## APPENDIX B

## AN ECONOMIC ANALYSIS OF MOOSE, CARIBOU, SHEEP, BEAR AND WATERFOWL HUNTING IN THE SUSITNA BASIN

Prepared by Stephen M. Burgess, PhD Habitat Biologist

prepared for

Alaska Department of Fish and Game Habitat Division, Region II 333 Raspberry Road Anchorage, Alaska 99502

August 1983

# TABLE OF CONTENTS

.

.

1000

And a second sec

The sector sector sector

.

	PAGE
LIST OF TABLES	. ii
EXECUTIVE SUMMARY	. 1
INTRODUCTION. Data Base Harvest Ticket Hunter Report System Summary of Total Annual Expenditures	2 2 2 7
HARVEST STATISTICS AND PATTERNS OF USE OF GAME IN THE SUSITNA BASIN. Moose Caribou Sheep Bear Waterfowl	, 4 , 4 , 8 , 12 , 15 , 17
TRAVEL COST ANALYSIS OF MOOSE, CARIBOU AND SHEEP HUNTING IN SELECTED STUDY AREAS Work Sheet Assumptions and Applications License and Tag Fees	. 22 . 22 . 34

i

:

# TABLES

.

# PAGE

.

. .

1.	Economic Values of Recreational Hunting in the Susitna Basin	1
2.	Summary of 1981 Costs of Hunting in the Susitna Basin	2
3.	Susitna Basin 1981 General File Harvest Statistics for Moose	5
4.	1981 Moose Harvest Statistics for Susitna Basin Harvest	
	Report Code Units (HRCU)	6
5.	1979 Moose Hunter Expenditure Survey at the Glenn Highway	
	Creek Station	8
6.	Susitna Basin 1981 General File Harvest Statistics for Caribou	9
7.	1981 Caribou Harvest Statistics for Nelchina Basin	
	Harvest Report Code Units	11
8.	Total Costs for Susitna Basin Caribou Hunters	12
9.	Susitna Basin 1981 General File Harvest Statistics	
	for Dall Sheep	13
10.	Reported Harvest of Dall sheepTalkeetna	14
11.	1981-1982 Bear Harvest Statistics for the Susitna Basin	16
12.	Total Costs for Bear Hunting in the Susitna Basin	16
13.	1974-1976 Waterfowl Hunting in the Susitna Basin.	
	Average Values for Hunter Days and Harvests	17
14.	Annual Trip and Equipment Expenses for Waterfowl Hunter	19
15.	Dollar Value of Waterfowl Meat	20
16.	Travel Cost Analysis Work Sheet	23
17.	Auto, Boat, and Air Travel Costs Constants	26
18.	Area Summary of Travel Cost Analysis	28
19.	Susitna Lowlands: Moose Hunting, Travel Costs	
	Contributed by Anchorage Area Hunters	29
20.	HRCU Summary for 16-01-002 (Petersville)	
	of Moose Hunting Travel Costs	29
21.	Palmer Area Summary of Travel Cost Analysis	
	for Moose and Dall Sheep Hunting	30
22.	Nelchina Area Summary of Travel Cost Analysis	
	for Anchorage area Moose, Caribou, and Sheep Hunters	31
23.	Lake Louise Unit Summary for Moose Hunting	32
24.	Lake Louise Unit Summary for Hunting Caribou	32
25.	Nelchina Area Summary of Travel Costs	
	for All Moose, Caribou, and Sheep Hunters	32
26.	1981 Travel Costs for Moose, Caribou, and	
	Dall Sheep Hunters in the Susitna Basin	33
27.	1981-1982. Costs to the Hunter for Susitna Area	
	Hunter Licenses, Tags, and Duck Stamps: for Moose,	
	Caribou, Dall Sheep, Bear, and Waterfowl	35

ii

#### EXECUTIVE SUMMARY

The human use of wildlife hunting areas in the Susitna basin is analyzed from an economic perspective. Value is demonstrated in terms of expenditures by big game and waterfowl hunters, under the assumption that these expenditures would not occur in the Alaska region were wildlife resources absent.

In addition, an application of the travel cost method of resource valuation is attempted for recreational moose, caribou, and Dall sheep hunting in nine selected areas of the basin. The values derived are underestimates, since important elements of the method, such as quality variables, site fees, opportunity costs, and availability of substitutes have not been included. However, the relative contributions to the general economy of hunting in these areas is indicated. No effort has been made to establish consumer surplus values, since a required assumption (that higher costs of travel result in reduced rates of use) is apparently not valid for Alaska (Burgess, S.M., 1983. A Comparison of the Net Benefits of Livestock Grazing and Moose Hunting in the Headwaters of the Little Susitna River. State of Alaska, Department of Fish and Game, Anchorage).

Values demonstrated are summarized in Table 1, which follows.

TABLE 1.	Annual	Economic	Values	of	Recreational	Hunting	in	the	Susitna
•	Basin					-			

Source of Value	oose, Caribou, Dall Sheep, Bear, Waterfowl TOTAL VALUE (\$)
Licenses & tags <sup>1</sup>	193,000
Leisure time estimate <sup>2</sup>	580,000
Estimated total expenditures <sup>3</sup>	5,000,000

<sup>1</sup>See Table 26

 $^{2}$ 43,440 hunter days X 8 hr/day X  $\frac{28,406/\text{yr}}{2,080 \text{ hr/yr}}$  X 1/3 = \$579, 760

<sup>3</sup>See Table 2

#### INTRODUCTION

The purpose of an economic analysis of recreational hunting in the Susitna basin is to establish dollar values to the economy for these activities. If reliable, these values may 1) demonstrate that hunting does in fact bring dollars to the economy of the state and therefore represents economic value to its citizens; 2) allow comparisons with the extent and magnitude of economic values of other land extensive, resource-based industries and the possible losses resulting from competing activities; and 3) define the sources of value so that they might be protected and increased through appropriate land management practices.

Southcentral Alaska supports a human population with densities comparable to many other urban/suburban areas of the country. Additionally, only a small portion of the land area of the Susitna basin is served by roads. The existing pressures upon accessible fish and wildlife resources are therefore extremely high in selected areas. As shown below, the economic values of these resources are likewise very high. It is the combination of relatively abundant fish and game resources in close proximity to population centers that gives rise to the high economic values found in the Susitna basin.

Several different methods are used in this report to establish economic value; in every case they are chosen to best match the data available to the department. In general, an effort is made to follow the guidelines provided by the Water Resources Council (CFR, Chapter VI, Subpart k. NED Benefit Evaluation Procedures: Recreation. November 4, 1980). Total expenditures basin-wide are estimated initially, based upon check station surveys of hunters (contingent valuation). In cases such as bear and waterfowl, where available data are minimal, estimates by staff experts are used (unit day value approach). Basin-wide values for total expenditures by hunters are included in the discussion of harvest data presented elsewhere. A travel cost analysis is attempted for those cases where travel data are available. Using these several different approaches, an estimate of the general level of the value of hunting to the economy of the state in the land areas considered should be possible.

#### Data Base

This report is dependent upon a broad array of data collection programs carried out by the department. The data base used for each species analyzed is described in the appropriate sections. The harvest ticket hunter report system provides data on the use of three major game species: moose, caribou, and Dall sheep. This report makes extensive use of this data base, which is therefore described below.

<u>Harvest ticket hunter report system</u>. Harvest tickets are issued to all hunters who participate in moose, sheep, and caribou hunts throughout the state. Forms are provided by the Department of Fish and Game and by vendors of hunting licenses (see Figure 1). Participants are requested to return completed tickets to the department regardless of the success or failure of the hunt. The only exception to this requirement occurs in the case of permit hunts, which are discussed below. The harvest ticket system constitutes one of the major data gathering systems used by the department for game management. Some 69,339 harvest ticket forms were issued for the

-2-



1981-1982 season: 44,337 for moose hunts, 18,252 for caribou hunts, and 6,750 for sheep hunts. Three sets of information are requested on three separate parts of the ticket: the "overlay," the "hunter report," and the "harvest ticket." The overlay requests information about the hunter: name, residence, and, by reference, the information on the hunting license. This information is essential for the present review and is very likely the most specific and reliable information collected. This portion of the ticket is issued by and returned to the department. The "hunter report" requests information on the hunt itself (number of days, locality of hunt, and transportation used) and, in cases of successful hunters, the characteristics of the animal killed (date, sex, size, and method of kill). Lastly, the "harvest ticket" portion indicates the date of the kill and accompanies the animal until it is processed and stored.

This data is automated by the Game Division Statistics Section. The first step is entry of the data by harvest ticket number into a general or "sequential" file. The Habitat Division, Data Management Unit, through the cooperation of the Game Division, has developed summaries of hunter report data for the 1981 moose, caribou, and sheep hunts (see Data Supplement for general file harvest statistics for the planning area).

