Alaska Habitat Management Guide

Economic Overview of Fish and Wildlife

Volume II:

Hunting, Trapping, Nonconsumptive Use, and Subsistence and Other Local Use

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Introduction

Economic Overview of Fish and Wildlife

Alaska is currently confronted with a wide range of decisions about the use of resources that will influence activities in the state for years to come. Some of these decisions pertain to the allocation of resources among different user groups, such as fish harvested for commercial, sport, and subsistence purposes. These types of allocative decisions are generally made by the Boards of Fish and Game, based on relatively broad policies set by the Alaska State Constitution and state and federal statutes. Economic analyses have traditionally not entered into these allocative decisions. For the most part, the department has also minimized the use of economic analyses when managing fish and wildlife populations "for the maximum benefit of its people" (Alaska State Constitution, Article VII, Section 2) because these benefits cannot be expressed solely in financial terms. This is especially true given the range and complexity of allocative decisions in Alaska.

Allocative decisions regarding fish and wildlife are made primarily by those who are particularly interested in those resources. In contrast, land use planning decisions involve a variety of agencies with different perceptions of the values associated with using land primarily for fish and wildlife management. Land use planning decisions can limit and otherwise influence the options available for ADF&G managerial decisions. If a shopping mall, for example, is built in moose habitat, that specific habitat will no longer produce moose for any user group.

Planning decisions inevitably involve tradeoffs and compromises because the interested parties place different values on land and its resources. Historically, the department's contribution to the planning process has consisted primarily of providing biological information to influence planning decisions "to maintain or enhance fish and wildlife population levels" (AS 16.05.020). In societies such as ours, however, with capitalist systems based on market economies, economic values have become the yardstick for measuring the value of competing uses. This would be appropriate, however, only if all the competing uses could be undertaken with the purpose of participating in the market economy. Problems arise in creating economic comparisons when some uses of the land and resources are not for the purpose of producing marketable goods. In practice, if the values of a particular interest group are difficult or impossible to express in economic terms, they are generally ignored by those evaluating the alternatives because such qualitative values are too difficult to incorporate into the analysis. Ultimately it is left to the political system to reconcile noneconomic and economic values.

Recognizing this shortcoming in conventional economic theory, economists have recently attempted to develop methods to measure the economic value of unpriced, or nonmarket, values. A variety of innovative techniques have been used to try to place nonmarket resource values (a day of deer hunting, for example) on a similar economic footing as market resource values (1,000

board feet of timber, for example). The advent of these new techniques can be both tempting and repellent to the biologist and the public. On the one hand, the ability to translate the obvious (though often intuitive) significant fish and wildlife values into an economic measure is a powerful attraction. On the other hand, biologists recoil at the thought that, once rendered in economic terms, fish and wildlife may begin to be valued only in those terms. That possibility is particularly worrisome because the new techniques generally produce economic figures that are merely approximations of value; no method has been developed that enables unpriced values and market-priced values to be compared exactly.

Given this set of circumstances, the question becomes how (or whether) to use economics in evaluating the importance of fish and wildlife resources. A number of important factors need to be considered regarding the economic values of fish and wildlife in Alaska. One is that relatively little information exists to compute economic values for fish and wildlife uses other than commercial fishing and possibly commercial furbearer harvesting. Studies need to be designed and implemented to make this information available, and a high level of economic sophistication is necessary for proper interpretation and application of newly acquired data. Also, unlike market-priced values, which are updated automatically by direct market transactions, unpriced values can be updated only by subsequent studies. Hence, accurate, useful information on many factors important for evaluation is not easily maintained.

Economic values of fish and wildlife are also extensively influenced by regulations and management objectives. Economics is the study of how people and society choose, with or without the use of money, to employ scarce resources and distribute them for consumption over time among various people and groups. Generally speaking, however, fish and wildlife populations have been managed to supply abundant resources, which indirectly results in relatively low costs of harvesting these populations to the people of Alaska. This management objective prevents the short-term maximization of readily measurable economic values. For instance, rather than auction Alaska's unique hunting opportunities in a world hunting market to maximize the economic market potential of the resource, the state has shown a preference for allocating these opportunities to its residents. Clearly, management decisions that affect species abundance and allocation also affect their measurable economic values. Within this context, it is overly simplified and incorrect to make land use planning decisions strictly on the basis of comparing economic values of resources. It is important that the biologist and public understand both the potential of economics and its limitations as a tool in natural resources planning for the ADF&G and other agencies.

In consideration of these factors, these volumes have been written in terms of a fairly broad definition of economics to assist the biologist and manager in understanding and applying economic principles to the planning process. It is the purpose of these volumes to indicate what information is available for economic analyses, to point out the limitations of that information, to use the available information for analyses, and to suggest ways of improving the economic database by listing additional useful

information and how it could be collected. Appendices are also included that go beyond describing the source of economic data to explain some of the practical obstacles in applying these data in general and in Alaska in particular.

I. STATEWIDE OVERVIEW

A. Introduction

An assessment of the economic value of wildlife in Alaska is especially challenging because 1) the allocation of hunting opportunities does not occur through the market economy, and 2) very few data are available. This hunting chapter* addresses these difficulties from both a conceptual and a practical perspective in order to provide a framework for developing a systematic database for land use planning. This economic methodology section is Section VIII. Section B. addresses data requirements for informed land use decisions and economic analyses of wildlife resources. Part of this discussion pertains to using data already routinely collected by the department; section II. provides an example of this with an assessment of the demand for hunting opportunities based on the analysis of existing permit and registration hunt data. Section III. summarizes the preliminary results of the statewide economic survey of Dall sheep hunters. Sections IV through VII provide regional hunting summaries for the Southwest, Southcentral, Western and Interior, and Arctic Regions, respectively. This chapter does not consider the nonconsumptive use of wildlife (see the chapter on nonconsumptive use in this volume), existence values, or option demand.

B. Database Requirements and Recommendations

In developing information for wildlife population and land management, three principal categories of information can be identified: 1) hunter effort and harvest estimates, 2) habitat requirements and population data, and 3) economic evaluations. Each of these is necessary to manage wildlife for maximum public benefit and is discussed in this section. The potential development of database components is presented in a relatively simple, conceptualized manner (fig. 1). This is not to say that it is not an immense undertaking, but it identifies how economic valuation can be utilized with biological data for effective land use planning.

* Because of the length and nature of this chapter, as a convenience to the user each section is treated as a discrete entity having its own reference section and with its own set of numbered tables and illustrations.

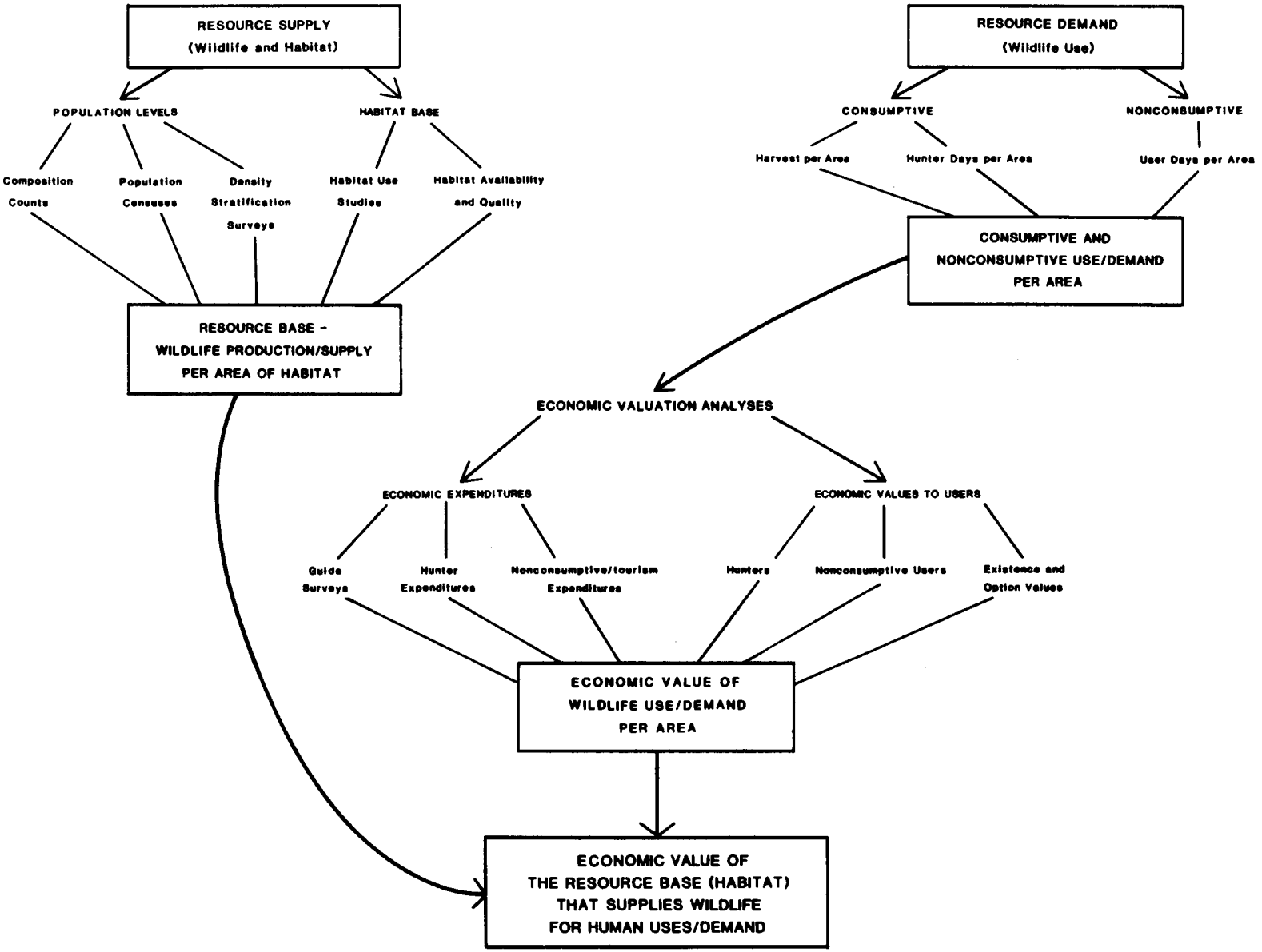


Figure 1. Interrelationship of major components of economic valuation analyses of demand and supply of wildlife for land use planning.

Wildlife managers have long studied various aspects of species biology, such as population size and structure, reproductive rates, and mortality rates, to ensure that hunter harvest does not deplete wildlife populations. Harvest-per-unit-of-effort figures and population surveys (e.g., composition counts) are used to estimate relative abundance and population composition. Excessive changes from season to season in these estimations result in changes in management practices or regulations to adjust harvest accordingly. Given a stable land base or a low enough level of hunter effort and harvest, this system is both effective and efficient. If, however, the demand for wildlife resources is increasing and/or changes in habitat and the land base are occurring, management and allocation of resources becomes increasingly intensive and may require information regarding habitat requirements of wildlife species. In order to effectively manage wildlife resources coming under increasing hunter pressure and habitat encroachment, the availability of suitable habitat that is assumed in the management system needs to be explicitly analyzed. Habitat use studies are needed to identify the habitat requirements of species and their relative abundance associated with particular habitat types. Then the habitat base required to maintain harvestable populations of wildlife species needs to be identified (fig. 1).

On Kodiak Island, for example, these types of data pertain to habitat requirements of brown bears and the approximate acreage of each type of bear habitat that is required to "produce" a bear. With the identification of bear habitat on maps and a population database, production of bears per unit area of bear habitat could be estimated. This estimate of the carrying capacity of an area is not equivalent, however, to the maximum sustainable yield (to hunters and other predators) of bears from a particular study area. Instead, the estimate of maximum sustainable yield links the type of land and habitat requirements of a species together to determine the ability of a unit of area to "produce" or supply a bear. In this sense, bears would be a "renewable good" of the land base under consideration. Data on hunter harvest, hunter-days per harvest area, and success rates could then be combined with habitat maximum sustainable yield data to assign the number of hunter-days per unit of harvest area. A simultaneous determination of the demand for nonconsumptive use of wildlife in user-days per area could provide for the maximum consumptive and nonconsumptive use of wildlife per available area.

Economic analyses of hunters, wildlife guides, and nonconsumptive users can be utilized to estimate hunter and nonconsumptive users' net benefits. Analyses can also estimate earnings to guides and the tourist industry and identify how these earnings and hunter expenditures affect regional and statewide economies. However, without information on the relationship of wildlife to its

habitat, economic survey data assign value to the activities themselves without regarding the dependency of these activities on the habitat that "supplies" the wildlife. Therefore, to be most effective in land use planning, estimates of demand (in numbers of users), economic value, and public use benefits need to be linked to the supply or sustainable yield of wildlife populations associated with a specific land area.

To extend the Kodiak Island brown bear example, maximum sustainable yield can be related to the hunter-days, success rates per unit area, hunter and nonconsumptive user net economic benefits per unit area, and the game guide and tourism industries' values to estimate a public use economic benefit of brown bear habitat per unit area. This can then be combined with other values (such as community water system or nonwildlife-related tourism) and considerations that cannot be accounted for in economic analyses (cultural or life style aspects) to arrive at effective input into land use planning. This type of information begins to clearly assess the nonmarket economic losses involved with competing land uses. There are undoubtedly areas in Alaska, especially near population areas, where the value of land producing nonmarket benefits to users exceeds the market benefits of a development project.

The most efficient and effective way to develop additional data is through existing collection systems. Potentially useful data for economic analyses are already collected by the department; these include hunter numbers and modes of transportation. One significant addition to routine hunter harvest information would be to collect hunter-days per area for both successful and unsuccessful hunters. Information regarding the total population of hunters demanding a particular opportunity is necessary for land management and economic analyses.

It is also likely that existing surveys can be modified to gather additional information. It would probably be more practical to add some economic questions to existing surveys than to resurvey respondents. For the 1985 season, the deer hunter harvest survey in Southeast Alaska was substantially expanded to collect economic information as well as the harvest information routinely collected. There was no appreciable difference between this year's response rate and last year's response rate for the basic survey, suggesting that the additional questions for economic valuation do not compromise the return ratio. The response rates for economic surveys already conducted by the department range from approximately 60 to 89%.

Another group of wildlife users that could be targeted for maintaining current economic data are professional game guides. This is a source of income and employment that is not covered by

the Alaska Department of Labor because it is self-employment. An important consideration for sampling this group is that a consistent survey be developed for the whole state rather than different surveys for each region, because many guides operate in more than one region.

Because of the theoretical and technical complexities involved with most economic analyses, a staff specialist (e.g., economist) with the responsibility of helping to design and organize surveys would be a desirable arrangement. This would ensure that methods were accurately applied and analyzed to obtain the most usable results, and it would also facilitate the application of consistent methodologies among areas and surveys and ensure that no user group is being overly sampled. Economic questions would not need to be included on surveys every year. It would also be extremely helpful (regardless of whether the survey contained economic questions) for the public to have a better understanding of how survey results are used and how the process benefits their user group. One way this can be done is by sending the survey summary results or report of the survey analysis to respondents who wish to receive the information. This indirectly would also create a timeline for finalizing results. To avoid the problem of surveying the public for information but not having funding to support analysis of data, a research plan identifying funding for an entire study should be required. The Division of Game, Information Management Committee, could address some of the organizational aspects of conducting surveys. An economist on a contractual retainer arrangement could be used for designing and analyzing surveys; continuity as well as an understanding of available data are important considerations.

