# OFF-ROAD VEHICLE USE AND ITS IMPACT ON SOILS AND VEGETATION ON BUREAU OF LAND MANAGEMENT LANDS ALONG THE DENALI HIGHWAY, ALASKA

A Report

# on the

1975 Outdoor Recreation Survey

Submitted To

Bureau of Land Management Anchorage, Alaska

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May 6, 1976

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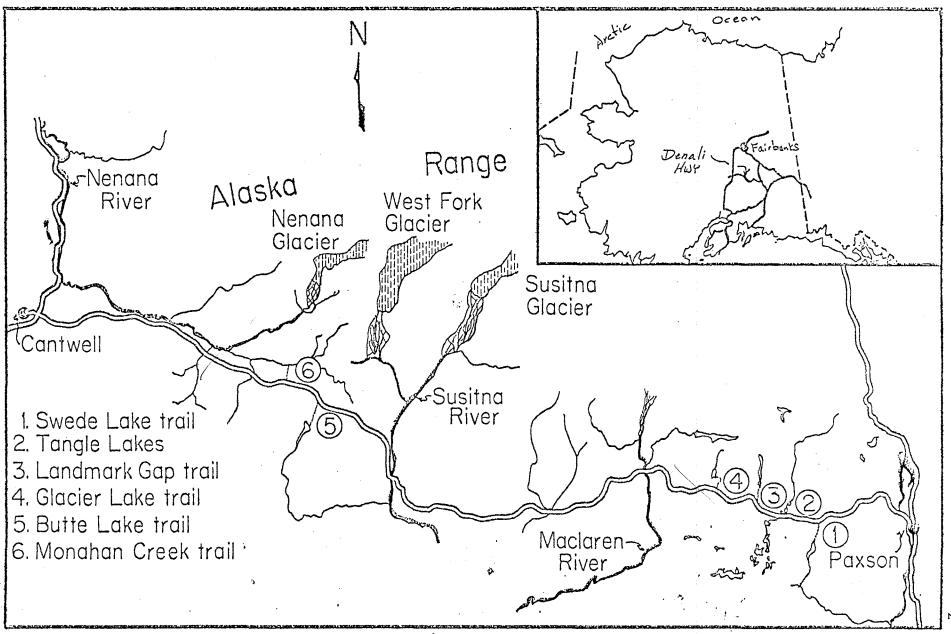
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## I. INTRODUCTION AND STUDY OBJECTIVES

From its eastern terminus at Paxson on the Richardson Highway, the Denali Highway stretches 135 miles westward to Cantwell, two miles beyond the Parks Highway Junction (Figure 1). Lying just to the south of the Alaska Range, this two-lane, gravel road traverses an area characterized by alpine tundra interspersed with lakes and river valleys. There is little permanent development in the region, and the Denali Highway is usually open and maintained only from mid-June to the end of September. During these months the area's fishing and hunting resources and outstanding wilderness scenery attract many outdoor enthusiasts.

The lands along the Denali Highway are administered by the Bureau of Land Management (BLM). According to the provisions of the Alaska Native Claims Settlement Act (ANCSA 1971), most of this portion of the Gulkana unit of the BLM's Glenallen resource area has been designated as national interest (D-1) lands. It is anticipated, therefore, that the BLM will continue its administrative responsibilities here, and that outdoor recreation will continue to receive primary consideration in decisions related to resource allocation and land use.

Managers and planners need considerable information as they seek to make the best possible decisions regarding the allocation of natural resources to public uses such as outdoor recreation. They need to be aware of the legal and political context of their actions. They should be well informed as to the existing and probable uses that are in conflict with one another. They are also concerned about questions of economic feasibility and public input related to their decisions. With respect to outdoor recreation on public



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FIGURE 1. Denali Highway Area

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lands, two types of basic information are particularly helpful: (1) data on the physical and biological characteristics of the resources, and (2) information about the types and amount of recreation activity that affect as well as depend on these resources.

Among its many activities related to rural land use, the Agricultural Experiment Station at the University of Alaska has staff active in these two research fields - i.e., natural resource characteristics and outdoor recreation use. Thus, experiment station researchers submitted a proposal to the Bureau of Land Management in March, 1975, to develop baseline data on resources and recreation activity in the Denali Highway area. Although lead time was very short, the study, "Off-Road Vehicle Use and Its Impact On Soils and Vegetation on Bureau of Land Management Lands Along the Denali Highway, Alaska," began on schedule in June, 1975.

Two distinct efforts were proposed for implementation during the summer field season. One sought information about the soils and vegetation in the study area. The investigators focused their attention on the effects of offroad vehicle (ORV) activity on the resource base. Revegetation test plots were also initiated in a heavily used area of the Tangle Lakes Campground. The results of the soils and vegetation analysis were reported to the Bureau of Land Management earlier this year (Sparrow et. al. 1976).

The other component, information on recreation activity in the study area, began in the summer of 1975 and is planned to continue during the coming (1976) field season. Survey research is being employed to obtain data on the types, amounts, and patterns of outdoor recreation activity in the Denali Highway area. More detailed information is being sought as well from

off-road vehicle users. This group is being surveyed regarding preferences for terrain and vegetative cover, evaluation of the Denali Highway area as an ORV use area, attitudes toward selected management options, and socioeconomic characteristics to assist in developing user profiles and assessing and predicting demand for ORV activity. A summary of the general objectives of the two components of the project is presented below.

## Summary of Objectives

- 1. Determine the types, amount and location of recreational activities in the Denali Highway area.
- 2. Develop baseline information on vehicle users relating to patterns of use, preferences and motivations, and socio-economic variables.
- 3. Identify and describe major soil types and plant species in areas of vehicle use.
- 4. Determine relationships and effects of different amounts of vehicle use on soils and vegetation.
- 5. Revegetate an area such as the Denali Campground, which has been made barren as a result of excessive traffic.

Preliminary results of the 1975 outdoor recreation survey were presented to the Bureau of Land Management in May, 1976. This paper is a description of the survey and summary of the results obtained in the initial analysis and presented to the BLM. Once fieldwork is completed this summer, the data from both seasons will be analysed and a final report prepared.

#### II. METHODOLOGY

#### A. Survey Design and Procedures

The sampling design, survey instruments and procedures were developed to obtain basic information about outdoor recreation activity as well as more

specific data on off-road vehicle users. Since the Denali Highway allows virtually unlimited access to the lands it traverses, recreation activity is irregularly dispersed throughout the area, with concentrations occurring at nodal attractions such as Tangle Lake.

When there are relatively few potential respondents irregularly dispersed over a relatively large geographic area, sampling becomes very difficult. Obtaining a sufficiently large, representative sample is normally beyond a project's budgetary constraints. Unless field contacts are for acquiring names and addresses for a subsequent mailed questionnaire, analyses of the data acquired often require robust assumptions about activities following the interview. The two-step process of interviewing, then mailing a questionnaire adds to administrative costs as well as information losses due to increased non-response.

The problem of acquiring accurate information about dispersed recreationists has been tackled by a number of researchers, especially those in the forest service concerned with estimating use in wilderness areas (Wenger 1964, Wenger and Gregerson 1964, Hendee et. al. 1968, Lucas and Ottman 1971, Lucas et. al. 1971, James and Schreuder 1971, Lime and Lorence 1974). Many of their studies illustrate the value of some type of registration or permit to develop a suitable sample frame. Recreation surveys are also facilitated by controlled or limited access. Lucas (1964), Cushwa and McGinnes (1963), and James and Henley (1968) interviewed recreationists at established road checkpoints as they exited large, general recreation areas. This cordon survey approach is most suitable where access is limited at the boundary and the egress mode of nearly all area users corresponds with checkpoint selections.

These two conditions were well satisfied in the Denali Highway area. For nearly all recreation users there are only two access/egress points - namely, the junctions at either end of the highway. Checkpoints were selected as close to the study area boundary as safety considerations would allow. To provide adequate safety for both motorists and interviewers, the interview stations were sited at right-side (exiting) turnouts that were large enough to accommodate at least four vehicles at one time. Consideration was also given to adequate sign posting and visibility along the approaches to the checkpoints.

One turnout was chosen at "Twenty-Mile Hill." This western-end check station at Milepost 118, although some distance from Cantwell, was very near the study area boundary. Most of the land along the highway to the west of "Twenty-Mile Hill" has been designated for Native selections under ANCSA. The other checkpoint was a large, paved turnout at Milepost 4, just before the highway drops down to the junction at Paxson.

The same procedures were established for both checkpoints. Two interviewers were assigned to a check station on a sampling day. They would arrive before 8 a.m. and set up cautionary signs according to the recommendations of the Alaska Department of Highways. Figure 2 illustrates schematically a typical sign sequence placement for traffic exiting the Denali Highway area. A "caution" or "slow" sign was placed on the entering traffic's approach to the checkpoint as well. At 8 a.m. the pneumatic counter readings would be recorded. These counters were provided by the BLM and were installed in the exiting traffic lane near the check stations. They remained in place throughout the 1975 survey season. The readings were recorded again at 8 p.m. on each sampling date.

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	500-1,000 ft. 500-1,000 ft.
A ·	B C D
Α.	Slow, caution, or flagman ahead
В.	Be prepared to stop
C.	Recreation check station
D.	Turnout with interviewers (orange vests) directing traffic, stop sign, schematic map of study area.

FIGURE 2

FIGURE 2. Sign Placement For Highway Check Stations

The interviewers wore orange vests with University of Alaska name tags. They directed vehicles into the turnouts, identified themselves, stated briefly the purpose of the study, and requested a few minutes to ask some questions. Generally, each interview lasted less than five minutes, and respondent cooperation was excellent. Traffic was normally light enough to stop and interview every vehicle. Those arriving when two interviews were in progress were waved on by.

If a respondent cited participation in any type of off-road vehicle activity during the current trip to the Denali Highway area, the interviewers gave out the longer, off-road vehicle questionnaire and stamped, return envelope. They stressed the importance of returning the questionnaire at the respondent's earliest convenience. All vehicles interviewed were given handout materials such as litter bags, maps, and pamphlets provided by the Bureau of Land Management. These were given to the respondents as a token of appreciation for their assistance in the survey. During the sampling day, station personnel kept records on the traffic they observed in both directions. They noted vehicle types, license plates (state), recreational equipment and the number of people observed. The primary use of this information was in conjunction with the traffic counters i.e., observations on the number of vehicles exiting the area were used to calibrate the pneumatic counters so that total traffic for the season could be estimated.

Consultation with BLM personnel resulted in three recreation activity nodes being selected for additional survey. The Susitna River Crossing (SRC) - i.e., about 1/4 mile along the highway in both directions from the bridge - was chosen because of past use for unloading/loading off-road vehicles. Two developed sites were chosen as well: Brushkana Campground (BCG), and Tangle Lakes Campground (TCG), including the nearby BLM boat launch area. Campers and others contacted in these areas were interviewed in a manner similar to that used at the highway check stations.

It is clear that variations occur over the season in some recreation activities. Legal specification and enforcement of hunting seasons tend to produce "all-or-none" variations across the period surveyed. Just as clearly, berry picking, a popular leisure time activity throughout Alaska, is associated with maturation of the berries. There may be other less obvious, or unanticipated variations across the summer. To guard against these - i.e., to improve the chances of the observations being representative of the target population - stratification was introduced into the survey design. Specifically, the 105-day season (June 16 - September 28, 1975) was divided into three, 5-week strata: June 16 - July 20, July 21 - August 24, and August 25 -September 28.

A second stratification was imposed in anticipation of greater recreation activity in the study area on weekends than on weekdays. Collectively, all weekdays were considered to be equivalent to all holiday/weekend days with respect to sampling rate. Thus, within the 5-week strata the same number of weekdays as holiday/weekend days were chosen for interviewing.

The third stratification was based on location. Tangle Lakes Campground, Brushkana Campground, Susitna River Crossing, and the highway check stations. The Paxson-end checkpoint (DHP) and the Cantwell-end checkpoint (DHC) were operated simultaneously so as to provide total coverage of exiting traffic on the dates sampled.

Within the 5-week strata three holiday/weekend days and three weekdays were chosen for highway interviewing. Two of each day type were selected within the 5-week strata for each of the nodal locations as well. The result was 72 location-specific interviewing dates. Table 1 shows the sample stratification.

### TABLE 1

			······································
	Number of Interview Days	in Stratified Random	Sample
	Weekda	<u>ys (W)</u>	
Location	6/16 - 7/20	7/20 - 8/24	8/25 - 9/28
DHP	3	3	3
DHC	3	3	3
TCG	2	2	2
BCG	2	2	2
SRC	2	2	2
		,	

### Number of Interview Days

TABLE	1.	(continued)
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	Holidays/Weekend Days (H)								
Location	<u>6/16 - 7/20</u>	7/21 - 8/24	8/25 - 9/28						
DHP	3	3	3						
DHC	3	3	3						
TCG	2	2	2						
BCG	2	2	2						
SRC	2	2	2						
TOTAL:	72 Days (i.e., Date - Locations	)							

Specific dates were randomly selected using a table of random numbers (Rohlf and Sokal 1969). These dates constituted the survey schedule shown in Table 2.

