, 1972. All claims concerning mine sites developed after that date are invalid. A few claims were filed in the Noatak drainage within GANPP for sites mined prior to that date.

Levy Mills did some prospecting in the early 60's and found copper "in good quantities" around Midas Creek. He and Nelson Walker filed several lode claims there, but they were deemed invalid by the Department of the Interior in 1985, because of the lack of profitable amounts of copper there (NPS files).

E. B. Joiner built a small cottonwood-pole-frame cabin on Nigikpalvgururvrak Creek (Joiner Creek) some time in the mid-sixties and did some small-scale mining on the creek. He filed for an unpatented placer mining claim for 160 acres of land on the creek in 1981. NPS geologists conducted tests in the creek and determined the claim invalid because mining is presently

unprofitable there. The decision is being contested (C. Drummond pers. comm.).

Hunting

Nelson Walker (pers. comm.) has been active in the upper Noatak since 1949. He began guiding hunters there in the late fifties and built cabins on Lake Isiak and Nelson Walker Lake in the early sixties. He had a gentleman's agreement with guides working adjacent drainages and, in 1974, legally obtained exclusive guiding rights to the upper Noatak. He purported that the sheep hunting was some of the best in the world and that he'd guided from 20 to 30 parties per year. Most of the hunting took place in the fall, but he said that he'd guided 2 to 3 parties in the spring for bears. One other man tried to guide in there in the mid-sixties, but Walker "run him off".

Walker had 2 assistant guides in the sixties. John Schmitz, of Anchorage, helped him early in the decade and Tony Bernhardt assisted later. Walker helped Bernhardt construct a cabin at the northwest end of Pingo Lake and Bernhardt lived on the land and subsistence hunted there for about 8 years. Bernhardt applied for an 80-acre native allotment at the northwest end of Pingo Lake in 1966. This property was awarded to him in 1987.

According to Walker, a few private parties began hunting in the

upper Noatak in the late sixties when word got out that the hunting was so good. These were people from Anchorage and Fairbanks and amounted to 6 to 8 parties per season. This continued until the area was included in the National Park system in 1979.

In 1972, 160 acres surrounding Nelson Walker Lake were awarded to Walker's wife, Myra, under the native allotment program directed by ANSCA. Walker received title to 5 acres surrounding his cabin on Lake Isiak in 1972.

Scientific research

At least 3 archaeology parties descended the Noatak in 1961 and at least 5 other expeditions took place over the next 3 summers. Archeological and anthropological work conducted in the Noatak is summarized in Hall (1973).

Biological investigations were conducted at several locations within the Noatak Basin in 1961 by a study team under the direction of Dr. F. C. Dean of the University of Alaska. One of 3 camps on the Noatak was at Lake Omelaktavik. The group spent 3 weeks gathering data on the vegetation, birds and mammals in the headwaters (Dean and Chesmore 1974).

A group of scientists conducted USNPS-sponsored

interdisciplinary field studies in the Noatak Basin in 1973. Approximately 3 weeks were spent within the headwaters, with camps at Kipmik Lake and Pingo Lake. Data was collected on limnology, soils, vegetation, insects, birds and mammals (Young 1974).

Recreational boating

An 8-member party canoed the river from Lake Omelaktavik to Noatak Village in 1972 as part of the Bureau of Outdoor Recreation's studies directed by ^{ANSCA} ~~ANILCA~~. This team of scientists recommended that the river receive wild status under the Wild and Scenic River System. They reported that recreational use of the river was minimal at that time. A U.S. Dept. of Interior report (1974) noted that an occasional party of 2 to 8 people floated the Noatak River from it's headwaters to Noatak Village or further down-river.

The Noatak River first gained broad exposure to the public in the mid-70's from articles in popular magazines which described float trips on the river (Crouch 1973, Greenough 1977, Kauffman 1977).

Attention was drawn to the central Brooks Range as the result of the ANSCA land withdrawals and this was probably what initially stimulated the recreational guiding business in the

Noatak and other rivers in the region. The first guided trips on the Noatak probably occurred in the early 1970's. Bettles resident Dave Schmitz (pers. comm.) and Fairbanks guide Ron Yarnell did an exploratory float of the river in 1974. Schmitz began guiding trips down the Noatak for Sourdough Outfitters (owned by Dave Ketscher) in 1975 and began leading his own trips in 1977. Yarnell began guiding on the river in the late seventies. He mentioned that the guided trips really started to pick up on the central Brooks Range rivers in 1978, when the region was designated as Gates of the Arctic National Monument. Others who had explored the Noatak headwaters in the seventies included Wilbur Mills, Molly McCammon and Bob Waldrup.

Legislative History

Almost all of the Noatak River watershed above the village of Noatak was withdrawn by the Secretary of the Interior from all forms of appropriation under Section 17 (d)(2) of the Alaska Native Claims Settlement Act (ANSCA) of 1971. This was part of approximately 80 million acres which was to be evaluated for suitability for inclusion into the 4 national preservation systems.

A task force was appointed by the Bureau of Outdoor Recreation (BOR) to study 40 Alaskan rivers for possible inclusion into the Wild and Scenic Rivers System (WSRS) in 1972. The group

recommended that the Noatak River, from it's source to it's confluence with the Kelly River be classified and managed as a wild river and that the remainder be managed as a scenic river (BOR Alaska Task Force 1973). The Noatak headwaters, comprising approximately 730,000 acres, were included in the proposed Gates of the Arctic Wilderness Park (USDI 1974). A joint BSW-BLM proposal in 1973 called for the creation of the Noatak National Ecological Range, which was to encompass the remainder of the acres withdrawn from land selection (USDI Alaska Planning Group 1974).

Gates of the Arctic National Monument and Noatak National Monument, encompassing those lands within the watershed as described above, were created by presidential proclamation in 1978. ANILCA legislation changed the status of these monuments in 1980 to Gates of the Arctic National Park and Preserve (including the Noatak headwaters) and Noatak National Preserve. The river received it's recommended WSR status during this time and the entire watershed within the 2 NPS units received wilderness status.

GANPP General Management Plan

Gates of the Arctic National Park and Preserve (GANPP) was created with the idea of preserving a vast wilderness with the conviction that "it is neither necessary nor desirable to dilute

its primitive primeval character in the name of either outdoor recreation or economic benefit." (USDI Alaska Task Force 1974). Congress intended that GANPP be managed to, among other reasons, "maintain the wild and undeveloped character of the area, including opportunities for visitors to experience solitude, and the natural environmental integrity..." (USDI 1986:3).

GANPP personnel established a set of management objectives and standards which were felt necessary to keep visitor recreational use compatible with maintaining the park's wilderness qualities (USDI 1986:127). These standards concern, among other things, disturbance to vegetation and soils, conflicts with wildlife and encounters between visitors. The document addresses the need to monitor areas within the park in order to see that these standards are met and to initiate management actions when they are not met. These actions may include efforts to change human behavior through education or through limiting use.

Visitor Use, 1981-1987

Commercial operators are requested to turn in a summary of their activities in the park at the end of each year as part of the permit renewal process. A relatively complete listing of the number of guided parties using the Noatak headwaters and the number of people flown there by air taxi services can be derived from these reports.

Thirty licenced commercial operators listed river floating as one of their activities in GANPP in 1988. From 6 to 10 guides listed guided trips in the Noatak headwaters on their activity reports for any one year, between 1982 and 1987. A total of 20 have reported providing outfitting or guiding services there, during the past 8 years (Table 2).

Table 2. Years in which licenced outfitters and guides reported trips into the Noatak headwaters on their activity reports, 1981 -1987.

Alaska Travel Adventures	1982
Alaska Wilderness Adventures	1983
Alatna Guide Service	1983,6,7
Arctic Air Guides	1983,5
Arctic Brothers Entertainment Committee	1982,5,7
Arctic Treks	1987
Brooks Range Expeditions	1982,3,4,7
Brooks Range Wilderness Trips	1982,3,4,6
Frontier Flying Service	1983
Hugh Glass Backpacking	1982,3,4
James Henry River Journeys	1982,4,6
Journey's North	1984,5,7
National Outdoor Leadership School	1985,6
Nichols Expeditions	1987
Ouzel Expeditions	1983
Sevy Guide Service	1982,5,6,7
Sierra Club	1985,6,7
Sourdough Outfitters	1981,2,3,4,5,6,7
Wilderness Alaska	1985,6,7
Wilderness Alaska/Mexico	1982,3,4,5,6,7

The number of people participating in guided trips within the Noatak headwaters has increased steadily in the past 8 years (Table 3). Although both the number of groups and the average

group size have fluctuated yearly, an upward trend in both has contributed to increased use.

Table 3. Yearly summary of guided trips, Noatak River headwaters, 1981-1987.

YEAR	# PEOPLE	# GROUPS	# GUIDES	AVG. GROUP SIZE
1981	32	4	1	8.0
1982	57	9	9	6.3
1983	78	14	8	5.6
1984	42	8	6	5.3
1985	107	15	8	7.1
1986	132	16	8	8.3
1987	215	23	11	9.3

There are currently 13 air taxi operators licenced to operate in GANPP. Eight of these have indicated on past activity reports that clients were dropped off within the Noatak headwaters. Three others currently not licenced had showed limited activity there in the past (Table 4). The principle operators from 1981 through 1987 were Ambler Air of Ambler, Brooks Range Aviation of Bettles and Arctic Air Guides of Kotzebue.

Visitor use was estimated from activity reports of air taxi operators and those outfitter/guides using their own aircraft. Data suggest that the total number of people visiting the Noatak headwaters between June and August has increased moderately

during the past 8 years (Table 5). Numbers have stabilized over the past 4 years to just under 250 visitors per year.