II. PERMIT DATA ANALYSIS

A. Introduction

Economics is the study of how people and society choose, with or without money, to employ scarce resources and distribute them for consumption over time among various people and groups (adapted from Samuelson 1964, emphasis added). This is a fairly traditional definition of economics. Economic analysis has increasingly utilized dollars as the primary unit of measurement of value because the dollar value of market goods tends to be readily available and provides a relatively consistent measurement to the otherwise extremely complex concept of value. However, this narrowing of the definition of economics discourages some powerful "economic" analyses from being made regarding fish and wildlife use in Alaska.

Because the State of Alaska does not distribute game resources (which are limited and therefore "scarce") through means of the market economy, other mechanisms are used to determine how they are allocated. Two of these mechanisms are permit drawing and registration hunts. The number of permits available in any given drawing hunt is the estimation of the sustainable harvest of the hunted population. In economic terms, this is the supply of the scarce resource. The number of applications for the permit drawing indicates the demand for the opportunity to hunt. The number of applications does not directly translate into the dollar value of the resource, but the trend in these numbers does provide a measure of the scarcity and desirability of the opportunity in question. "Value" is an indication of the relative level of competition for or scarcity of a resource and not a measure of intrinsic worth or necessity - why else would diamonds be more "valuable" than water? In this sense, the number of applicants competing for permit drawing and registration hunts in Alaska is an indication of the value of these resources. Although this is not a monetary analysis, it is an "economic" analysis regarding the demand for scarce supply of game resources within the State of Alaska. Given the unavailability of and obstacles to obtaining monetary economic values for many game resources in Alaska, this type of information should not be overlooked in the land use planning process.

B. Methods

Information on permit hunts is available from 1978 to the present. Until July 1985, two types of restricted hunts were held in the state -- registration hunts and drawing hunts. Registration hunts, in most cases, do not limit the number of hunters but can have special restrictions and require all hunters to register. In

addition, all but a few require hunters to complete harvest reports whether or not they were successful. Drawing hunts can have the same restrictions as registration hunts. In addition, the number of hunters is always limited. Applicants compete in a lottery type drawing for the permission to hunt. In the 1985-1986 season, Tier II hunts were instituted. These limited who could hunt based on various criteria. Because of the difference in types of permits beginning in 1985, this analysis covers the years 1978 through 1984.

In analyzing drawing permit information, it is important to keep several things in mind. First, permit hunts are not always consistent from year to year. The boundaries of hunts change, and hunts are periodically created and eliminated from the game regulations for several reasons. In some cases, permit hunts are created to control hunting pressure on a limited game population. Or they are used to attract attention to a particular population that has been overlooked by hunters in the past. Or permit hunts are used to distribute hunting throughout an area so that portions of the game population that are easily accessible to hunters are not overharvested in comparison to less accessible populations. Because permit hunts are instituted or discontinued for a variety of reasons, some of which are more restrictive in the killing of animals, some of which are more liberal, the reasons the numbers of permit hunts or available permits change are equally important as the numbers themselves in an analysis of permit data and should also be considered.

Second, not all those who apply for permits seriously intend to hunt. It is reasonable to assume that a few people apply for permits simply because of the lottery nature of some permit drawing hunts and because applying is relatively easy. The limited entry aspect of the hunt gives it a special aura that a general hunt does not have and thus attracts a very few people who otherwise may not have planned to hunt in that area. The entry procedure for drawing hunts requires little investment of time or money. An application must be completed for each hunt and a nonrefundable fee of five dollars is charged (ten dollars for bison and muskox since 1982). With hunts of this nature, it is important to have information on the number of permits hunted or the motivation of applicants. Without that information, it is impossible to determine if the percentage of those hunting has changed over the years and to what extent the number of applicants reflects those who seriously intend to hunt. The number of permit holders who actually hunted is known in some cases, but not in all. We have assumed, therefore, that the percentage of issued permits actually hunted has been relatively constant and that the number of applications for permits generally reflects the desirability of a particular hunt such that any bias has remained consistent.

Third, although it is required by regulation, not all hunters return their permits complete with hunting information at season's end. The return rate is usually better for permit hunts than for general hunts. But harvest figures still must be considered estimates (except for brown bear hunts, where "sealing" the animal is also required).

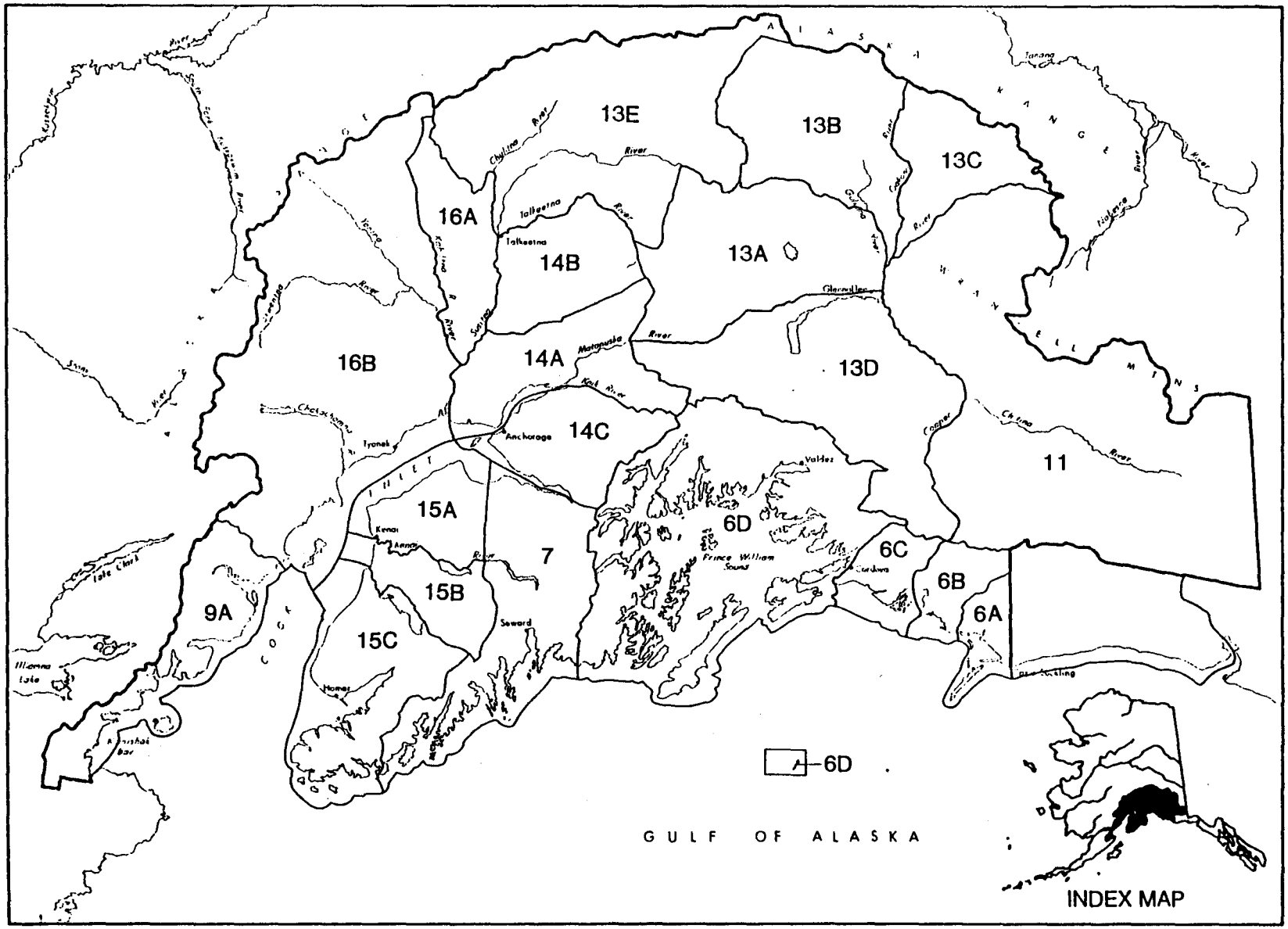
In this analysis, data on subsistence drawing hunts were not included because 1) their limited eligibility requirements influence the number of applicants, and 2) they are not held for all species. Data on subsistence hunts are included in the tables because the analysis of subsistence hunt figures may be appropriate for local planning or studies. However, their limited and varying eligibility requirements bias the database for the type of permit analysis being done in this section. To avoid this bias, subsistence data are presented but not included in the statistical analysis.

Information on permit hunts comes from the Big Game Data Information Files 1977-1984 (BGDIF) and from annual reports of survey and inventory activities ("S & I reports"). Data from these files were extracted to produce tables for drawing and registration hunts on the number of hunts, permits available, applications received, and animals harvested by region, species, and year. The GMU in which the hunt(s) occurred is also noted, but the analysis was done on a regional basis.

C. Results

1. Southcentral Region. Because of its large human population and consequent potential impact on wildlife populations, the Southcentral Region had the most drawing permit hunts of any region during the years 1978-1984. Drawing hunts were held for bison, caribou, moose, mountain goat, and Dall sheep. Registration hunts were also held for these species.

   Hunting is defined as the taking or attempted taking of game under the rules and regulations of the Alaska Fish and Game Code and Board of Game (ADF&G 1985b). A hunt is defined as hunting activity for one species specifically occurring in an area and season specified by regulation. The largest number of both drawing and registration permit hunts were established for moose and mountain goats. More indicative of the relative demand for one species compared to another is the number of applicants for permits rather than the number of hunts. However, for any given species, the trend in the number of hunts reflects changes in demand for that species, primarily changes in the population levels. Map 1 shows the location of GMUs in the Southcentral Region.



Map 1. Game management units in the Southcentral Region.

Applicants for moose and caribou permits far outnumber those of other species. The number of drawing hunts for moose increased from 9 hunts in 1978 to 28 hunts in 1984 (table 1, fig. 1). In 1978, 2,844 applicants competed for 425 permits, which gave them each a 15% chance of obtaining a permit. In 1984, 15,494 people competed for 1,365 permits, which gave them each an approximately 9% chance of receiving a permit. In short, the number of applicants for moose drawing hunts in the Southcentral Region increased by 445% from 1978 to 1984, and the chance of obtaining a permit decreased by almost one half. Moose populations in the Southcentral Region were generally increasing during this time period; opportunities to hunt in nonpermit situations were improving as a result (Faro, pers. comm.). The number of applicants for moose registration hunts also increased; it was up 66% from 1979 to 1984 (table 2, fig. 2). The number of moose registration hunts increased from 3 to 7 over that period. Generally, however, the demands for moose hunting opportunities remains largely satisfied by nonpermit hunting opportunities. Therefore, the analysis of permit applications for this species results in an underestimate of demand.

Caribou drawing hunts experienced an even more dramatic increase in demand. In 1978, 3,350 hunters competed for 1,450 permits and had a 43% chance of getting the opportunity to hunt (table 3, fig. 3). By 1984, the number of applicants had quadrupled to 13,177, giving each only a 15% chance at one of 1,950 permits. In contrast to the number of moose permits (which tripled), the number of caribou drawing permits rose by only a third. This was largely due to the relatively low population levels of Southcentral caribou herds and the ADF&G management objective to let the population increase. Southcentral Region caribou registration hunts were held in 1982-1984 and were all subsistence hunts (table 4).

The number of mountain goat drawing and registration hunts in the Southcentral Region showed a different pattern from that of moose and caribou. The number of drawing hunts decreased from 41 in 1980 to 26 in 1984, and the number of registration hunts increased from four hunts in 1978 to 20 hunts in 1984 (tables 5 and 6, figs. 4 and 5). In 1984, hunts in GMU 14 that had previously been drawing hunts became registration hunts. An increase in goat numbers and the setting of later season dates for registration hunts made this change liberalizing the regulations possible (Faro, pers. comm.). While the number of drawing hunts decreased from 1980 to 1984, the number of applicants increased from 1,158 for 255 permits in 1980 to 2,561 for 400 permits in 1984 (121% increase, table 5, fig. 5). The chances of obtaining a

Table 1. Southcentral Region Moose Drawing Hunts, 1978-84

Year	GMU	No. of Hunts	Permits Available	Applications Received	Estimated Harvest
1978	6,14,15,16	9	425	2,844	175
1979	6,14,15,16	11	580	11,380[a]	230
1980	6,14,15,16	13	80	4,411[b]	187
1981	6,14,15,16	14	605	11,020	246
1982	6,14,15,16	14	885	8,819[b]	302
1983	6,14,15,16	26	1,235	11,321	447
1984	6,14,15,16	28	1,365	15,494	458

Source: Sexton 1979-85.

a Subunits 14A and B late-season permit hunt added over 6,000 applications.

b Fort Richardson moose hunt was not held as a separate drawing; the separate drawing tended to increase applicants overall.

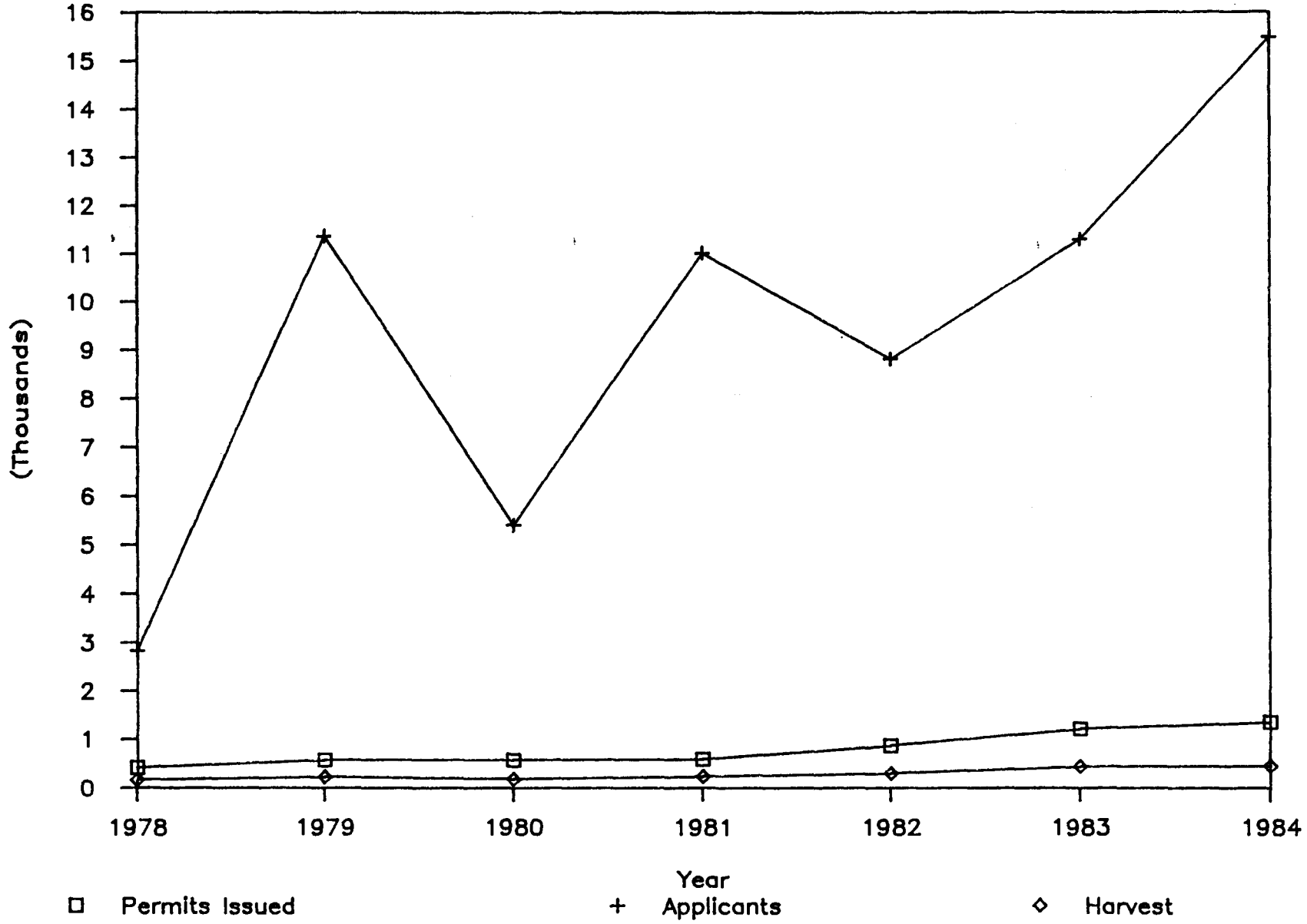


Figure 1. Southcentral Region moose drawing hunts.