Permit hunts are designed for situations in which close control of the number of animals taken is necessary to meet the special needs of a given subpopulation and for hunter safety. Data on these hunts is normally tabulated by area biologists and maintained in respective regional offices.

There is at present no regular data collection program within the department regarding the economic aspects of wildlife uses.

Summary of Total Annual Expenditures

Cost information outlined below is summarized in Table 2. The summary of total annual expenditures by Susitna basin hunters for selected species approaches \$5,000,000. An estimate of expenditures for numerous small game species was not attempted.

Species	Hunters	Total Cost Estimate
Moose Caribou Dall Sheep Bear Waterfowl <sup>1</sup>	4,594 747 328 1,714 1,951	1,089,000 650,000 890,000 1,610,000 664,000
TOTAL	9,334	4,903,000

TABLE 2. Summary of 1981 Costs of Hunting in the Susitna Basin

<sup>1</sup>Includes Willow subbasin area

-3-

#### HARVEST STATISTICS AND PATTERNS OF USE OF GAME IN THE SUSITNA BASIN

As outlined above, harvest statistics collected directly from hunters by the Alaska Department of Fish and Game provide data for estimating use of moose, caribou, and Dall sheep in the Susitna Basin. In the sections that follow, these statistics are summarized by species and linked with general descriptions of the patterns of hunting in the area, with "typical" hunts, and with other descriptive material designed to promote an understanding of the harvest statistics data base. Finally, an estimate of total expenditures by hunters for the entire planning area is made, based upon these harvest statistics and the expenditure data available. In all instances permit hunts are excluded from this discussion.

Moose Hunting Data Base

Moose hunting was described in Chapter I from a general perspective for the entire Susitna-Beluga basin. Information on the numbers and distribution of moose hunters is presented, as well as additional information on residency and travel modes. Similar information in a slightly different format is summarized for 1981 in Table 3. In Table 4 the same data is presented for selected Susitna basin harvest report code units where most moose hunting occurs.

<u>Use patterns/typical hunts</u>. There are several approaches to conducting a moose hunt in the planning area.

- a. Road hunts. For areas accessible by road where moose are known to be present, weekend  $(2\frac{1}{2} day)$  road hunts are common. A hunter will use a camper-equipped pick-up or light camping gear and, with binoculars, drive from lookout to lookout searching for moose. In a likely area, a hunter will park and leave the road area for perhaps a half-mile, but rarely further. Fully 80% of the hunting in the Petersville Road area is of this type. An important variation on the road hunt is the use of ORVs to extend the range of search possible during a half-day or one-day foray from the highway. Table 4 indicates the large number of hunters who consider ORVs primary transportation.
- b. Fly-in hunts. Because of the limited road system, fly-in hunts are very common in the area. Since weight and space are important considerations in small aircraft, fly-in hunters often go light and store or locally secure ORV, boat, and camping equipment. In portions of the Beluga area (Unit 16-02-013) this system is used through the cooperation of local residents.
- c. Boat hunts. Because of the demanding conditions met on the Susitna and tributary rivers, larger boats with a minimum of 50 hp (jet equipped) are most commonly used. Boat transportation is efficient since heavier weights can be accommodated. Most often a hunter will put in at a landing along the Parks Highway, then travel to a preferred hunting area, make camp, and then pursue the hunt, using the boat and the camp as a base.

÷.,

	Game Manage	ment Unit (GMl	ן)		
	13 Talkeetna Mts. Chulitna/ Watana Hills	14 Talkeetna Mts. to Chugach Mts.	16 Alaska Range	Deletion	ns <sup>1</sup> Total <sup>2</sup>
Hunters Total Successful Unsuccessful Hunter Days by Residency	999 258 741	1,834 272 1,562	2,195 567 1,628	434 53 381	4,594 1,044 3,550
Anchorage area Mat-Su Borough Kenai-Homer Fairbanks-Delta Cordova-Tok Southeast Out-of-state Foreign Other state	3,380 1,055 177 492 448 53 264 30 21	5,057 4,192 106 42 27 13 175 7 119	8,467 2,117 452 289 32 26 643 88 184	ND	16,904 7,364 735 823 507 92 1,082 125 324
TOTAL	5,920	9,738	12,298	2,598 <sup>3</sup>	25,358
Hunter Days by Primary Mode of Transportation Air Boat Off-road vehicle Highway vehicle Unknown Horse	948 1,009 1,487 1,201 1,185 90	447 495 1,523 4,166 2,913 194	3,974 2,139 1,273 2,634 2,251 27	ND	5,369 3,643 4,283 8,001 6,349 311
TOTAL	5,920	9,738	12,298		27,956

TABLE 3. Susitna-Basin 1981 General File Harvest Statistics for Moose

Alaska Department of Fish and Game, Habitat Division, Data Management Unit. Greg Fischer, 1983. Special computer run Source:

completed 7/18/83. <sup>1</sup>2Required for reporting units partially outside the planning area <sup>3</sup>Does not include hunters or days of unknown residency or unknown success Assume 10%

-5-

efferances/efferite/setails And a second sec 

IABLE 4.	981 Moose Harves	c Stat	istics	for Se	lected Sus	itna Bé	isin Harv	est Repor	t Code	Units (H	IRCU)						
HRCU	Name acreage	H H	unters <sup>1</sup> S	D	Days Huntin TL	<sup>1</sup> د	D	Orig Anch Area	in Of H Mat-Su Boro	unters <sup>2</sup> other Alaska	out-of- state	Prin air b	nary Mo off oat ve	bde of T F-road H Shicle v	ransport nighway ehicle u	ation Inknown	horse
16-01-002	Petersville Rd 400,000 acres	604	106	498	3,342	595	2,747	472	82	38	7	13	13	136	326	116	0
16-01-003	Susitna River/ Lower Yentna 270,000 acres	121	27	46	635	137	498	91	24	-	4	18	28	80	29	38	0
14-01-011 -013 -017 subtotal	Moose Creek Reserve 61,400 acres	79 52 190 321	13 12 36 61	66 40 154 260	429 244 871 1 <mark>,544</mark>	40 37 130 207	389 207 741 <b>1,337</b>	50 50 118 204	28 13 65 106	wh	0 - 7 m	00	, 1-00	18 10 42	44 32 97	16 10 74	600-
16-02-013	Beluga 630,000 acres	158	62	96	945	420	525	129	6	10	6	112	10	8	11	17	0
16-02-004	Mt. Yenlo/ míd-Yentna 630,000 acres	168	63	105	950	322	628	131	14	-	18	89	57	0	0	22	0
16-02-012	Alexander Creek Mt. Susitna 426,000 acres	200	54	146	1,037	225	812	163	1	10	11	108	53		-	37	0
14-01-016 14-01-024 subtotal	Jim's Slough Hunter Creek	69 62 131	17 14 31	52 48 100	283 353 636	70 65 135	213 288 501	37 20 57	31 39 70	0- -	٥٥٥	54 T	1 16 17	14 8 22	121 22 <u>143</u>	48 12 60	non
13-10L 13-12L 13-13L 13-14L 13-14L subtotal	Nelchina Basin 1,900,000 acres	292 211 74 68 645	38 52 10 34 134	254 159 64 34 511	1,718 1,211 356 377 3,662	212 263 47 168 690	1,507 948 309 210 2,974	190 129 24 <u>42</u> <u>385</u>	33 50 119 116	44 33 1 82 82	11 11 35 35	52 1 36 36 31 31 722 7	08 0 29 33	11 78 19 25 133	47 36 22 1 106	73 41 25 745	97970
14-01-001 14-01-003	W. Chickaloon R. Castle Mt. 85,000 acres	31	3 W	23 8	130 54	25 3	105 51	15 	13	- 0	00	- 0	0-	00	6	6 <del>-</del>	90
subtotal		42	=	31	184	28	156	24	15	-	0	2	-	0	16	10	9
TOTAL		,390	549 1	,841	12,935	2,759	10,178	1,656	447	149	84	475 3	60	350	829	519	26
<sup>1</sup> TL=Total, <sup>2</sup> Anch Area Mat-Su Other Alas	S=Successful, U=L = Anchorage, C = Palmer, Sutt ka = Fairbanks, k	Jnsucce Chugia Con, We Cenai,	essful. <, Eagl ssilla, etc.	Figu e Rive Big L	res do not r, Elmendou ake, Talkeé	includ rf Air ∍tna, T	e hunter: Force Ba: rapper Ci	s or days se, Ft. R reek, Wil	of unk ichards low, Al	nown res on, Eklu exander	idency or itna. Creek, Be	unkno 1 uga.	wn suc	. seese			

-6-

;

It is possible to define in more detail a few of the characteristics of moose hunting in the Susitna basin by a further look at Tables 3 and 4. An annual harvest of approximately 1,000 moose from the planning area, together with over 25,000 hunter days required to realize this harvest, is an activity of significant proportions. For example, taking the usual measure of the value of leisure time at 1/3 wage rate, \$0.9 million in opportunity cost is represented by this activity:

(25,358 days X 8 hr/day X <u>\$28,406</u> median AK income X 1/3 = \$923,000) 2,080 hr/yr

With 1,044 hunters of 4,594 reporting successful hunts we see success rate of 23% for the basin, or one in every five hunters, and about 24 hunter days required to take one moose. Rates of success vary from 14% in Unit 13-13L and 16% at Moose Creek, to 39% rates of success at Beluga and 50% in Unit 13-14L. Hunters from Anchorage dominate the field, although in terms of per capita participation rates, Matanuska Valley hunters dominate (19 per 1,000 to 68 per 1,000, using 1980 population figure of 174,431 and 17,816, respectively).