TAI	BLE 2
Survey	Schedule

						 		·			
DHP	& DHO	2	<u>1</u>	CG			SRC			BCG	
June	26	W	June	25	W	June	28	н	June	24	W
July	1	W		29	Н	July	8	W		29	Н
	2	W	July	4	H		11	W	July	7	W
	5	H		18	W		12	н		20	н
	6	н	Aug.	1	W		26	H		23	W
	13	н		2	н	Aug.	4	W		31	W
	27	н		17	H		16	н	Aug.	9	Ĥ
Aug.	7	W		21	W		18	W		10	н
	11	W		28	W	Sept.	3	W		27	W
	15	W		31	H		.6	H	Sept.	_7	H
	23	н	Sept.	10	W		21	H		18	W
	24	н		14	H		23	W		28	H
	30	H									
Sept.	13	H									
	17	W									
	25	W			-			•			
	26	W									
	27	Н									

## B. Survey Forms

Copies of the interview schedules and off-road vehicle questionnaire appear in the appendix. There was virtually no difference between the interview forms used at the nodal locations and the highway check stations. Basic data were gathered on the respondent's residence; time spent in the study area; size and age/sex composition of the group; and recreation activity participation by those 13 years of age and older. Three characteristics of recreation activity were identified: type, location, and duration. The interview schedule, in conjunction with a map and the interviewer's knowledge of the area, made it possible to elicit from the respondents the zones (six, subdivided into north and south of the highway) in which specified activities took place. The duration of these activities was recorded in hours. Questions about information needs comprised the final section of the interview schedules. These were included to obtain data for a companion study concerning interpretation in the Denali Highway area (Miller, et. al. 1976).

The off-road vehicle questionnaire was longer, and respondents were asked to fill it out at their earliest convenience, then return it to the University of Alaska Agricultural Experiment Station. A stamped, pre-addressed envelope was provided for this purpose. No provisions were made for follow-up prodding of non-respondents, but a cover letter attached to the questionnaire reiterated the purpose of the survey and the importance of each respondent's confidential answers.

There were four parts of the off-road vehicle questionnaire: I. General information about off-road vehicle use; II. Off-road vehicle use in the Denali Highway area; III. Investment in equipment and expenditures

related to off-road vehicle use; and IV. Personal data section. Part I included such items as vehicle type, days of use in recent years, location of ORV activity, and terrain and cover preferences.

Questions in Part II related specifically to the study area. Data was sought on frequency, duration, and location of off-road vehicle activity. Respondents were also asked to rate the Denali Highway area in comparison to other places they had used their vehicles. Selected statements related to ORV management options were presented in this part, and respondents were asked to indicate whether they agreed or disagreed with them.

Part III asked for investment and expenditure data related to off-road vehicle activity. These questions were included to provide information for another companion study, "Determinants of Choice in Outdoor Recreation," which is supported by Agricultural Experiment Station Hatch funds. The socioeconomic information sought in Part IV is expected to be used in assessing or predicting demand for off-road vehicle activity as well as developing user profiles. Part IV contained typical survey questions about age, sex, education occupation, and family income.

#### III. RESULTS OF THE 1975 SURVEY

A. Denali Highway Traffic

Meter readings and the number of vehicles observed exiting the study area on sample days were combined in a linear regression to develop a prediction equation for daily (exiting) traffic. The data are shown in the following table.

#### TABLE 3

	Paxson			Cantwell	
Date	Observed	Metered	Date	Observed	Metered
7-13	73	81	6-26	11	11
7-27	93	109	7-1	18	32
8-7	28	33	7-2	21	33
8-11	33	36	7–5	94	162
8-15	34	37	7-6	116	194
8–23	48	56	7-13	42	57
8-24	100	108	8-7	35	60
8-30	65	70	8-11	32	52
			8-15	31	54
			8-23	45	62
			8-24	61	93
·			8-30	52	96

Traffic Exiting the Denali Highway

The equations developed from the data in Table 3 were:

Paxson:  $Y_{i} = .11 + .89X_{i}$  (r<sup>2</sup>=.99) Cantwell:  $Y_{i} = 3.22 + .57X_{i}$  (r<sup>2</sup>=.98)

Where Y = number of vehicles exiting at the given location on Day i.

> $X_{i}$  = number of vehicles counted by the pneumatic meter at the same location, and direction on day i.

In order to calculate the total exiting traffic across a season or other similar time period, the above equations and relevant data must be summed. The simplified equations used for summing over such a time period are:

Paxson:  $Y_t = .11n + .89X_t$ Cantwell:  $Y_t = 3.22n + .57X_t$ 

- Where Y = number of vehicles exiting at the given location during time period t.
  - n = number of days in time period t.
  - X<sub>t</sub> = number of vehicles counted by the pneumatic meter at the same location and direction during time period t.

Meter counts were available for exiting traffic at both ends of the Denali Highway during the 75-day period of July 1 - September 13, 1975. Rounded to the nearest 100, the results of the calculations for this time period show 3,300 vehicles exiting at the Cantwell end and 5,100 at Paxson.

B. Interview Results

It was observed that about 15% of all exits were by vehicles not targeted for interviewing - i.e., location residents, government and commercial vehicles, and recently-interviewed parties. Thus, the target population during the 75-day period was 85%, or about 7,100 of the 8,400 exits calculated.

During the 8 a.m. - 8 p.m. contact period on sample dates 83% of the exiting vehicles were interviewed at the Cantwell end of the highway - i.e., 558 of 675 vehicles exiting at the "Twenty-Mile Hill" checkpoint. 73% (436 of 611) of the vehicles exiting at the Paxson check station were interviewed. The overall rate during the contact hours for both locations combined was 77%. These figures are based on data from 14 sample dates at the Cantwell end and 12 dates at the Paxson end, where July 5 and 6 were not included owing to incomplete records for those dates. It should be noted, too, that since more than 80% of a given day's exits was assumed to occur in the 8 a.m. - 8 p.m. period, the results of the survey are considered to be representative of all the target population. Altogether 1,214 interview contacts were made at the two check stations. Additional interviews were obtained as follows: Tangle Lakes Campground 202; Brushkana Campground 46; and Susitna River Crossing 11. Three others, referred to as "Targets of Opportunity" (TOO), were obtained from unspecified locations along the Denali Highway during the last week of sampling. Adverse weather, a shortened hunting season, and the high cost of surveying relative to the expected yield of additional information resulted in September 14 being the last sampling date. The selected dates subsequent to September 14 were cancelled; these are separated from the others by the horizontal lines appearing in Table 2 above. The 60 date-locations sampled yielded 1,476 interviews for the 1975 season.

About 90% of all respondents cited recreation as the primary purpose of their trip. Business was the main purpose for 4%; visiting friends or relatives was the reason given in 2.4% of the interviews; all other reasons also accounted for 2.4% of the answers; and no answer was given 1.6% of the time. The remainder of this section on outdoor recreation activity is based on the data obtained from the 1,323 respondents who indicated that recreation was the primary purpose of their trip. These respondents are assumed to be the leaders of their respective recreation parties.

Based on figures presented earlier, approximately 6,400 recreation groups exited the Denali Highway area in the 75-day season, July 1 - September 13, 1975. Some 900 of these, or about 14% were interviewed at the highway checkpoints. Since recently-interviewed groups were not to be re-surveyed at the highway check stations, there was virtually no respondent redundancy in combining the information on all recreation parties contacted. Therefore, the

approximately 1,300 recreation parties constituted just under 20% of the 6,400 exiting the Denali Highway during the 75-day period.

Using rates or proportions identified in the sample in conjunction with the total of 6,400, it is possible to calculate season estimates with respect to the parameter in question. For example, the area's recreation visitation can be calculated as the product of 6,400 parties and their average size of 3.2 persons. Thus, about 20,500 recreation visits occurred in the Denali Highway area, July 1 - September 13, 1975. When associated with a time dimension such as length-of-stay, this gives managers a picture of recreation use or pressure on the resources. If the number of individuals is desired, the visitation figure would need to be reduced to the extend that people made repeat visits during the 75-day period.

A note of caution should be introduced with respect to using average figures such as party size. Although useful for the season expansion discussed above, the 3.2 person average obsures somewhat the fact that campground users tended to be in larger groups. The average party size for the 202 recreation groups interviewed at Tangle Lakes Campground was 4.3 persons, or about onethird larger than the overall average of 3.2 persons. Similarly, the average lenght-of-stay for recreation respondents was 29 hours, but many were in the area 6 hours or less; others were there for a week or more.

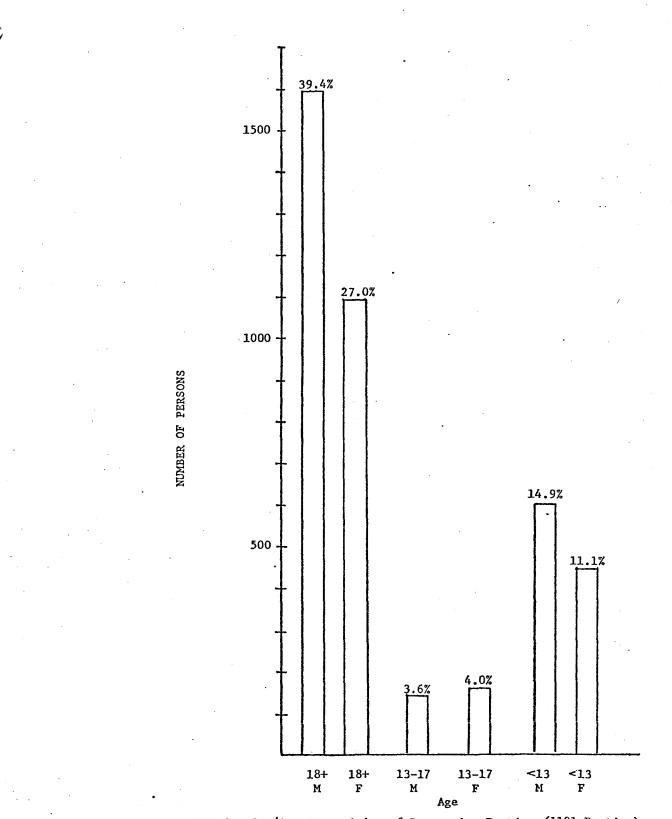
Respondents reported their residence (city and state, or foreign country), and a summary of this information by interview location is displayed in Table 4. Alaskans comprised more than 82% of the recreationists in the Denali Highway area. Three-fourths of the Alaskans were from Anchorage and Fairbanks. About 35% of all recreationists resided in Anchorage, and 27% in Fairbanks.

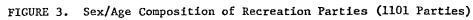
				· · · · · · · · · · · · · · · · · · ·			
	Anc (34.8)	Fai (27.0)	Other Ak (20.5)	Other US (15.4)	For (2.3)	Totals	3
DHP	179 (30.6)	201 (34.4)	114 (19.5)	77 (13.2)	14 (2.4)	585	(100)
DHC	198 (41.6)	103 (21.6)	89 (18.7)	77 (16.2)	9 (1.9)	476	<b>(</b> 100)
BCG	14 (30.4)	7 (15.2)	8 (17.4)	17 (37.0)	0(0)	. 46	(100)
SRC	8 (72.7)	1 ( 9.1)	1 ( 9.1)	1 ( 9.1)	0(0)	11	(100)
TCG	61 (30.2)	44 (21.8)	58 (28.7)	31 (15.4)	8 (4.0)	202	(100 <b>)</b>
T00	0(0)	1 (33.3)	1 (33.3)	1 (33.3)	0(0)	3	(100)
TOTALS	460 (34.8)	357 (27.0)	271 (20.5)	204 (15.4)	31 (2.3)	1,323	(100)

TABLE 4 Residence of Recreation Parties

Application of X<sup>2</sup> tests of differences for the various interview locations yielded significant results for Brushkana Campground in terms of the residence of its users. Brushkana was used more by non-residents of Alaska than was expected from the overall data. When comparing length-of-stay data for Brushkana and Tangle Lakes Campgrounds, it was found that visitors to Tangle Lakes generally stayed 2-3 times as long as those visiting Brushkana.

Figure 3 shows the sex/age composition of recreation parties. This data was complete for 1,101 (82%) of these groups. About three-fourths of the 4,055 people in this sample were 13 years of age or older, which is the same age group about which the survey sought information on recreation activity participation. Figure 3 also shows that just over one-fourth of the people were children i.e., pre-teens - and about two-thirds were adults - i.e., 18 or older. There were about the same number of teenage males and females, with the latter having





a slight majority. Males outnumbered females in the children bracket; and there were half again as many males as females in the 18 and older category. Males accounted for 58% of all persons in recreation parties.

Perhaps somewhat surprisingly one person in three, 13 or older, and part of a recreation party, did not engage in any recreation activity other than camping, relaxing around camp, camp chores, etc. Of the activities in Table 5, 2,010 of the 3,002 recreationists 13 or older participated in one or more; the reminder did not engage in any of the activities listed.