Table 2. Southcentral Region Moose Registration Hunts, 1978-84

Year	GMU/GMS	No. of Hunts	Permits Issued	Estimated Harvest
1978	6	3	---	82
1979	6	3	728	104
1980	6	3	1,093	148
1981	6,16B	4	1,431	175
1982	6,16B,14C	6	1,530	238
1983	6,16B,14C	8	2,059 (120)[a]	285 (31)[a]
1984	6,16B,14C	7[b]	1,209 (122)[c]*	183 (40)[c]*

(One hunt added in 16B; two cancelled in 14C and 6).

Source: BGDIF 1978-84, Sexton 1979-85.

--- means no data were available.

a One hunt restricted to local 16B residents. Figures for hunt (in parentheses) are in addition to other totals.

b One hunt added in GMS 16B; two hunts cancelled in GMU 6 and GMS 14C.

c Two hunts restricted to local 16B residents. Figures for hunts (in parentheses) are in addition to other totals.

* Data incomplete.

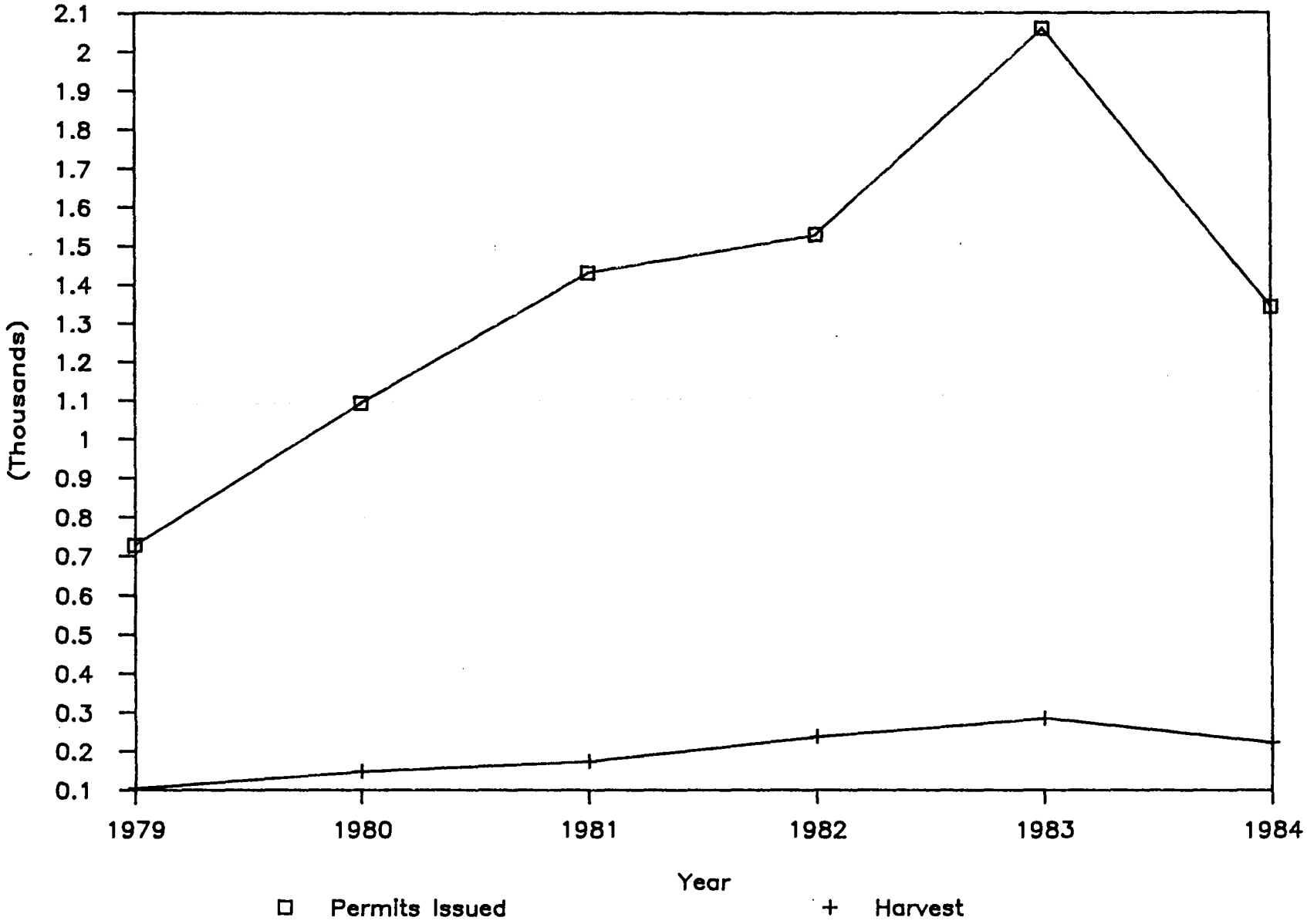


Figure 2. Southcentral Region moose registration hunts.

Table 3. Southcentral Region Caribou Drawing Hunts, 1978-84

Year	GMU	No. of Hunts	Permits Available	Applications Received	Estimated Harvest
1978	7,11,13,14	3	1,450	3,350	741
1979	7,11,13,14	3	1,750	6,362	762
1980	7,11,13,14	3	1,750	7,653	786
1981	7,11,13,14	4	1,996 (150)*	7,753 (54)*	1,018 (36)*
1982	7,11,13,14	4	1,800 (450)*	10,058 (233)*	984 (46)*
1983	7,11,13,14	4	1,800 (450)*	10,498 (438)*	893 (198)*
1984	7,11,13,14	4	1,950 (500)*	13,177 (718)*	948 (286)*

Source: BGDIF 1978-84, Sexton 1979-85.

* Subsistence hunt figures (in parentheses) are in addition to other totals.

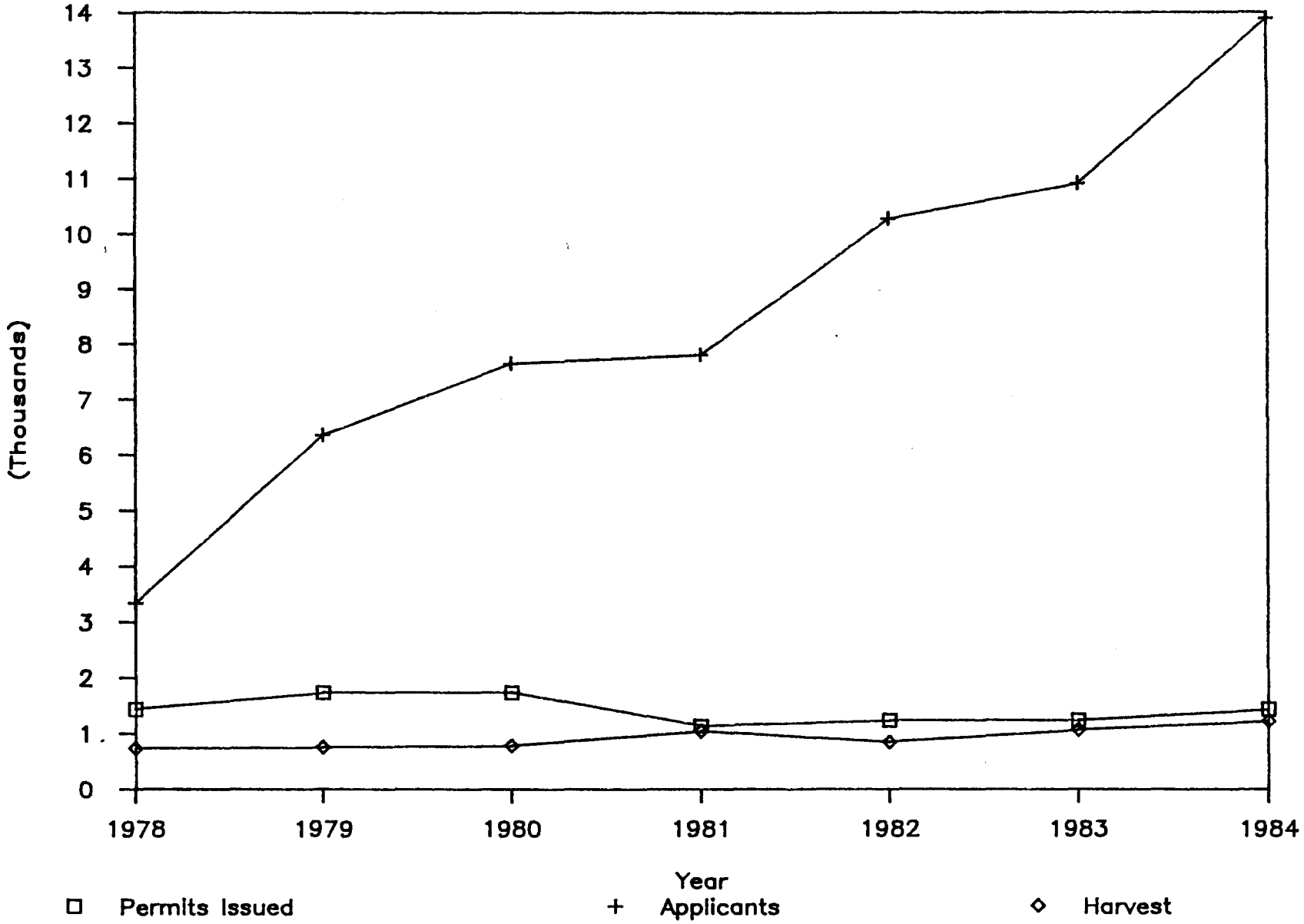


Figure 3. Southcentral Region caribou drawing hunts.

Table 4. Southcentral Region Caribou Registration Hunts, 1982-84

Year	GMU	No. of Hunts	Permits Issued	Estimated Harvest
1982	13*	1	217	105
1983	13*	1	17	9
1984	13*	1	10	10

Source: Sexton 1983-85.

* All subsistence hunts.

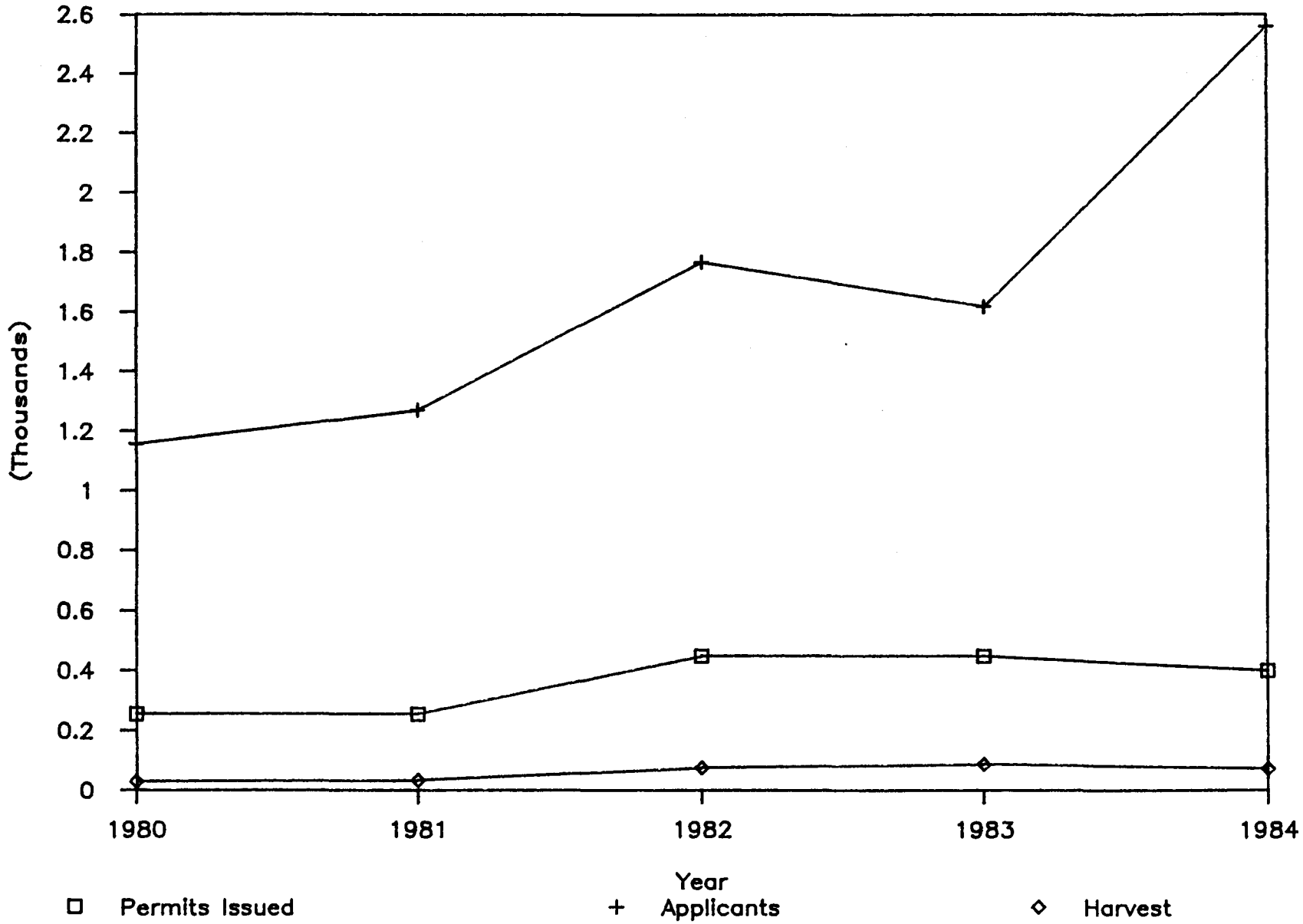


Figure 4. Southcentral Region mountain goat drawing hunts.

Table 5. Southcentral Region Mountain Goat Drawing Hunts, 1980-84

Year	GMU	No. of Hunts	Permits Available	Applications Received	Estimated Harvest
1980	6,7,14,15	41	255	1,158	29
1981	6,7,14,15	36	255	1,271	33
1982	6,7,14,15	36	450	1,769	76
1983	6,7,14,15	31	450	1,618	87
1984	6,7,15	26[a]	400	2,561	71

Source: Sexton 1981-85.

a Five hunts in GMU 14 changed to registration hunts.