A fair balance exists (except for the occasional use of horses) among all modes of transportation reported as "primary" by basin hunters, indicating the complexity of travel requirements. This is particularly true in Unit 13. In Unit 14 the predominance of highway travel is obvious, as is the predominance of air travel in Unit 16. The large number of hunters not reporting a mode of transportation ("unknown") results from the difficulties in answering the question on the hunter report form ("What was your primary mode of transportation?") when multiple modes are almost always used.

Of the planning area, nine geographic units, comprising some 4,600,000 acres of the Susitna basin, have been selected for economic analysis (Table 4). These areas, or Harvest Report Coding Units (HRCU), are shown on Atlas maps A3a, A3b, A3c, and are selected on the basis of their importance to users and to the maintenance of fish and wildlife resources. These units are part of three major land areas: the Susitna lowlands (GMU 16), the rivers and foothills of the Knik Arm area (GMU 14A), and the southwestern portion of the Nelchina basin (GMU 13). The popularity of the Petersville Road, Moose Creek and the 10L and 12L Nelchina units is obvious.

Moose hunters spend 5.4 days hunting on the average, with a range of 4.2 for the West Chickaloon to 5.9 at Beluga. Successful hunters spend a little less time on their hunts (5.2 days) than unsuccessful hunters (5.4 days). Mode of transportation is important to an economic analysis. Obviously, those units accessible by road (Units 1, 3, 7, 8, 9) provide hunting opportunities to a larger group of people at lower cost than remote, fly-in areas (Units 2, 4, 5, 6). Problems in the use of this data are caused by the large "unknown" category.

<u>Total expenditures</u>. Data in Table 3 allows an estimate of expenditures for moose hunting in the planning area if linked with a survey of costs faced by hunters passing the Glenn Highway check station carried out by the department in 1979.

-7-

During nineteen days of operation of the check station a total of 1,195 hunters were contacted. Expenses averaged \$237 each per hunt. Most hunters hunt in parties of two to five people. The non-resident hunters hunting alone or with another non-resident faced the highest costs: 34 interviewed from seventeen states showed average costs of \$3,500 each per hunt (range \$150-\$10,000). The non-resident hunter apparently spends much less when hunting with a resident friend or relative. Nineteen mixed resident/non-resident parties were interviewed with average hunter expenses of \$470 each per hunt (range: \$50-\$8,000). A large group of resident hunters interviewed (1,079) showed average expenses of \$120.00 each per hunt. This data is summarized in Table 5.

TABLE 5. 1979 Moose Hunter Expenditure Survey at the Glenn Highway Check Station

Hunters	Parties	Residency	Average Cost(\$)	Expenses/Hunter Range (\$)
34	24	non-resident	3,400	150 - 10,000
82	19	mixed parties	470	50 - 8,000
1,079	NA	resident	120	N/A
TOTAL 1,195	NA .	All Groups	237	50 - 10,000

Source: Cunning, Tina and Sterling Eide 1979. Moose Hunter Expenditures, Glenn Highway Check Station. Unpublished data. Alaska Department of Fish and Game, Glennallen, Alaska.

This work was carried out for internal purposes and was not subject to formal validation procedures. The results, however, provide an indication of the range of expenses faced by the moose hunter in the Susitna basin and the important influence of residency on these expenses.

If the \$237 average figure for resident and non-resident hunters is accepted, total annual expenditures for Susitna basin moose hunters exceed \$1 million dollars (4,594 hunters X \$237/hunt = \$1,089,000). This assumes that each hunter engages in one hunt only, which results in a very conservative estimate.

Caribou Hunting Data Base

Most caribou hunting in Southcentral Alaska occurs in the Nelchina basin (GMU 13). As shown in Table 6, effort is light in GMU 14 and dominated by

	Game Mar	agement Unit		
	13 Talkeetna Mts. Chulitna/ Watana Hills	14 Talkeetna Mts. to Chugach Mts.	16 Alaska Range	Deletions <sup>1</sup> Total
Hunters Total Successful Unsuccessful	751 577 174	4 1 3	43 16 27	51 747 41 553 10 194
TOTAL Hunter Days	2,534	27	277	349 2,489
Hunter Days by Residency			-	
Anch area Mat-Su Boro Kenai-Homer Cordova-Tok Frbks-Delta Southeast Out-of-State Foreign Other state	1,228 611 46 132 389 18 102 0 8	0 1 0 20 0 0 0 6	51 3 10 2 0 113 24 74	1,279 615 56 132 411 18 215 24 88
TOTAL	2,534	27	277	2,838
Hunter Days by Primary Mode of Transportation				
Air Boat Off-road vehicle Highway vehicle Unknown Horse	658 406 855 479 67 69	27 0 0 0 0 0	129 0 25 62 10 51	814 406 880 541 77 120
TOTAL	2,534	27	277	2,838

TABLE 6. Susitna-Basin 1981 General File Harvest Statistics for Caribou

Source: Alaska Department of Fish and Game, Habitat Division, Data Management Unit. Greg Fischer, 1983. Special computer run completed July 13, 1983. <sup>1</sup>Required for those reporting units partially outside the planning boundary

2

guided hunts in GMU 16. The discussion of caribou hunting presented in our chapter on demand may be summarized as follows.

The Nelchina caribou herd is located near the population centers of the state and is therefore an extremely valuable resource. Three Harvest Report Code Units in the Nelchina basin are particularly popular (13-10, 13-12, 13-14), accounting for over 50% of reporting hunters, who spend an average of 3.6 days per hunt and use aircraft as the primary mode of transportation most of the time (31%).

Other areas in the Susitna basin where caribou are occasionally taken include Yellow Jacket Creek (14-01F), the headwaters of the Talkeetna River, and the Rainy Pass area (16-04B) (see Atlas Map). Outside the Nelchina area the huntable population of caribou is very low. In Table 6, residency and travel mode information is presented for units selected for the economic analysis carried out below.

<u>Use patterns/typical hunts</u>. Caribou are hunted in Unit 13 in the fall (August 20-September 20) by the recreational hunter. The subsistence hunter hunts both in the fall and during a winter season January 1-March 31. As shown in Table 6 the caribou hunters in Unit 13 mostly reside in the Anchorage and Palmer areas. There is a strong contingent, however, from both the Fairbanks and Cordova-Tok areas (110 and 37, respectively). A large number consider the airplane their primary mode of transportation. Unit 13-10L leads all others in intensity of use (725 hunter days for 201 hunters for 141 caribou; see Table 7).

In 1982 the "typical" caribou hunter came to the Nelchina basin from Anchorage and spent  $3\frac{1}{2}$  days hunting caribou in hunting areas along the Denali Highway or in the Talkeetna Mountains. These areas are most often accessed by aircraft from Anchorage to any of a number of large lakes. No lodging or support facilities are sought to speak of, since most hunters enjoy wilderness camping. Moose hunting is available as a substitute for caribou hunting in cases of failure or cancellation of the fall hunt. The characteristics of a high quality hunt sought by the hunter are: 1) to encounter large groups of caribou and 2) to enjoy a wilderness experience without seeing a lot of other hunters.