#### TABLE 5

## Recreation Activity Participation

	(2,010, 13+, Engaged in One or More	e Activities)	
	Activity	Recreationists	<u>13+ (2,010)</u>
01	Big Game Hunting	131	(6.5%)
02	Bird Hunting	18	(0.9%)
03	Other Hunting	25	(1.2%)
04	Stream Fishing	859	(42.7%)
05	Lake Fishing	861	(42.8%)
06	Motor Boating	152	(7.6%)
07	Sail Boating	4	(0.2%)
08	Canoe/Kayak/Raft	159	(7.9%)
09	Trail Biking	20	(1.0%)
10	4-X Driving	51	(2.5%)
11	ORV/ATV Driving	141	(7.0%)
12	Picnicking	112	(5.6%)
13	Hiking	360	(17.9%)
14	Berry Picking	3.32	(16.5%)
15	Rock H/Goldp/Prospecting	36	(1.8%)
16	All Others	111	(5.5%)

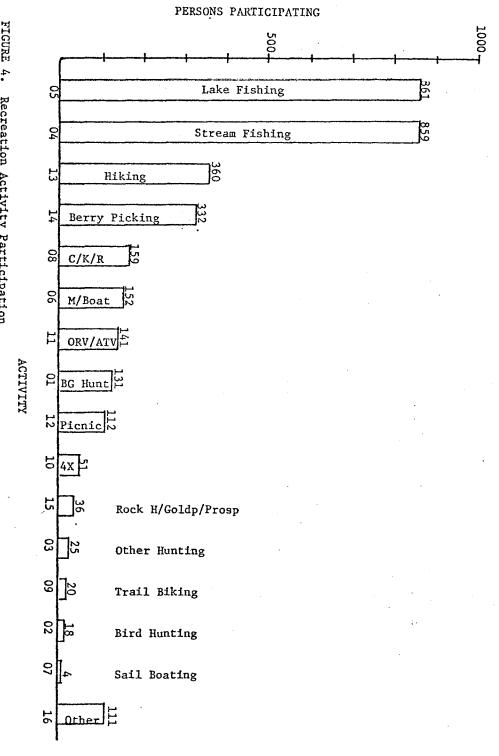


FIGURE 4. Recreation Activity Participation

Table 5 also shows that stream and lake fishing are by far the favored activities of participating recreationists in the Denali Highway area. "Participating recreationists" are those 13 or older who engaged in one or more of the activities during their visit to the area. This information is presented more graphically in Figure 4.

As noted earlier, the sample of recreation parties (1,323) comprised just under 20% of all such parties using the area July 1 - September 13, 1975. Since two-thirds of those 13 or older (i.e., those who engaged in one or more of the listed recreation activities) is the same as one-half of all persons in the recreation parties, it is estimated that just over 10,000 people participated in one or more of the activities. This figure is a total for the 75-day period and is not discounted for repeat visits. Similar totals can be estimated for each activity by multiplying by 5 the number of participants shown in Table 5. Thus, there were an estimated 100 participants in trail biking, 1,800 in hiking, 800 in canoe/kayak/raft, and so on during the 75-day season.

The survey did more than identify the activities participated in by recreationists 13 or older. It also obtained data on the location and duration of such participation. Figure 5 is a map of the study area showing the six zones (I-VI). A similar map was used at the highway check stations to assist respondents in identifying the zones where they engaged in recreation activities. They were also asked to estimate the duration (in hours) of such activities. Figure 6 shows the time spent by all respondents in each activity in Zone I. The activities are coded 01-16, corresponding to the activity codes in Table 5. Figures 7-11 give the same information for each of the other five zones.

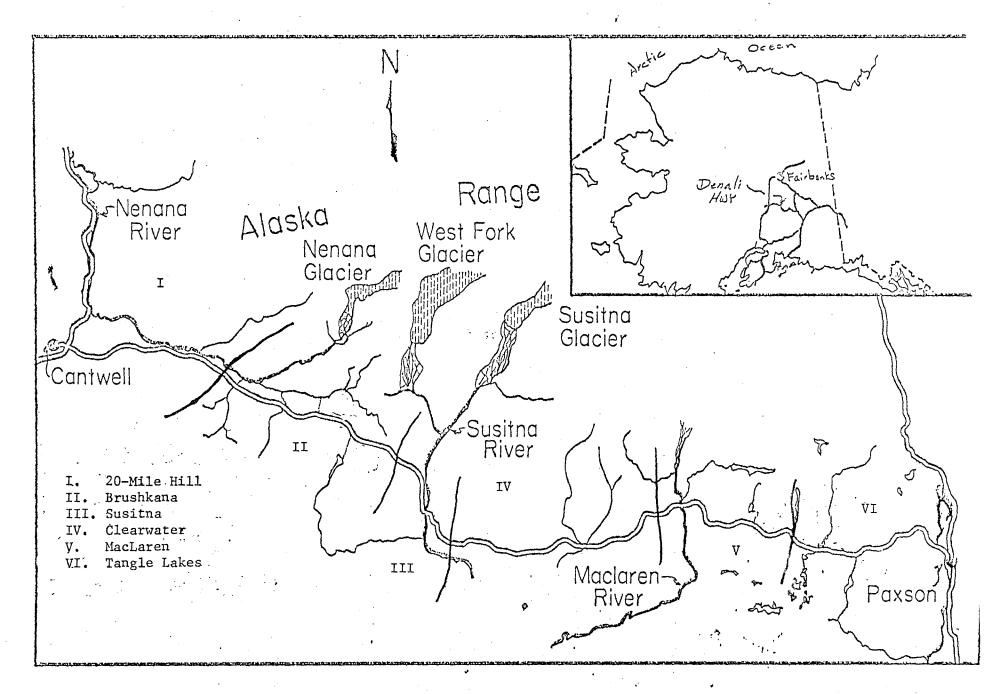
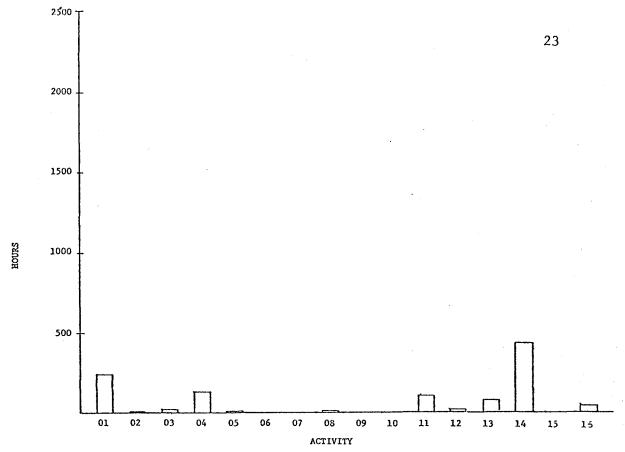
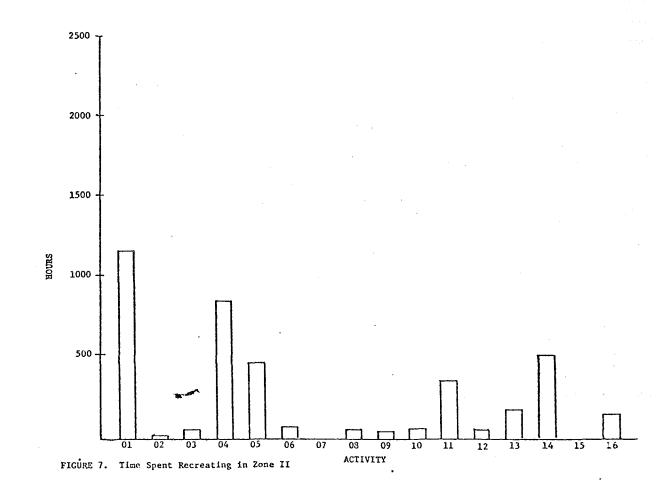
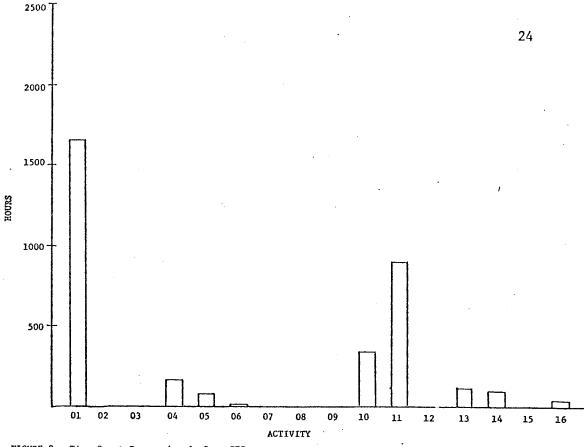


FIGURE 5. Denali Highway Area - Six Zones











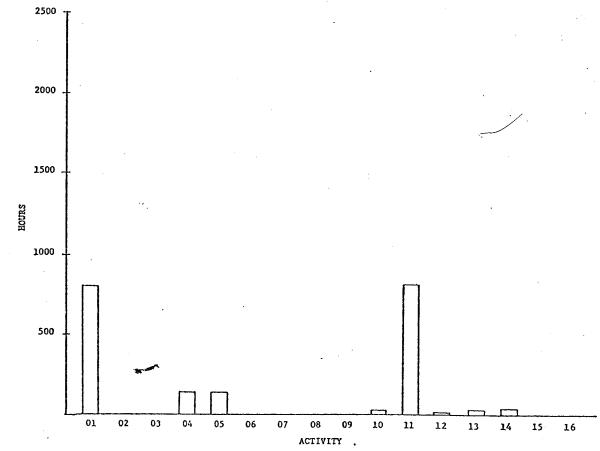
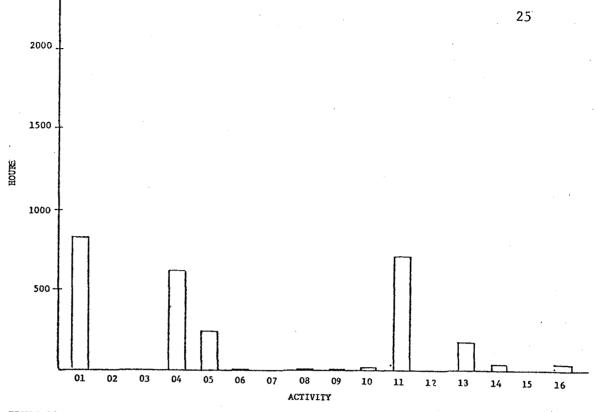
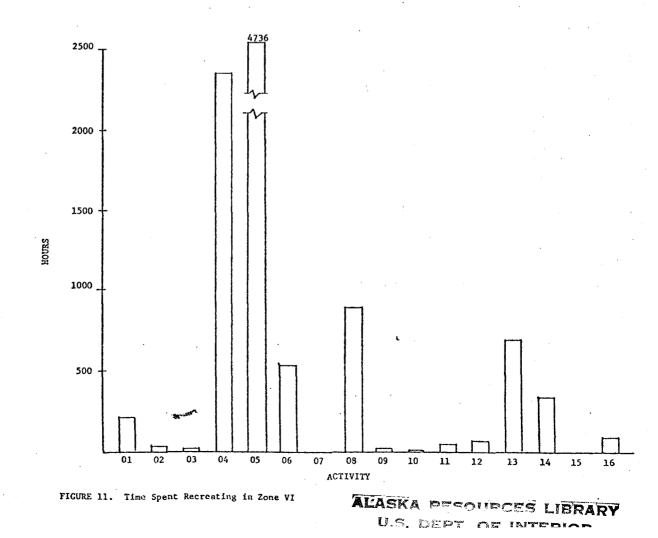


FIGURE 9. Time Spent Recreating in Zone IV





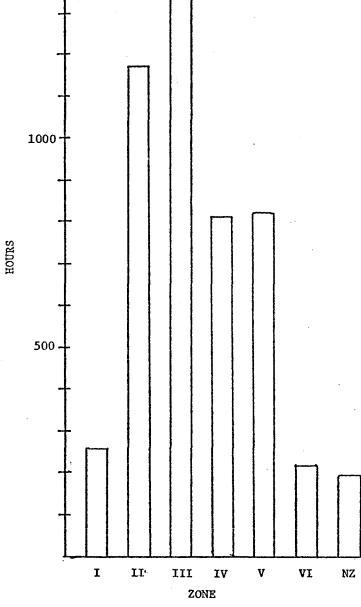


Comparison among Figures 6-11 shows that some activities are more prevalent in some zones than in others. Stream and lake fishing occur in all zones, with participants spending slightly more time in the former in zones I-V. Although more time is spent stream fishing in Zone VI than anywhere else, the amount of time devoted to lake fishing in this zone is twice that devoted to stream fishing. Tangle Lakes, the developed campground and boat launch, and paved access are important factors in the considerable fishing use occurring in Zone VI. The importance of the water resources and their accessibility in this portion of the study area is further illustrated by the nearly exclusive appearance of canoe/kayak/raft activity in Zone VI, even though opportunities such as the MacLaren and Susitna Rivers or Butte Lake exist in other zones.

Figure 12 shows the distribution across the six zones of time spent big game hunting by all respondents. "NZ" refers to big game hunting data with location unspecified - i.e., "No Zone." Figures 13-24 show similar information for each of the activities identified. Figure 25 contains all other activities, including sail boating and rock hounding/goldpanning/prospecting, but not camping.

The relationship between ORV/ATV activity and big game hunting is indicated by a comparison of Figure 12 and Figure 21. Zones II - V, account for most of the time spent by participants in big game hunting. They also experience the most ORV/ATV activity. Proportionately lower ORV/ATV activity in two of the zones (II and IV), however, may reflect big game opportunities available closer to the highway, more fly-in hunting activity, or terrain less suited to ORV/ATV driving.