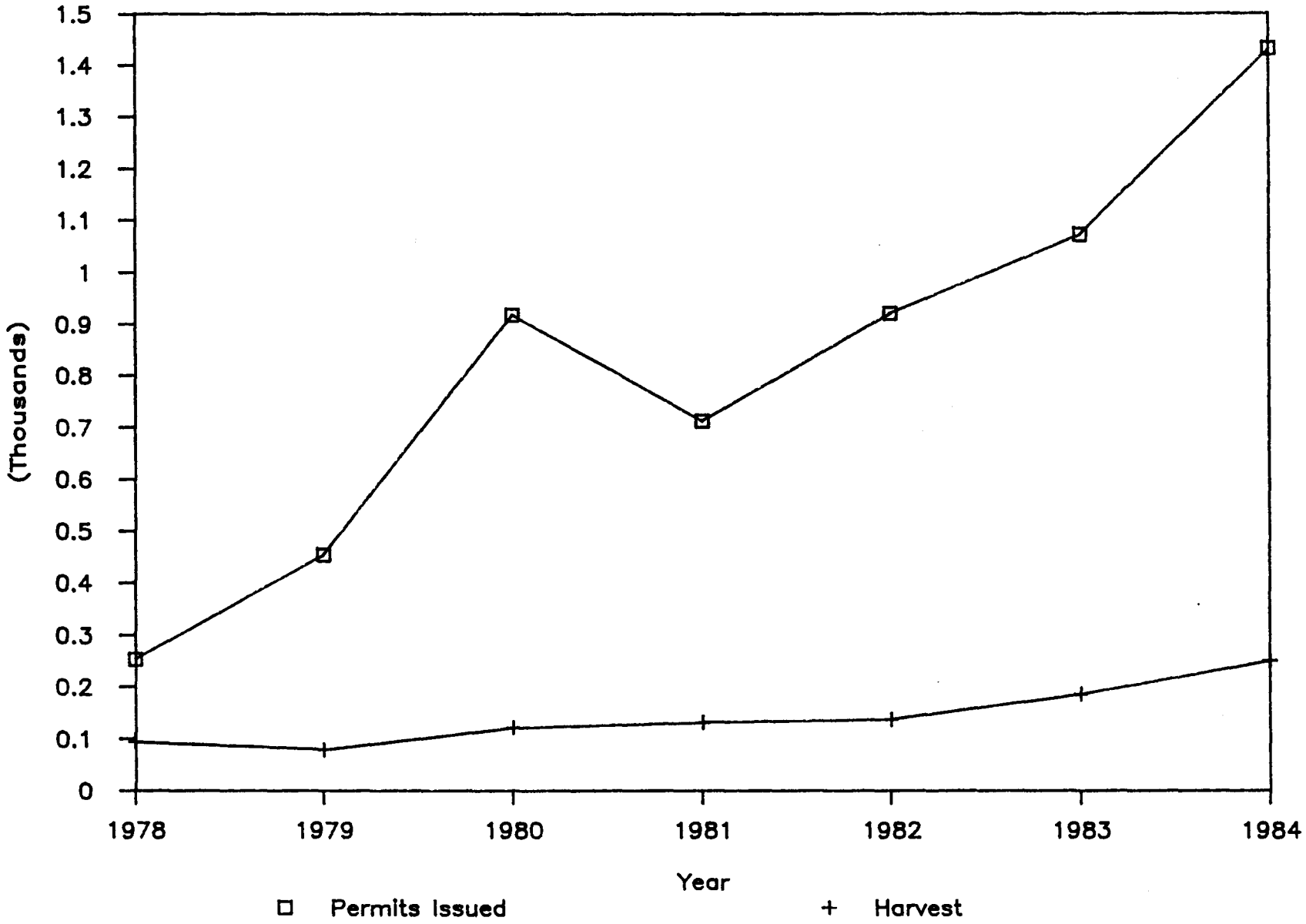


Figure 5. Southcentral Region mountain goat registration hunts.

Table 6. Southcentral Region Mountain Goat Registration Hunts, 1978-84

Year	GMU/GMS	No. of Hunts	Permits Issued	Estimated Harvest
1978	7,14A,15	4	254 hunters	94
1979	7,14A,15	4	455	79
1980	6,11	3	918	122
1981	6,11	2	713	132
1982	6,7,11,15	14	921	138
1983	6,7,11,15	15	1,073	186
1984	6,7,11,14,15	20	1,432	250

Source: Sexton 1981-85.

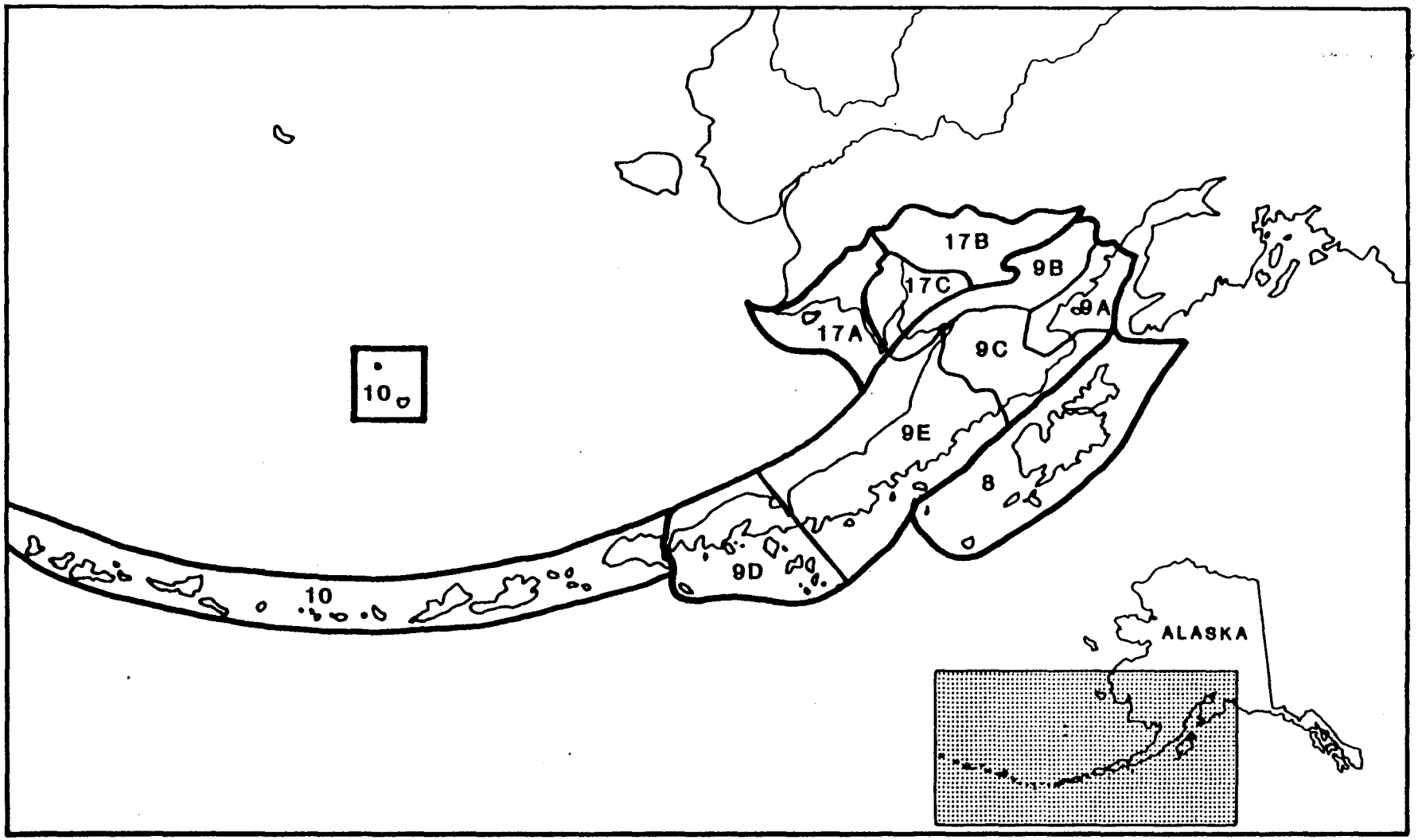
drawing permit to hunt mountain goat in the Southcentral Region decreased from a 22% chance in 1980 to a 16% chance in 1984.

Drawing hunts for Dall sheep in the Southcentral Region began in 1982 with seven hunts. The number of applicants for these hunts increased from 519 for 130 permits in 1982 to 2,053 for 130 permits in 1984 (a 296% increase, table 7). The chances of receiving a permit dropped from 25% in 1982, to 6% in 1984.

From 1978 through 1984, both a registration and drawing hunt were held for bison (except in 1982, when the registration hunt was cancelled). The number of permits issued for bison was eight from 1978 through 1981; 12 permits were issued from 1982 through 1984 (table 9). In 1978, however, 346 hunters applied for the eight permits, with a 2% chance of being drawn. By 1984, the number of applicants for 12 permits increased to 1,454, with less than a 1% chance of obtaining a permit. During this same period, the number of applicants for the bison registration hunt in the Copper River valley decreased (table 10). This decrease was probably a result of the difficult access to the remote hunt area.

2. Southwest Region. Drawing and registration permit hunts were held for brown bear, elk, moose, and mountain goats in the Southwest Region during the years 1978 through 1984. Map 2 shows the locations of the GMUs in the Southwest Region. Brown bear hunts on Kodiak Island attracted the most applicants and had the largest increase in demand during the period of analysis. The large number of drawing hunts on Kodiak Island (26) is an example of the use of permit hunts to distribute the harvest throughout a population so that the more accessible animals are not overharvested. Regulations limit harvest to one bear per hunter every four regulatory years; cubs and sows with cubs cannot be harvested. Available permits are divided between residents and nonresidents, with the latter allowed up to 40% of the total. Registered guides are allotted a certain number of registration permits for nonresident clients who hunt without next of kin. Beginning in 1983, permit drawing hunts within the Kodiak National Wildlife Refuge were available only to residents and nonresidents hunting with resident next-of-kin. Nonresidents could also participate in registration hunts with registered guides; the number of registered guides limits the number of nonresident hunters.

As a result of some of the regulatory complexities, the number of applicants for Kodiak Island brown bear drawing hunts underrepresents the demand. This is especially true



Map 2. Game management units in the Southwest Region.

Table 7. Southcentral Region Dall Sheep Drawing Hunts, 1982-84

Year	GMS	No. of Hunts	Permits Available	Applications Received	Estimated Harvest
1982	14A,B	7	130	519	14
1983	14A,B	7	130	846	17
1984	14A,B	7	130	2,053	10

Source: Sexton 1983-85.

Table 8. Southcentral Region Dall Sheep Registration Hunts, 1984

Year	GMS	No. of Hunts	Permits Issued	Estimated Harvest
1984	14C	1	360	32

Source: Sexton 1985.

Table 9. Southcentral Region Bison Drawing Hunts, 1978-83

Year	GMU	No. of Hunts	Permits Available	Applications Received	Estimated Harvest
1978	11	1	8	346	6
1979	11	1	8	433	4
1980	11	1	8	272	1
1981	11	1	8	398	3
1982	11	1	12	931	2
1983	11	1	12	1,454	8

Source: Sexton 1979-85.

Table 10. Southcentral Region Bison Registration Hunts, 1978-84

Year	GMU	No. of Hunts	Permits Issued	Estimated Harvest
1978	11	1	---	15
1979	11	1	96 hunters	15
1980	11	1	132	15
1981	11	1	110	8
1982	11	1	Cancelled	---
1983	11	1	50	7
1984	11	1	34	5

Source: Sexton 1979-85.

--- means no data were available.

for nonresidents because they contact guides rather than the ADF&G to obtain permits. If a permit is not available with a guide, they will often reserve a booking for a future permit, but their interest in the current year goes unreported. Even with some demand unreported, the number of Kodiak Island brown bear fall drawing hunt applicants increased from 167 in 1978 to 2,656 in 1984 (fig. 6), a remarkable 1,490% increase. Applicants for both spring and fall hunts increased by 135% from 1981 to 1984 (table 11). The chances of obtaining a fall drawing permit (resident and nonresident combined) decreased from 66% in 1978 to 5% in 1984. The number of Southwest Region registration hunt permits issued also increased from 202 in 1978 to 533 in 1984 (164%, table 12).

A small permit drawing hunt (15 permits) also existed for brown bear on Unimak Island. The number of fall hunt applicants increased from 46 in 1980 the first year of the hunt, to 76 in 1984 (66%, fig. 7). The chances of receiving a fall hunt permit decreased from 18% in 1980 to 11% in 1984. However, the number of applicants for the spring and fall hunts combined remained about the same from 1980 to 1984 (table 13). In 1985, this hunt became a registration hunt.

Drawing and registration hunts were held from 1978 to 1983 for elk on Afognak Island. The number of drawing hunts decreased until 1984 when they were discontinued, whereas registration hunts increased as a result of the increase in the elk population. The number of hunters competing for drawing permits increased from 268 for 125 permits (a 47% chance of receiving a permit) in 1978 to 896 for 95 permits (an 11% chance) in 1984 (table 14, fig. 8); this is a 334% increase in applicant numbers. From 1980 to 1984, the number of registration permits issued increased from 1,296 to 1,750 (35%, table 15).

Mountain goat drawing permit applications increased from 59 for 29 permits in 1978 to 247 for 90 permits in 1984 (319%, table 16). The chances of receiving a permit decreased from 49 to 36% during the same period. One mountain goat registration hunt was also initiated in 1984 (table 17).

Moose registration hunts have also been held in the region since 1980 (table 18). The number of applicants increased abruptly when a portion of moose hunting in GMU 17 changed from a general hunt to a registration hunt in 1983 and 1984. Overall, moose hunting permit numbers jumped from 88 in 1980 to 365 in 1984 (a 315% increase, table 18).

3. Western and Interior regions. Despite the relatively small human population of the Western and Interior regions, the

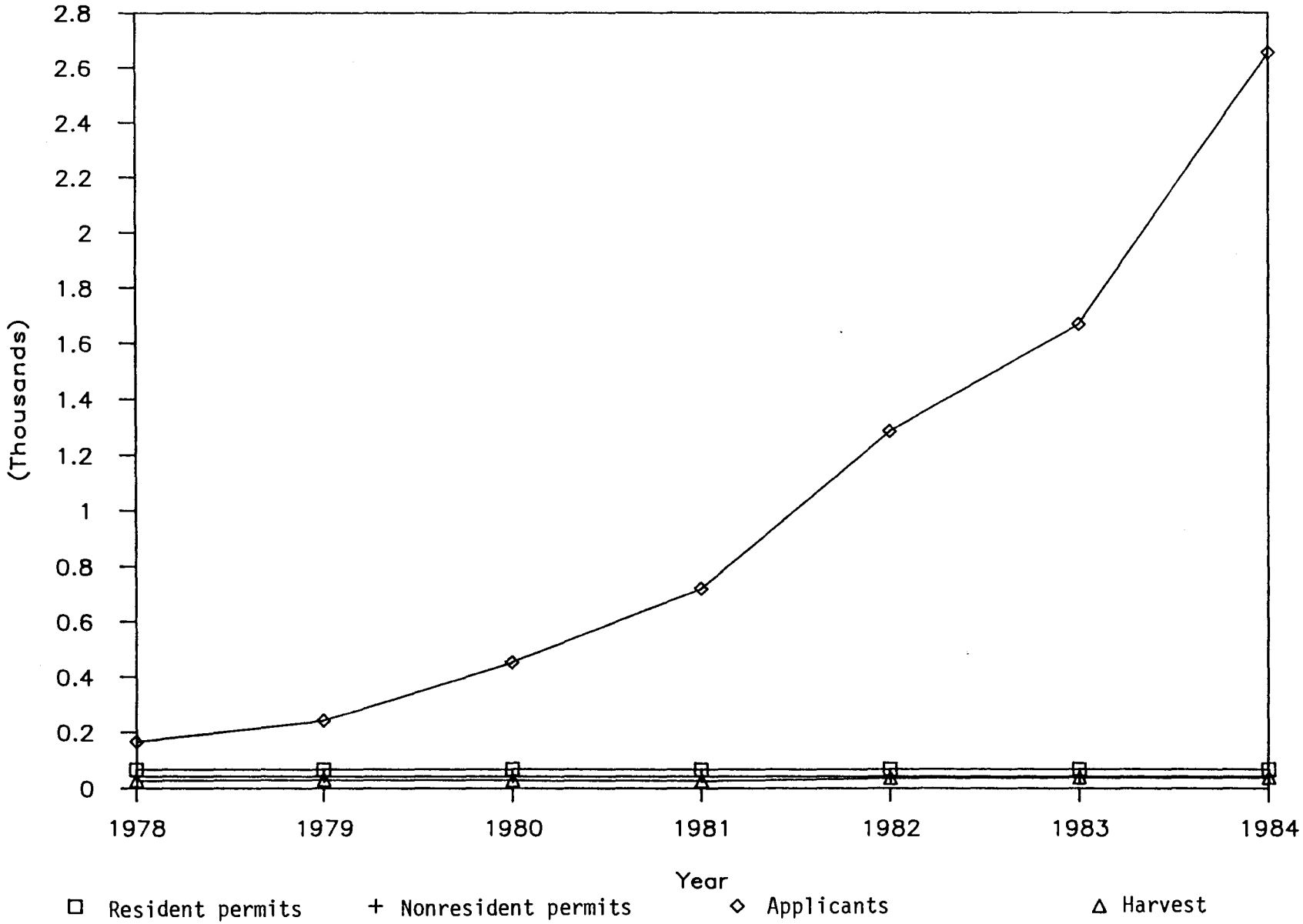


Figure 6. Southwest Region Kodiak brown bear fall drawing hunts (BGDIF 1978-1984).