Table 4 Air Taxi Operators providing services to the Noatak headwaters, 1981-1987 activity reports.

Operator	1981	1982	1983	1984	1985	1986	1987
Ak Air Charters					X		
Ambler Air	X	X	X	X	X	X	X
Arctic Air Guides			X	X	X	X	X
Baker Aviation				X			
Brooks Range Av	X	X	X	X	X	X	X
Canning Air						X	
Exped. Services						X	
Frontier Flying				X			
NW Aviation						X	
Walker Air	X			X			
Wright Air				X	X		

Table 5. Estimated numbers of visitors flown into the headwaters by commercial operators, 1981-1987.

Operator	YEAR						
	1981	1982	1983	1984	1985	1986	1987
Brooks Range Av	127	76	114	111	77	79	85
Arctic Air Guides	--	--	13	29	29	40	28
Ambler Air	20	35	--	28	44	15	25
Sourdough Outfit.	32	8	31	30	38	63	57
Other Comm. Oper.	--	--	2	36	35	45	54
TOTAL	179	119	160	234	233	242	249

Commercial operators provided information on 139 guided and outfitted trips from 1981 through 1987. Fifty-six percent of 91 guided trips were entirely within the headwaters, while 26% ended in Noatak Village, 9% ended between these 2 and 9% were

unreported. By contrast, 57% of 44 outfitted trips ended in Noatak Village, 34% ended in the headwaters and 9% ended somewhere in between. Ten percent of trips began in late June, while 37% began in July and 53% began between August 1 and September 3.

Eight guided and 25 non-guided parties which started their trips in the Noatak headwaters were contacted by rangers at Kelly Bar in the Noatak National Preserve during 1986. Non-guided parties ranged in size from 1 to 4 people, with an average slightly higher than 2. Guided parties included from 4 to 13 people, with an average of around 8.

Noatak National Preserve rangers stationed at Kelly Bar contacted 20 parties who floated from Pingo Lake to Noatak Village between late June and early September during 1986. Trip length varied from 14 to 34 days, with an average of 22 days. The number of days spent in the park ranged from 5 to 15, with an average of 8. Forty-two guided/outfitted trips taken from the Noatak headwaters to Noatak Village from 1981 to 1987 ranged in length from 13 to 36 days, with an average of 19 days. Sixty-two trips restricted to the headwaters during the same time period ranged from 4 to 16 days in length and averaged 10 days.

Visitor Use 1988

Numbers and distribution

All air taxi operators who have taken clients to the Noatak headwaters in the past 8 years and are currently licenced to operate in the park were contacted this year. Arctic Air Guides and Brooks Range Aviation were the only operators who made regular trips this season. Northwestern Air uses only wheeled aircraft and drops a few parties off in the vicinity of Lake Matcharak when gravel bar conditions are favorable. All others reported no activity in the Noatak headwaters this season.

An estimated 240 recreationalists used the Noatak headwaters of Gates of the Arctic National Park from June 1 through early September in 1988 (Table 6). There were a total of 61 parties, including 55 floater-groups, 5 backpacker-groups and 1 group of fishermen.

Group size for floaters ranged from 1 to 11. 51% of parties contained 1 or 2 persons, 36% contained between 3 and 7 people and 13% contained from 8 to 11. Fourteen trips were known to be guided, including 8 by Sourdough Outfitters. Of 49 trips with known destination, 55% floated to Noatak Village and 45% floated only the headwaters. Fifty-one parties reached the headwaters with either Brooks Range Aviation, Sourdough Outfitters or Arctic

Table 6. Recreationalists in the Noatak River headwaters, Summer 1988.

June 6 - ?	6 people, guided, Arctic Treks, Pingo to Matcharak.
June 12 - July 1	2 in canoe, USNPS, Pingo L. to Noatak. Brooks Range Aviation.
June 13 - ?	6 in 3 canoes, Pingo Lk. to Noatak. Arctic Air Guides.
June 23 - July 2	4 in canoes, 12-mile to Matcharak. Sourdough, guided. Seen from air at Igning River on 6/29.
June 23 - ?	2 in canoe, Pingo Lk. to Noatak. Arctic Air Guides.
June 24 - ?	1 in Klepper, 12-mile to Noatak. Brooks Range Aviation.
June 25 - June 29	2 in canoe, 12-mile to Douglass L. Sourdough, unguided.
June 26 - ?	2 canoeists. Pingo Lk. to Noatak. Arctic Air Guides.
July 2 - July 10	2 in canoe, 12-mile to Douglass L. Sourdough, guided. contacted.
July 2 - July 11	4 in Folboats, 12-mile to Noatak. Sourdough, unguided.
July 2 - ?	3 kayaks/ 4 people, 12-mile to Noatak on river at Igning R. seen from air on 7/8. Brooks Range Aviation
July 2 - July 27	2 in canoe, Portage L. to Matcharak. Sourdough, unguided.
July 3 - ?	2 in canoe, Pingo L. to Noatak. Arctic Air Guides. 2 canoeists seen on gravel bar just below Matcharak on July 7
July 5 - ?	2 or 3 in canoe, Pingo to Noatak. Arctic Air Guides.
July 7 - ?	4 in 2 canoes, Pingo to Noatak. Arctic Air Guides. 2-3 canoes/tent seen at Pingo from air on 7/8.

Table ____ . Continued.

July 11 - July 20	7 in canoes, Portage L. to Matcharak. Sourdough, guided. contacted.
July 13 - Aug 3	6 in 3 canoes, Pingo L. to Noatak. Arctic Air Guides. contacted.
July 13 - July 30	2 in Folboat, Pingo L. to Noatak. Arctic Air Guides. contacted.
July 15 - Aug 19	2 in Metzler, 12-mile to Noatak. Brooks Range Aviation. contacted.
July 15 - July 26	2 in canoe, 12-mile to Douglass. Sourdough, unguided. 2 in canoe seen from air on river between Omlektovelik and Kugrak on 7/21.
July 17 - Aug 14	2 in Metzler, 12-mile to Noatak. Brooks Range Aviation. contacted.
July 20 - ?	3 in raft, Pingo to Noatak raft and camp at river by creek just upstream from Omlektovelik on 7/23. Seen by air. Brooks Range Aviation
July 21 - ?	4 in 2 canoes, Pingo to Cutler River. seen on 7/24 near Douglass Cr. by another party.
July 23 - Aug 13	1 person/canoe. 12-mile to Noatak. Brooks Range Aviation. contacted.
July 23 - Aug 2	2 people dropped off at Omelaktavik for backpacking trip. Brooks Range Aviation
July 25 - Aug 10	Folboat, 2 people. N.Walker L. to Noatak. Brooks Range Aviation. contacted.
? - ?	4 canoes seen at Igning River on July 27
July 26 - Aug. 11	8 in 4 canoes, 12-mile to Noatak. Sourdough, guided.
July 26 - Aug 11	10 in 5 canoes, 12-mile to Noatak, Sourdough, guided.
July 28 - Aug 6	2 people in Klepper, Pingo to Matcharak. Private plane. contacted.

Table 6. Continued.

July 28 - July 29	Backpackers, picked up at Pingo Lk. Seen on shore on 7/29. Brooks Range Aviation.
July 28 - ?	11 in Kleppers, Pingo to Noatak, NOLS Supplied w boats by Brooks Range Aviation.
July 29 - Aug 22	2 people, Nauteraide, N.Walker. L. to Noatak. Brooks Range Aviation. contacted.
? - ?	2 canoes seen E. of Ipnelivik R. at horseshoe on 8/5. Also seen near Douglass Lk. on 8/9.
July 30 - Aug 13	5 people, Portage L. to Noatak. Sourdough, unguided. 2 canoes/1 kayak seen camped at Kugrak impact site on 8/5.
July 31 - Aug 11	2 rafts/ 6 people, 12-mile to Douglass Cr. seen 3 mi E of Igning R. on 8/5. Seen at Midas Cr. on 8/9. Brooks Range Aviation.
July 31 - Aug 23	6 in 3 canoes, Portage L. to Noatak. Sourdough, unguided 3 canoes/6 people seen camped across from Kugrak R. on 8/5. Seen near Douglass Cr. on 8/9.
July 31 - Aug 12	Sierra Club, 11 people. 12-mile to Douglass Lk. 3 single/4 double kayaks seen at river end of Pingo Lk. portage trail on 8/5. Suspect this was them. BRA
Aug 1 - ?	AAG reported 2 in canoe from Pingo to Noatak. May be same as 1 of the ?'s below.
Aug 3 - Aug 17	2 in canoe, 12-mile to Douglass Lk. Sourdough, unguided.
Aug 5 - ?	4 in 2 canoes, Pingo to Noatak, Wild. Ak. Seen on w side of Pingo Lk. on 8/5. One was seen at outlet of Joiner Cr. and the other near Douglass Cr. on 8/9. Brooks Range Aviation
Aug 5	2 hikers camped above 12-mile
Aug 6 - ?	AAG reported 3 from Pingo to Noatak.

Table 6. Continued.