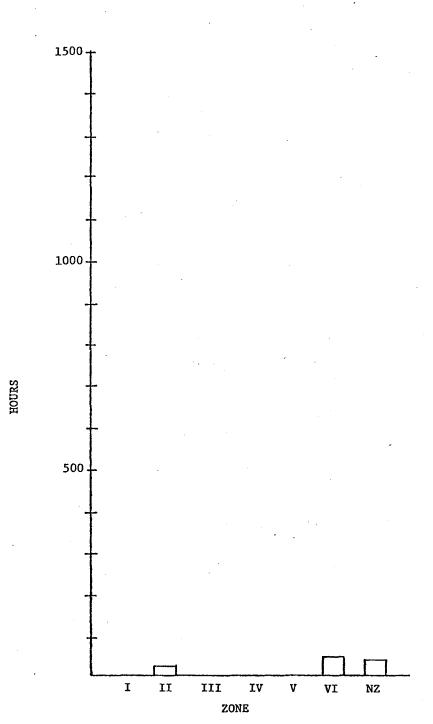


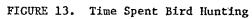


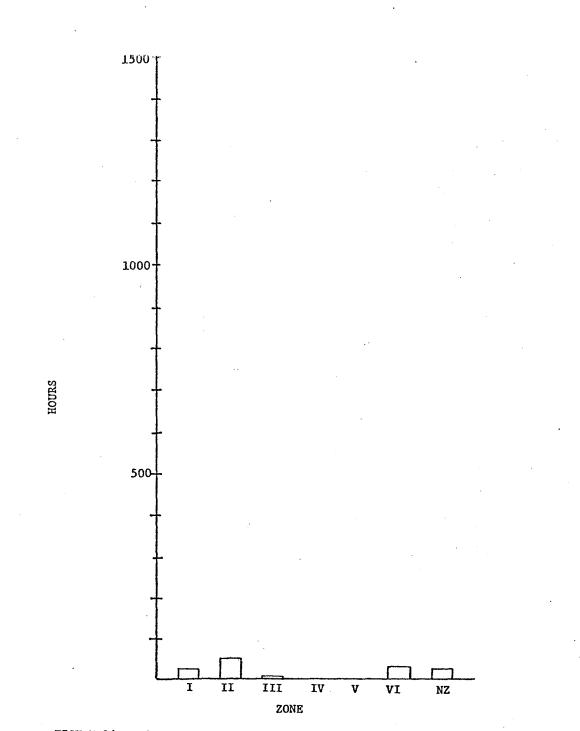
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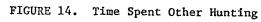
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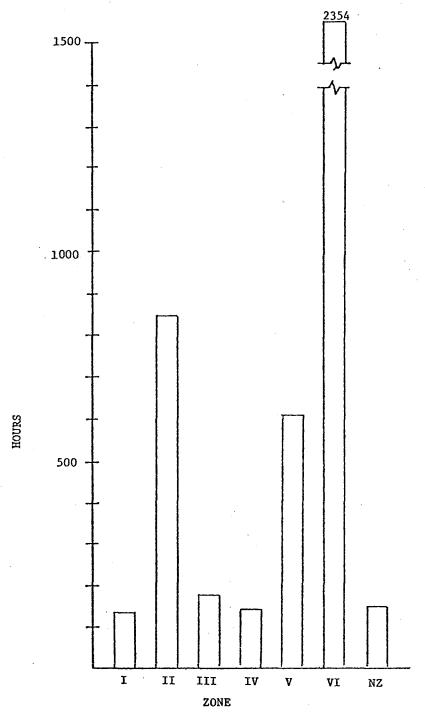


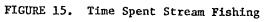


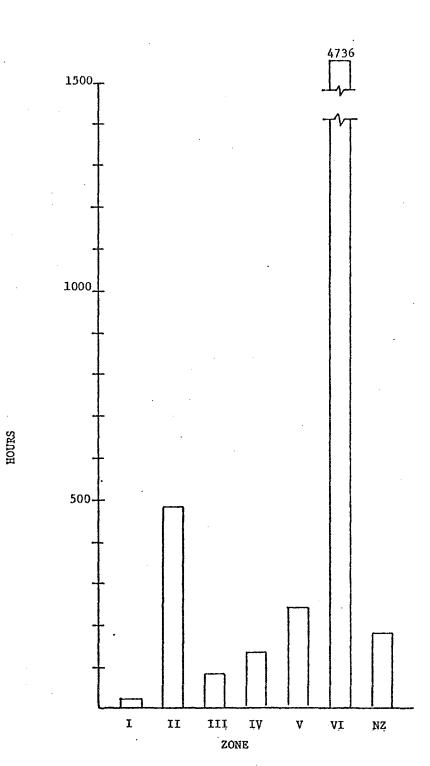






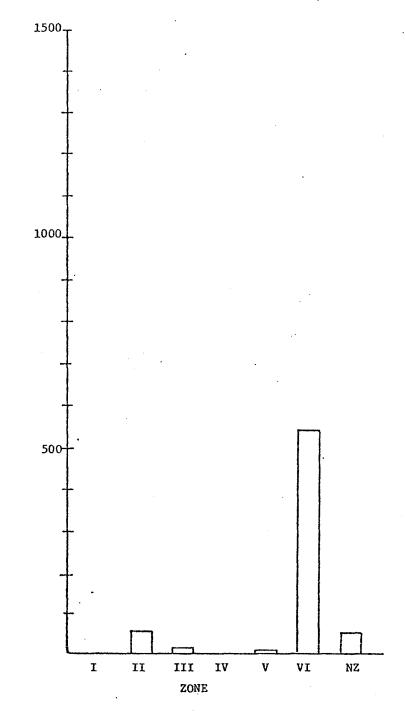






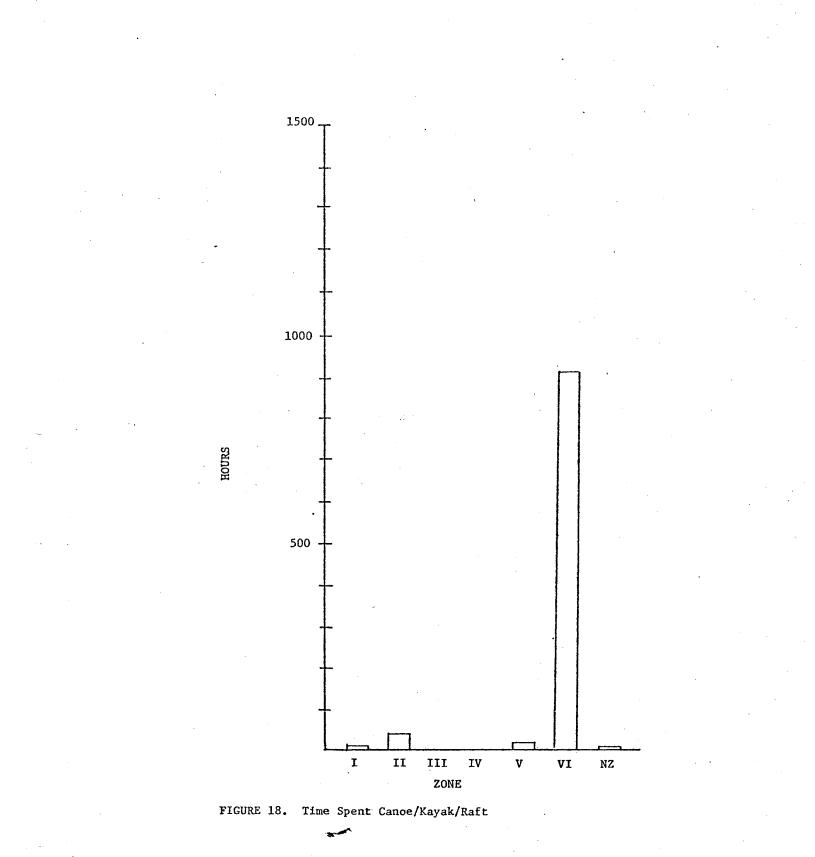


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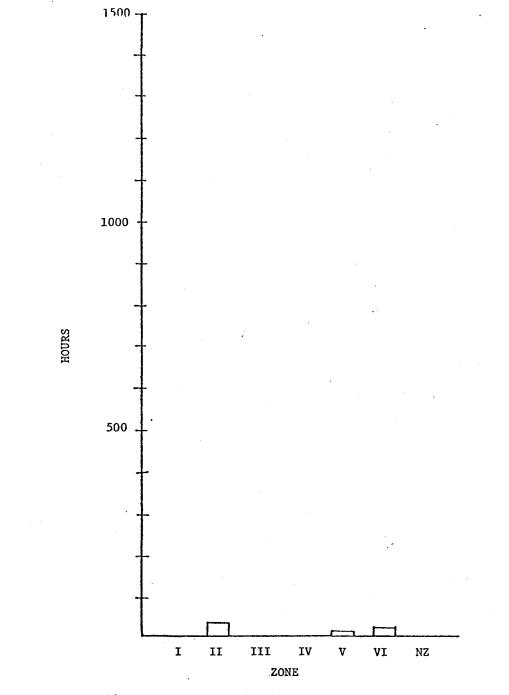


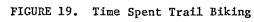


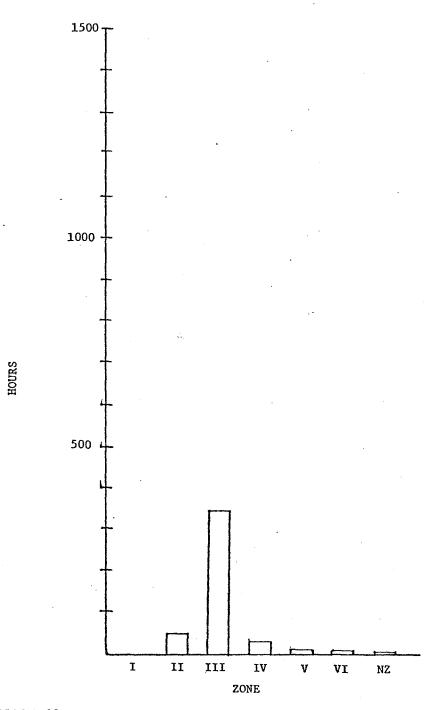
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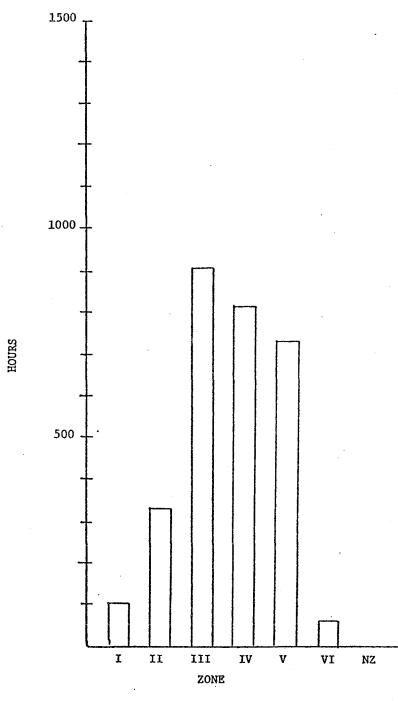
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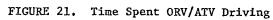