Of course, there is more than one "typical" hunter for caribou in the Nelchina. The local Mat-Su Borough resident very often uses an off-road vehicle along the Glenn Highway, as does the Fairbanks resident. The rural resident in Unit 13 will use only a highway vehicle, without the use of aircraft or an ORV. Local residents are very often familiar with herd movements and do not require ORV support.

for Nel	china Basin H	larvest Report Code l	Jnits⊥	
	13-10L Lake Louise	13-12L Little Nelchina R.	13-14L Oshetna R.	13-13L Anthracite Ridge
Hunters Total Successful Unsuccessful	201 141 60	188 135 53	82 72 10	21 13 8
Hunter Days by Re	sidency Group			
Anch area Mat-Su Boro Frbks-Delta Cordova-Tok Kenai-Homer Southeast Other state Out-of-state Foreign	380 165 5 28 117 10 0 20 0	285 115 11 43 65 9 0 26 0	128 58 5 10 39 0 0 19 0	59 25 0 9 0 0 0 0
TOTAL	725	554	259	93
Hunter Days by Pr	imary Mode of	Transportation		
Air Boat Off-road vehicle Highway vehicle Horse Unknown	118 349 45 197 2 14	95 5 320 108 18 8	169 5 66 17 0 0	1 9 79 0 5 12
Does not include	hunters or d	lays of unknown resid	dency or unkr	nown success

TABLE 7. 1981 Caribou Harvest Statistics for Nelchina Basin Harvest Report Code Units<sup>1</sup>

<u>Total expenditures</u>. If costs of travel, food, lodging, hunting equipment, ammunition, and camping equipment are summarized for caribou hunters, expenditures range from \$300 to \$1,050 per hunter per hunt for the rural resident and Anchorage resident, respectively (Bob Tobey pers. comm. ADF&G Glennallen, Alaska). Data in Table 8 show 747 hunters, with 45% from the Anchorage area, 21% from the Matanuska Valley area, 15% from the Fairbanks area, and the remaining 20% divided between other state origins and non-resident hunters. Using a conservative approach values to non-residents total expenditures of \$650,000 area estimated for the Susitna basin. Once again, travel mode shows the greatest influence on cost of any single factor. More caribou hunters fly than moose hunters, resulting in a higher per hunt range of costs.

Hunter Origin	Hunters	Cost/Hunt	TOTAL Dollars	
Anchorage Other state Non-resident	335 74 74	1,050 1,050 1,055	351,750 77,700 77,700	
Mat Valley	153	300	45,900	
Fairbanks	111	878	97,125	
TOTAL	747	NA	650,175	

TABLE 8. Total Costs for Susitna Basin Caribou Hunters

#### Sheep Hunting

Data base. As with moose and caribou, harvest data on Dall sheep are collected from all areas in the state by use of the Harvest Ticket Hunter Report System. The basic 1981 harvest statistics for Dall sheep have already been outlined in our chapter on demand. Table 9 summarized these data in a slightly different format. We see that 328 reporting hunters spent 1,532 days afield (4.6 days/hunter) to take 134 rams from the Susitna basin. In addition, this table indicates a willingness on the part of resident hunters to travel from outlying areas (Fairbanks, Delta, Homer, etc.) to hunt in the basin, as well as revealing the presence of a significant number of non-resident hunters.

Ten years of data on the number of hunters, harvest and percent success is available for the Talkeetna mountains in Table 10. This data indicates a diminution in hunting in the face of increasing rates of success, which is somewhat unexpected. Also, Department staff speculated that with changes in federal land status occurring since 1978, hunting pressure would markedly increase in areas remaining open to sheep hunting. This increase in pressure has not occurred. Sheep hunting is very demanding with longer trips common and a high level of effort usually required. It appears that with the loss of an area, considerable time is needed for a hunter to establish new hunting areas with comparable chances for success.

Use patterns/typical hunts. The Dall sheep is one of the most prized of all big game trophies. Hunting usually takes place between mid-August and mid-September. Except in controlled hunts where ewes may be taken, only rams with horns with 7/8 curl or larger are legal game. Hunting in rugged mountain country, considerable skill is required to approach these animals. In addition to the usual camping and support equipment, good binoculars or

	Game 13	e Management 14	t Units <sup>2</sup> 16	Deletions	<sup>3</sup> Total
				Berebrons	
Hunters					
Total	204	146	20	42	328
SUCCESSTUI	81	53	12	12	134
Pes (Non-res	170/25	93 110/27	8 7/12	30	194
Nes/ Non-res	1/9/20	119/2/	//15	39/3	200/02
TOTAL Hunter Days	931	618	123	140	1,532
Hunter Days			,		
by Residency	507	005	10	110	600
Anch area Mat Su Bama	507	285	18	112	698
Kanaj-Homon	235 Q	147 11	0	20	302
Frbks_Delta	45	11	. 0	5	20 40
Other state	32	20	20	0	72
Out-of-state	103	152	55	1	309
Foreign	1	3	21	0	25
TOTAL	931	618	123	. 140	1,532
Hunter Days by Primary Mode					
of Transportation					
Air	364	185	99	46	602
Boat	23	66 40	0	15	/4
Utt-road venicle	107	49	0	10	140 //12
linknown	207	59	10	17	122
Horse	100	62	14	1	175
TOTAL	931	618	123	140	1,532

TABLE 9. Susitna Basin 1981 General File Harvest Statistics for Dall Sheep<sup>1</sup>

Source: Alaska Department of Fish & Game, Habitat Division, Data Management Unit. Greg Fischer, 1983. Special computer run completed 7/13/83.

<sup>1</sup>Does not include hunters with unknown residency or unknown success. Game Management Unit 13 = Talkeetna Mts. Chulitna and Watana Hills Game Management Unit 14 = Talkeetna Mts. to Chugach Mts. Game Management Unit 16 = Alaska Range Only 50% of units 13-26D and 14-25D, 10% of Unit 14-21D and 33% of unit 14-22D are within the planning area.

• 2

	All Hun	ters <sup>1</sup>		
Year	No. rams harvested	No. hunters	% success	
1971	85	240	35	
1972	81	304	27	
1973	61	277	22	
1974	114	312	37	
1975	109	281	39	
1976	77	300	26	
1977 <sup>2</sup>	55	203	27	•
1978	77	304	25	
1979 <sup>3</sup>	65	269	24	
1980 <sup>3</sup>	80	244	33	
1981 <sup>3</sup>	96	236	41	

TABLE 10. Reported Harvest of Dall Sheep Rams, Numbers of Hunters, and Percent Success of Hunters for Talkeetna Mountain Range, 1971-1981, as Derived from Harvest Reports

<sup>1</sup>Data includes hunters of unknown residency. 3No reminder letters were sent to sheep hunters. Legal horn size increased from 3/4 to 7/8 curl.

spotting scopes, and rifles equipped with telescopic sights are necessary. The successful hunter receives an additional bonus, since sheep meat properly prepared is a gourmet item.

As shown in Atlas Map C2c HRCU are established for Dall sheep hunting in the higher elevations of the western and eastern portion of the Basin. The units showing activity to the west are 16-02, 16-03B, 16-04B (the Emerald Creek, Crystal Creek, Skwentna River and Happy River areas). Access to these areas is by aircraft while guiding operations out of Rainy Pass Lodge use horses for packing in. In GMU 14 (14-01 through 14-09), 53 animals were harvested in 1981 from a highly dispersed population which ranges over the higher elevations of the western portion of the basin. Nearly all access in this unit is by air. Occasionally a guide will use pack horses.

Total expenditures. The Department of Fish and Game is currently engaged in a cooperative research study in an effort to establish the economic

characteristics of Dall sheep hunting statewide. Until such time as that study is completed only general estimates of hunter costs will be used here.

As a general rule, resident hunters spend about \$1,000.00 on a sheep hunt, whereas non-resident hunters spend about \$10,000.00. Statewide annual expenditures range from \$7-10 million dollars.

Applied to 1981 data (Table 9), Susitna-basin hunts represent over 886,000 in total expenditures by the hunter (266 resident hunters X 1,000) + (62 non-resident hunters X 10,000).

Bear Hunting

Data base. Table 11 summarizes the available harvest data for brown and black bear hunting in the Susitna basin. The Harvest Ticket Hunter Report System is not used for bear but rather a tag and sealing form system, as described in Chapter I. The lack of information on resident effort for black bear requires application of non-resident success rates to the resident harvest attributable to the basin, in order to estimate resident effort. We estimate that 1,714 hunters took 248 black and brown bear in the planning region and further estimate 9,400 hunter days for the 1981-1982 season.

<u>Use patterns/typical hunts</u>. It is hard to define a black bear hunter because very often black bear are taken incidentally to moose hunting or salmon fishing (42% reported harvest as incidental in the Nelchina, 1981). Those who hunt specifically for brown bear show a notably wide range of success rates, with harvests in the Nelchina basin dominating. Non-resident success rates are high, since a guide is required for these hunts. Resident success rates are low, since many hunters pick up brown bear tags for use in the event they encounter bear on their moose hunt.

<u>Total expenditures</u>. At present no data collection program relating to the economic aspects of bear hunting exists within the department. The individual interests of area and research staff occasionally lead to observations of potential interest (see e.g. Sellers, R.A. 1982 "Million Dollar Bears" Fish Tales and Game Trails, Summer 1982. ADF&G, Juneau, Alaska). Sellers estimates expenditures associated with brown bear hunting on the Alaska Peninsula at \$1.5 million in 1981.

<sup>1</sup>Costs established with the assistance of Wayne Heimer, Game Division, Fairbanks office, May 1983. TABLE 11. 1982 Bear Harvest Statistics for the Susitna Basin Bear Hunting<sup>1</sup>

	Blac	k Bear	Brown B	lear	A11 E	Bear
AREA Resi	dent	Non-resident	Resident	Non-resident	Resident	Non-resident
STATEWIDE						
Tags issued	NA	1,247	5,049	813	5,049+	2,060
Harvest	NA	235	376	435	-	670
Success rates	NA	19%	7.4%	54%		
SAP AREA						
Tags issued	NA	122	824	52	1,540	174
Harvest	136	23	61	28	197	51
Success rates	19%	<u> </u>	7.4%	54%		

 ${}^{1}$ File Data 1983. Alaska Department of Fish and Game, Anchorage, Alaska. Statewide non-resident rate.