Aug 6 - Aug 20	2 in raft, Pingo to Kavatchurak, Air taxi from Fbnx. contacted.
Aug 7 - Aug 17	8 in 4 Kleppers, Pingo to Kavatchurak, ABEC Brooks Range Aviation
Aug 8 - Aug 18	Sierra Club, 5 canoes/11 people. 12-mile to Kavatchurak. BRA. contacted.
Aug 9 - ?	AAG reports 2 from Pingo to Noatak.
? - ?	2 in Metzeler, seen at horseshoe on 8/9.
? - ?	2 canoes, seen at W. Kugrak on 8/9.
? - ?	2 canoes halfway btwn Douglass and Kavatchurak on 8/9.
? - ?	raft seen at Joiner Cr. on 8/9.
Aug 15 - Aug 20	2 in canoe, Portage L. to Matcharak. Sourdough, unguided.
Aug 18	2 C185's/ 2 people on Lk. Isiak, fishing
? - Aug 18 - ?	red canoe (AAG?) 3 mi E of Igning on 8/18
? - Aug 18 - ?	2 tents 1 mi. above 12-mile, no boat seen.
Aug 18 - Aug 31	2 in canoe, Portage L. to Douglass L. Sourdough, unguided.
Aug 21 - Sept	4 in 2 canoes, 12-mile to Kavatchurak Brooks Range Aviation
Aug 22 to Aug 31	11 in canoes, 12-mile to Douglass Lk. Sourdough, guided.
Aug 27 to Sept 5	7 in canoes, Portage L. to Matcharak. guided by Sourdough for Mountain Travel.
Sept 3 to Sept 7	3 people, Portage L. to Matcharak. Sourdough, guided
Sept 4 to Sept 9	3 hikers, Omelaktavik. Brooks Range Aviation.

Air Guides. Two parties came in by private plane and 8 parties used unknown transportation.

Encounters with other parties

We encountered 16 parties comprised of 58 people during our 5 trips. Two parties each with 2 canoeists were seen briefly in early July and the remainder were seen between mid-July and mid-August. Nine parties were each seen briefly during a single encounter and only 5 parties were seen 3 or more times. We kept "leap-frogging" with one other party on trips 3 and 5, seeing each party 6 times.

One or two parties camped within sight or hearing distance of us during each of 11 nights. These included 5 nights at Kugrak, 2 nights each at Pingo Lake and Ipnelevik River, and 1 night each at Lake Matcharak and Joiner Creek. Two parties were in close proximity of us on each of 3 nights.

Contacts with other parties

A total of 14 parties were contacted during the 1988 season, including 1 solo canoeist, 10 groups of 2, and 1 group each containing 6, 7 and 11 people. Summaries of these contacts are

included in Appendix 3.

Ten of the smaller parties contacted were asked their feelings concerning the amount of use the headwaters received. Two parties expressed mild disappointment with the amount of human activity (other parties, aircraft, campsites), while 5 groups were surprised but not disappointed, and 3 groups found the level of use as they expected. Two groups expressed displeasure with impacted campsites and felt something needed to be done to prevent this occurrence. Another party was disturbed at having to pick up bits of aluminum foil and other trash at campsites. We found that four of the parties we had contacted had left messy campsites (fire pits with charcoal, cut live branches, bits of trash).

Nine parties were asked if they carried firearms for bear protection and all responded affirmatively. Attitudes towards bears ranged from carefree to great concern. One party was observed to leave fresh-caught, cooked fish in their fire pit overnight and they left their aluminum foil and bones in the fire pit when they broke camp. Most of the groups were making an effort to be clean in their handling of food, and a few expressed interest in the bear-proof containers we were using.

Campsites

Campsites investigated this summer included sites which received repeated use and showed damage to vegetation as well as those showing temporary or no impacts. The former includes camps established at popular drop-off and pick-up points and camps near scenic attractions. There are 11 designated Human Impact Sites (HIS) documented by photographs and writing. Reference tags have been placed at each site for future monitoring.

Drop-off and pick-up points

At this time there are 4 lakes which serve as drop-off points for floaters and 3 lakes which are used for pick-ups. Each of these show evidence of repeated use, but vary in the amount of impacts, depending on the level of use each receives. The greatest impacts occur at some of these sites

Twelve-Mile Slough

This is a shallow, oblong oxbow lake which is just under a half mile long. It is the uppermost put-in site on the Noatak accessible by floatplane. Floater disembark on the south bank of the lake and must portage their gear about a half mile to the river. Boats full of gear can be paddled or lined to the west end of the lake and then gear must be carried along a narrow

slough for a quarter mile.

We observed that at least 2 parties camped at the lakeshore this summer. Most people probably prefer to portage to a more suitable campsite along the river, as we noticed no impacts in the immediate area which suggested heavy camping pressure. The portage trail is evident, but is light compared to others further down-river.

Portage Lake

There is an impacted campsite (HIS #103) at the western tip of this half-mile-long lake. The main camping area is approximately 40 feet in diameter and is about 20 feet from the lakeshore. Low-growing vegetation is compressed at this site and there is 1 fire pit. A well-worn trail leads to the lakeshore where floatplanes pull up and there are a few other less-worn peripheral trails. The portage trail is worn to bare ground near the campsite, but is less defined further out. Canoes were stashed at this site intermittently throughout the summer.

Nelson Walker Lake

A campsite (HIS #200) is located on the north end of the lake, next to the cabin. The portage from this lake to the river is only about 50 yards long. The site has received less use in the

past 6 years than previously. The NPS discouraged people from using this site because it is on a private native allotment and NPS requested that commercial operators not use the lake as a drop-off. This property is being purchased by NPS and was used this summer as a drop-off point by Brooks Range Aviation.

Much of the ground immediately surrounding the cabin is bare of vegetation. Vegetation has been compacted on a site approximately 5 yards to the east of the cabin and about 5 yards by 10 yards in area. There is evidence of an old fire ring here and light trails leading away from the cabin and campsite are in evidence. There is another old campfire ring approximately 80 yards to the east of the cabin, near the end of the point. There is quite a bit of scattered wood laying about. We removed several aluminum old aluminum cans and other litter from this site in early June.

Pingo Lake

This has been the primary drop-off site for floaters for the past several years. Due to congestion and camper impacts, many commercial operators are avoiding this lake. The main drop-off point (HIS #49) is at the southeast end of the lake and there are 3 portage trails leading to the river. There is a bear-proof barrel at this site and 2 canoes were stored there for most of the summer. Impacts include 2 large bare patches and a smaller

pit where campfires had been made. Dead willows were stacked at this site for firewood. The barrel was tipped over and filled with dead wood part way through the summer. A worn trail leads to the north along the lakeshore. Most of the willows within a few hundred yards of this site have been pruned of their dead branches for firewood.

Two parallel trails approximately one-eighth-mile long traverse the shortest distance due east to the river. A more heavily-used trail runs south for about 3/8 mile and ends at a large sand/gravel bar. The river end of this trail is a popular camping spot (HIS #50). There was very little impact to the vegetation at this end, since most people seem to camp either on the sandbar or on the naturally barren sites on the bank. There is a single fire pit next to the trail about 15 yards from the riverbank.

A point of land at the northwest end of the lake is used as a storage for canoes and fuel by Arctic Air Guides. In July, there were 10 5-gallon cans of assorted fuels there. We also observed parties camped on that point twice during the summer.

Lake Omelaktavik

This lake is not used as a drop-off for floaters but 2 parties of hikers was dropped off there this summer. Three fifty-five

gallon fuel drums were spotted from the air on a point at the southeast end of this lake. Ground inspection of this site revealed a small garbage dump containing old cans, bottles and paper.

Lake Matcharak

This has been a popular pick-up point for persons doing short floats within the Noatak headwaters and is the only lake used as such within the park. It also serves as a drop-off point for longer floats into the preserve. The access point to the river on this lake is at it's westernmost tip and there is a well-worn portage trail 400 yards to the river. There are impacted campsites at both ends of the portage trail.

At the lake end (HIS #54), there are 6 adjacent sites from 6 to 10 feet in diameter where bare ground has been exposed. Two of these contained campfire pits. Several blackened rocks forming a fire ring were redistributed by us and small bits of trash were removed from the fire pit. Up to 8 canoes were stored at this site during the summer.

The river terminus of the portage trail was used repeatedly as a campsite (HIS #40) throughout the summer. Low-growing vegetation amongst the willows next to the riverbank is heavily-trampled and exposed soil occurs within the site of most

concentrated use. Dead willow branches have been removed from several shrubs. We found a spot where someone had used several willow branches for tie-downs for their tent or tarp and then, upon leaving, had cut the strings, leaving the ends still tied to the willows. We also found charcoal in an excavated fire pit and human waste and toilet paper at this campsite. Small bits of trash were scattered throughout the camp. An eddie in the river next to the site was swirling with large quantities of blackened firewood.

Douglass Lake

This take-out point is about 20 miles down-river from Matcharak and is about 4 river miles below the park/Noatak Preserve boundary. This site appears little-used at this point, but its use will probably increase as more people seek an alternative pick-up site to Lake Matcharak.

The portage to this lake is difficult and includes scaling a steep embankment perhaps 100 feet high, and 2 1/4 mile hikes separated by a 1/4 mile paddle across a smaller lake. A very light trail now exists across the route and we picked up small bits of trash along the trail and on the lakeshore. There is no suitable campsite at the river end of this trail and only a few flat spots suitable at the lake end. There is no wood at this site for campfires.

Kavatchurak Lake

This lake is approximately 10 miles below Douglass Lake. We did not paddle this far into the preserve, but met a few parties who were planning to take out here. The portage to the lake appears short and across easy terrain.

Other heavily-impacted campsites

These campsites all show signs of repeated use and long-term vegetation damage. Some have been monitored over the past few years, while others were newly-discovered this year. All have been documented as Human Impact Sites (HIS).

Pingo Access (HIS #134)

This campsite is located on the river bank at the closest distance to the Pingo above Pingo Lake. The pingo is a popular landmark which is 1/4 mile from the river and offers a good vantage point of the valley. The impacted area on the river is a sandy embankment covered with horsetail. Vegetation within an area about 20 feet across had been trampled, but there was little damage to perennial species. Two fire pits and a huge stack of firewood were present at this site. Campfires were sloppily buried and charcoal remnants were scattered about. Several live

willow branches were also broken over.