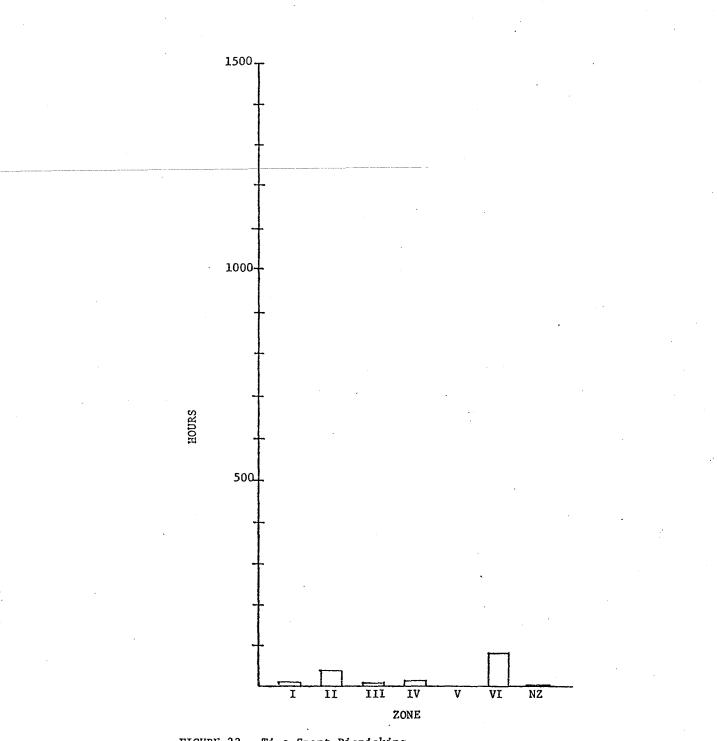


FIGURE 22. Time Spent Picnicking

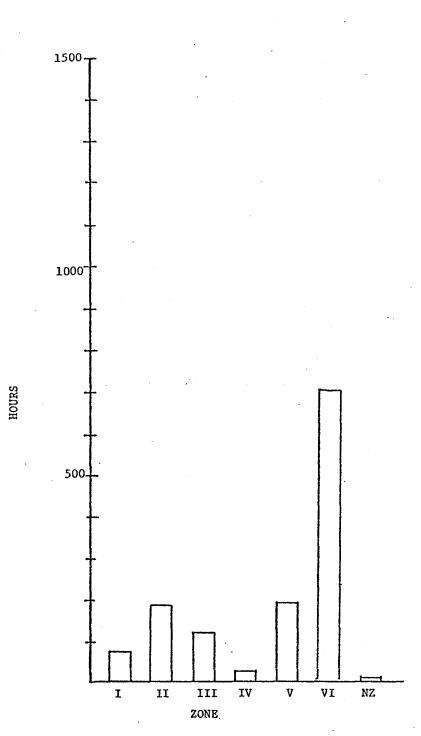
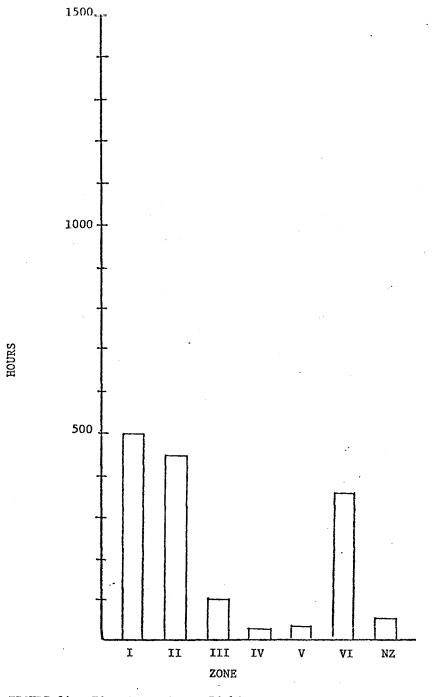
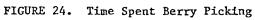
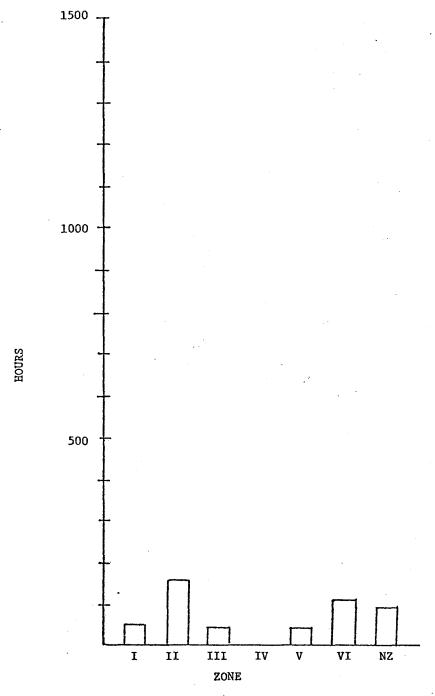


FIGURE 23. Time Spent Hiking







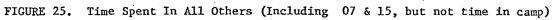


Figure 24, time spent berry picking, shows little of this activity in the interior zones II - V, even though field observations revealed available resources in these areas. The relatively high activity level in Zone I is particularly noteworthy since most of this zone is actually outside the study area - i.e., west of the "Twenty-Mile Hill" checkpoint. This is particularly evident when Figure 6 is compared with Figures 7-11. Total recreation activity is very low in Zone I in contrast to Zones II - VI.

Table 6 summarizes the amount of time (in hours) spent by all recreation party respondents in each activity listed. The activities have been ordered according to total time. Thus, the 861 participants in lake fishing identified in Table 5 spent a total (shown in Table 6) of 5,879 hours in this activity in the study area. Trail biking occupied 65 hours (Table 6) of time for twenty participants (Table 5).

With respect to total time spent, lake fishing and stream fishing rank first and third. Together they account for over 40% of all time spent in the activities listed in Table 6. It was seen earlier (Table 5) that these two activities were first and second, and hiking was a distant third, in terms of the number of participants. Big game hunting had only 131 respondents participating, but Table 6 shows that they accounted for 5,156 hours of this activity, making it second on the list.

The relationship between the number of participants and the time spent in a given activity was considered in terms of activity participation rates (APR's). These were calculated as shown in Table 7 and the activities were ordered according to the APR's determined. The 39.4 figure for big game hunting means that the 131 people who participated in big game hunting spent

an average of 39.4 hours in this activity per trip to the Denali Highway area in 1975. Also, relatively high APR's were calculated for off-road vehicle use (ORV/ATV driving and 4-x driving). Otherwise, most activities have APR's of 4-7 hours/participant/trip.

	Activity	Hours		Percent
)5	Lake Fishing	5,879		24.1
)1	Big Game Hunting	5,156		21.2
)4	Stream Fishing	4,415		18.1
11	ORV/ATV Driving	2,961		12.2
4	Berry Picking	1,516		6.2
.3	Hiking	1,327		5.5
)8	Canoe/Kayak/Raft	<b>9</b> 82		4.0
)6	Motor Boating	686		2.8
.6	All Others	486		2.0
0	4-X Driving	459		1.9
.2	Picnicking	171		0.7
)3	Other Hunting	135		0.6
)2	Bird Hunting	102		0.4
)9	Trail Biking	65		. 0.3
)7	Sail Boating	7		0.0
5	Rock H/Goldp/prospecting	4		0.0
	TOTAL	24,351		100.0
[OT]	E: 04 - 05 All Fishing	10,294	(42.2)	• • • • •
0	1 - 02 - 03 All Hunting	5,393	(22.2)	
0	9 - 10- 11 All ORV	3,485	(14.4)	

TABLE 6 Recreation Activity Time Breakdown

		(Hours/Person	)			
	Activity	Hours	•	Persons	=	APR
01	Big Game Hunting	5,156	<u>.</u>	131		39.4
11	ORV/ATV Driving	2,961		141		21.0
10	4-X Driving	459		51		9.0
05	Lake Fishing	5,879		861		6.8
38	Canoe/Kayak/Raft	982		159		6.2
02	Bird Hunting	102		18		5.7
03	Other Hunting	135		25		5.4
04	Stream Fishing	4,415		859		5.1
14	Berry Picking	1,516		322		4.6
06	Motor Boating	686		152		4.5
16	All Others	486		111		4.4
1.3	Hiking	1,327		. 360		3.7
09	Trail Biking	65	·	20		3.3
07	Sail Boating	7		4		1.8
12	Picnicking	171		112		1.5
L5	Rock H/Goldp/Prospecting	4		4		1.0

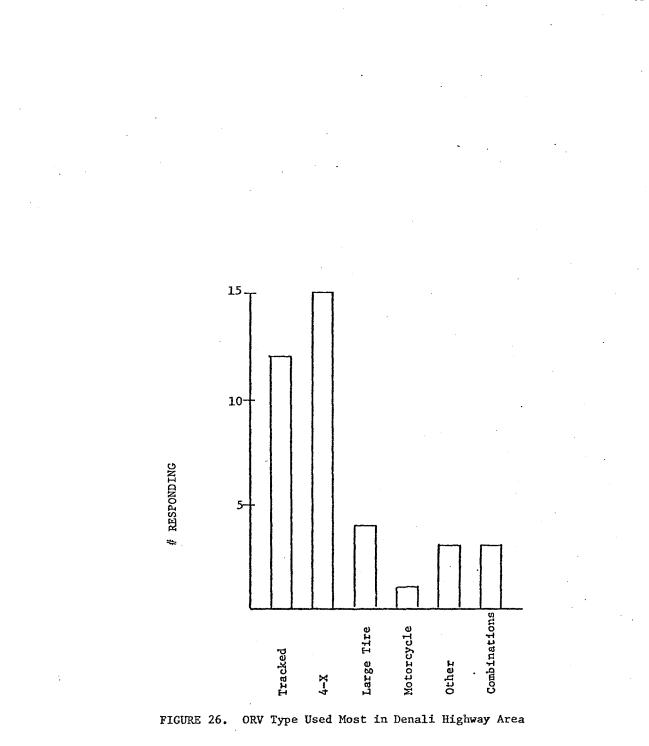
TABLE 7Recreation Activity Participation Rates

## C. Off-Road Vehicle Questionnaire Results

It is impossible to determine precisely the return rate for the off-road vehicle questionnaires since distribution records were incomplete for the eastern portion of the study area. Of the 83 ORV questionnaires known to have been distributed, 34 were returned - a 41%.response rate. Some ORV activity was identified in 21 interviews that lacked any indication of an off-road vehicle questionnaire being given to the respondent. Four completed ORV questionnaires were returned even though they had not been recorded as being distributed. If this unrecorded group had a return rate similar to the 41% cited above, then 10 ORV questionnaires were given out (probably to half those identified as engaging in ORV activity but not noted as receiving the questionnaire). The return rate is probably in the 35-45% range - i.e., 90-110 ORV questionnaires given out, and 38 returned. The records also show a considerable difference in return rates among locations. For example, only 14% of the ORV questionnaires given out at the Paxson-end checkpoint and nearby Tangle Lakes Campground were returned. The return rate was 49% at the Cantwell-end checkpoint, "Twenty-Mile Hill." Questionnaires distributed by Frank Jackson at Brushkana Campground, the Susitna River Crossing, and elsewhere along the highway were returned at a 56% rate.

The known response rate of 41% is likely to be close to the actual rate, and is an acceptable figure for the type of questionnaire used. The reader is cautioned, however, to bear in mind the following: (1) the major source of data was off-road vehicle users contacted from the Susitna River Crossing westward, and (2) the returned questionnaires constituted a relatively small sample size. The following discussion of the results of these questionnaires, therefore, covers some of the information obtained from the respondents and can be considered representative of this group, but inferences about population parameters should be reserved until the additional data is available from the proposed 1976 continuation of the survey.

Figure 26 depicts the distribution of off-road vehicle types used most often in the study area by the respondents. 39% indicated they used a fourwheel drive (4-X) vehicle most often, and 32% said they used tracked vehicles the most. Only one respondent (3%) said he used a motorcycle the most for his his ORV activity in the Denali Highway area.



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The questionniare asked people to identify the main use of their ORV's in the area. Many respondents checked two or more activities. Hunting was cited in 68% of the cases (32% said hunting only; 36% checked hunting as well as one or more others). 58% identified fishing as the main use of their vehicles in the area (42% indicated fishing in combination with one or more other activities, such as hunting; only 16% cited fishing only). In addition to the 16% giving fishing only as the primary use, only 9% checked fishing in combination with others that did not include hunting. Just two respondents (5%) did not check either hunting or fishing.

When asked to rate the Denali Highway area in comparison to other places where they have used off-road vehciles, five (13%) said that it was the best area. Fourteen persons (37%) rated it as being better than average. The modal response, however, was that the Denali Highway area was an average area for off-road vehicle use. Sixteen people (42%) gave it an "average" rating. None thought that it was the worst place for off-road vehicle activity, but two respondents (5%) considered it to be worse than average.

Of the five rating the Denali Highway area "best," three commented on the lack of people as the basis for their rating. They used terms such as "isolated" and "not crowded". One of them also mentioned scenic beauty, but no one else giving the "best" rating noted scenic values as significant to their ratings. In fact, only one of the eleven respondents who considered the area to be better than average indicated that scenery was part of his reason for the rating. One of those giving the Denali Highway a "best" rating was particularly straightforward in giving the reason, "That's where I got the most game with the least trouble."

The two respondents who thought that the area was worse than average cited difficult driving conditions as the basis for their ratings. Wet and boggy conditions were noted in both cases.

Figure 27 shows the responses to questions about the number of ORV trips made to the Denali Highway area in 1975. When interviewed, over one half the people were on their first trip, and nearly 40% were on their second. 45% did not anticipate making another ORV trip to the area in 1975, and 45% expected to make one or two more such trips. Several respondents gave no indication of expected trips, and these were assumed not to be visiting the area again in 1975 for off-road vehicle activity. The one respondent failing to indicate how many trips "so far" was considered to have made only the one he was on at the time of survey contact.

The total number of ORV trips by respondents can be estimated by combining "so far" and "expected" responses. Thus, ten made one ORV trip to the Denali Highway area; six made two trips; four made four; and five made five or more. 58% of the respondents made 1-3 trips in 1975. There were 101 ORV trips altogether made by all respondents. Assuming a response rate of 40% and a contact rate of 20%, these ORV trips represent over 1,200 such visits to the Denali Highway area in the summer of 1975.

Data were available from 74% of the respondents to determine the average length of an ORV trip. These people took 41 trips, which lasted a total of 185 days (106 weekdays; 79 other days). The average trip length was 4.5 days.. The range was 2-13 days, and the modal value was 3 days. Using the 4.5 day average, 101 ORV trips, 40% return rate, and 20% contact rate, the total summer off-road vehicle use can be estimated as 5,700 days. This is not vehicle operating time, but the total number of days (on a per vehicle basis) accounted for by all ORV trips to the Denali Highway area in the summer season of 1975.