Table 11. Southwest Region Brown Bear (Kodiak) Drawing Hunts, 1978-84

Year	GMU	No. of Hunts	Permits Available Res.	Permits Available Nonres.	Applications Received	Estimated Harvest
1978	8	26	198	125	167*	110
1979	8	26	198	125	244*	115
1980	8	26	198	125	454*	103
1981	8	26	198	125	1,776	121
1982	8	26	198	125	2,649	116
1983	8	26	198	125	3,204	123
1984	8	26	198	125	4,171	149

Source: BGDIF 1978-84.

* Fall hunts only; no data available for spring hunts.

Table 12. Southwest Region Brown Bear Registration Hunts, 1978-84

Year	GMU	No. of Hunts	Permits Issued	Estimated Harvest
1978	8,9	2	202	14
1979	8,9	3	238	30
1980	8,9	3	284	24
1981	8,9	3	387	31
1982	8,9	3	492	35
1983	8,9	3	565	39
1984	8,9	2	533	42

Source: BGDIF 1978-84.

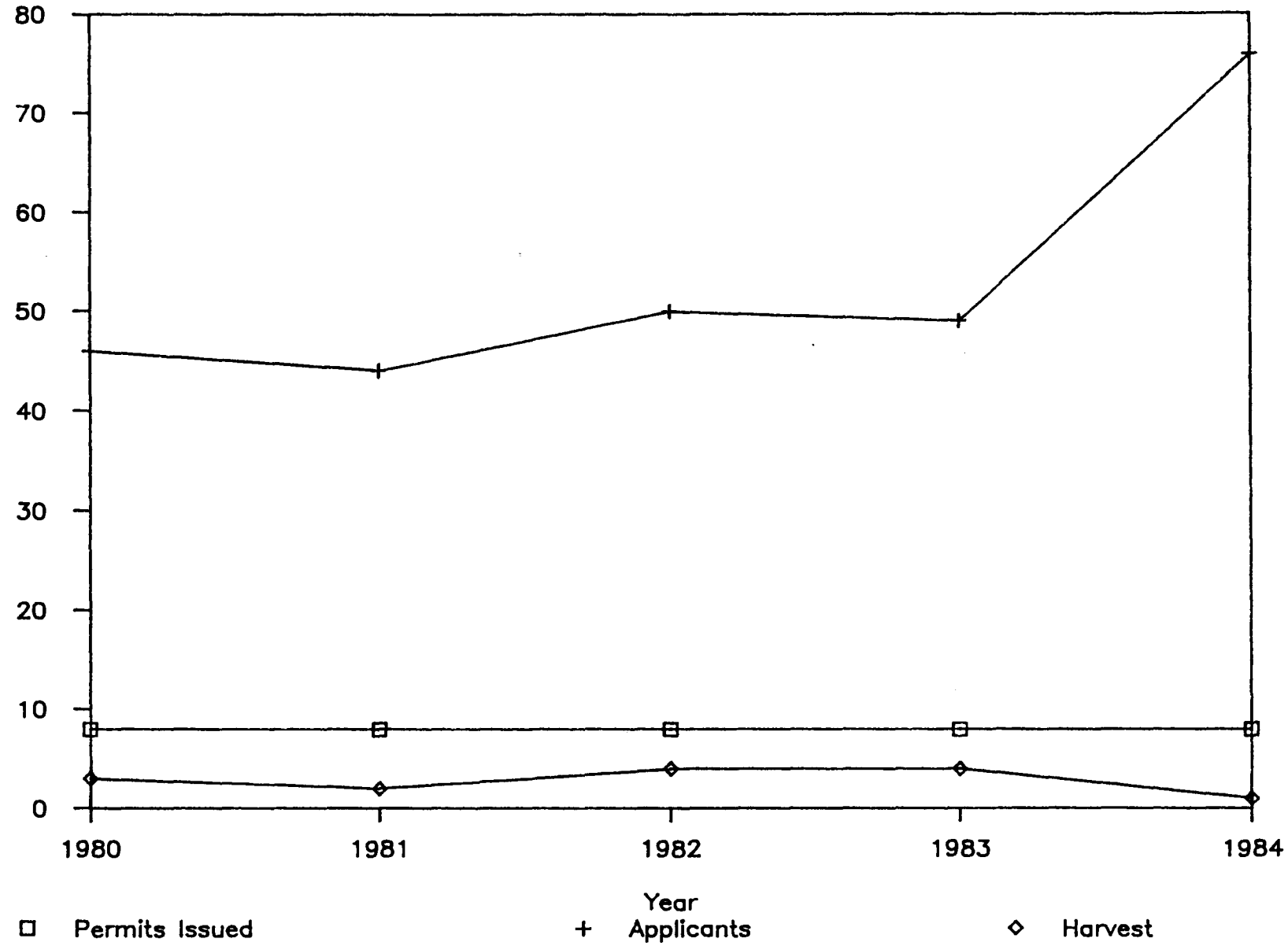


Figure 7. Southwest Region Unimak brown bear fall drawing hunts.

Table 13. Southwest Region Brown Bear (Unimak) Drawing Hunts, 1980-84

Year	GMU	No. of Hunts	Permits Available	Applications Received	Estimated Harvest
1980	10	1	15	46*	4
1981	10	1	15	91	3
1982	10	1	15	103	4
1983	10	1	15	89	6
1984	10	1	15	92	1

Source: BGDIF 1980-84.

* Fall hunt only; no data available for spring hunts.

Table 14. Southwest Region Elk Drawing Hunts, 1978-84

Year	GMU	No. of Hunts	Permits Issued	Applications Received	Estimated Harvest
1978	8	2	125	268	16
1979	8	2	200	349	29
1980	8	1	65	352	9
1981	8	1	65	426	9
1982	8	1	95	731	11
1983	8	1	95	896	12
1984	8	0	---------- no hunt ----------		

Source: Sexton 1979-85, ADF&G 1980.

Note: Decline in elk hunts is a result of the conversion of drawing hunts to registration hunts.

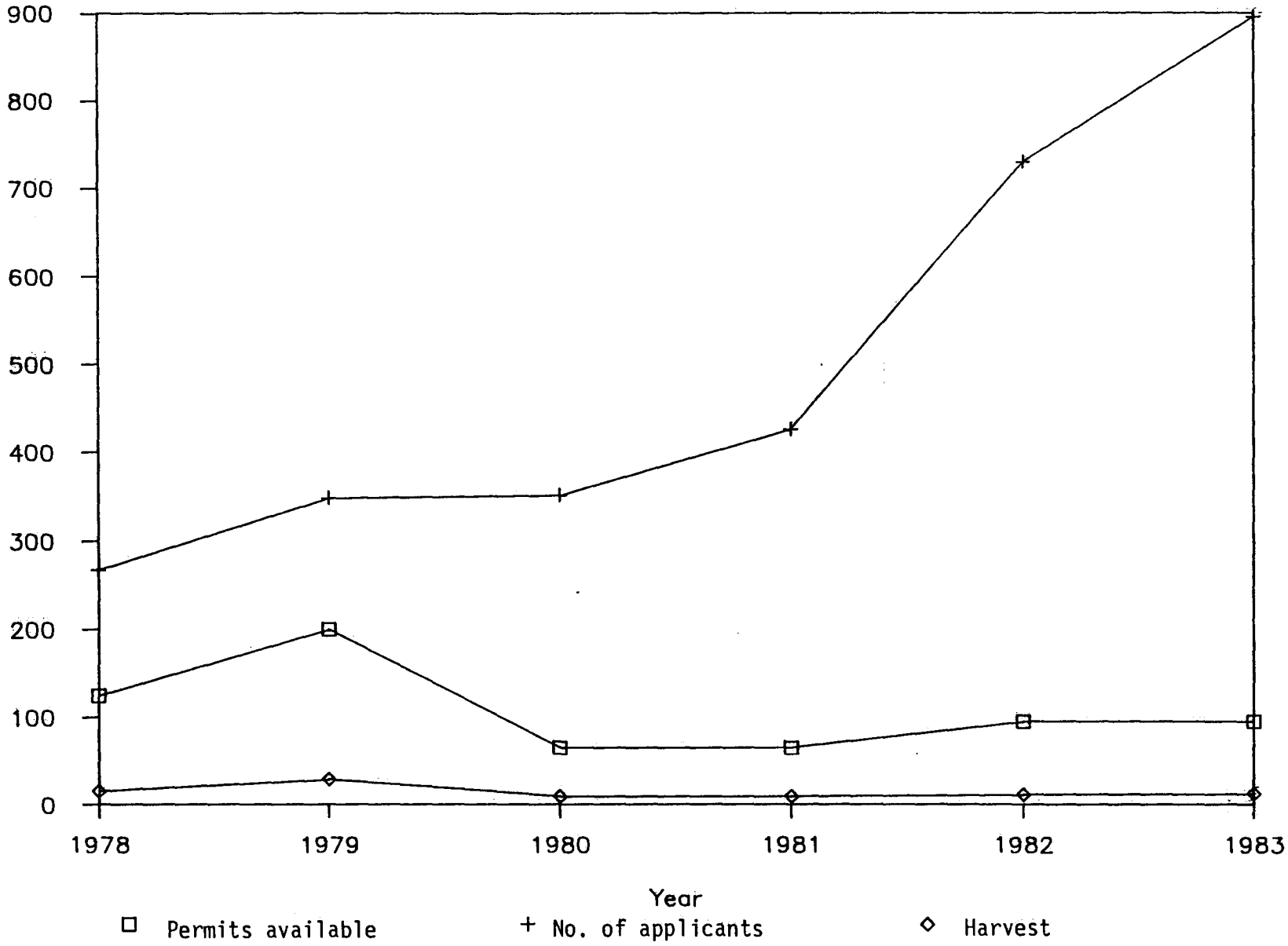


Figure 8. Southwest Region elk drawing hunts (BCDIF 1978-1983).

Table 15. Southwest Region Elk Registration Hunts, 1978-84

Year	GMU	No. of Hunts	Permits Issued	Estimated Harvest
1978	8	1	197 hunters	29
1979	8	1	286 hunters	39
1980	8	2	1,296	92
1981	8	2	1,662	103
1982	8	2	1,490	140
1983	8	2	1,720	174
1984	8	3	1,750	254

Source: Sexton 1979-85, ADF&G 1980.

Note: The increase in elk hunts is at the expense of drawing hunts, which have become registration hunts over the years.

Table 16. Southwest Region Mountain Goat Drawing Hunts, 1978-84

Year	GMU	No. of Hunts	Permits Issued	Applications Received	Estimated Harvest
1978	8	4	29	59	9
1979	8	4	31	79	11
1980	8	4	36	94	11
1981	8	4	36	80	11
1982	8	4	57	119	14
1983	8	4	57	144	15
1984	8	4	90	247	26

Source: Sexton 1979-85.

Table 17. Southwest Region Mountain Goat Registration Hunts, 1984

Year	GMU	No. of Hunts	Permits Issued	Estimated Harvest
1984	8	1	84	29

Source: Sexton 1985.

Table 18. Southwest Region Moose Registration Hunts, 1980-84

Year	GMU/GMS	No. of Hunts	Permits Issued	Estimated Harvest
1980	9	1	88	7
1981	9	1	50	8
1982	9	1	88	12
1983	9C, 17C & B	2	531	50
1984	9C, 17C & B	2	365	46

Source: Sexton 1981-85.

area attracts a large number of big game drawing permit applicants because of the popularity of a number of hunts. Drawing permit hunts were held for brown bear, bison, caribou, Dall sheep, and muskox during the years 1978 through 1984; registration hunts were held for those species as well as for moose. Map 3 shows the locations of GMUs in the Interior and Western regions. Bison hunts attracted the largest number of applicants. The number of bison applicants grew from 4,285 for 80 permits in 1978 to 12,456 for 75 permits in 1984 (a 190% increase, table 19). The chance of receiving a permit declined from 2% in 1978 to 0.6% in 1984. The scarcity of bison as game animals, the high success rate (100% in 1979), and the large amount of meat obtained per animal are probable reasons for the hunt's popularity.

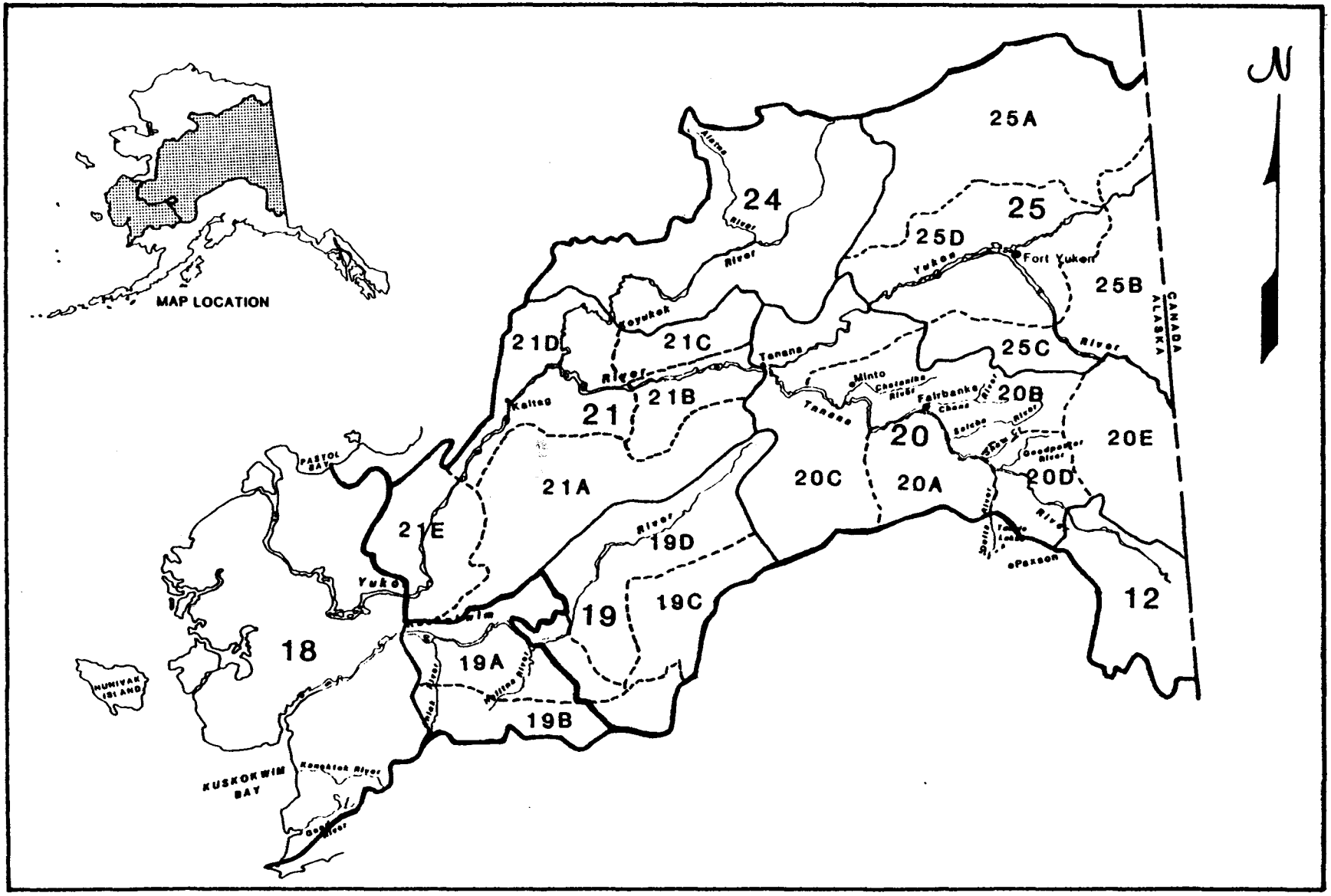
The number of applicants for caribou hunts declined in 1983 (table 21). This is more indicative of an increase in the caribou population than a decrease in demand because one drawing hunt was changed to a general hunt.