East Kugrak Confluence (HIS #52)

This site is located on the bank of the river adjacent to the small easternmost braid of the Kugrak River. Heavy use of this site was first documented in 1982 and it is probably the most disturbed area besides the portage sites. Extensive bare ground and trampled vegetation occur here, along with fire pits and stacked firewood. During an early-August inspection of this site, we found a fire ring with recent ashes containing several aluminum can lids and foil as well as fresh-cut live willow branches with whittled ends, many broken tree limbs and a huge stack of firewood.

Middle Kugrak Confluence (HIS #53)

This site is located within a vegetated embankment just east of the main braid of the Kugrak River. It has also received heavy use over the years and contains much exposed ground. There are 3 old fire pits there and a small pile of firewood. This site received little use this year and we found no fresh disturbance other than lightly-trampled vegetation.

West Kugrak Confluence (HIS #199)

This site is on a dry grassy flat above the western edge of the gravel bar associated with the Kugrak River drainage. This site makes an ideal, comfortable place to camp, but the vegetation is highly sensitive to trampling. This spot is just beginning to show signs of overuse, although it is probably used infrequently. There is a fire pit on this site and a few old cottonwood logs with sawed butts probably used as seats. There is a trail leading west along the bank to a small creek.

Kugrak Warm Springs (HIS #115)

This site is an artesian spring entering the Kugrak River from a small bluff about 5 miles above the river's mouth. There is a large grove of cottonwoods growing there and a waterfall shrouded with lush, sensitive vegetation. This is the focus of a popular day hike up the Kugrak Valley. Trails are beginning to form in the timbered areas adjacent to the waterfalls and the mosses and forbs growing in the falls show signs of compression and displacement.

Igning River Confluence (HIS #60)

This site is located on a vegetated bank on the eastern edge of the Igning river mouth. Trampled vegetation and bare ground

occur within areas of heaviest use on this site. There was little sign of use on this site this year.

Midas Creek

We did not check this site, but another group of floaters informed us that there was a highly impacted site there. They indicated that there was a large fire pit ringed with rocks and full of charcoaled wood and ashes, cut green firewood and a small amount of trash at this site.

Recent campsites

We investigated 25 recent campsites (from 1 day to 12 days old) during the summer (Table 7). Fourteen were located on gravel bars or in places where ground vegetation would not be affected, One was in a dry slough containing sedges and horsetail and the remainder were on already-established HIS sites. Nine sites showed no impacts or lightly-matted vegetation. Common impacts included fire pits with scattered charcoal debris (13 sites), paper, aluminum trash (6), rocks used for fire rings or to encircle sleeping areas (6), cut live wood or broken branches (5) and stacked firewood (5).

Most of these impacts are probably temporary. Sites located below high-water line are swept clean during spring break-up. We

Table 7. Summary of findings at campsites located along the Noatak River during summer 1988.

#	DATE	LOCATION	IMPACTS
1.	6/23	L. Matcharak HIS	recently constructed fire ring surrounding old fire pit. Remains of firewood, cigarette butts and small pieces of litter in the firepit. Dead wood stacked nearby.
2.	6/29	Gravel bar, 1.5 mi. above Portage Cr.	No impact
3.	7/3	Gravel bar, 500 yds. below Igning River.	No impact
4.	7/14	Gravel bar, river end of Pingo Lake portage.	No impact
5.	7/16	River end of Pingo L. portage.	Matted vegetation/no impact
6.	7/17	Gravel bar, Kugrak R.	No impact.
7.	7/27	N. Walker L. cabin	Matted vegetation./ No impact.
8.	7/28	Pingo Lake campsite.	Campfire remains. Stacked firewood. Firepit dug more extensively. Bear barrel turned on side and filled with firewood.
9.	7/29	Kugrak River outlet.	Firepit with charcoal. Rocks used to line fire ring and tents.
10.	7/30	Middle Kugrak HIS	Large camp with lots of new ground scuffing. New campfire pit ringed with rocks constructed; aluminum, ashes and wood debris left. Large pile of firewood. Broken willow branches. Live branches cut and whittled for use at fire.
11.	7/31	Gravel bar, Kugrak R	Firepit buried sloppily. Scattered charcoal. Fresh willows cut to support lean-to.
12.	8/1	Gravel bar west of Igning River.	No impacts

Table 7. Continued

13.	8/2	River end, Lake Matcharak portage.	Firepit on gravel bar below bank with ashes and charcoal. Stacked firewood. Eroded trail up bank.
14.	8/2	Grassy slough below L. Matcharak portage.	Firepit buried, barely noticeable.
15.	8/3	Gravel bar 2 mi. past Preserve border.	Several rocks forming circles. Charcoaled wood remains. Buried firepit. Stacked firewood.
16.	8/9	Portage Lake campsite.	Extensive compressed vegetation. Scattered wood and ashes in firepit. Toilet paper and small bits of paper litter.
17.	8/10	River end, Pingo Lake portage.	Compressed vegetation. Willow branches broken.
18.	8/10	Anoret Creek mouth.	No impacts.
19.	8/11	Karumnulima Creek mouth.	2 firepits with scattered charcoal and ash. Dead branches broken from standing willows. Live branches cut and used for supports.
20.	8/11	Gravel bar across river from Igning R.	Rocks used to anchor tent/tarp. 2 buried fire pits.
21.	8/11	Mouth of Joiner Cr.	No impacts.
22.	8/13	Mouth of Komakak Cr.	Large rocks left in rectangle. Dead branches broken off willows, Large fire ring with black ashes scattered over a large area, very poor effort to disperse large, blackened rocks. Live willow branches cut for tent stakes.
23.	8/13	Gravel bar island below Ipnelivik R.	Several (25-30) large rocks distributed to form 3 rings, probably surrounded tents. Small amount of paper trash.

Table 7. Continued.

24.	8/15	River end, Lake Matcharak portage trail.	Firepit on gravel bar filled in, but still noticable. Matted vegetation. Pieces of string tied to willow branches. Charcoaled wood floating in eddie next to bank.
25.	8/16	Douglass Lake pickup point.	Scattered bits of paper trash.

found none of these impacts on gravel bars early in the season, except for occasional bits of trash. Those frequently-used sites on higher ground are periodically cleaned by conscientious campers.

Fire pits and firewood piles remain on non-flooded sites. Even carefully-buried pits can leave scars on gravel bars. Evidence of 5 old fire pits were found during a brief inspection of the willow floodplain on the downstream side of the Kugrak River. Another impact which remains is the removal of dead branches from standing willow bushes. This is particularly noticeable at the Pingo Lake campsite.

Aircraft

A total of 69 aircraft passes were observed during 46 full days on the river (Appendix IV). Twenty-five round-trip flights involving drop-offs or boat shuttling accounted for 50 of these flights. An additional 8 passes were each believed to be one-leg portions of round-trip flights, while the remaining 11 were overflights. Aircraft were heard at all hours of the day between 8:00 A.M. and 10:30 P.M., with over 80% heard between 10:00 A.M. and 6:00 P.M.

No aircraft were seen during half the days on the river. A single overflight or round-trip flight per day was observed on 16

days, while 2 or more flights per day were seen on the remaining 7 days; more than 3 different aircraft were seen during only 2 days. The largest number of flights observed on any one day was 12 and involved 4 separate aircraft, on July 2.

Thirty of the 33 trips we observed which involved landings were made by 3 commercial operators (Brooks Range Aviation, Sourdough Outfitters, Arctic Air Guides). Each was seen making 3 round-trip flights per day at least once during the summer.

All planes which we observed flying through the valley without landing did so at a few thousand feet or more above the valley floor and along the edge of the mountains. Those pilots who landed in the valley, for the most part remained as far away from the river as practical prior to landing. We did observe pilots flying directly over the river at less than 1000 feet on at least 4 occasions between Pingo and Matcharak Lakes. Twice, pilots remained low to shuttle canoes up-river.

Human/wildlife interactions

Bears

The only incident we are aware of for the Noatak headwaters in which a bear came into a camp searching for food occurred this summer. A guided Sourdough Outfitter group was in the process of

breaking camp when a bear came up to their fire pit and began pawing around as if looking for food. The party made efforts to scare the bear off, including firing warning shots, without results. The bear wandered off after finding no food. The incident occurred at the mouth of the Ipnelivik River.

This bear exhibited the classic signs of a potential problem bear. It is very obvious that bears, foxes and wolves occasionally get the opportunity for an easy meal from sloppy campers. During our first trip this summer, we noted that a fire pit had been dug up by one of the 3 species in search of food. We observed 1 incident in which fish and aluminum foil had been left in campfire coals overnight and 2 in which discarded bones and foil had been left in the fire pit. A man guiding a party this summer related to us that a stuffsack containing food had disappeared from his camp overnight during a trip the previous summer. The stuffsack was found several hundred yards from the camp with its contents torn apart and food eaten. We observed foxes throughout the summer which exhibited very little concern for us and a few approached very closely to our camp. We talked to several other parties who also witnessed foxes approaching their camps.

Dave Schmitz reported seeing a dead brown bear in the river above Matcharak Lake. He determined that the bear had been shot, but no cause was apparent.

Bear problems can be expected to be increase in the Noatak River headwaters, as they have in many National Parks, without preventative management. There are several bears in the headwaters and most of the parties we spoke to had seen at least one. We saw 4 different adult bears on our trip in mid-July. Dave Ketscher (pers. comm.) saw 15 different bears near the river during a mid-September overflight between Portage Lake and Lake Matcharak.