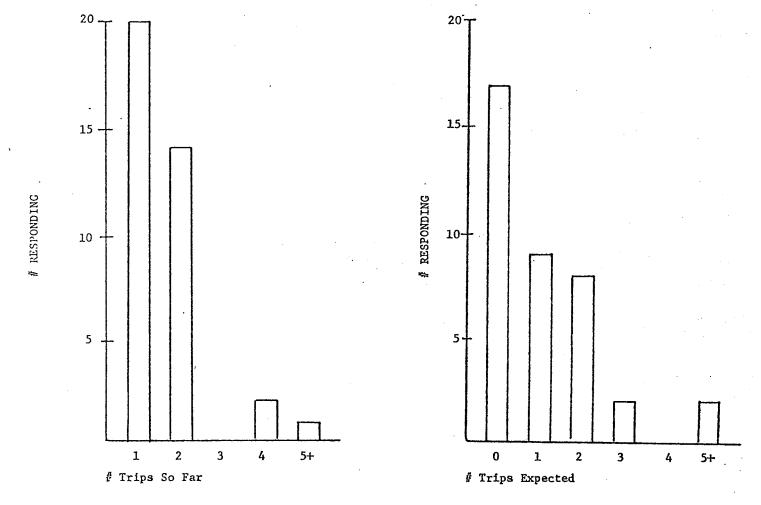


FIGURE 27. ORV Trips to The Denali Highway Area

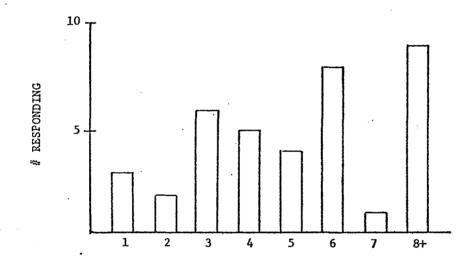
When asked about off-road vehicle use of the area in previous years, onethird of the respondents said they had none - i.e., 1975 was the first time they had engaged in ORV activity in the study area. Although it was their first time for such activity in the Denali Highway area, most (69%) of these respondents had used their off-road vehicles elsewhere the previous year. In other words they were not novices to the sport. 53% of the 1975 respondents were inactive in 1973 and 63% inactive in 1972 with respect to off-road vehicle use of the Denali Highway area.

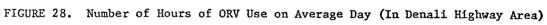
Fifteen of the twenty-five who used their ORV's in the Denali Highway area in 1974 spent 10 days or less - seven indicated 1-5 days and eight said 6-10 days. Five of the twenty-five respondents listed 16 or more days of use in the area in 1974.

Figure 28 shows the responses to a question about the hours of ORV use on an average day in the Denali Highway area. The modal value is eight hours or more, with six hours being a significant secondary mode. Figure 28 also shows that a number of respondents used their vehicles 3-5 hours on a typical day.

Respondents were asked where they operated their vehicles most often in the area. They were presented with choices such as "along the highway," "near a campground," and "across country, breaking new trail." 55% responded "across country, using existing trails or tracks" as their only choice. Another 33% chose this alternative in combination with one or more of the others. "Across country, bearing new trail" was the only choice of 18% of the respondents.

The questionnaire also sought user preference information by presenting alternatives related to the types of terrain, trails, vegetative cover, and





contact with other off-road vehicle users. Rolling or hilly terrain was preferred by 84% of the respondents, and they were about evenly divided on their choices. 32% selected tundra only as their preference for vegetative cover; another 26% indicated tundra along with one or more of the other cover alternatives.

"Rough trail, with little or no maintenance" was the only choice of 29% of the respondents, and another 21% chose it in conjunction with one or more of the other trail types. 21% checked "open country, with many trails or tracks to follow" as their only trail preference. 11% selected this alternative in combination with others. Significantly, no one picked "open country, with no trail or track" as the only preferred type. However, this option was chosen along with others by 13% of the respondents.

53% said they preferred to operate their vehicles where they would see other ORV's occasionally. Most of the others favored less frequent contact i.e., 39% preferred areas where no other ORV users were lokely to be seen. None of the respondents stated a preference for areas where they would be likely to see other off-road vehicles nearly all the time, but 3% did select the alternative of seeing others often. The remaining 5% selected various combinations - i.e., more than one alternative.

A companion question sought information about user willingness to shift to other areas if the type they preferred was unavailable. Uncrowded areas were acceptable to most; some respondents were willing to use areas where others would be seen often. Very few were willing to shift to areas where they could expect to see other off-road vehicles nearly all the time.

The questionnaire also sought data on the distance travelled to engage in ORV activity. Respondents were asked to indicate the normal travel distance from where the vehicle is stored to where it is used most often. Responses were subdivided further according to whether the trip was for a oneday outing, or for a longer period. The data appear in Table 8, which includes non-answers. Excluding non-answers, the percentages are somewhat different. For example, 90% of the respondents travelled 100 miles or less for a one-day outing, and 70% said they travelled more than 150 miles for trips of two days or longer. Also, for the longer trips, only 9% were in the 101-150 mile range; 21% were 100 miles or less.

#### TABLE 8

#### Travel Distance To Use ORV

(Distance From	m Storage Place to Use Area)
For A One Day Outing	
25 miles or less	26%
26 - 50 miles	16%
51 - 100 miles	26%
More than 100 miles	8%
No answer	24%
For 2 or More Days	
25 miles or less	11%
26 - 50 miles	3%
51 - 100 miles	5%
101 - 150 miles	8%
More than 150 miles	63%
No answer	11%

Off-road vehicle users were asked for their opinions on some selected management options. These were presented as statements, and the respondents were asked to agree or disagree. Non-response was 10% or less for each statement. The results of this portion on the survey are shown in Table 9.

Statement	Agree	Disagree	
Overused trails and areas should be closed to off-road vehicle use until vegetation recovers.	37%	58%	
Off-road vehicle trails should be maintained.	16%	79%	
	10%	13%	
Off-road vehicle trails should be marked with signs.	18%	76%	
More parking and off-loading areas should be provided for off-road vehicle users.	29%	66%	
The entire region should be open to off-road vehicle use, with certain areas designated for <u>off-road vehicles only</u> .	45%	45%	- - -
Off-road vehicle use should be kept open on the same bases as it is now.	66%	26%	
Only a few, limited areas should be open to off-road vehicles.	8%	89%	
Off-road vehicles should be restricted to designated trails only.	16%	76%	
Off-road vehicles should be prohibited in the entire Denali Highway area.	3%	92%	

TABLE	9	

### Attitudes on Selected Management Options

The Agricultural Experiment Station's companion project, "Determinants of Choice in Outdoor Recreation," will be concerned with the investment and expenditure data provided by off-road vehicle users. As this information becomes available from the 1976 continuation of the survey, Bill Workman, an economist at the station, will examine the relationships among investment, expenditures, and socio-economic characteristics of the ORV respondents. That study is expected to develop a descriptive profile of off-road vehicle users as well.

Although the sample size was too small to profile all ORV users in 1975, some of the characteristics of the respondents were summarized to provide a general picture of the respondent group. The 1975 off-road vehicle respondent was male (97% of respondents) and about 40 years of age (average age 38.7 years, with a range of 22 to 69 years). He was a high school graduate (average grade completed was 12.2, with a range of eighth grade through 6+ years of college); grade 12 was the modal response (45%). To the extent that occupations were identified and could be generally classified, the respondent was twice as likely to be "blue collar" (53%) as "white collar" (26%). Eleven percent of the respondents were on active duty in the military, and five percent listed "retired" as their occupational status. The average and modal (21%) bracket for total family income was \$20 - 24,999. The average family size - i.e., those living at home included the respondent - was 3.1 persons. Finally, the respondent usually owned either a 4-X vehicle (37%) or a tracked vehicle (32%).

#### IV. Discussion

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The two objectives of the outdoor recreation component of this study were noted above (see page 4). As an interim report based on the data

obtained in the 1975 survey, this paper does not include data from the continuation of the survey planned for 1976. At this point results are preliminary and conclusions tentative. Nonetheless, it is felt that the fieldwork done in 1975 has virtually accomplished objective 1 and has given some good indications as to what can be expected from the accomplishment of objective 2. Considering the methodological and practical problems that had to be overcome, these achievements are particularly satisfactory.

Short lead time was perhaps the greatest challenge of this project. There were three months from the submission of the proposal to commencement of the survey in the study area. The time available for survey design and construction of the questionnaire and interview schedules was actually a matter of days owing to the expected time constraints of the required review by the Office of Management and Budget (OMB). Within this short period consultations were held with various BLM personnel regarding information needs, procedures, and logistics. The Alaska Department of Highways was contacted for information on the area and advice about regulations and feasibility of the proposed highway interviews. Alaska State Troopers were informed of the project and consulted about its implementation as well. Additional discussions were held with researchers working on related projects at the University of Alaska ("Determinants of Choice in Outdoor Recreation") and Colorado State University ("The Denali Highway Information Plan"). These were held before the questionnaire and schedules went to the OMB so that items of interest to those investigators could be incorporated in the survey instruments.

Time and budgetary constraints meant that the project had to be implemented without the benefits of an exploratory or pilot study. Such preliminary investigations often provide invaluable guidance in formulating research

designs and highlight information needs and problem areas. There was no time to pre-test and revise the survey instruments and procedures. The 1975 data collection effort can be considered a pre-test to the extent that revisions have been proposed for the 1976 season; but information, not pre-testing, was the objective of the survey. There were no previous recreational studies of the area to build upon, and other relevant data was in short supply. Consequently, some assumptions failed to hold true as the survey was implemented. Denali Highway traffic volume was a case in point.

Vehicle count data was obtained from the Alaska Department of Highways. This information was not available for the Denali Highway but for segments of the Parks and Richardson Highways adjoining the Denali. BLM and Highway Department personnel were consulted as well as others. It was assumed that at least 15,000 vehicles would exit the Denali Highway in the 75-day period July 1 - September 13, 1975. The actual exiting traffic estimated above (see page 14) was about one-half the amount expected. Some 1,500 contacts were expected at each check station; the actual number was about 600. Without contradictory guidance from a pilot study or other data source, it was assumed that 20% of the contacts would be identified as ORV users. Thus. where it was anticipated that 400 or more ORV questionnaires would be distributed, the amount was actually less than one-fourth of that. The return rate (c. 40%) was higher than expected (25-30%), but the sample size was considered inadequate. With better information about the traffic flow and ORV user proportion, a more productive sampling scheme could have been designed.

Other problems or developments contributed to the small ORV sample as well. The summer of 1975 proved to have the worst weather in sometime for outdoor activity - it was cloudy and rainy during most of the season.

Orientation, training and performance of interviewers at the eastern end of the study area was not supervised closely enough by the project leader. Finally, declining game populations and a short hunting season meant fewer hunters in the area, and hunting is a significant activity of off-road vehicle users.

The relatively large sample size and complete responses recorded in the initial contacts have resulted in a fairly comprehensive picture of recreation activity in the Denali Highway area, July 1 - September 13, 1975. Approximately 6,400 recreation parties visited the area, staying there an average of 29 hours and accounting for a total of about 20,500 visits. More than 80% of the visitors were Alaskans, three-fourths of whom lived in either Anchorage or Fairbanks.

About 10,000 people (13 or older) engaged in one outdoor recreation activities other than camping. 24% of all time spent in these activities was for lake fishing; 21% big game hunting; 18% stream fishing; 12% ORV/ATV driving; 6% berry picking; and 5% or less in each of the others. Lake fishing had 4,300 participants, as did stream fishing during the same period. There were 1,800 hikers; 1,650 engaged in berry picking; canoe/kayak/raft 800; ORV/ATV driving 700; big game hunting 650; 4-X driving 250; and trail biking 100.

Although Zone I was primarily to the west of the check station (see Figure 5 for locations of the six zones), some recreation activity was picked up in the survey.. For example, small amounts of stream fishing, hiking, big game hunting, and ORV/ATV driving were identified. The most significant activity, in terms of time involved, was berry picking. Berry picking, as well as lake fishing and ORV/ATV driving, was important in Zone II, but the main activities in this part of the study area were big game hunting and stream fishing.

Zones III, IV, and V were dominated by big game hunting and associated ORV activity. The pattern was similar for all three of these areas except that 4-X driving was notable only in Zone III and stream fishing was more significant in Zone V. Some fishing, hiking, and berry picking occurred in all three zones.

Zone VI, which includes Tangle Lakes and the BLM campground and boat launch area there, is overwhelmingly dominated by fishing activity. More than 80% of all time spent lake fishing in the Denali Highway area occurred in Zone VI. About 50% of all time spent stream fishing also occurred in Zone VI. The water resources of this area, including the designated canoe route down the Delta River, and the paved access and proximity to Paxson account for the significant participation in canoe/kayak/raft activities identified in this zone. Hiking and berry picking enjoyed participation, too, as did big game hunting and other activities to a limited extent.

Nearly two-thirds of all time spent in all activities was in fishing and/or hunting. All fishing comprised 42.4% of the time, and all hunting accounted for 22.2%. All ORV activity was another 14.4% of participation time.

The activity participation rates discussed above (page 41) are another dimension of time-activity relationships. The 39.4 hour APR for big game hunting is particularly important since it suggests a topic of further research. Since the average length-of-stay was 29 hours, big game hunters generally were in the area longer than other types of recreationists. Furthermore, differences in length-of-stay normally have implications in terms of demand for recreation opportunities or stresses on the resource base.

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Future analyses might look, therefore, at the variations in length-of-stay among groups with different clusters or patterns of recreation activity.

Different activity mixes are associated with factors such as resources and facilities available, location, and the visitor's perception of an area's recreation uses. Examination of the data on residence and length of stay also provide information about the perceived purpose, or use of facilities. For example, the survey found that Brushkana Campground was used more by non-Alaskan residents who stopped for a shorter period of time than would be expected from:the overall data. When compared with Tangle Lakes Campground, Brushkana was found to have proportionately greater use as a stopover point for travelers on their way to Mount McKinley National Park, "seeing Alaska," etc. On the other hand Tangle Lakes was perceived to a greater extent as a destination point.