Dall sheep drawing hunt applicants increased from 680 for 240 permits in 1978 to 2,079 for 282 permits in 1984 (a 206% increase, table 23, fig. 9). This increase in applicants decreased the chance of obtaining a permit from 35% in 1978 to 14% in 1984. The number of Dall sheep drawing hunts also increased from three hunts in 1978 to six hunts in 1984. Nonresident Dall sheep hunters are required to hire a guide.

A small number of muskox permits (5-10) are issued by drawings in the region. The number of applicants increased from 12 in 1978 to 90 in 1984 (a 650% increase, table 25). The chances of getting a permit dropped from 83% to 6% during the period.

4. Arctic Region. Drawing hunts were held for brown bear, Dall sheep, and muskox; registration hunts were held for those species plus moose, caribou, and Pacific walrus. Muskox (drawing), Dall sheep (registration), caribou (registration), and walrus (registration) data are too incomplete to include in this analysis (tables 30-35). The demand for brown bear hunts was relatively stable, with only a 40% increase in applicants for drawing permits (table 36). This was probably because the brown bears in this region are small compared to other regions of the state. Map 4 shows the locations of the GMUs in the Arctic Region.

5. Southeast Region. In the Southeast Region, permit drawing and registration hunts were held for moose; registration hunts were held for mountain goats. Map 5 shows the locations of the GMUs in the Southeast Region. In 1984, one



Map 3. Game management units in the Western and Interior regions.

Table 19. Western and Interior Regions Bison Drawing Hunts, 1978-84

Year	GMU	No. of Hunts	Permits Available	Applications Received	Estimated Harvest
1978	19,20	5	80	4,285	63
1979	19,20	3	25	3,930	25
1980	19,20	3	55	5,087	40
1981	19,20	2	75	5,858	66
1982	19,20	2	95	8,890	77
1983	19,20	3	95	8,735	69
1984	19,20	3	75	12,456	55

Source: Sexton 1979-85; Johnson, pers. comm.

Table 20. Western and Interior Regions Bison Registration Hunts, 1979

Year	GMU	No. of Hunts	Permits Issued	Estimated Harvest
1979	19	1	118	30

Source: ADF&G 1981b.

Table 21. Western and Interior Regions Caribou Drawing Hunts, 1978-84

Year	GMU	No. of Hunts	Permits Available	Applications Received	Estimated Harvest
1978	20	1	70	139	16
1979	20	1	70	218	20
1980	20	2	270	800	122
1981	20	2	220	1,130	108
1982	20	2	315	1,265	142
1983	20	1[a]	140	341	11
1984	20	1	359	359	20

Source: Sexton 1979-85.

a Hunt in GMS 20A changed to a general hunt.

Table 22. Western and Interior Regions Caribou Registration Hunts, 1981-84

Year	GMS	No. of Hunts	Permits Issued	Estimated Harvest
1981	20A & C	1	880	179
1982	20A, C	1	1,538	169
1983			---------- no hunt ----------	
1984	20A	1	1,500	414

Source: Sexton 1982-85.

Table 23. Western and Interior Regions Dall Sheep Drawing Hunts, 1978-84

Year	GMU	No. of Hunts	Permits Available	Applications Received	Estimated Harvest
1978	12,13,20	3	240	680	80
1979	12,13,20	4	240	1,220	74
1980	12,13,20	3	240	1,360	72
1981	12,13,20	3	240	1,228	79
1982	12,13,20	3	270	1,446	79
1983	12,13,20	3	270	1,350	69
1984	12,13,20	6	282	2,079	49

Source: Sexton 1979-85.

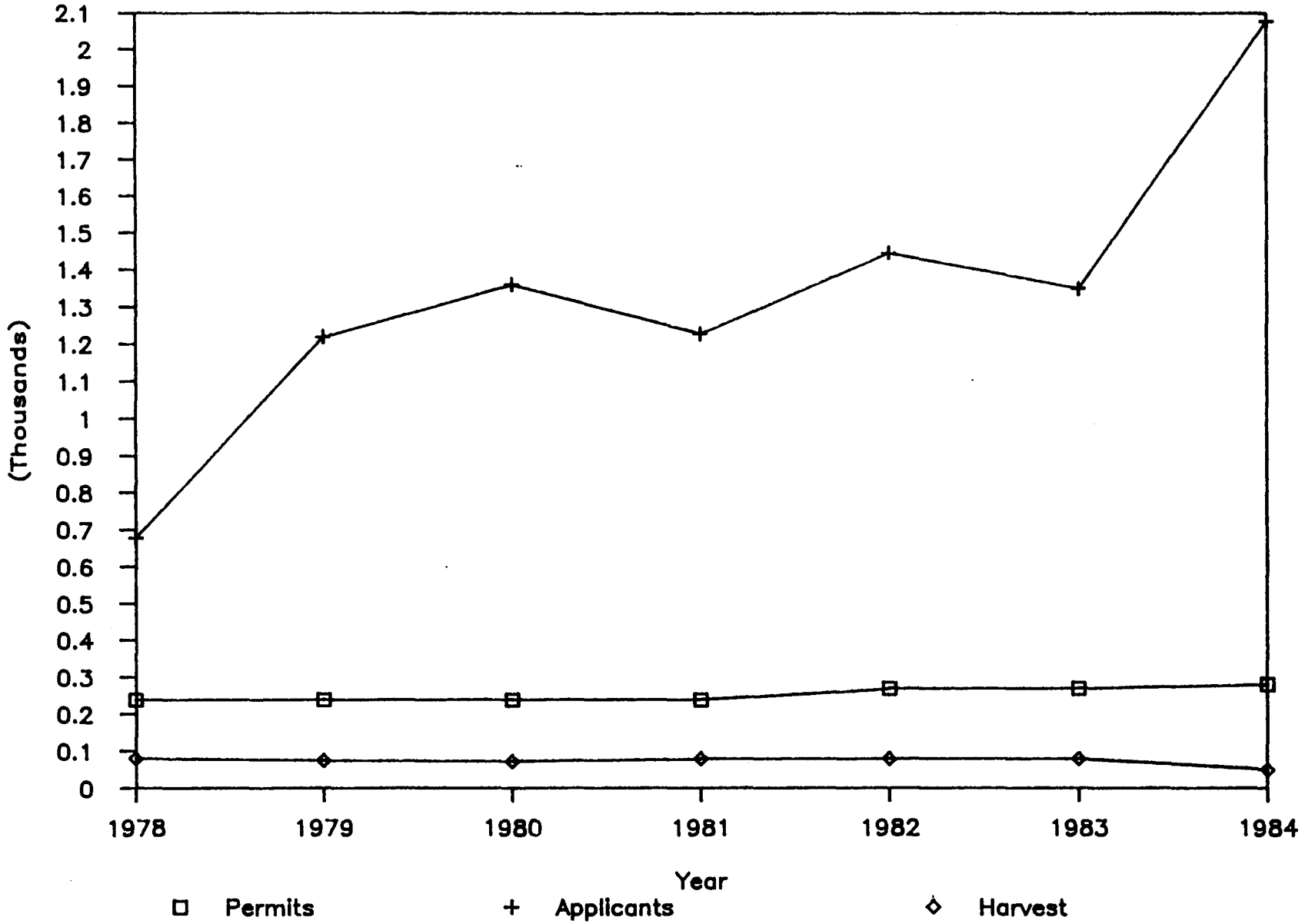


Figure 9. Western and Interior regions Dall sheep drawing hunts.

Table 24. Western and Interior Regions Dall Sheep Registration Hunts, 1978-84

Year	GMU	No. of Hunts	Permits Issued	Estimated Harvest
1978	12,13,20	1	179	27
1979	12,13,20	1	95	29
1980	12,13,20	1	90	11
1981	12,13,20	1	57	5
1982		1	---------- no hunt ----------	
1983	12,13,20	1	39	5
1984	12,13,20	1	64	7

Source: Sexton 1979-85.

Table 25. Western and Interior Regions Muskoxen Drawing Hunts, 1978-84

Year	GMU	No. of Hunts	Permits Issued	Applications Received	Estimated Harvest
1978	18	4	10	12	3
1979	18	2	5	52	5
1980	18	2	5	40	3
1981	18	4	10	34	4
1982	18	4	10	27	4
1983	18	4	5	42	2
1984	18	2	5	90	2

Source: Sexton 1979-85.

Table 26. Western and Interior Regions Muskoxen Registration Hunts, 1979-84

Year	GMU	No. of Hunts	Permits Issued	Estimated Harvest
1979	18	1	0	0
1980	18	1	1	0
1981	18	1	4	4
1982	18	1	4	4
1983	18	1	10	2
1984	18	1	10	10

Source: Sexton 1980-85.

Table 27. Western and Interior Regions Brown Bear Drawing Hunts, 1978-84

Year	GMU/GMS	No. of Hunts	Permits Available	Applications Received	Estimated Harvest
1978	24,25	3	78	114	21
1979	24,25	3	55	104	8
1980	24,25	3	55	74	15
1981	19B,14,15	6	71	114	16
1982	19B,24,25	6	55	147	17
1983	19B,24,25	6	71	131	15
1984	24,25	4[a]	33	106	5

Source: Sexton 1979-85.

a Two new hunts added in GMU 24; four hunts in GMS 19B changed to general hunts.

Table 28. Western and Interior Regions Brown Bear Registration Hunts, 1983-84

Year	GMU	No. of Hunts	Permits Issued	Estimated Harvest
1983	24 & 26*	1	8	1
1984	24 & 26*	1	8	2

Source: Sexton 1979-85.

* Gates of the Arctic National Park subsistence hunt only.

Table 29. Western and Interior Regions Moose Registration Hunts, 1978-84

Year	GMU/GMS	No. of Hunts	Permits Issued	Estimated Harvest
1978	20	1	---	14
1979	20,21	3	501	82
1980	20B & D	3	465	57
1981	20B, D	2	513	53
1982	20B, D	2	566	51
1983	20B,21D,25	3	160*	68
1984	20B,21D,25D	3	*	35

Source: Sexton 1979-85.

--- means no data were available.

* Data incomplete.

Table 30. Arctic Region Dall Sheep Drawing Hunts, 1979-84

Year	GMU	No. of Hunts	Permits Available	Applications Received	Estimated Harvest
1979	25,26	3	400	400	87
1980	25,26	4	480	345	61
1981	25,26	4	400	235	61
1982		0	no hunts		
1983		0	no hunts		
1984		0	no hunts		

Source: Sexton 1980-85.

Table 31. Arctic Region Moose Registration Hunts, 1978-84

Year	GMU	No. of Hunts	Permits Issued	Estimated Harvest
1978	22,23	3	---	---
1979	22,23	4	729	155
1980	22,23	3	492	121
1981	22,23	3	693	85
1982	22,23	3	904	162
1983	22	3	747	145
1984	22	3	601	74*

Source: ADF&G 1980, 1981a, 1981c, 1983, 1984, 1985a.

--- means no data were available.

* Data incomplete.

Table 32. Arctic Region Muskox Drawing Hunts, 1983-84

Year	GMU	No. of Hunts	Permits Issued	Applications Received	Estimated Harvest
1983	25,26	1	5	52	4
1984	25,26	1	5	42	5

Source: Whitten, pers. comm.

Table 33. Arctic Region Caribou Registration Hunts, 1978-84

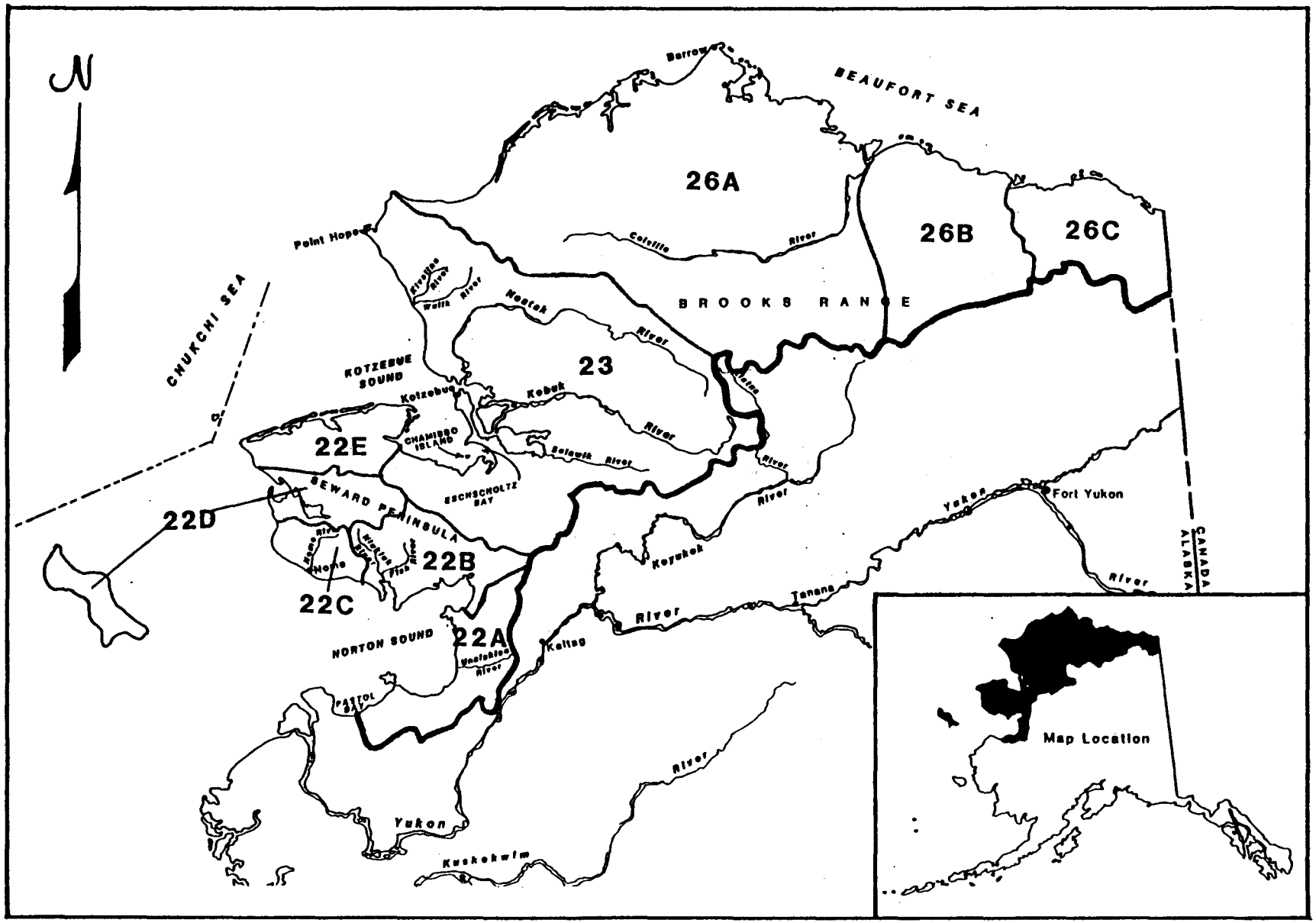
Year	GMU/GMS	No. of Hunts	Permits Issued	Estimated Harvest
1978	23,24*,26	2	---	---
1979	22, 25*	2	1,946	852
1980		0	No hunts ----------	
1981		0	No hunts ----------	
1982	22,23,24,26A	1	**	1,418
1983	22,23,24,26A	1	**	1,249
1984		0	No hunts ----------	

Source: Sexton 1979-85.