All non-resident brown bear hunters in the planning region must use a professional guide. The willingness to pay in the range of \$5,000.00 for a guided brown bear hunt in Southcentral Alaska (a minimum figure, according to area staff) establishes a substantial base for the valuation of this resource. For Unit 13, where most of the brown bear are taken, 47% of the harvest has been by non-residents since 1961. For the entire basin, 52 guided hunts in 1982 establishes an estimate of gross income to guides and related services of \$260,000 ( $52 \times \$5,000$ ). A high percentage of non-resident black bear hunts (46 of 122) are also guided and are often combined with other target species for a package deal. Allowing \$2,000 for the black bear component of a multispecies guided hunt (these are never under \$5,000 total), a total annual value of \$92,000 ( $46 \times \$2,000$ ) is realized.

The contribution to the economy of the non-guided, non-resident black bear hunter will not be much less. Half of the guided costs is used here, for a total of \$76,000 (76 hunts x \$1,000). Non-resident expenditures are nominal, and a total expenditure for bear hunting is therefore estimated at \$1.6 million. Resident hunters of brown bear spend on an average of \$1,000 a hunt, while resident black bear hunters spend an average of \$500 per hunt. These costs are summarized in Table 12.

TABLE 12. Total Costs for Bear Hunting in the Susitna Basin

52 guided 46 guided 76 non-guided	non-resident non-resident non-resident	Br. Bear Bl. Bear Bl. Bear	@ \$5,000 @ \$2,000 @ \$1,000	260,000 92,000 76,000	
Ĵ	824 Resident 716 Resident	Br. Bear Bl. Bear	@\$1,000 @\$500	824,000 358,000	
			TOTAL	\$1,610,000	-

#### Waterfowl Hunting

Data Base. The data base for recreational waterfowl hunting used by ADF&G includes information from USFWS National Hunting Surveys, USFWS annual duck stamp sales, postal questionnaires, parts collection surveys, seasonal bag checks, and ADF&G waterfowl hunter surveys conducted from 1974 through 1976. In addition, a study of the economic values of waterfowl hunting prepared in 1976 for the Federal-State Land Use Planning Commission by game division staff has been very useful to this report.

<u>Use Patterns</u>. While most of the planning unit is not noted for its waterfowl hunting, the Susitna Flats Refuge, which borders on Cook Inlet, is the most heavily hunted waterfowl area in the state (see Figure 2). In the discussion which follows, Susitna Flats is therefore the focus of the analysis. Other areas where waterfowl hunting occurs in the planning unit (and for which data are available) are also included, even though these areas are part of the Willow subbasin (see Table 13). These data were not presented in the <u>Willow Plan</u>. A more compelling reason for including them here is that these areas constitute a continuous biogeographic unit that supports waterfowl.

1974 - 1976 Average				1976 Average	Values		
	Hunter	Days	Du	cks	G	eese	
Area	All Wat	erfowl	Harvest	% Statewide	Harvest	% Statewide	
Susitna flats Ret	fuge	5,700	10,000	11.00%	350	3.40% <sup>.</sup>	
Palmer hay flats	Refuge <sup>1</sup>	4,470	6,300	7.20%	119	0.80%	
Goose Bay Refuge	1	370	380	0.43%	ND	.01%	
TOT	ΓAL	10,540	16,680	18.6%	469	4.2%	

TABLE 13. 1974-1976 Waterfowl Hunting in the Susitna Basin Average Values for Hunter Days and Harvests

Source: Alaska Department of Fish and Game, Game Division. 1976, 1977, 1978. Survey and Inventory Reports, Waterfowl. Alaska Department of Fish and Game, Juneau, Alaska.

<sup>1</sup>These areas are within the Willow subbasin and are included here since these data were not presented in the Willow Plan.

Statewide harvest statistics over this period indicate that the average waterfowl hunter spends 5.4 days hunting ducks and geese, for an average trip length of 2.4 days.

-17-

Waterfowl hunting areas in the Susitna basin are both close to population centers and very popular. Good numbers of waterfowl are present, especially in the Susitna flats area, where typical annual harvests average 8 ducks and 0.4 geese per hunter, taken during an average 5.4 days afield. The Palmer hay flats and Goose Bay areas are accessible by road and trail, whereas access to the Susitna flats is primarily by air. This results in entirely different use patterns for these areas.

Other types of waterfowl harvest in the planning unit are associated with big game hunting and subsistence. Waterfowl hunter survey results indicate that a few ducks and an occasional goose are taken by big game hunters in both the lower Susitna and that portion of the Gulkana basin within the planning area. Since this harvest is random, the actual number of birds harvested is unknown but probably minimal. Local residents throughout the planning unit also harvest an unknown number of waterfowl for personal use.

Use of the Susitna flats. Trips hunters take to the Susitna flats are limited by access and effective season length. Even though the flats are only between 5 and 35 miles from Anchorage, primary access is by aircraft, with boat and road (from Beluga and Tyonek) access being minimal. The response of 13 hunters interviewed on opening day 1982 indicated an average of 2.2 trips to Susitna flats per year, with a range from 1-6 trips. While sample size was small, observations by ADF&G personnel over a period of years support these figures.

With access by air and most hunters overnighting, the typical hunter is facing a significant commitment of time and money to hunt waterfowl on the flats. About 155 cabins in the Susitna flats area are dedicated primarily to use for waterfowl hunting or set net fishing. A bag check survey conducted in 1982 (9/1-3/82) showed 71 hunters between the Beluga and Theodore rivers, with an average bag of 3.6 ducks and 0.43 geese. Twenty-one aircraft were parked on Seeley Lake on opening day.

In addition to hunters with private cabins and private aircraft, other hunters tent in the area, purchase package hunts from charter services and occasionally carry out day hunts from Anchorage, traveling by boat on a high tide to the eastern portion of the flats.

<u>Total expenditures</u>. The average Susitna flats waterfowl hunter spends an estimated \$396.00 per year in pursuit of waterfowl, or approximately \$73.00 per day. These expenses can be broken down into two basic classifications: 1) annual equipment expenses and 2) annual trip expenses. These expenses are listed below, based on 1982 prices (Table 14). Equipment expenses are self-explanatory.

Travel cost, food, and lodging constitute trip expenses. Without direct surveys of hunters these expenses can be estimated only on a nominal basis. Air travel expenses are determined by whether the aircraft is private or chartered. Since hunters chartering into an area typically go less frequently, stay longer, and travel with larger groups than those gaining access by private aircraft, actual travel costs between the two groups are

Item	Annua	al Expense
Equipment Expenses		
Hunting license (\$12.00 prorated at 22% for waterfowl	only)	\$ 2.65
Federal duck stamp		7.50
Shells (\$15/box [mag] X .5 box/day, X 5.4 days)		40.50
Equipment maintenance		25.00
	Subtotal	\$ 75.65
Shotgun (\$250.00 for 20 yrs.)		12.50
Decoys (2 doz. medium G&H @ \$75.00/doz for 10 yrs.)		15.00
Gear (boots, raingear, camping equipment gun cleaning kit, etc.) (\$150.00 for 5 yrs.)		30.00
	Subtotal	\$ 57.50
Total Annual Equipment	t Expense	\$133.15
Trip Costs		
Transportation (\$50.00 x 2.2 trips/yr.)		\$110.00
Food (\$20.00/day x 5.4 days)		108.00
Lodging		45.00
	Total	\$263.00
GR/	AND TOTAL	\$396.15

TABLE 14. Annual Trip and Equipment Expenses per Waterfowl Hunter

Source: Campbell, Bruce 1983, pers. comm. Alaska Department of Fish and Game, Game Division, Anchorage, Alaska; and personal communications with hunters.

:

probably similar. Average transportation costs are therefore estimated at \$50.00/trip for all hunters. Lodging also presents an unusual problem, with the majority of the waterfowl hunters using hunting cabins as mentioned. The estimated expense in constructing a cabin, including transportation, is about \$3,000. Since most cabins have multiple ownership with two to six persons common, the individual's expense for a cabin is perhaps \$750.00. Prorating this over the life of the cabin, which is estimated at 20 years, annual estimated expense, including upkeep, is at \$60.00 per individual per year. This figure is offset by hunters who either purchase lodging as part of their charter or who tent camp. Annual lodging expense per hunter is estimated at \$45.00.