With respect to the data obtained from the off-road vehicle questionnaires, the small sample size noted previously restricts any discussion or conclusions at this point. For example, the 1,200 ORV visits estimated on page 47 is felt to be too large, but until more data is collected it represents a "best estimate" of the season total. The same is true for the season estimate of days of ORV use in that section.

The small sample size (and the occasional failure of interviewers to indicate which interview schedules related to which ORV questionnaires) negated the analysis of ORV respondents' recreation activities in the area. This should be remedied in future studies so that a more comprehensive picture of off-road vehicle users can be developed.

Some problems of interpretation or instruction also appeared in the preliminary analysis of responses to the ORV questionnaire. For example, by not

specifying operating time in question 5, Part II (see ORV questionnaire in the Appendix), the results may have been inflated. In questions where one of several alternatives was to be chosen, respondents often selected two or more.

Although these problems should temper the interpretation or other use of the results of the ORV data obtained so far, the information presented above (III-C) should be indicative of ORV users, their preferences, characteristics, etc., in the Denali Highway area. As additional data is collected, more precise inferences will be possible.

#### V. IMPLICATIONS FOR FURTHER STUDY

### A. 1976 Continuation

Highway checkpoints could be established again in 1976, but they would be unlikely to contribute significantly to the overall picture of recreation activity in the Denali Highway area that was developed from the 1975 survey. Check station interviews this year might indicate changes or trends occurring in recreation activity or visitor characteristics. The main value of continuing the highway interviews, however, would be the additional opportunities they represent for contacting those engaging in off-road vehicle activity in the study area.

The main focus of the 1976 fieldwork should be ORV users. More observations are needed from this group. Data quantity and quality should be improved wherever possible. In order to obtain information on group size and composition recreation participation, and length-of-stay for the trip in progress at the time of contact, relevant questions will have to be added to the ORV questionnaire, or existing interview schedules used. In the latter case, the Denali Highway (or campground) questionnaire should be revised to facilitate the interviewer's job. More intensive orientation, training, and supervision should be instituted for the same purpose.

Some changes could be made in the ORV questionnaire as well to reduce respondent confusion or other difficulties. The investment/expenditure section should be easier to fill out. Instructions should be as clear as possible, and the frequency of multiple responses reduced. The management-option section should be expanded, perhaps including other attitudinal statements; also, the agree-disagree range should offer respondents more latitude.

#### B. Other Research

Various perception studies could be undertaken to determine how off-road vehicle users see themselves, other recreationists, area residents, land managers, etc. With respect to ORV activity in the Denali Highway area, what conflicts are seen by these various groups? How do they view various management options? How is the resource base perceived? For example, many respondents indicated a preference for tundra as the vegetative cover where they engaged in off-road vehicle activity. Are they in agreement as to what tundra is? Similarly, many said they used their vehicles "across country, using existing trails or tracks." How many passes of a vehicle constiture an "existing" trail? What and where are "existing" trails?

Scenic values are another aspect of resource perception. There are a number of systems for landscape assessment based on the principles of form, line, texture, and color. The highway corridor and other significant use locations should be subjected to such an analysis. This could be combined with visitor perceptions of the area's scenic qualities. In this regard it will be recalled (see page 46) that few ORV respondents explicity cited scenic values as explaining their high ratings of the Denali Highway area.

Responses to other questions suggest additional research possibilities.

"open country, with no trail or track." On the other hand 18% of the respondents indicated that the option which best described where they used their offroad vehicles the most in the Denali Highway area was "across country, breaking new trail." Is there a contradiction here? What implications are there for management? Another item showed that ORV respondents tended not to use areas 101-150 miles from home (see page 52). Understandably, only 8% travelled more than 100 miles for a one-day, ORV outing. But for trips of two days or longer respondents travelled more than 150 miles (70%) or 100 miles or less (21%), avoiding the intermediate distance. Is this related to resouce opportunities, or characteristics of the individuals? What significance might this have for decisions affecting the opening or closing of lands to ORV use?

Studies of use control should go beyond enumeration of what is possible or feasible. Perception of managment options has been suggested as a topic for investigation. Various control measures or other management prescriptions could be tested experimentally as well. For example, a reservation system or other limitations on use could be introduced to different areas. These would be tested with reference to the quality of the ORV experience as measured by the lack of crowdedness (see page 51).

Finally, cross-sectional studies provide valuable, current data, but these studies typically are infrequent or one-shot occurrences. Changing recreation patterns, trends in the distribution, frequency or duration of use, and the associated effects on the resource base usually require longitudinal studies for timely identification and assessment. Longitudinal studies (or at least systematic repetition of cross-sectional ones) may be complex and expensive, but research should be aimed at the development of relatively simple and inexpensive monitoring systems as well. To this end remote sensing should be

examined for potential use as a low-cost means of monitoring recreation use

and resource impact over large areas such as that of the Denali Highway region.

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# VII. APPENDIX

- A. Denali Highway Interview Schedule
- B. Campground Interview Schedule
- C. Off-Road Vehicle Questionnaire

# A. Denali Highway Interview Schedule

Expiration Date: January	1	972	3
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ne		Today's Date
	RECREATION SURVEY (Denali Highway)	Location
1.	Where is your home (residence)? City	State
2.	Where did you enter the Denali Highway? (This	trip)
	🗌 Paxson 🔲 Cantwell	
3.	About how much time did you spend in the Denali	Highway area on this trip?
	Hours Days	
4.	What is the main purpose of your trip?	
	Recreation (go to Question 6) Business Visiting friends or relatives Other (describe)	
5.	Did you do any recreating while you were in the	e Denali Highway area?
	No (Stop interview) Yes	• • • • • • • •
	(If general sightseeing while driving is only r	ecreation, stop interview.)
6.	Why did you (head of household, group leader, e in the Denali Highway area?	etc.) decide to recreate
7.	Which of the following best describes this grou	up?
	Respondent only Couple	
	Family	
	Group of friends Organized group	
8.	Number in group 12 years of age or younger: Bo	ysGirls
9.	(For all over 12 years of age) This question is activities while in the Denali Highway area on like to know whether you participated in an act how much time you spent doing it in this area.	this trip. We would

Time

RECREATION PARTICIPATION (Time/Location - Sex/Age)

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fVľTY	Sex/Age:					<u> </u>		
		1	2	3	4	5		ADDITIONAL PARTICIFATION
Hunting		<u> </u>	1	1	1	1	٦ T	
Big Game							-   -	
Waterfowl		}					1  -	
Other Hunting		Ļ	1	.l	<u> </u>		JL	
Fishing	,	[	1	Ţ	1	1	1 [	
Stream	•				<u></u>		-	
Lake			<u> </u>	<u> </u>	]	<u> </u>		
Boating		<b></b>	· · · · · ·	1	1	1	۲	·
Hotorboat				ļ	.		-	
Sailboat	•				ļ	ļ	· _	
Canoe/Kayak/Raft			<u> </u>					
Off-Road Vehicle Use		·		·····			, p	
Trail Biking								
4-X Driving	•		<u> </u>					
'/ATV Driving								
Camping (include set-up/meal	ls/							
relaxing around camp/slee								
games and other camp acti							-	
Other Activities								
Picnicking								
Hiking								
Horseback Riding								
Mountain/Rock Climbing								
Berry Picking								
Mushroom Hunting								
								······································
Other Cathering								
Rock Hounding								
Nature Photography								
Other								
		L	L		L		·	-

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10. (To adults in group) This last question is about information that would have made your trip along the Denali Highway easier or more enjoyable. Was there any information that you did not have before or during your trip that would have helped to make your trip more enjoyable?

NO

NO

NO

NO NO

NU

YES, What?

YES, What?

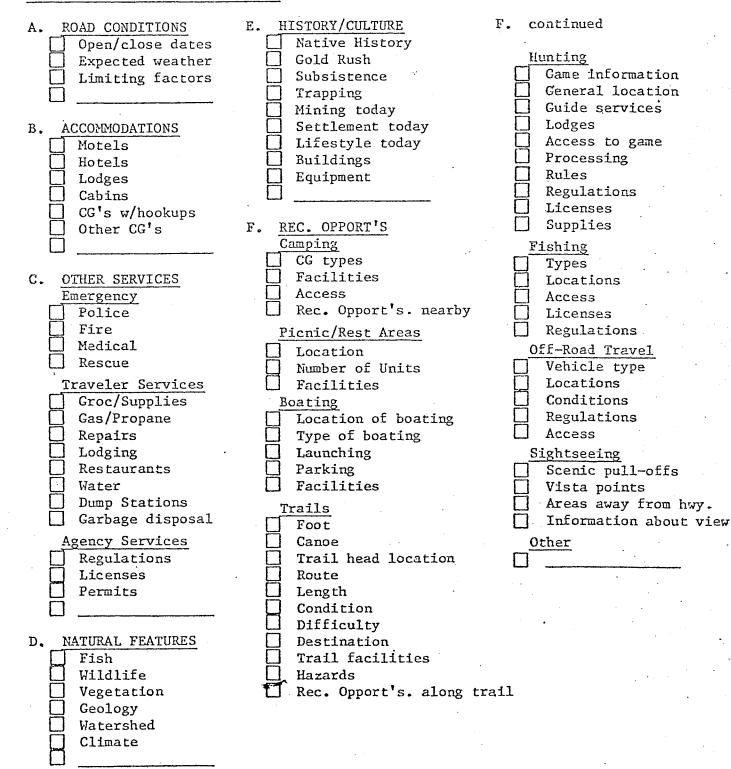
YES, What? YES, What?

YES, Mial?

YES, What?

- A. Information on ROAD CONDITIONS
- B. Information on ACCOMMODATIONS
- C. Information on OTHER SERVICES D. Information on NATURAL FEATURES
- E. Information on HISTORY AND CULTURE
- F. Information on RECREATIONAL OPPORTUNITIES

#### SPECIFIC INFORMATION CHECKLIST



# B. Campground Interview Schedule

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Form Approved O.M.B 42S-75023 Expiration Date: January 1978

# RECREATION SURVEY (Campground)

		Location
١.	Where is your home (residence)? City	State
2.	Where did you enter the Denali Highway? (This	s trip)
- •		
	Paxson Cantwell	· · · · · · · · · · · · · · · · · · ·
3.	About how long have you been in the Denali Hi	ighway area so far?
	Hours Days	
+ -	About how long do you expect to remain in the	e area?
	Hours Days	
5.	Why did you (head of household, group leader, in the Denali Highway area?	, etc.) decide to recreate
5.	How many are there in your group?	
5.		
5.	Males 18 and over Females 18 and over	
5.	Males 18 and over Females 18 and over Males 13-17	
5.	Males 18 and over Females 18 and over Males 13-17 Females 13-17	
5.	Males 18 and over Females 18 and over Males 13-17 Females 13-17 Boys 12 and under	
ō.	Males 18 and over Females 18 and over Males 13-17 Females 13-17	
	Males 18 and over Females 18 and over Males 13-17 Females 13-17 Boys 12 and under	coup?
	Males 18 and over Females 18 and over Males 13-17 Females 13-17 Boys 12 and under Girls 12 and under Which of the following best describes this gr Respondent only	coup?
	Males 18 and over Females 18 and over Males 13-17 Females 13-17 Boys 12 and under Girls 12 and under Which of the following best describes this gr Respondent only Couple	coup?
	Males 18 and over Females 18 and over Males 13-17 Females 13-17 Boys 12 and under Girls 12 and under Which of the following best describes this gr Respondent only Couple Family	coup?
ō. 7.	Males 18 and over Females 18 and over Males 13-17 Females 13-17 Boys 12 and under Girls 12 and under Which of the following best describes this gr Respondent only Couple Family Group of friends	coup?
	Males 18 and over Females 18 and over Males 13-17 Females 13-17 Boys 12 and under Girls 12 and under Which of the following best describes this gr Respondent only Couple Family Group of friends Organized group	
	Males 18 and over Females 18 and over Males 13-17 Females 13-17 Boys 12 and under Girls 12 and under Which of the following best describes this gr Respondent only Couple Family Group of friends Organized group (For all over 12 years of age) This question	n is about your recreation
7.	Males 18 and over Females 18 and over Males 13-17 Females 13-17 Boys 12 and under Girls 12 and under Which of the following best describes this gr Respondent only Couple Family Group of friends Organized group	n is about your recreation on this trip. We would

RECREATION PARTICIPATION (Time/Lucation - Sex/Age)