--- means no data were available.

* Part of Interior Region.

** Data incomplete.



Map 4. Game management units in the Arctic Region.

Table 34. Arctic Region Dall Sheep Registration Hunts, 1979-83

Year	GMU/GMS	No. of Hunts	Permits Issued	Estimated Harvest
1979	26C	1	---	20*
1980	26C	1	12	*
1981	26C	1	20	36
1982	23,24,25A, 26A,26C	3	*	*
1983	23,24,25A, 26A,26C	3	*	*

Source: Sexton 1979-85.

--- means no data were available.

* Data incomplete.

Table 35. Arctic Region Pacific Walrus Registration Hunts, 1978

Year	GMU	No. of Hunts	Permits Issued	Estimated Harvest
1978	18,22,23,26	1	---	---

Source: Sexton 1979.

--- means no data were available.

Table 36. Arctic Region Brown Bear Drawing Hunts, 1978-83

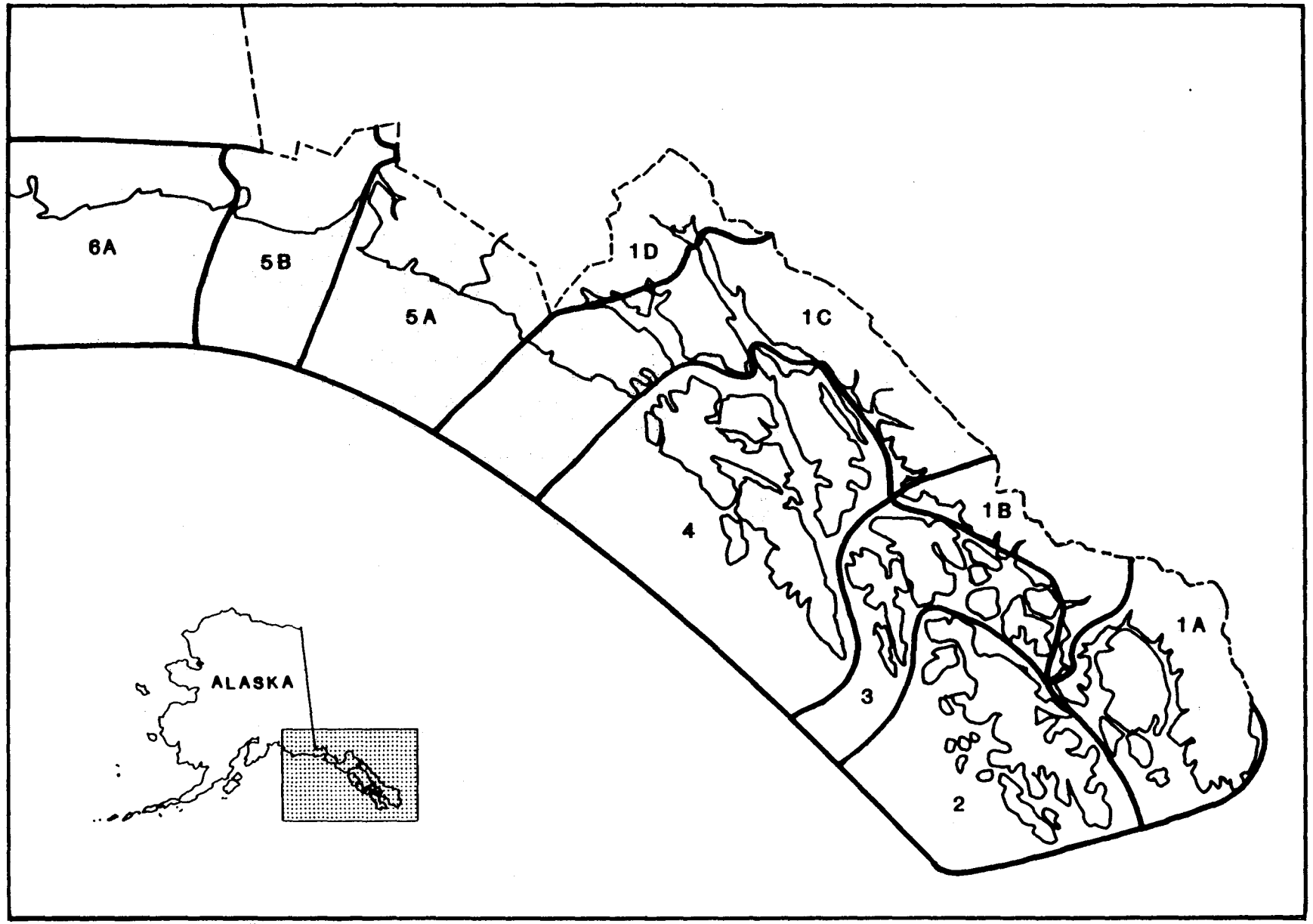
Year	GMU	No. of Hunts	Permits Available	Applications Received	Estimated Harvest
1978	23,26	4	82	114*	14
1979	23,26	4	82	126*	24
1980[a]	22,23,26	6	109	141*	32
1981[a]	22,23,26	6	119	215	29
1982[a]	22,23,26	6	119	187	30
1983[a]	22,23,26	6	115	210	51
1983[b]	22,23,26	6	120	190	40

Source: Sexton 1979-85, BGDIF 1978-84.

* Fall hunts only; data not available for spring hunts.

a Two hunts in GMUs 22 and 23 were for nonresidents.

b Only nonresidents required to have drawing hunt permits.



Map 5. Game management units in the Southeast Region.

registration deer hunt was also held. The hunt extended the season into January, with permits issued only in Angoon. The number of applicants for a small number of moose permits (15-25) increased from 326 in 1978 to 777 in 1981, then decreased to 589 in 1984 (an 81% increase, table 37). The number of hunters that registered for moose registration hunts increased from 234 in 1978 to 1,288 in 1984 (a 450% increase, table 38, fig. 10). The number of hunts also increased from two hunts in 1978 to six hunts in 1984; the additional hunts were previously general hunts that required additional regulation because of increased demand.

In 1978, one registration hunt was held for mountain goat in the Southeast Region. The number of hunts rose to 8 by 1981. In 1984 one hunt near Skagway was discontinued because of concerns about the size of the local goat population. The number of permits issued increased from 175 in 1978 to 1,335 in 1984 (a 663% increase, table 39).

D. Summary

The complex system of game regulations, including seasons, bag limits, drawing, registration, and Tier II hunts, is an alternative to market economics for managing supply and demand allocation problems. Information regarding dramatic increases in the demand for game hunting opportunities can be a persuasive argument in the land use planning arena. It is apparent from this analysis that the demand for hunting opportunities is increasing significantly throughout the state and quite rapidly in regions with relatively high human populations and unique hunts. It is also apparent that despite diminishing chances of obtaining a permit, applicants continue to compete for hunts because no close substitutes exist for these opportunities. Increasingly more intensive management of Alaska game populations will be required to accommodate a continued growth in hunter demand if it continues at the rate which occurred between 1978 and 1984. Although the ability of hunting regulations to control legal harvest is shown in the tables in this analysis, further regulation and hunting restrictions probably will be required to protect game populations.

Data are available, but not readily accessible, to conduct more detailed analyses of permit drawing and registration hunts. Changes in the number of permit applicants can be analyzed on a subregional basis (hunt or GMU, for example) that corresponds to a particular planning area. Presentation of this type of data also specifically addresses the fact that game allocation and regulations in Alaska directly affect the apparent economic value of hunting. As long as the hunting of game populations is allocated

Table 37. Southeast Region Moose Drawing Hunts, 1978-84

Year	GMU	No. of Hunts	Permits Available	Applications Received	Estimated Harvest
1978	1	1	20	326	12
1979	1	1	25	514	17
1980	1	1	25	974	5
1981	1	1	25	777	10
1982	1	1	25	597	5
1983	1	1	15	699	13
1984	1	1	15	589	14

Source: Sexton 1979-85; Zimmerman, pers. comm.

Table 38. Southeast Region Moose Registration Hunts, 1978-84

Year	GMU/GMS	No. of Hunts	Permits Issued	Estimated Harvest
1978	5	2	234	39
1979	5	2	257	42
1980	5	2	138	16
1981	5	2	133	29
1982	5	3	328	76
1983	5	3	414	60
1984	1B,1C,1D, and 5A,5B	6	1,288	141

Source: Sexton 1979-85; Zimmerman, pers. comm.

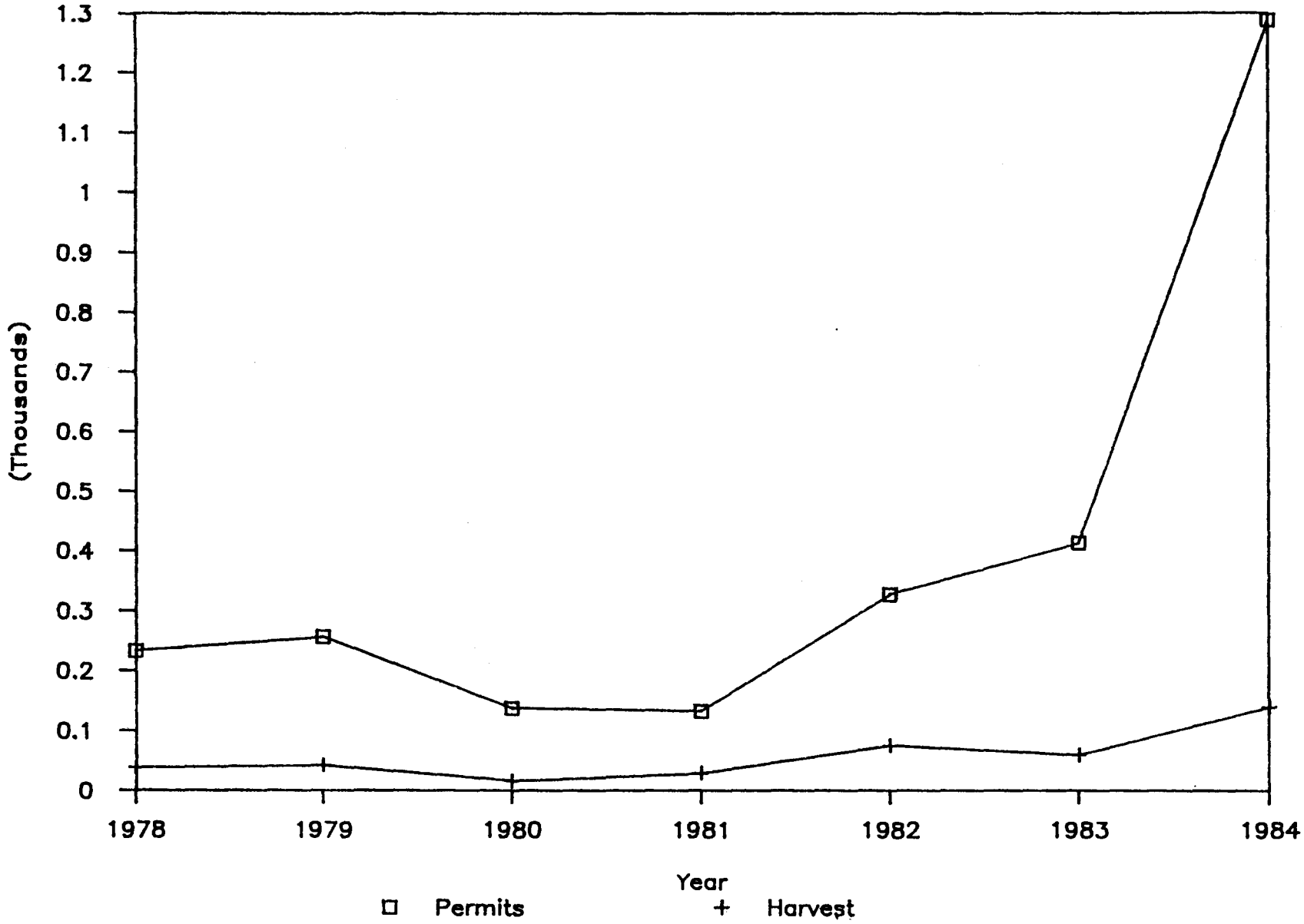


Figure 10. Southeast Region moose registration hunts.

Table 39. Southeast Region Mountain Goat Registration Hunts, 1978-84

Year	GMU/GMS	No. of Hunts	Permits Issued	Estimated Harvest
1978	4	1	175	32
1979	4	1	253	59
1980	1A-D,4,5A-B	7	1,466	244
1981	1A-D,4,5A-B	8	1,459	270
1982	1A-D,4,5A-B	8	1,426	254
1983	1A-D,4,5A-B	8	1,433	255
1984	1A-D,4,5A-B	7	1,335	205

Source: Sexton 1979-85; ADF&G 1980,1981b.

Table 40. Southeast Region Deer Registration Hunts, 1984

Year	GMU	No. of Hunts	Permits Issued	Estimated Harvest
1984	4*	1	64	11

Source: Sexton 1985.

* Extended hunting season.

to local residents on an easily accessible and relatively low-cost basis, it is contradictory to use expenditure surveys to debate competing and/or exclusive land use planning decisions. Detailed analysis of the allocation and permit system may lead to improved and more appropriate ways of evaluating the demand for game resources than solely through conventional economic methods.