Other wildlife

Disturbance to bird and mammal species at nest or den sites could be a problem. Species of greatest concern are wolves, raptors and loons. Waterfowl, shorebirds and passerines also nest in the riverbottom.

There are 2 wolf packs which have dens close to the floatable stretch of the Noatak headwaters. These wolves are highly visible to floaters, as many reported seeing singles or groups. The locations of both den sites were known by some of the floaters.

Seven species of raptors (including eagles, hawks and owls) are known to nest in the Noatak headwaters in close proximity to the river. At least a few active nests were discovered by visitors

and undoubtedly, others were found by people hiking the side valleys and ridges. Raptors are highly visible.

Loons often nest on islands or lakeshores. Several pair of arctic loons and at least 1 pair of red-necked loons nested in the Noatak headwaters this summer. We saw 2 broods of arctic loon chicks on lakes. People fishing or hiking lakeshores might inadvertently disturb a nesting loon.

Visitors enjoy observing wildlife and often approach closer to sensitive areas than they should for a closer look or a photograph. Most of these people wish no harm to the animals and ignorance accounts for the majority of harmful incidents. Not only are adults and young directly stressed by people, but predators may also be alerted to nest locations.

I talked to a visitor who seemed concerned that people were negatively impacting caribou by camping near areas where they were trying to cross. We did note that the caribou were very skittish to us and we did cause a group of animals to retreat back across the river from where they had come. It is doubtful that the small number of users on the river is having much of an impact on the caribou by causing excessive energy expenditure.

Fisheries use

Fishing is a common activity among floaters. Pike can be found in most of the larger lakes near the river in the headwaters and lake trout occur in Lake Matcharak. Grayling occur in small numbers in several of the side streams and rivers. We know of a few grayling that were caught in the main river, but the river is so silty most of the time that it's use may be limited by the fish. Arctic char occur seasonally in the mouths of the Kugrak and Igning Rivers, as well as in some holes in the Noatak River. This summer, people caught char from mid-July at least through the end of August.

It is unknown at this time what impact floaters are having on the various fish populations. It is clear that only a small number of grayling occur in each side stream, due to limited habitat. The fish move from the side streams to the river in late fall before the creeks freeze over and the river water clears. Without knowing the population size and migrations of this species, it is not possible to know what level of fishing pressure that they can withstand. These fish are easily caught and it would easily be possible to remove all the fish from a given stream during a season. Angler harvest can cause a decline in average size and age of arctic grayling populations (Falk and Gillman 1974).

Lake Matcharak has been a popular fishing spot for lake trout for a number of years. One commercial operator pointed out that the lake trout fishing is not what it used to be and that the sizes of fish are much smaller than in earlier years. We caught and released several from the banks near the portage trail at the west end of the lake in mid-June, with ease. We were able to catch a few with a much greater effort in early August by trolling the entire lake. This is due, no doubt, to a seasonal change in the fish's behavior.

One guide expressed concern to me about the char population. There is apparently very limited habitat for them in the headwaters. Heavy fishing pressure at these sites may have a big impact on the population which uses the headwaters seasonally. The species is very slow-growing and cannot withstand heavy exploitation (Andrews and Lear 1956).

DISCUSSION

Number of Visitors

Data from commercial operator's activity reports indicate a leveling off of the number of people floating the Noatak River headwaters over the past 5 years. However, the number of people taking guided trips and the average group size per guided trip increased significantly from 1983 to 1987. This suggests a shift

in user-group type from smaller groups to larger ones. All of the 23 guided trips in 1987 started between July 1 and September 3. Seventeen of these were parties of 8 to 13 people. This averages out to 1 large group approximately every 4 days.

The number of guided trips and the average group size decreased slightly in 1988. This may have been partly due to a surge in interest for trips within the Arctic National Wildlife Refuge (ANWR), which may have drawn attention away from the Noatak. Several guides reported having a hard time filling their Noatak trips and some didn't float the river this year for that reason.

Encountering other groups in a remote area is often disappointing and/or unexpected. We found that expectations and tolerance levels varied greatly among the users we interviewed this summer. At present use levels it is possible for a group to have contact with 6 or more parties while floating in the Noatak headwaters during peak use periods. It is also still possible to float the river and encounter no one, although there is no assurance of this.

Several smaller groups commented to us this season that they do not like seeing larger groups. Several of the guides also indicated that this was a concern of theirs. Some guides mentioned that there is some pressure to get to favorite

campsites when other guided groups are on the river.

Given the number of large groups now using the river in July and August, it may be unrealistic to expect to not see a large group during a given trip in that time period. However, a large group can be avoided fairly easily by others not wanting to encounter the group often. This would be more difficult if 2 or more large groups were within close proximity of one another since it is not possible to predict where people will be on the river day by day. Some parties float through the headwaters quickly and others may float at a slower pace, engagin in other activitiës such as day-hiking and fishing. Bad weather may also slow the floating pace.

At present, there is no system for keeping large user groups spaced apart on the river. It would be possible, at present use levels, to do this so that guided groups start their trips 4 to 6 days apart. A scheme which would regulate the traffic in this way would minimize the chances of surpassing the tolerance threshold of smaller user-groups and would reduce congestion or competition among groups at favorite camping areas.

Some people will not float the Noatak River because, to them, it no longer represents wilderness. Others would agree that the use levels now exceed that which invokes a wilderness feeling, but would float the river for it's numerous assets not found on

other floats. It appears that current use levels are small enough that the number of encounters among groups is not dissatisfying for most users and it lives up to the expectations of most. However, our sample size is small. A proper assessment of attitudes can only be made through a more intensive survey effort. Increased use can be expected. The quality of the experience is highly dependent on the user group, and as use increases, there will be a shift in favor of the more tolerant user.

If the river is to be managed to maximize the feeling of solitude and a wilderness experience, the use has now exceeded that level during peak use periods. Simultaneous use of camping areas by two or more groups is already occurring.

At current use levels, management for solitude could still be achieved by spreading use more evenly throughout the floating season. This could be achieved most effectively by requiring users to obtain a permit for a given time slot prior to their trip. The height of the season occurs in August, primarily due to a lack of mosquitos at that time. Forcing users to fit an earlier time slot may deter them from floating the river.

Temporary visitor impacts

The majority of impacts resulting from improper camping

techniques are temporary in nature. Lingering rainstorms frequently raise water levels and sweep gravel bars clean of debris and impressions left by campers. Conscientious campers clean up trash and redistribute rocks left by others. Spring floods remove all but a few traces of use from the previous year.

Even temporary impacts are disturbing and unnecessary. Although there is no harm to the natural ecosystem, the integrity of the river is being disturbed. An occasional campfire ring is probably unavoidable, but these sites are now commonplace. We frequently encountered these sites and other groups did as well. One guide reported having to remove 13 campfire rings within the headwaters in August. This occurred between trips in which we also cleaned up several.

Currently, conscientious groups are the majority. This is due, in part, to the quality of most guiding operations. Several guides I talked with stress the importance of minimum impact camping to their clients and explain the frail balances in place within the arctic ecosystem. These guides felt that the majority of the impacts are caused by private parties who are improperly educated. Those guides express some concern about guided parties led by persons whom are themselves unfamiliar with proper backcountry techniques. The problem is amplified since other party members take example from the leader of the group.

This problem can only be corrected through an effective means of education. Some guides explained that they integrate their minimum-impact education with a broader education of the arctic environment. Their clients obtain an appreciation for the area and learn by example. One guide suggested to me that an education program which makes people want to cooperate would be much more effective than regulations which force them to comply. This can be done by gaining their confidence and understanding. A workshop on minimum impact camping attended by all guides would also help to maintain the integrity of the Noatak River as well as other areas within the park.

Semi-permanent visitor impacts

Semi-permanent damage or removal of vegetation has occurred at important drop-off sites, sites close to popular or scenic attractions and pick-up sites. A total of 11 of these sites have been identified in the Noatak headwaters. Suitable campsites are limited on tundra vegetation and people are funnelled to those specific dry, flat locations.

Little can be done to eliminate portage trails. People tend to take the shortest route and trails develop very easily in the tundra. Attempts to discourage a trail from being used will most likely result in the development of new trails. There are barren game trails throughout the valley bottom and hillsides. Perhaps

the few human trails can be tolerated.

It is understandable how campsites develop at drop-off points. When a party flies in, often, not all members can get there the same day. People frequently don't arrive until late in the day. Often times people are not immediately organized to portage, jump into their boats and paddle to the nearest good gravel bar. A bit of repacking may be involved. Rather than go through the extra effort, people stay at the campsite which is at hand and already made obvious by past use.

Impacted campsites occur at pick-up points for a similar reason. Camping right at the pick-up spot saves an extra day of moving camp. Also, suitable campsites on the river may be unavailable or already occupied.

The impacted campsites along the river are preferred to gravel bars by some groups because they are not sandy (loose sand has a way of getting into everything) and they are unlikely to be flooded. Some people also are attracted previously-used campsites.

Park staff must decide whether to just continue to monitor camping impacts or to attempt to minimize the problem. Camping at these sites could at least be discouraged through a minimum-impact education program. The sites already damaged will only

recover through continued avoidance. An extreme measure would be to have strict policy on closure of impacted sites.

Aircraft

The upper Noatak River is not an important travel corridor for aircraft during the summer months and the number of aircraft entering the drainage is dependant on the number of recreationalists, almost exclusively river-floaters, visiting the headwaters.

Our sightings of aircraft was highly variable from day to day and between trips. Sightability was highly dependant on hearing the aircraft, which was affected by our location in the valley, as well as wind speed and direction and other weather factors. We detected only a small portion of the flights required to get all of the visitors into the headwaters while we were there. At times, we could hear a plane for 15 minutes, while others were heard only briefly. On a few occasions, we actually saw a plane on a lake without even knowing that it had landed there. Once we were as far down-river as the mouth of the Kugrak River, we could not hear planes from Bettles bringing passengers to the drop-off points.