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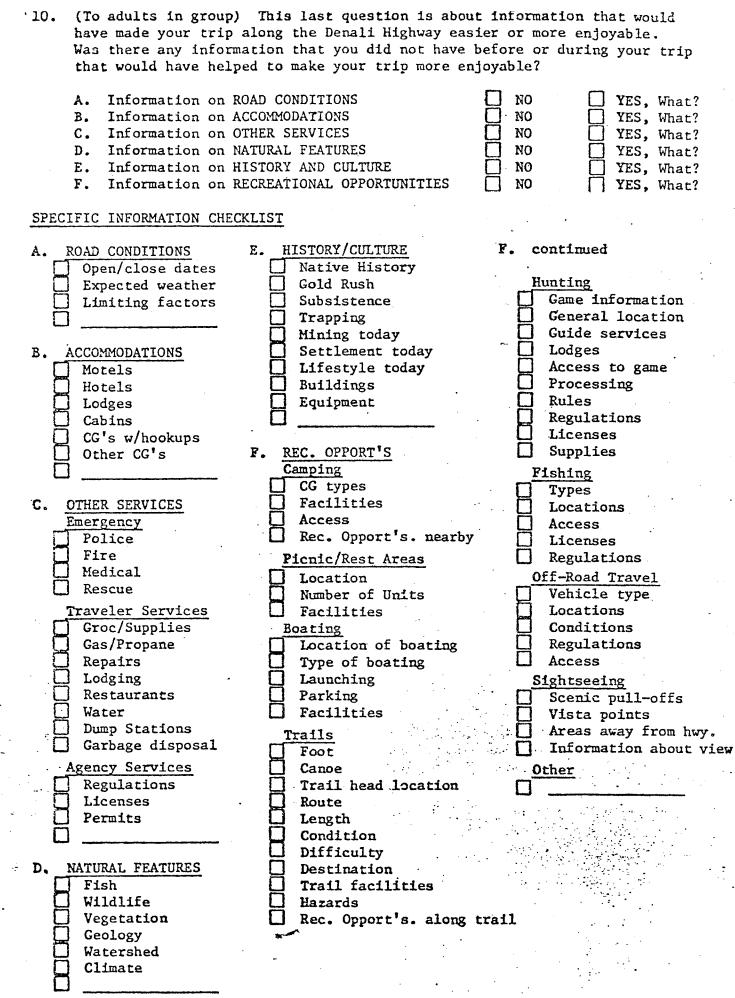
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TIVITY	Sex/Age:			<u> </u>	1	1	j i	•
<u>nting</u>		1	2	3	4	5		ADDITIONAL PARTICIPATION
Siz Game			· · ·			T	1	
isterfowl	•							
Jeber Hunting	· · · · · · · · · · · · · · · · · · ·							
57178		 r	r	·····	••••••	<del>.</del>	1 f	
Stream								
Like								
<u>a:1:12</u>		<b></b>			1	1	ı r	
hotorboat						<u> </u>		
Sailboat .								
Ceope/Kayak/Roft	•					]		
f-Road Vehicle Use		[]	·				, I	
Trail Biking								-
ir ziving		· · · ·						
CRY/ATV Driving							L	· · · · · · · · · · · · · · · · · · ·
=2:-2 (include set-up/se		[]					Γ.	
relaxing around camp/s]		[ <b>]</b>					Ĺ	•
games and other camp ac	tivities)					,		
<u>ter Activities</u>	,			· · · · ·		[]	Г	•
Picnicking	· · ·						-	
Eiking								
Ecrseback Riding	11							
Hountain/Rock Cliabing							ŀ	
Eerry Picking							-	
Eushroom Hunting							F	
Other Cathering							+	
Zock Hounding							· -	
Sature Photography					-		$\vdash$	
Other							·	• •
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# C. Off-Road Vehicle Questionnaire



### Institute of Agricultural Sciences UNIVERSITY OF ALASKA FAIRBANKS, ALASKA 99701

## OFF-ROAD VEHICLE SURVEY

Will you do us a favor?

The Institute of Agricultural Sciences, University of Alaska, in cooperation with the Bureau of Land Management, U.S. Department of Interior, is conducting a survey of off-road vehicle users in the Denali Highway area of Alaska. The results of this survey will be very important in helping to meet the recreation needs of people using this area.

You were initially contacted in a scientifically selected random sample of recreationists in the Denali Highway area. Your answers to this survey are very important to the accuracy of our research.

It will take only a few minutes to answer the questionnaire and place it in the pre-addressed and stamped envelope we have provided for your convenience.

Of course all answers are strictly confidential and will be used only in combination with those of others being surveyed.

Your cooperation in this study is greatly appreciated.

Sincerely,

Leonard K. Johnson Project Leader Off-Road Vehicle Study

P.S. If you are interested in receiving a summary of the findings of this study, just enclose your name and address (or request the results of the Off-Road Vehicle Study in a separate letter). We will be glad to send you a complimentary summary of the results when ready.

### OFF-ROAD VEHICLE SURVEY DENALT HIGHWAY STUDY

Today's Date

#### I. GENERAL INFORMATION ABOUT OFF-ROAD VEHICLE USE.

1. What type of off-road vehicle do you use the most? (Do not include highway use.)

Tracked vehicle (e.g., Trackster)
Large tire vehicle (e.g., Rolligon)
4-Wheel drive vehicle (off-road use)
Motorcycle (off road use)
Other (please specify)

Please answer remainder of questions for the off-road vehicle you checked above.

 About how many days have you used your off-road vehicle so far this year (1975)?

a.	Number	of	Saturdays,	Sundays,	and	holidays	 (1975)	
b.	Number	of	weekdays				(1975)	

3. About how many hours do you use your off-road vehicle on an average day of use?

1 hour or less	5 hours 6 hours
2 hours	🗍 6 hours
3 hours	7 hours
4 hours	🗌 8 hours or more

4. Is this average about the same for both weekdays and weekend/holiday days?

Yes No - The average for weekdays is hours and for weekend/holiday days is hours.

5. Have you used your off-road vehicle in previous years?

Yes No (If No, please go on to Question 7.)

6. About how many days did you use your off-road vehicle:

Last year (1974) \_\_\_\_\_ days 1973 \_\_\_\_\_ days 1972 \_\_\_\_ days 7. Where do you presently operate this off-road vehicle the most?

Your own property	
Other private property	
State lands	
Federal lands	
Other (please specify)	

8. How far do you normally travel from where your off-road vehicle is stored to the area where it is used most often? (Please check one box in each column.)

One Day Outing	Two or More Days	
Less than 5 miles 5-25 miles 26-50 miles 51-100 miles 101-150 miles Over 150 miles	Less than 5 miles 5-25 miles 26-50 miles 51-100 miles 101-150 miles Over 150 miles	

9. What do you use your off-road vehicle for most often?

General sightseeing
Transportation to fishing areas
Transportation to hunting areas
Mineral exploration
Nature study (please specify)
Other (please specify)

10. Please check the combination that best describes the usual load in your off-road vehicle. (Please check one box in each column.)

People	Gear
One adult Two adults One adult, one child Three or more people Other (describe)	0-5 pounds 6-25 pounds 26-50 pounds Over 50 pounds

11. What kind of terrain do you prefer for using your off-road vehicle?

$\Box$	Flat
$\Box$	Flat Rolling, gentle slopes
	Hilly, some steep slopes
$\Box$	Mountainous, steep canyons

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12. What kind of cover do you prefer for using your off-road vehicle?

Bare rock, gravel, or sand
 Tundra
 Willow-brush-shrub
 Aspen-birch forest
 Mature spruce forest (white spruce)
 Scrub spruce (black spruce)
 Other (please specify)

13. What kind of trail do you prefer most for your off-road vehicle use? (Please check one box only.)

Unpaved road, with bridges and guardrails Unpaved road, without bridges and guardrails Smooth, well-maintained trail Rough trail, with little or no maintenance Wet, boggy trail Open country, with many trails or tracks to follow Open country, with no trail or track Other (please describe)

14. What kind of area do you prefer most for your off-road vehicle use? (Please check one box only.)

Areas where no other off-road vehicles are likely to be seen Areas where other off-road vehicles will be seen occasionally Areas where other off-road vehicles will be seen often Areas where other off-road vehicles will be seen nearly all the time

15. If the area you preferred above was not available, would you be willing to use your off-road vehicle in any other areas? (Please check yes or no for each area.)

	AREA	YES, I would use this area	<u>NO</u> , I would not use it
-	Areas where no other off-road vehicles are likely to be seen.		
-	Areas where other off-road vehicles will be seen occasionally.		
	Areas where other off-road vehicles will be seen often.		
d.	Areas where other off-road vehicles will be seen nearly all the time.		

In PART I we asked you some questions about general off-road vehicle use. The next section is concerned with your off-road vehicle use in the Denali Highway area only.

- II. OFF-ROAD VEHICLE USE IN THE DENALI HIGHWAY AREA (i.e., on the lands either side of the Denali Highway between Paxson and Cantwell).
  - What type of off-road vehicle do you use the most in the Denali Highway area? (Do not include highway use.)

Tracked vehicle (e.g., Trackster)
Large tire vehicle (e.g., Rolligon)
4-Wheel drive vehicle (off-road use)
Motorcycle (off-road use)
Other (Please specify)

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2. How often have you used your off-road vehicle in the Denali Highway area so far this year?

<u>So Far in 1975</u>

	Number of trips trips trips days days Number of Saturdays, Sundays, official holidays days
3.	Do you expect to use your off-road vehicle in the Denali Highway area again this year?
	Yes No (If No, please go on to Question 5.)
4.	How often do you expect to use your off-road vehicle in the Denali Highway area during the rest of this year (1975)?
	How many more trips? (Rest of 1975) How many more days? (Rest of 1975)
5.	About how many hours do you use your off-road vehicle on an average day of use in the Denali Highway area?
	1 hour or less5 hours2 hours6 hours3 hours7 hours4 hours8 hours or more
6.	Have you used your off-road vehicle in previous years in the Denali Highway area?
	Yes No (If No, please go on to Question 8.)
7.	About how many days did you use your off-road vehicle in the Denali Highway area? Last year (1974) days 1973 days 1972 days
8.	Is the Denali Highway area the area where you operate your off-road <b>vehicle</b> the most?
	Yes No (If No, where do you operate it the most?
	LocationState
9.	When you use your off-road vehicle in the Denali Highway area, what is its main use?
	General sightseeing Transportation to fishing areas Transportation to hunting areas Mineral exploration Nature study (Blease specify) Other (Please specify)
	4

10. Where do you use your off-road vehicle most often in the Denali Highway area?

Near a compground (usually within a mile of comp)
 Along the highway (usually within a mile of the highway)
 Along the Susitna River
 Along the McClaren River
 Across country, using existing trails or tracks
 Across country, breaking a new trail

11. How does the Denali Highway area compare to other areas where you use your off-road vehicle?

The Denali Highway area is:

Eest	Better than Average	Average	Worse than Average -	Worst

- 12. Please explain why the Denali Highway area was given the particular rating above.
- 13. Please indicate whether you agree or disagree with the following statements about off-road vehicle use in the Denali Highway area.

		AGREE	DISAGREE
а.	The entire region should be open to off- road vehicle use with certain areas designated for off-road vehicles only.		
b.	Off-road vehicle use should be prohibited in the entire Denali Highway area.		
с.	Off-road vehicle use should be kept open on the same basis as it is now.		
d.	to off-road vehicles.		
e.	Off-road vehicles should be restricted to designated trails only.		
f.	Off-road vehicle trails should be marked with signs.		
g.	Over-used trails and areas should be closed to off-road vehicle use until vegetation recovers.		
h.	Off-road vehicle trails should be maintained.		
i.	More parking and off-loading areas should be provided for off-road vehicle users		

## III. UNVESTMENT IN EQUIPMENT AND EXPENDITURES RELATED TO OFF-ROAD VEHICLE USE.

1. What off-road vehicles do you own? (Use back of this page if you need more space.)

Manufacturer	Model	Year
an a	<u>a na anti-anti-anti-anti-anti-anti-anti-anti-</u>	
\		· · · · · · · · · · · · · · · · · · ·

2. Please indicate the total original investment and the year of purchase of the off-road vehicles you now own.

Investment	Year Purchased	Investment	Year Purchased
\$ <u>1</u> - 499		\$ 3,000 - 3,999	
500 <b>-</b> 999		4,000 - 4,999	
1,000 - 1,999	**************************************	5,000 - 9,999	
2,000 - 2,999		10,000 or more	

3. Please give your best estimate of what it will cost to operate your off-road vehicle this year (1975).

	TOTAL ESTIMATED COS	TS FOR 1975 Vehicle to
	Off-Road Vehicle	Transport ORV
Fuel Repairs Maintenance Rentals	\$ \$ \$	\$ \$ \$

4. Please give your best estimate of expenditures for a typical day of off-road vehicle activity in the Denali Highway area. Include only those expenditures above what you would have spent if you stayed at home.

Food and drink	\$
Lodging	\$
ORV rentals	\$
Other (Please explain)	\$
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#### IV. PERSONAL DATA SECTION

1.	Your age	sex_		occupat	tion								-		•	
2.	Are you cur	rently o	on acti	ive duty in	the	mi	lit	ary	?			Ye	s		No	
3.	Circle the	highest	grade	completed:	1	2	3	4	5	6	7	8	9	10	11	12
			-	College:	1	2	3	4	5	6+						

-6-

4. How many people are living in your household? (Include yourself.)

Males	Females
18 and older 13 - 17 12 and under	 18 and older 13 - 17 12 and under

5. What is your annual family income?

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□\$ 5,000 - 9,999 □ 10,000 - 14,999 □ 15,000 - 19,999	]\$30,000 - \$34,999 ] 35,000 - 39,999 ] 40,000 - 44,999 ] 45,000 - 49,999 ] 50,000 - over
25,000 - 29,999	

PLEASE USE THE SPACE BELOW FOR ANY ADDITIONAL COMMENTS ABOUT OFF-ROAD VEHICLE USE, THE DENALI HIGHWAY AREA, OR THIS QUESTIONNAIRE.

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