Obviously, the birds bagged by area hunters have value as a highly nutritious centerpiece of a gourmet meal. In the past, estimates of this value have been based upon the current market price of the meats replaced by the waterfowl harvested. Table 15 estimates the meat value of the Susitna flats harvest at about \$49,000 using current market prices in Anchorage for frozen domestic duck. This is a very conservative estimate, which could easily be doubled.

	Total	Ducks	Geese
1982 Waterfowl harvest statewide <sup>1</sup>	88,412	78,209	10,203
Waterfowl harvest attributable <sup>2</sup> to Susitna flats (%) Market price <sup>3</sup> \$1.69/lb.	9,763	9,385 (12%) \$1.69	378 (3.7%)
TOTAL DOLLAR VALUE	49,498	47,582	1,916

TABLE 15. Statewide and Susitna Flats Waterfowl Harvest and Its Economic Value

<sup>1</sup>Campbell, Bruce H. & Daniel E. Timm 1983. Annual Survey and Inventory Report, Part V. Waterfowl. Table 2, p. 1280.

<sup>2</sup>Timm, Daniel E. 1976. Report to the Federal-State Land Use Planning Commission on Waterfowl. Alaska Department of Fish and Game, Anchorage, Alaska.

<sup>3</sup>Carr's Payless. 6/10/83. Anchorage, Alaska (Average dressed weight) is taken at 3lb/bird. Calculation: \$1.69/lb X 3lb/bird X (9,385 + 378) = \$49,498 In summary, waterfowl hunters on Susitna flats, which is the portion of the planning unit where most of the waterfowl hunting occurs, hunt an average of 5.4 days and spend an average of \$73.00 per hunting day, (\$133.15 + \$263.00). 5.4 days

An estimated 5,700 hunting days are spent on Susitna flats, for an annual expenditure of approximately \$416,000.00, virtually all of which is spent locally. The value of waterfowl meat is estimated at about \$49,000.

These figures may be extended to the basin-wide harvests estimated in Table 13. However, since travel to Goose Bay and Palmer Hay Flats is by road, travel costs must be reduced by 50%. The following basin-wide values result: Expenses per hunting day  $\frac{(133 + 208)}{5.4} = $63$ 

Total basin-wide expenditures  $(63 \times 10,540) = $664,000$ Total value of waterfowl meat  $(17,149 \times 316 \times 1.69) = $86,945$ 

-21-

TRAVEL COST ANALYSIS OF MOOSE, CARIBOU, AND SHEEP HUNTING IN SELECTED SUSITNA BASIN STUDY AREAS

The study areas selected for an analysis of travel cost are shown in the Atlas of maps. The purpose of the analysis is to indicate the relative contribution to the economy of the region of specific hunting areas by selecting one cost factor that reveals preference for these areas. In addition, net benefit to the economy at one point in time is indicated by combining site costs, including travel, site fees, and the cost of time (see Water Resources Council regulations cited above.) In the following sections, the assumptions used in the travel cost analysis are outlined, followed by the analysis itself. A summary is then attempted of all sources of net benefit for these units.

Work Sheet Assumptions and Applications

The following narrative explains the assumptions and provisions applied to the travel cost analyses of moose, caribou, and sheep hunting in the Susitna Basin. Each item refers to an item on the work sheet used for the analysis that appears in Table 16.

<u>Travel destination</u>. It is impractical to calculate the distance traveled to a hunting site for each individual hunter. Hunting occurs in many different sites over a large land area. In addition, the harvest ticket data base lacks sufficient precision to determine kill sites, although such data has been developed by the department under special studies programs. The hunting location is therefore designated as a single, centrally located and commonly used staging point, even though this procedure results in minimizing travel costs. For each Harvest Report Code Unit (HRCU) the following destinations are used:

Harvest Report Code Unit	Travel Destination (nearest place name)
13-10L	south shore of Lake Louise
13-12L	Nelchina (cabin sites)
13-14L	Oshetna River
13 <b>-</b> 13L	Chitna Creek
14-01-001	Moss Creek
14-01-003	Kings River
14-01-017	Moose Creek
14-01-013	Moose Creek
14-01-011	Moose Creek
14-01-016	Jim's Slough
14-01-024	Hunter Creek
16-01-002	Peters Creek
16-01-003	Shulin Lake
16-02-013	Beluga Lake
16-02-004	Bulchitna Lake
16-02-012	Alexander Lake

TABLE 16. Travel Cost Analysis Work Sheet Work Sheet - Big Game Hunting Values Hunting location \_\_\_\_\_ Point of origin AUTO AUTO/BOAT ORV Hunters by travel mode AIR AUTO AUTO/BOAT ORV TOTAL TRAVEL COST 1) Air: \_\_\_\_\_ miles X \$1.67/mile X \_\_\_\_\_ hunters = \$ \_\_\_\_\_ plus ORV local use: 25 mi X \$.90/mi X \_\_\_\_\_ hunters = \$ \_\_\_\_\_ 2) Auto: \_\_\_\_\_ miles X \$.037/mile X \_\_\_\_\_ hunters = \$ \_\_\_\_\_ plus ORV local use: \$22.50 X \_\_\_\_\_ hunters = \$ \_\_\_\_\_ plus ORV access: \_\_\_\_ X \$.90/mile X \_\_\_\_\_ hunters = \$ \_\_\_\_\_ 3) Auto: \_\_\_\_\_ miles X \$.037/mi = \$\_\_\_\_\_ hunters = \$ \_\_\_\_\_ hunters = \$ \_\_\_\_\_ plus Boat:\_\_\_\_\_ miles X \$.45/boat mile X \_\_\_\_\_ hunters = \$ \_\_\_\_\_ Total travel cost for this location =  $\begin{pmatrix} 1 \\ 1 \end{pmatrix} + 2 \end{pmatrix} + 3 \end{pmatrix}$ \_\_\_\_\_ Total kill Travel Cost = \$ Total hunter days Hunter Day

<u>Point of origin</u>. The same residency classifications are used for this analysis as those appearing in the general file harvest statistics (Data Supplement). Since the analysis requires use of a single point for calculating travel distances, a central location is chosen for each group of communities based upon the origin of the largest number of residents, as follows: Area

Anchorage-Girdwood Palmer-Skwentna Kenai-Homer Kodiak-Alaska Peninsula Cordova-Tok Fairbanks-Delta Southeast Other Alaska Out of state Foreigners Central Point Used

Lake Hood Palmer Kenai Kodiak Chitina Fairbanks Juneau Anchorage Seattle Hamburg, Germany

<u>Round trip travel distances</u>. Travel distances are calculated on a 1:250,000 scale USGS topographic map and 1:1,000,000 scale world aeronautical charts using a digital map plotter (see also <u>Alaska Milepost</u> for mileages). It is assumed that hunters make one round trip from their point of origin to the designated hunting location. Second trips and side trips are ignored, even though additional travel of this kind is common.

It is further assumed that hunters specifying air travel have available off-road vehicle transportation for twenty-five miles of local use. Air travel is assumed straight-lined, with only one round trip taken per hunt (two round trips are common for charters or parties). In areas where no road access exists (e.g., 16-02-013, Beluga), all hunters entering unknown or highway vehicle travel are entered under aircraft travel.

For local use of boat transportation, 40 miles is assumed.

It is also assumed that every hunter specifying off-road vehicles (motorbike, ORV, snowmobile, horse) as a primary mode of transportation also used a highway vehicle. A specific travel distance is entered for ORV in locations such as the Nelchina basin, where considerable off-road travel is required to reach the hunting site. Otherwise, only local use (25 miles) of ORVs is assumed.

Hunters. Hunters active in a specific HRCU are tabulated in the harvest ticket data base by the following modes of travel:

airplane horse boat motorbike snowmachine off-road vehicle (ORV) highway vehicle or auto unknown

These categories are reduced to four for purposes of the travel cost analysis (airplane, boat, auto, and ORV), placing all specialized vehicles in the ORV category and assuming all "unknown" hunters travelled by auto only (again minimizing travel costs). An assumption of major importance to this analysis is that the number of hunters is equal to the number of hunting trips taken (travel costs apply to hunting trips). Each hunter is assumed to take one trip, hunting alone. This is obviously not accurate, since most people hunt in parties. Moreover, most hunters also take more than one hunting trip per season. These actualities do not show up on the harvest ticket hunter reports, and it is assumed that these differences are roughly equal. These differences therefore cancel, leaving the number of hunters equal to the number of hunting trips taken.

<u>Travel cost</u>. Travel cost is calculated by the simple expedient of multiplying the number of hunters by the round trip distance travelled, by the cost per mile of travel. It is assumed that the levels of cost and the patterns of travel are similar for moose, caribou, and sheep hunting.

These costs are developed in the form of constants for each travel mode. Since these constants greatly influence the results of this analysis, they have been developed with some care (with the exception of ORV costs, which are highly variable and therefore set somewhat arbitrarily at \$.90/mile). Table 17 specifies auto, boat, and air travel cost factors.