Our experience with aircraft noise during each trip was probably representative of what the average group floating the

headwaters would hear if travelling at a slow pace and ending their trip at one of the headwaters lakes. Those persons floating all the way to Noatak Village would probably be spending a much greater portion of their time down by the river. This second group would be more likely to hear aircraft in the valley, but would be spending relatively less time in the headwaters area. More aircraft would probably be heard by those people camping near the put-in points for several days. One group of canoeists had expressed their displeasure at hearing "on average, 3 planes per day" while camping between Twelve-mile Slough and Nelson Walker Lake during the first week of their trip. They heard relatively few further down-river during the second week.

Impacts to wildlife and fisheries

Preventative management of bear/human interactions would best be based on education of all users. Although we found that many users were attuned to bears, some were definitely not practicing sound bear-avoidance measures. People should be made aware of the potential damage to wildlife by harassment at sensitive sites, including den sites and nest sites. An education program might also include advising people to camp away from groups of caribou attempting to cross the river.

There may be concern for certain fish populations, including

grayling, lake trout and arctic char. Although little is known about these populations, observations by users and studies in other areas suggest that these species could be negatively impacted by present or future levels of fishing pressure. Investigations into a system for monitoring these populations should be considered.

Canoe caching

Canoes are presently stashed at a few locations within the headwaters. Some remain at specific locations all summer, some are brought in for large parties prior to the group's arrival and some are shuttled back and forth depending on where they are needed. No concern about canoe caching was expressed to us this summer by river users and several guides interviewed found caching acceptable. Many of these people were using these canoes. Stashing canoes reduces the time and cost of the outfitter, who can pass the savings on to his clients. Less trips into the drainage means less traffic, noise and pollution. Very few users see these canoes and many benefit from them. Some use the boats at Lake Matcharak to fish while waiting for their pick-up.

Forcing guides to remove boats would result in increased cost,

which would be passed on to the client. Operators could switch to collapsible or inflatable boats. This would be costly. A guide pointed out that these boats are susceptible to leaks or holes. Small bits of food which may go unnoticed could attract various mammals which may damage the boats. A client could possibly get dropped off with an unsafe boat.

CONCLUSIONS

The Noatak River is a unique area with a diversity of characteristics attractive to recreationalists. As a result visitor use has increased dramatically since it received broad exposure in the late seventies. Visitor use can be expected to increase in the future.

The Noatak headwaters is part of a great wilderness park and is within the fragile arctic ecosystem. Visitor impacts are highly visible and even low levels of visitation may affect the quality of the user's experience. These impacts are already occurring to some degree. Therefore, a program of education and management may be appropriate for this area.

An education program is needed to teach some users how to

tread lightly within this and other park areas. Park personnel should give careful consideration to an effective method of contacting visitors prior to their trip, gaining their respect and providing them with useful information. Education should provide an easily-understood picture of the arctic environment and entice people into wanting to adopt minimum-impact techniques. Since a high proportion of visitors are accompanied by guides, a method to ensure that guides are familiar with the area and well-versed in minimum impact camping should also be considered.

A means of staggering large parties on the river throughout the short season should either be instigated by the park, or encouraged among the guides. This would increase the quality of individual group experiences and reduce congestion at popular camping areas. This may be easy to put into effect now, while use levels are still relatively light. Concern over trip quality was expressed by many guides and since most are responsible boaters, they should be open to this idea. At this time, the total number of users appears to be below the level needed to maintain the quality of the river trip. However, if use continues to rise significantly, a quota system may some day be necessary.

Monitoring use levels and impacts should be continued. Activity reports submitted by commercial operators are accurate

and this data base should be used to identify congestion problems. Rangers should make a few trips on the river each year during peak use periods. They should continue to determine numbers of visitors, monitor campsites and contact visitors. A questionnaire survey would be helpful in identifying user groups and determining if their expectations were met. Other areas within the park should also be monitored using these techniques.

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APPENDIX I. Personal Communications

Persons mentioned in text

Ray Bane	Superintendent, Katmai National Park King Salmon
Chuck Drummand	Geologist, USNPS Anchorage
Dave Ketscher	Outfitter and Guide, Sourdough Outfitters Bettles
Mike Kunz	Archeologist, USNPS Fairbanks
Kate Roney	Resource Manager, USNPS Kotzebue
Dave Schpitz	Guide, Brooks Range Wilderness Trips Bettles
Pat Valkenberg	Research Biologist, ADF&G Fairbanks
Nelson Walker	Guide and Air Taxi Operator Kotzebue
Ron Yarnell	Guide, Wilderness Alaska/Mexico Fairbanks

Other persons contacted

McGill Adams	Guide, Wilderness Alaska Anchorage
Rick Atkinson	Guide, Sourdough Outfitters Bettles
Jim Campbell	Guide, Alaska Treks Fairbanks
Ron Costello	Air Taxi Operator, Brooks Range Aviation Bettles
Ramona Finoff	Guide, ABEC Guides Fairbanks
Jack Hession	Sierra Club Anchorage

APPENDIX I, Continued

John Kauffman	former Planner, USNPS Bar Harbor, Maine
Carol Kasza	Guide, Arctic Treks Fairbanks
Buck Maxson	Air Taxi Operator, Arctic Air Guides Kotzebue
Wilbur Mills	Guide, Journey's West Seattle, Washington
Jack Mosby	Regional Planner, USNPS Anchorage
Bob Parker	Guide, Sourdough Outfitters Bettles
Jeff Rennie	former Guide, Sourdough Outfitters Boulder, Colorado
Bob Waldrop	former Guide, Wilderness Alaska Ketchikan

APPENDIX II. Weather information, Noatak River headwaters,
Summer 1988.

TRIP 1

6/15 Sunny. Large cumulus clouds accumulating over peaks at headwaters. Slight breeze out of E. ~75 d.

6/16 Sunny and hot until midafternoon. Clouds built up and sky was completely overcast. Rained at about 5:00 P.M. for an hour and then intermittantly until 7:00. Cleared and warm by 8:30.

6/16 Weather similar to yesterday's. Hot, sunny and clear all A. M. Clouds built up around peaks around 1:00 P.M. Sun continuously until about 9:00 P.M. Light winds from W started in early afternoon and picked up at around 7:00 P.M. Would make for tough paddling. Wind shifted direction at 9:00 P.M.

6/17 Sunny all day

6/18 Partly cloudy in A.M., with sun on us. Rained hard for about a half hour at 5:00 P.M. , then cleared.

6/19 Sunny and nice in A.M. Becomming partly cloudy (50-75%) in afternoon. Intermittant local showers at different places in the valley. Wind direction changing frequently.

6/20 Clear except for smoke haze which is thick in lower valley. Warm.

6/21 Cool and breezy. overcast and hazy, with the smell of smoke in the air. Temperature in 50's. Overcast but dry all day. Began to rain about 8:30 P.M.

6/22 Rain on and off all night. Cold, dreary, overcast and windy today. Peaks covered with snow above 5000'. Wind from west. In afternoon, patch of blue over the river most of afternoon. Persistent wind from south. Cloudy and damp in late afternoon. Began raining at 5:30 P.M. Cold with clouds to 3500' level. Lifted at 9:00 P.M. Beautiful, clear and sunny, with mountains snow-covered.

6/23 Overcast and drizzly all day, snowing above 3500'.

6/24 Low ceiling of about 5000'. Wet, raining.

TRIP 2

6/29 Completely clear all A.M. Clouds develop in P.M., bur scattered, never completely overcast.

APPENDIX II. Continued.

6/30 Hot and dry. Occasional light breeze from East. Clouds begin building around 11:00 A.M. By 1:30 P.M. there is 40% cloud cover, clouds scattered. Overcast by 4:00 P.M. Hard rain for an hour beginning at 5:30. Sky breaks up at 8:00.

7/1 Hot and sunny, almost cloudless. in A.M. Strong west wind develops in early A.M. Afternoon cloud buildup over mountains to the east and in Kugrak valley. Cloudy over valley at 5:30. Rain intermittently from 7:00 to 10:00.

7/2 Still. Sun behind light layer of clouds in A.M. stretching from Kugrak valley to the peaks to the east. Clear downriver. Slight breeze from east. Layer of clouds dispersed in afternoon.

7/3 Overcast and very smoky in valley. Sprinkling in A.M. Clouds thin in a few places and sun peaks through on occasion. Winds from west pick up in afternoon - hard paddling. By 6:00 P.M. it is clear above, but still very hazy with smoke in the valley. Cannot even see mountains, but can see silhouettes by late evening.

7/4 Still extremely smoky, cannot see from Igning valley to Kugrak valley. Very light breeze in morning from east. Clear above us. Big cumulus clouds build up around peaks in late A.M. but sunny and hot where we are. West wind picks up in early afternoon. Sunny and breezy in late P.M.

7/5 Hot, no clouds, slight breeze from east in A.M. Cloudy in valley above Igning River and around peaks in late morning. Wind from west really picks up steam at 6:00 P.M. We had sun all day except for a few clouds in late evening.

7/6 Hazy due to smoke, otherwise partly cloudy with sun out. Wind from east. Cloudy and threatening to rain all afternoon. Starts raining a little at 3:00. Picks up at 6:00 and really pours at 7:00.

7/7 Ceiling low in A.M., about 4000' until 11:00, when 6000' peaks become visible. Rain off and on all day.

7/8 Calm in A.M. High clouds, about 50% C.C. Low clouds hugging mountains to about 3000'.