It is important to note that consistent with the assumption that each hunter takes one trip, hunting alone, cost constants are calculated on the basis of one person per vehicle (that is, a party of one).

Since nearly all foreign and out-of-state hunters travel to and from Anchorage, round trip fares calculated from the central point or origin (Seattle at \$579.00; Hamburg at \$1,021.00) may be used, together with Anchorage-origin travel costs, for these hunters.

For Matanuska Valley hunters, Anchorage origin travel distances may be used, less the round trip distance between Anchorage and Palmer.

In instances where the number of hunters from a given origin is small, travel costs from comparable origins or occasionally averaged values are used.

# TABLE 17. Auto, Boat and Air Travel Cost Constants

[]

And the second second

South on the starting of the s

Sec.2

.]

	Item			¢/mile	
AUTO	TRAVEL		1976 <sup>1</sup> U.S. National	Nov. 1982 <sup>2</sup> U.S. National Average	Nov. 1982 <sup>3</sup> Alaska Costs 1982
	Variable Mainten Parts & gas & o Subt	costs ance, tires il otal	<u>Average</u> 4.2 <u>3.3</u> 7.5	<u>1976 X 1.8</u> 13.5	<u>USA X 1.24</u> 16.7
	Fixed cos Depreci Insuran Taxes	ts ation ce otal	4.9 1.7 <u>1.6</u> 8.2	14 76	18 3
		-	<u></u>	<u>+1</u>	10.0
<u>0AT</u>	Assume 70 (.70 X <u>TRAVEL<sup>4</sup></u> Fiberglas a)	% family 35.0) + s Hull - Ownersł	y car use, 30% red (.30 X 42.0) = 24 - 22' w/125 hp Vo nip cost/yr	creational vehicle 4.5 + 12.6 = 37.1¢ lvo inboard & trai	e use: per mile per trip ler
		- \$2	23,000 new/15 yr cost = \$3,023	life/10% interest .90/yr	rate
		- hi co	rs used/yr = 200 ost/hr = \$15.12		
		- av OV	vg speed = 20 mph wnership cost/mil	e = \$15.12 ÷ 20 =	75.6¢/mile
	b)	Repair	& maintenance co	st	
		- es 4(	stablished @ \$400 )0 <del>:</del> 200 hrs = \$2	/yr .00/hr	

÷

- c) Operation
  - 4 gal/hr @ 20 mph
  - gas & oil = \$1.40/gal.
  - $\frac{\$1.40 \times 4.0}{20} = 28.0$ ¢/mile

Total Cost = 75.6 + 10.0 + 28.0 = \$1.14/mile

#### AIR TAXI TRAVEL

Assume Cessna 185

cost/hour = \$200 hrcruising speed = 120 mph cost/mile =  $\frac{$200}{120 \text{ mph}}$  = \$1.67/mile

## Sources

<sup>1</sup>Federal Highway Administration. 1977. Transportation Trends and Choices. Tolls and parking fees excluded.

<sup>2</sup>Pers. Comm., Neal Freid, Alaska Department of Labor 1/13/83, based upon United States Transportation CPI update factor:

 $\frac{\text{Nov. 1982}}{1976}, \quad \frac{297.4}{165.5} = 1.8$ 

<sup>3</sup>Ibid. 1/13/83, 11/82 Transportation Index for Alaska:124 or 24% higher in Alaska.

For comparison see use of 7¢/mile in Nicholson, A.J. 1957. Summary of Sportsmen's Expenditures, Missouri River Basin. Spec. Sci. Report: Wildlife #35. United States Department of Interior Fish and Wildlife Service, Washington, D.C. Surveys from 1940's. For comparison see also use of 30¢/mile for reimbursable cost of private auto use by State of Alaska.

<sup>4</sup>Ward's Marina, Anchorage, Alaska

#### Susitna Lowlands (GMU 16)

Five harvest report code units making up most of the Susitna lowlands were selected for economic analysis. Only moose hunting occurs in these units. Table 18 summarizes the travel cost analysis for these units: 1,251 hunters expended \$225,143 in travel costs to hunt 7,187 days and kill 312 moose. Theory and practice in economic valuation of recreational hunting allows the use of travel cost as a proxy for <u>net</u> economic benefit of this activity to society. Table 19 summarizes the travel costs from all origins analyzed for the single most popular moose hunting area of the group: the Petersville unit (16-01-002). Work sheets for the Susitna lowlands area have been shown (Table 16) demonstrating the methods used and allowing further interpretations of the basic data if required.

TABLE 18.	Area Summary of Trave	Costs Analysis	Susitna	Lowlands	(GMU	16)
	Moose Hunting	-				

HRCU	Total Hunters (H) <sup>1</sup>	Total Harvest	Travel Cost (TC)	Total Hunter Days(H-D) <sup>1</sup>	TC H/Day	TC Hunter Notes
16-01-002 Petersville Road	604 e	106	73 <b>,</b> 552	3,468	21.22	122 road accessible
16-02-012 Alex. Creek	200	54	42,250	1,115	37.89	211
16-02-004 Yenlo Hills	168	63	50,965	967	52.70	303 remote
16-02-013 Beluga Lake	158 e	62	40,739	970	42.00	258
16-01-003 Lower Yentr Lower Susit	121 na/ tna	27	17,667	671	26.33	146 limited road access
TOTAL	1,251	312	225,143	7,191	31.33	180

 $^1 \mbox{Does}$  not include hunters with unknown success or unknown residency

-28-

HRC Unit	Total Hunters	Total Harvest	Travel Cost(TC)	Hunter Days	TC/ Hunter Day
16-01-00	2 476	71	53,181	2,516	21.14
16-02-012	2 168	45	30,435	935	32.55
16-02-01	3 125	46	25,137	684	36.75
16-02-004	4 135	44	34,436	775	44.43
16-01-00	3 91	19	12,991	462	28.12
TOTA	L 995 Travel	225 Cost/Hun	156,180 ter = \$157	5,372	29.07

TABLE 19. Susitna Lowlands: Moose Hunting Travel Costs (TC) Contributed by Anchorage Area Hunters

TABLE 20.	HRCU Summary	for 16-01-002	(Petersville):	of Moose Hunting
	Travel Costs	(TC)		,

.

Origin of <u>Hunter</u>	TL Hunters	Total Harvest	Travel Cost	Hunter Days	TC/ Hunter Day	
Anchorage	476	71	53,181	2,516	\$21.14	
Mat Valley	82	24	7,677	644	11.92	
Frbks-Delta	25	7	5,616	182	30.85	
Balance of state	16	2	3,594	93	30.84	
Out-of-state	5	2	3,454	33	104.67	
Foreign	0	0	0	0	0	
TOTAL	604	106 Travel Cos	73,522 st per hunte	3,464 er = 122	\$21.22	

-29-

:

Palmer Area (GMU 14)

Moose and sheep are hunted in the reporting units selected for analysis in the Palmer area. For these units only the Anchorage-origin hunter is selected for analysis. In addition, in order to compare similar geographic areas, moose harvest report code units are used also for sheep harvest data. Table 21 summarizes the travel cost analysis and shows Anchorage-origin moose and sheep hunters paying \$48.62 and \$63.92 in travel costs per trip, respectively. The data base indicates a large number of Matanuska Valley area hunters also use the area along with one out-of-state moose hunter and nine out-of-state sheep hunters. Anchorage values may be used for hunters for a conservative estimate of total travel costs as shown (moose: \$24,018; sheep: \$6,328).

TABLE 21. Palmer Area Summary of Travel Cost (TC) Analysis for Moose and Dall Sheep Hunting

Species	HRCU	Total Hunters	Total Kill	Ancho Hunters	orage 5 Kil	Area Hu 1 TC(\$)	nters Hunter Days	(\$)TC/ HD <sup>1</sup>	(\$)TC/ Hunter
MOOSE									
14-01	-011	79	13	not	known				
14-01	-013	52	12	not	known				
14-01	-017	190	36	208	40	9,318	946	9.85	
14-01	-016	69	17	37	7	1,979	171	11.60	
14-01	-024	62	14	20	5	1,105	84	13.15	-
14-01	-001	31	8	16	2	968	54	17.92	
14-01	-003	11	3	9	2	730	38	19.21	
Subtot	al	494	103	290	56	14,100	1,293	10.90	48.62
TOTAL	Travel	.Cost:	494 X 4	8.62 =	\$24,0	)18		unionali - Uni Inprovina -	
DALL SHE	EP								
14-01	-011	0	0	0	0	0	0	0	
14-01	-013	0	0	0	0	0	0	0	
14-01	-017	5	0	3	0	32	14	2.29	
14-01	-016	32	7	16	2	1,063	107	9.93	
14-01	-024	44	12	23	2	1,196	57	20.98	
14-01	-001	18	11	8	4	906	45	20.13	
14-01	-003	0	0	0	0	0	0	0	
Subtot	al	99	30	50	8	3,197	223	14.34	63.92
TOTAL	. Trave	1 Cost:	99 X 6	3.92 =	\$6,32	28			
TOTAL		593	133	340	64	17,297	1,516	11.41	51.17
Grand To	tal =	\$30 <b>,</b> 34	6						

<sup>1</sup>Travel cost/Hunter day

### Nelchina Basin (GMU 13)

TADLE 22

Moose, caribou, and Dall sheep hunting occurs in the southwestern portion of the Nelchina basin selected for analysis. Only the Lake Louise area (Unit 13-10L) has been selected for travel cost analysis of all user groups. Table 22 shows an area summary of all hunters and total harvest for all three species and a summary of the travel cost analysis for Anchorage area hunters. As in Table 21, Tables 22 and 23 moose, caribou and sheep coding units are translated into a common coding unit, this time based on caribou units. For the Lake Louise area results of the travel cost analysis for all moose and caribou hunters is shown in Tables 23 and 24. Averaged values for all hunters from areas other than Anchorage may be used to estimate travel costs for these hunters for other units in the area. Table 25 summarizes these estimates and shows a total estimate of \$318,000 expended in travel costs for this area.