TRIP 3

7/13 Warm and clear with clouds built up around peaks in P.M. Intermittent breeze from west all evening. Very dry

APPENDIX II. Continued.

7/14 Clear, calm and hot in early A.M. Little smoke from Kugrak and Igning valleys. Strong winds pick up from west in early P.M. Remains clear.

7/15 Clear and beautiful. Clouds moved in around peaks about noon. The valley clouded over in midafternoon. Lots of smoke in valley in early P.M., but cleared out by 8:30. Strong west wind in P.M.

7/16 Clear and warm in A.M. Clouds build up in midmorning. Strong winds from west. Overcast all afternoon.

7/17 Clear in morning. Cool and cloudy by midmorning. Moderate, but bothersome breeze in afternoon.

7/18 Overcast and breezy all day.

7/19 Cool, breezy. 25% cloud cover with sun on us. Wind picks up in early afternoon. High clouds in late evening, becoming overcast.

7/20 Calm, cool, rainy and overcast in A.M. Clears up in P.M. Clear skies and light west wind at 5:30.

7/21 Sunny, beautiful, breeze from north/west.

TRIP 4.

7/27 Overcast and intermittently rainy all day. Breeze from east

7/28 Overcast in A.M. Cleared to partly cloudy by late morning. Slight breeze from west in P.M.

7/29 Clear in A.M. except for hazy clouds to east at very headwaters. Partly cloudy with lots of sun in afternoon and evening.

7/30 Overcast in A.M. Cold breeze from west. Ceiling at about 6000'. Remains overcast all day.

7/31 Cold, overcast, blustery winds from west all day with intermittent light rain. Rain on and off all night.

8/1 Overcast with a high ceiling, about 10000'. Cool but not breezy. Breeze picks up a little in afternoon from west.

APPENDIX II. Continued.

8/2 High overcast all day with thin clouds. Opened a little with about an hour of sun. Clear to west in late P.M. Slight breeze from west on and off all afternoon and evening.

8/3 Low clouds and light precipitation all day. Heavy rain in the early morning. Clouds lifted from the valley in the afternoon, but continued to hug the mountains to below 3000'. Clouds dispersed with a west wind in the early evening. Lots of sun as skies are clear to the west in late evening.

8/4 Ninety percent cloud cover, with a few blue patches providing brief sunshine. Slight breeze from the east. Ceiling at about 3-4000'.

8/5 Clear and sunny in the morning.

TRIP 5

8/9 Sunny and nice in A.M. Clouds move around peaks in late morning. Cloudy with breeze from east in P.M.

8/10 Cool and overcast in all day with light winds shifting from east to west frequently. Looks like a front.

8/11 Rainy and overcast. Windy on and off all day, picking up in early afternoon and settling down at about 6:30 P.M. Wind shifted directions frequently. Clouds above us thin by 8:00, with patches of blue.

8/12 Overcast and cold in morning. Small patches of blue by midmorning. Continue to increase in size throughout day until 4:00 P.M., when there is about 40% cloud cover. By 8:00, it's 80-90% clear. Cool breeze from west intermittent all day.

8/13 Mostly overcast, with sun shining through periodically for brief intervals. Moderate wind in early afternoon, shifting direction frequently. Wind very strong from 2:30 to 5:00. Seems to be pouring down from the Ipnelivik River bottom. Winds from upriver and Ipnelivik blew steadily all night.

8/14 Continues to be very windy from the south and east. Rainy at 1:00 P.M. Wet and windy all day, calms down during night but heavy rain.

8/15 Wind mellows, but continues from south. Windy all day, cloudy with a few small blue patches. Light intermittent rain in morning and early afternoon. Heavy rains during night.

APPENDIX II Continued.

8/16 Weather cleared up and was quite sunny most of the day. Wind from west made paddling tough at times. Rained heavily during the night.

8/17 Cloudy in A.M. Windy from south. Clearing from south, ranging from 25% to 75% overcast. Persistent moderate wind from south at Douglass Lk.

8/18 Nice day. Clear, sunny and warm. Slight breeze first thing in A.M. from west, dying by midmorning. Pickup in late morning.

APPENDIX III. Floaters contacted on Noatak River, 1988.

1. Jeff Poor (Sourdough) and client from Australia July 5

These 2 guys paddled by our camp at the horseshoe in the river near the east end of Lake Isiak at 6:00 P.M. They were in a canoe. The client was from Australia and was obviously very displeased at my request to talk with them. I was in my uniform and standing on the shore. They pulled over and reluctantly answered my questions with curt responses. They had backpacked in from the Reed River and were resupplied by Sourdough on July 2. They were taking out at Kavachurak Lake on July 10. From what I'd gathered, they had encountered 1 other party of 3 people in an unidentified type of boat. We passed their camp the following morning; they were camped on a gravel bar island just downstream from Ipnelivik River. Their canoe was on N side of river, so they may have hiked over to Lake Isiak. Their camp was not in a sensitive area.

2. Sourdough, 6 clients and 1 guide July 14

We encountered this party as they were packing up their camp at Pingo Lake. They came in at Portage Lake on July 11. They were in 3 canoes and were camped on a gravel bar. They reported hearing wolves near Portage Lk. and seeing 1 near their camp at Pingo. They saw a bull moose near Pingo and a fox wandered near their camp. One person caught a grayling in the river. They asked questions regarding drinking water and where to brush their teeth. We did not encounter this group again but saw where they camped along the river in subsequent nights. They got picked up at Matcharak on the 20th and I had a brief chance to talk with the guide before he left. They saw a bear near the Kugrak River and another near the Igning River and more wolves near Joiner Creek.

3. 6 men from Finland July 14

These men flew in to Pingo Lake while we were camped on the river end of the portage trail. They came in with 3 Grumman canoes with AAG. It took AAG 3 trips with a Maule and 2 trips with a 185 to get these guys and all of their gear in. These men were in their late 20's to late 30's. They planned to be on the river for about a month and were doing a leisurely camping/fishing trip to Noatak. This was their first time in Alaska and they obtained a lot of information from the Kotzebue office. They were concerned about bears and carried a shotgun. We found that these guys camped right out in the open, would spend much time around camp, spent more than 1 day at a campsite on 1 occasion and constantly had fires going. They used rocks to encircle their tents and campfire rings and did not redistribute them when vacating a camp. They cooked fish on

APPENDIX III. Continued.

aluminum and left bits of garbage in their fires. They did a poor job of concealing their firepits.

4. 2 men Holland/Chicago July 15

These men came in on 1 plane load with their folboat via AAG. The man from Holland wanted to float a river offering a lot of solitude and where they could observe wolves. His brother was interested in seeing a lot of waterfowl. They planned to be on the river for about 17 days and were going to take out at Noatak Village. The Dutchman hadn't heard about the Noatak in Holland, but found out about the river when inquiring about a good place to see wolves. They planned the trip in advance to get the best deal, which they found to be through Kotzebue. We didn't see these guys again, seems they wanted to get away from the other groups. They saw a bear just upstream from the Kugrak R., another near their camp at Ipnelivik River and a pair of fox. Saw a pair of gyrfalcons near the Pingo and heard young calling in the vicinity of the cliffs immediately north.

5. M. Fisher, friend Switz./Germany July 17

Flew in w BRA on 7/15 to 12-mile. They will be spending 5 weeks, floating to Noatak. They have been on several other Alaskan rivers and wanted to experience a float in the tundra. He is a die-hard fisherman, not much into hiking. They're into a relaxed fish/float type trip. They are using a Metzeler. They cook almost exclusively on wood fires and eat the fish that they catch. They are drinking river water after letting it settle out, without treating it. They saw a wolf near 12-mile and 4 wolves near where they camped at Joiner Creek.

6. Man and woman from Germany July 20

These folks are floating to Noatak, taking 3-4 weeks. They were put in by BRA at 12-mile. Interested in doing a little fishing, for consumption. Saw 1 fox. They will fly to Kotzebue from Noatak. They have been to several other rivers in Alaska. They are about 50 years old. They are surprised at the number of people they are encountering.

7. Bennett and friend, Connecticut July 26

This couple was outfitted by Sourdough and floated from 12-mile to Douglass Lk. They saw 4 other parties during their trip, including German and Swiss couples. They were not disturbed by

APPENDIX III. Continued.

the number of other people they saw, but were disturbed by the messy campsites, rock formations and garbage left in the camp. They were concerned about the rapids below Matcharak and the portage to Douglass Lk. and felt that they were not properly informed by this.

8. Man/woman from Fairbanks July 28

This couple are from Fairbanks and were flown in by a friend with a C185 on July 28 at Pingo. They planned a nice leisurely 10-day float to Matcharak, with lots of hiking and some fishing. They had a klepper and have done several other trips throughout Alaska. They expected to see other people, but don't like to see larger parties like NOLS. They knew the whereabouts of the Portage Cr. wolf pack. They had done the North Fork a few years back. They saw 2 people camped at 12-mile, but we never encountered this group during our trip. These folks camped right next to us at Kugrak, because they wanted to hike up the Kugrak and did not have hipboots for wading the river.

9. Man from Germany July 29

This man came in with BRA to 12-mile on Aug 23 with a party of 3 who were dropped off at Lake Omlektovlik for backpacking. He was solo canoeing to Noatak, planning on a 2-3 week trip. He was in his mid 30's. He saw a single bear at 12-mile, another at Kugrak and a wolf near Pingo Lake. He saw a group of 40 caribou about halfway up the mountain just west of the Kugrak. He has done 2 other trips in Gates and has floated the Yukon-Charley Rivers and rivers in Canada. He is taking his time, doing a lot of fishing and hiking. He cooks on fires. He has a shotgun for bear protection. He saw both Sourdough parties. His camp at Kugrak was amongst some willows on a gravel bar and he didn't properly bury his fire pit. He also had cut live willows to support a lean-to.