TADLE 22.	Netchina Area Summary of Travel Cost Analysis for Anchorage Are	=d
	Moose, Caribou, and Sheep Hunters	

Nolphing Augo Summany of Typyol Cost Anglusia for Anghange Aug

Species	HRCU T Hu	otal nters	Total Harvest	Anch Hunters	orage Harves	<u>Area Hur</u> t TC(\$)	iters Hunter Days	TC/ HD(\$)
MOOSE	13-10L 13-11L 13-12L 13-13L 13-14L	279 26 196 67 68	35 4 46 10 34	183 19 124 34 44	17 2 25 4 20	36,245 2,399 19,380 3,011 11,520	1,094 104 794 113 104	33.13 23.07 24.41 26.64 110.76
Subto	tal	636	129	404	68	72,555	2,209	32.85
CARIBOU	13-10L	201	139	106	70	23,169	380	60.97
	13-11L	0	0	0	0	0	0	0
	13-12L	188	132	107	76	18,073	285	63.41
	13-13L	21	13	14	7	1,805	59	30.59
	13-14L	82	69	45	35	15,618	127	123.00
Subto	tal	492	353	272	188	58,665	851	68.94
SHEEP	13-10L	0	0	0	0	0	0	0
	13-11L	0	. 0	0	0	0	0	0
	13-12L	5	1	2	0	227	7	32.43
	13-13L	102	38	42	22	9,185	248	37.04
<u> </u>	<u>13-14L</u>	/	1	4	<u> </u>	1,544	20	77.20
SUDTO		114	40	48	23	10,956	275	39.84
TO	TAL 1	,242	522	724	279	142,176	3,335	42.63

Travel cost per hunter: \$228.25

-31-

Origin of Hunter		Total Hunters	Total Harvest	Travel Cost(TC)	Hunter (\$) Days	TC HD(\$)	$\frac{TC}{Hunter}(\$)$
Anchorage Mat-Valley		183 35	17 4	36,245 6,111	1,094 294	33.13 20.79	198.06
Cordova-Tok Other state	d	14 21 12 13	2 5 2	5,724 3,670 6,444	90 102	40.00 40.78 63.18	356.02
Foreign		13	1	1,219	3	406.00	
	TOTAL Average	279	35	70,423	1,790	39.34	252.41

TABLE 23. Lake Louise Unit Summary for Moose Hunting

State of the second sec

TABLE 24. Lake Louise Unit Summary for Caribou Hunting

Origin of Hunter	Total Hunters	Total Harvest	Travel Cost(TC)(\$)	Hunter Days	TC HD(\$)	TC Hunter(\$)
Anchorage Mat-Valley Fairbanks-Delta Cordova-Tok Other state Out of state Foreign	106 46 30 7 5 7 0	70 36 20 4 3 6	23,169 9,783 14,530 1,275 2,790 5,586	380 165 117 28 14 20	60.97 59.29 124.00 45.53 200.00 279.00	218.58 357.53
TOTAL Average	201	139	57,134	724	78.91	284.25

TABLE 25. Nelchina Area Summary of Travel Costs for All Moose, Caribou, and Sheep Hunters

	Total	Hunters	Travel	Hunters	Travel	Travel
	Hunters	Anchorage	Cost(\$)	Non-Anchorage	Cost(\$)	Total_Cost(\$)
Moose	636	404	72,555	232	82,592 <sup>1</sup>	155,147
Caribou	492	272	58,665	220	78,540 <sup>1</sup>	137,205
Sheep	114	48	10,956	66	15,064 <sup>2</sup>	26,020
TOTAL	1,242	724	142,176	518	176,196	318,372

<sup>1</sup>Based on Lake Louise sample showing \$356/moose hunter/trip, \$357/caribou hunter/trip

<sup>2</sup>Anchorage value of \$228.25 used throughout

## Summary

Table 26 summarizes the estimated travel costs faced by moose, caribou, and sheep hunters in the areas of the Susitna basin selected for analysis. Net benefits enjoyed by the general economy from these hunters is estimated at just over \$500,000 for the 1981 study year.

the Susitna Basin	TABLE 26.	1981 Travel the Susitna	Costs Basin	for	Moose,	Caribou,	and D	a11	Sheep	Hunters	in
-------------------	-----------	----------------------------	----------------	-----	--------	----------	-------	-----	-------	---------	----

Area	Species	Total Hunters	Total Harvest	Travel Cost(\$	) <u>TC</u> Hun	ter Method
Susitna lowland	S					
	Moose Caribou Sheep	1,251 0 0	312 0 0	225,143 0 0	180 0 0	All residents analyzed.
Subtotal		1,251	312	225,143	180	
Palmer area (GMU 14)						
	Moose Caribou Sheep	494 0 99	103 0 30	24,018 0 6,328	48.62 0 63.92	Based upon Anchorage origin values.
Subtotal		593	133	30,346	51.17	
Nelchina basin (GMU 13)	Moose Caribou Sheep	636 492 114	129 353 40	155,147 137,205 26,020	243.94 278.87 228.25	All residents analyzed for Unit 13-10L only. Remainder based upon these values.
Subtotal		1,242	522	318,372	256.34	
TOTAL		3,086	967	573,861	185.95	

-33-

#### LICENSE AND TAG FEES

In most applications of the travel cost method (see Water Resources Council VI, K 11/1980) license and tag fees are among the costs faced by the hunter that can be included in an estimate of net benefit. The cost of a license to hunt game in the State of Alaska is \$12.00 to residents and \$60.00 to non-residents. In addition, non-residents are required to purchase a non-refundable big game tag at the following prices (see Alaska Department of Fish and Game, Board of Game. Alaska Hunting Regulation #22. July 1, 1981 - June 30, 1982. Juneau, Alaska):

Bear, blackeach	\$ 100.00
Bear, brown or grizzlyeach	250.00
Bear, polareach	250.00
Bisoneach	250.00
Cariboueach	200.00
Deereach	35.00
Elkeach	125.00
Goateach	125.00
Mooseeach	200.00
Muskoxeneach	1,000.00
Sheepeach	250.00
Walruseach	250.00
Wolfeach	50.00
Wolverineeach	50.00

Costs to moose, caribou, Dall sheep, black bear, brown bear, and waterfowl hunters in the Susitna basin for licenses and tags is estimated in Table 27 at about \$200,000.

These values are for those hunters who actually entered the field and submitted hunter reports.

č

	Repor	ting Hunters <sup>1</sup>	2
Species Hunted	Resident Licenses	Non-Resident <sup>2</sup> Licenses & Tags	Gross <sup>3</sup> Dollar Value
Moose	4,416	178	99,272
Caribou	609 <sup>4</sup>	37	11,447
Sheep	266 <sup>4</sup>	62	20,018
Bear <sup>5</sup>	1,540	174	54,120
Waterfowl	1,050 <sup>4</sup>	1,050 duck stamps <sup>6</sup>	7,875
		TOTAL	192,732

TABLE 27. 1981-1982 Costs to the Hunter for Susitna Area Hunting Licenses Tags and Duck Stamps for Moose, Caribou, Dall Sheep, Bear, and Waterfowl

<sup>1</sup>Alaska Department of Fish and Game, Game Division. General File Harvest statistics, 1981, printed 08/05/82

<sup>2</sup>See text for tag prices

<sup>3</sup>Calculation example: moose: (4,416 X \$12) + (178 X \$60) + (178 X \$200) = 99,272

<sup>4</sup>Use 25% only, since most resident caribou & sheep hunter also hunt moose <sup>5</sup>Calculation: (\$1,540 X \$12) + (174 X \$60) +  $\frac{(122 X 100)}{black bear}$  +  $\frac{(52 X $250)}{brown bear}$  = 54,120 <sup>6</sup>Federal Duck Stamps cost \$7.50