10. 2 guys from San Francisco July 30

These guys were dropped off at N. Walker Lake by BRA on July 26 and are planning to float to Noatak where they will leave on 8/10. They are using a folboat. They saw both sourdough groups and the klepper people. They didn't expect to see this many people, but were not overly disappointed. They hoped, however, that they didn't see anyone else. They were concerned about bears and were taking precautions with food and had a shotgun. They saw 2 moose just above Kugrak R. They were very interested in the bear canisters. They were into a leisurely trip with some light hiking and fishing. They were building fires to dispose of any foods and odors. They are in their 30's and this was their first trip to Alaska. They are camping on gravel bars and are leaving a clean camp.

APPENDIX III continued

11. man/woman from Bellingham, Washington August 1

This couple came into N. Walker Lake on July 29 with BRA and were planning on arriving in Noatak around August 22. She was in her 50's, while he was in his 70's. They were using a Nauteraide and have floated other rivers in the passed few years. They wanted to do a mellow river with lots of scenery. They had heard about the Noatak from neighbors, from a TV special on kayaking and from Sunset magazine. They were concerned about bears and rough water. They are not interested in fishing or hiking. They were told by Andy of BRA that they could drink the water right out of the river without treating it. They saw a group of 40 caribou right near the river near Pingo and ran into a group of 11 backpackers who saw a group of 100 further in the mountains. They don't use wood fires.

12. 2 brothers Texas/Oregon August 10

These guys were outfitted by Sourdough and were flown into 12-mile on July 3. They were on the river until July 17 when they were picked up at Douglass Lk. They spent about a week between 12-mile and Pingo. They were disappointed with all the planes they saw during that time, averaging about 3 per day. They also commented on the messy camps and the large Sierra Club group which they kept running into. They saw 2 other groups besides us, and were hoping for a little more solitude. There was a lot of leapfrogging. They saw a total of 7 bears, including a solitary and a sow w cubs at 12-mile a sow w cubs at Ipnelivik. They also saw the wolf pack at Portage, containing 15 individuals. Lots of sheep and Caribou. They are really interested in seeing wildlife, hiking side canyons, and have a spotting scope with them. They came here because they had always wanted to see the Brooks Range, but didn't want to get into anything too hairy. They are concerned about bears and carry a shotgun. They build fires frequently. They camp on gravel bars or suitable embankments.

13. 2 guys from Wilkes Barre, Penn. August 13

These 2 were dropped off at Pingo by an air taxi service out of Fairbanks. They are floating to Kavatchurak Lk. from Aug. 6 to Aug. 20. They are avid fishermen and hunters and plan to spend a week in the preserve hunting caribou. One guy was about 30 and the other about 50. They have both been on various trips to Alaska several times and was on a guided float on the river with Ramona Finoff in 1981. They wanted to do a nice mellow river above the arctic circle. They were a little disappointed because they didn't expect to see anyone else on the river. They saw a group of caribou on the north slope by Joiner Creek and a bear on the river bank just above the Igning River. They were quite loaded down with gear in a raft and were having a little trouble

APPENDIX III continued

with headwinds, although the river is up and fairly swift at this time. They were a little disappointed in the fishing, only managing to catch a few grayling. They were very inquisitive about the area, especially about the wildlife, really hoping to see a wolf.

14. Sierra Club, 2 guides, 9 clients August 14

This group was on the river from 8/8 to 8/21 and were taking out at Kavatchurak Lk. They were flown in to 12-mile by BRA. The leader of this group seems really responsible and considerate not to leave impacts. They only have an occasional fire to burn burnable trash. They are bear-consientious. At one camp, we saw where they placed their food on the other side of the river from their camp while out hiking. The leader had floated the river last year and had a stuffsack of food dragged off by an animal. They have been packing out any garbage they find and haven't really seen any noticably disturbing campsites. The rest of the group had never been to Alaska (the guide was from Fairbanks) and were all from the east or midwest. Only the guide fished and provided some fish to the rest of the party. He asked what the limit on lake trout in Matcharak was. They either boil or filter their water. The group was very inquisitive about our jobs, the area and wildlife. Some were avid birders and had seen several hawks. A few in the group had seen a bear near 12-mile and they estimated that they had seen about 500 caribou. They also saw a cow moose.

APPENDIX IV

Aircraft observed on Noatak River during field season 1988.

Trip 1 6/15 to 6/24

6/15 Arrive N. Walker Lk. at 11:15 - no aircraft
 6/16 No aircraft
 6/17 13:30 Pair of fighter jets flew over, ~40,000'
 6/18 No aircraft
 6/19 15:00 Small plane flew down valley, East to West, no
 ident.
 6/20 No aircraft
 6/21 No aircraft
 6/22 No aircraft
 6/23 No aircraft
 6/24 11:00 C185 on floats flew downriver.
 12:00 same plane flying upriver.
 13:00 We leave Noatak from Lake Matcharak

Trip 2 - 6/29 to 7/8

6/29 11:00 Arrive at Noatak R., 12-mile slough
 13:30 C185 flying at 10000' upriver, from Pingo to
 Gull Pass.
 6/30 No aircraft
 7/1 13:30 Park Service C185 flies over from east to west
 15:00 Park Service C185 flies over from west to east
 7/2 08:50 R/W C185 (AAG) west to east
 08:55 B/W Maule (Sourdough) east to west
 09:35 B/W Maule returns from Matcharak w 2 grumman
 11:00 B/W Maule flew back over at 1000 ft.
 11:20 R/W C185 flying upriver
 11:35 B/W Maule from Matcharak upvalley, 2500'
 14:10 C185 flies by Kugrak from upriver
 14:50 small floatplane (Maule?) flies 500'
 lands on lake upriver.
 15:10 AAG C185 flies upriver

APPENDIX IV continued

15:45 Maule w floats flies upriver, light-colored,
no noticable markings.

18:35 AAG C185 from Kotzebue to Pingo
19:00 AAG C185 flies back

7/3 No aircraft

7/4 No aircraft

7/5 8:00 C185 flying against mtn., 4000', downriver

7/6 No aircraft

7/7 13:30 AAG C185 flew upriver carrying 2 canoes, 500'
15:15 AAG C185 downriver, 2500'
17:30 AAG C185 upriver, to Pingo, 3500'
19:45 small plane above clouds, E. side near mts.
20:30 small plane above clouds, w side of mts.,
upriver

7/8 13:15 AAG C185 flies upriver, 1000'
14:45 AAG C185 flies downriver
14:55 We leave river, from Lake Matcharak

TRIP 3 7/13 - 7/20

7/13 17:00 Arrive at Noatak, N.Walker Lk.

7/14 No aircraft

7/15 15:30 AAG's R/W C185 and B/W Maule land at Pingo Lk.
15:45 Both planes leave
19:30 Both planes return to Pingo Lk.
19:45 Both planes leave Pingo Lk.

7/16 We did'nt see or hear AAG, but they returned with canoes

7/17 12:30 W/R cub flies upriver
14:10 W/R cub flies downriver

7/18 No aircraft

7/19 No aircraft

7/20 10:45 Sourdough's Maule flies downriver
11:15 Sourdough's Maule flies upriver
14:15 Sourdough's Maule flies downriver
14:30 Sourdough's Maule flies upriver
17:15 Sourdough's Maule lands on Matcharak
17:30 Sourdough's Maule departs from Matcharak

APPENDIX IV continued

7/21 11:00 AAG C185 flies upriver, 5000'
 12:45 C185 flies close to mts. to east, across from
 Matcharak, flies behind big peak nw of
 Ipnelivik
 18:00 We leave river, from Lake Matcharak

TRIP 4 7/27 - 8/5

7/27 18:00 We arrive at Noatak River, N. Walker Lake
 7/28 12:30 Bl/Or C185 lands at Pingo Lk
 13:10 Bl/Or C185 departs Pingo Lk
 7/29 11:20 BRA C185 lands on N. Walker Lk
 11:30 BRA C185 departs
 7/30 16:30 Sourdough's Maule flies over our camp at
 Kugrak R.
 17:30 Sourdough's Maule flies over us at about 500'
 with 2 canoes from Matcharak to lake upriver
 7/31 No aircraft
 8/1 15:45 AAG C185 flies upriver
 16:15 AAG C185 flies downriver
 8/2 18:30 Unid. floatplane flies bdownriver, 1000'
 8/3 No aircraft
 8/4 08:15 AAG C185 flies upriver w at least 1 canoe
 8/5 09:30 We leave Noatak R. from Douglass Lk.

TRIP 5 August 9 to August 18

8/9 11:30 Arrive at Noatak River, 12-mile slough
 8/10 No aircraft
 8/11 No aircraft
 8/12 14:20 BRA Beaver downriver (Matcharak?) High, away
 from river
 15:15 BRA Beaver upriver
 17:50 BRA Beaver downriver
 18:40 BRA Beaver upriver
 21:00 BRA Beaver downriver
 21:45 BRA Beaver upriver

APPENDIX IV continued

19:25 AAG Maule upriver with 2 canoes

8/13 No aircraft

8/14 No aircraft

8/15 12:30 Heard small aircraft fly over

8/16 No aircraft

8/17 12:30 BRA Beaver flies downriver, 2000'
13:15 BRA Beaver upriver
13:45 BRA Beaver downriver
14:15 BRA Beaver upriver

8/18 11:30 Sourdough Maule lands at Douglass
11:45 Sourdough Maule departs
12:15 We leave Noatak River from Douglass Lk.