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III. STATEWIDE DALL SHEEP HUNTER ECONOMIC SURVEY- PRELIMINARY RESULTS

A. Introduction

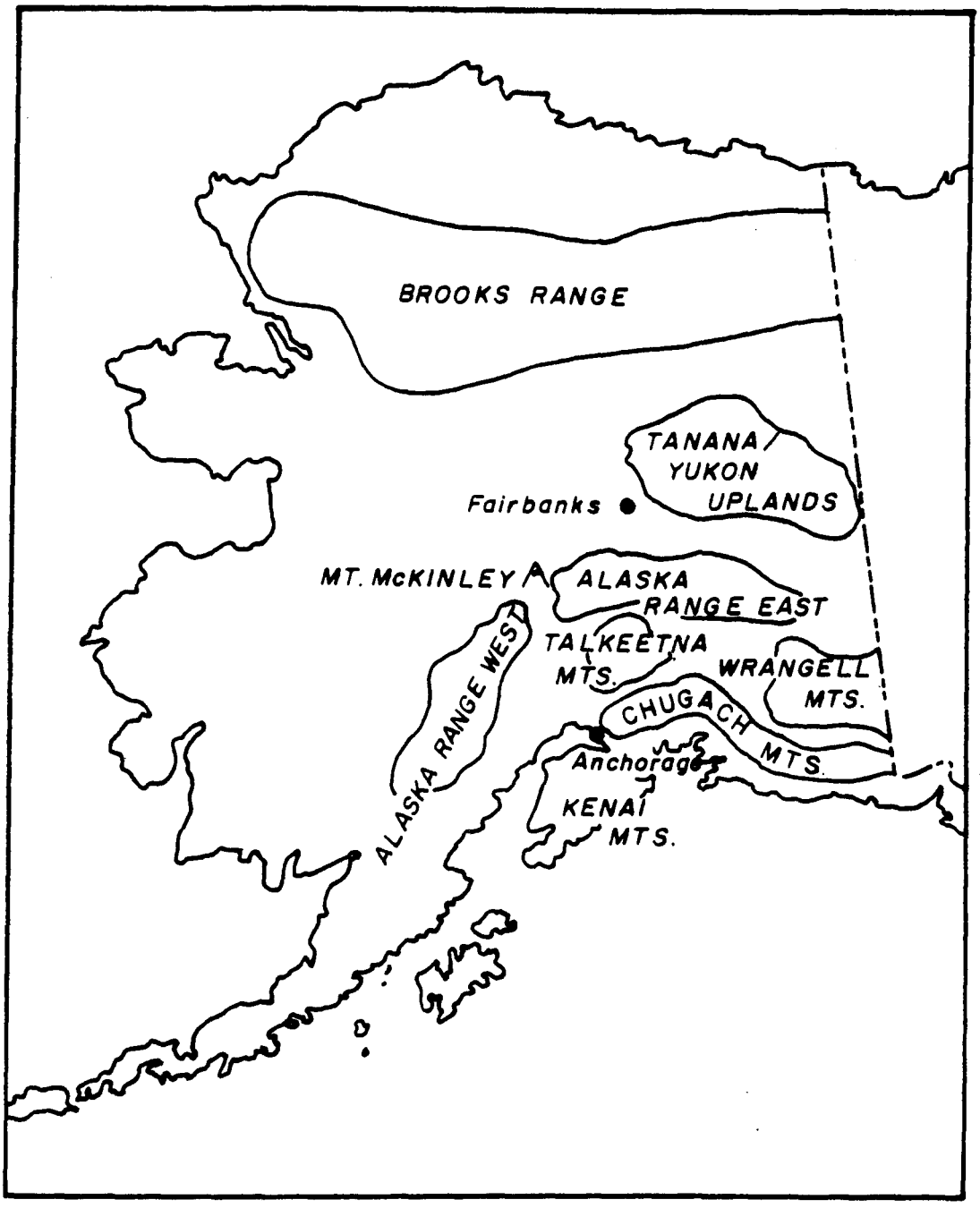
Approximately 2,600 people hunt Dall sheep each year in Alaska, harvesting about 1,100 sheep in the 40-day season (August 10 to September 20). Approximately 80% of the hunters are residents and 20% are nonresidents (ADF&G 1984).

Sheep hunters in Alaska have a variety of hunting opportunities from which to choose. Hunters may choose from eight different mountain ranges in the state, each having its own unique characteristics of terrain, weather, and accessibility (map 1). Dall sheep population characteristics also vary within each of these mountain ranges, which further accentuates the options available to hunters. However, sheep hunters do not have unlimited opportunities in Alaska. Restrictions include bag limits, minimum horn lengths, and area-specific transportation restrictions. Nonresidents are also required to purchase a Dall sheep tag and hire a guide unless they are hunting with an Alaska resident who is within the second degree of kindred.

Alaska is undergoing rapid changes in major land ownership as well as in decisions regarding the alternative uses of land. Economic valuation is a procedure that is increasingly being used by land and natural resources managers to estimate the costs and benefits of different land uses. To ensure that the value of areas used for wildlife are also adequately considered among the alternative uses, the economic value of wildlife habitat needs to be determined. In response to this need, in February 1984 the ADF&G, Division of Game, sent mail questionnaires to people who hunted Dall sheep during 1983. The purpose of the survey was to determine the economic values of Dall sheep hunting in Alaska. Such values express the economic role of sheep hunting and, by inference, sheep habitat to Alaska's economy and its sheep hunters. Land managers at state and local levels can use these economic figures to more fully evaluate the economic criteria of proposed alternative uses of Dall sheep habitat. Examples of development proposals for Dall sheep habitat include grazing of domestic livestock, mining, and human settlement, all of which can be incompatible with wild sheep.

B. Methodology

The economic aspect of Dall sheep hunting was estimated using a questionnaire prepared by department sheep biologists and economic and social research experts from the University of Alaska. The questionnaire was mailed in February 1984 to all resident and nonresident hunters who legally hunted Dall sheep in Alaska during



Map 1. The eight major mountain ranges inhabited by Dall sheep in Alaska.

1983 (2,121 residents and 396 nonresidents for a total of 2,517 hunters). After approximately two weeks, a reminder postcard was sent to all hunters who had not returned surveys. Approximately one month after the first survey was mailed, a second survey was sent to nonrespondents.

Eighty-nine percent of the hunters completed and returned their questionnaires. The nonresident return rate was 91%, while the resident return rate was 85%. Table 1 shows the information on survey mailings and responses. The high response rate increases the accuracy of survey results and is possibly indicative of sheep hunters' strong interest in sheep hunting. But because not all hunters responded to the questionnaire or answered every question, values found in the tables presented are values of respondents only and not the entire population of 1983 hunters. Some of the results have been estimated for the total population of 1983 hunters (respondents and nonrespondents); these figures are indicated as such. These estimates assume that the nonrespondents behaved as the survey respondents and do not take into consideration any response bias; the relatively high survey response rate and the tendency for economic methods to underestimate values makes this approach reasonable.

High response rates in mail surveys tend to reduce nonresponse bias and increase the precision of results (Filion 1978). Therefore, a number of techniques were used to encourage hunter response. Contact was made with hunters through newspaper articles prior to the survey mailing. The questionnaire was also pretested by the Alaska Chapter of the Foundation for North American Wild Sheep, who offered improvements in the wording of questions. Length and appearance of the questionnaire were also considered important. The final questionnaire contained 18 (for residents) or 20 (for nonresidents) questions in four double-spaced pages (attachments 1 and 2). A cover letter signed by the Director of the Division of Game explained the purpose of the survey and was printed inside the cover page. Illustrations and colored ink were used to enhance the visual impact of the questionnaire. Questionnaires were mailed with first-class postage to ensure the return of nondeliverable questionnaires; a return postage-paid envelope was included with each questionnaire.

Gross expenditures, travel cost, and contingent valuation were three techniques used in the survey to determine economic aspects of Dall sheep hunting. These three are the most extensively used and developed nonmarket economic evaluation methods. More than one method was used to enable the value of Dall sheep hunting to be comparable to the values of alternative uses obtained through several methods. Hunters were asked questions about their hunt, their expenditures, and the value of the hunt (and future hunts) to them in economic terms. The nonresident hunters who came to

Table 1. Responses to Statewide Dall Sheep Hunter Economic Survey by Date of Mailing

	2/20/84		3/30/84		Total	
	Resident	Nonresident	Resident	Nonresident	Resident	Nonresident
Number mailed	2,121	396	706	157	---	---
Undeliverable	86	6	0	0	86	6
Cumulative number of responses	1,052	182	1,756	307	1,806	354
Total usable surveys*	---		---		1,728	351

--- means no data were available.

* Not all questions, however, were necessarily answered or usable.

Alaska for reasons besides sheep hunting were also asked what fraction of their expenditures could be attributed to the sheep hunt. Their total expenditures could then be multiplied by this fraction to reflect only the cost of their sheep hunt. All hunters were assured their responses would be kept anonymous.

The gross expenditure technique summarizes the amount of money spent on the hunt. Expenditure data are useful in estimating monetary costs to the user. They can also provide information on the effects of a particular activity on local, regional, or state economies. This latter use is the most appropriate and significant for land use planning and management. Hunter expenditure information, however, does not estimate net benefits. Gross expenditures do not equal economic value. Expenditure data underestimates value because it is assumed that people will buy a good or service if the benefits exceed the costs. Equating expenditures with economic value is probably the most common misapplication of survey data. Loomis et al. (1984) gives examples of how misuse of expenditure information can be detrimental to wildlife and habitat planning considerations.

The travel cost method was conceived of by Hostelling (1947) and developed by Clawson (1959). Numerous revisions have improved the technique (Stroll 1982). The travel cost is a direct method of estimating economic value. The basic principal of the technique is that as the distance travelled to each site increases, travel costs increase, and the proportion of people in the associated geographic area willing to make the trip decreases. If people coming from different distances receive the same benefits on the site, then the difference in their travel costs equals the difference in the net benefits they receive (Bart et al. 1979).

Contingent valuation is an indirect method for measuring net economic benefits. It asks users to estimate how much more their costs could increase before they would switch to another activity (i.e., it estimates their willingness to pay). The amount remaining between what they actually paid and what they would be willing to pay is the net benefit (also referred to as the consumer's surplus). Answers to this question are typically constrained by income. Contingent value can also be estimated by asking how much a user would sell the activity for. Contingent valuation questions are largely hypothetical, and users can have difficulty predicting their own willingness to pay or sell for nonmarket items (Dwyer et al. 1976). For more discussion of contingent valuation, travel cost, and expenditure methodologies and consumer's surplus, see the methodology and data discussions in the Statewide Hunting Economic Overview section.

C. Economic Profiles

Economic and demographic profiles of the average resident and nonresident sheep hunter are useful in understanding more about sheep hunters. Caution should be used, however, when evaluating these averages because no information is indicated regarding the distribution of the data about the mean. Also, one must not confuse the mean expenditure with the mean price of a particular item. For example, nonresident hunters who hunted with a resident relative paid nothing or only nominal fees for their "guide." These negligible costs skew the average nonresident's expenditure for guide fees to a much lower amount than the average price one would expect to pay for a state-licensed guide.

Resident sheep hunters spent a mean of $1,567 for each sheep hunt (table 2) on a variety of goods and services. Ninety-six percent of this amount was spent in Alaska. Nonresident hunters spent a mean of $9,850 in total expenditures, with almost 80% of this spent specifically on their sheep hunt (table 2). Seventy-eight percent of of their total expenditures went directly into Alaska's economy. Their expenses went toward items similar to the residents', with the addition of transportation to Alaska. Nonresidents spent more on every item except for transportation within Alaska; guide fees typically include some transportation costs.

D. Demographic Profiles

The average resident hunter's age was most likely to be in the 30s (41%), although ages ranged from the under-20 age group (7%) to the 70-79 age group (0.5%). The annual household income level that described more hunters than any other was $30-$40,000 (15%), but $20-$30,000 (14%) and $40-$50,000 (13%) described similar numbers of hunters. Incomes ranged from under $10,000 (8%) to over $140,000 (3%).

The resident sheep hunter had lived in Alaska an average of 11 years, with the range being from 1 to 72 years. Most sheep hunters were male regardless of residency and had gone sheep hunting a mean of 3.8 times, including the 1983 hunt, and killed 1.38 sheep. Hunter success in 1983 was 33%. Interestingly, 43% of the hunters were sheep hunting for the first time in 1983. This affected the data for the average number of times a sheep hunter had gone hunting, and it is possible the inexperience of first-time hunters affected the average hunter success. First-time hunters will be studied as a subgroup in further analyses.

Table 2. Mean Expenditures by Commodity for Alaska Resident and Nonresident Dall Sheep Hunters in 1983

(n)	Residents	Commodity	Nonresidents[a]	(n)
		Transportation to Alaska	$ 973	(333)
(1,682)	$ 30	Guide fee	4,477	(332)
(1,682)	1	Guide tip	196	(331)
(1,679)	258	Transportation in Alaska	224	(333)
(1,683)	18	License fees	570	(335)
(1,678)	14	Lodging	106	(333)
(1,678)	27	Entertainment and restaurants	137	(333)
(1,678)	5	Tourism and gifts	243	(333)
(1,678)	183	Guns and ammunition	518	(334)
(1,678)	93	Camera and film	237	(334)
(1,678)	184	Camp gear	230	(334)
(1,678)	103	Taxidermy	449	(334)
(1,678)	535	Foregone income	1,427	(341)
(1,670)	126	Miscellaneous	119	(334)
(1,678)	$1,567	Average total	$9,850	(331)

a Not corrected for expenditures in addition to those only for sheep hunting.

Source: Watson 1986a.

For nonresidents, the demographic profile of the average hunter was somewhat different. Nonresident hunters were older, most likely between 40 and 50 years old (36%). Ages ranged from under 20 (1%) to in the 70s (1%). Hunters may have come from any of the states or from one of six other countries, but were most likely from Texas or, if from outside the United States, from West Germany. Annual household incomes ranged from less than $10,000 (3%) to over $140,000 (20%). Another 12% and 10% earned $30-$40,000 and $40-$50,000, respectively.

Hunting success for nonresidents was notably higher than for resident hunters. Seventy percent were successful in killing a sheep even though more than 75% were hunting Dall sheep in Alaska for the first time.

Even with the economic and demographic differences between resident and nonresident sheep hunters, both groups displayed a high interest in hunting sheep in the future. Nearly all (95%) of the resident hunters planned to go sheep hunting again despite their comparatively low success rate and the large number of first-time hunters. Half of these said they planned to go every year, and another 21% said they planned to go every other year. Less than 1% said they were not planning to go sheep hunting again.

More than half of the nonresidents (67%) plan to repeat the experience despite the costs. Forty-four percent of these said they planned to come one or two more times, and the remaining planned to return more often. Ten percent of the total nonresidents did not plan to hunt sheep in Alaska again.

E. Expenditure Results

Analysis of the survey responses is in the preliminary stage, but some summary statements can be made. The results indicate that sheep hunters who responded to the survey spent at least $5.2 million associated with their hunt in 1983 (table 3). The average resident hunter spent $1,567 and the average nonresident $7,780 directly related to their Dall sheep hunt. Estimated expenditures for the total population of people who hunted Dall sheep in 1983 were approximately $6.1 million. Hunters purchased hunting licenses, camping equipment, guns and ammunition, transportation, food, lodging, and other items.

Some hunters also took time off from work (without pay) to go sheep hunting. This cost hunters (respondents) $1.4 million in lost income ($1.6 million estimated for the total population of hunters). In addition to the expenditures listed above, responding nonresident hunters spent over $682,000 (average =

Table 3. Total and average expenditures of the Sample of 1983's Dall Sheep Hunters (by Residency and Hunt Area) in Alaska (Nonresidents' expenditures to Show Costs for Only Sheep Hunting)

Location	Residents (n)	Nonresidents (n)	Total (n)
AK Range, east of DNP[a]	$ 585,056 (393) $\bar{x}$= 1,485	$ 383,911 (49) 7,835	$ 968,967 (443) 2,185
AK Range, west of DNP[a]	162,098 (101) $\bar{x}$= 1,605	381,625 (49) 7,788	543,723 (150) 3,625
Brooks Range	437,577 (191) $\bar{x}$= 2,291	652,606 (76) 8,587	1,090,183 (267) 4,083
Chugach Mt Range	358,498 (259) $\bar{x}$= 1,384	260,228 (39) 6,673	618,727 (298) 2,076
Kenai Mt Range	90,078 (125) $\bar{x}$= 721	38,767 (8) 4,971	129,845 (133) 976
Talkeetna, Chulitna, Watana Mts	214,020 (175) $\bar{x}$= 1,223	173,250 (25) 6,930	387,270 (200) 1,936
Tanana-Yukon uplands	59,747 (38) $\bar{x}$= 1,689	19,720 (2) 7,803	79,467 (40) 2,684
Wrangell Mts	704,442 (417) $\bar{x}$= 1,689	632,042 (81) 7,803	1,336,484 (498) 2,684
Unspecified area	12,537 (7) $\bar{x}$= 1,791	39,790 (3) 13,263	52,327 (10) 5,233
Total	$ 2,624,053 (1,707) $\bar{x}$= 1,537	$ 2,582,940 (332) 7,780	$ 5,206,993 (2,039) 2,554
Estimate total[b]	$ 3,148,863 (2,121)	$ 2,944,552 (396)	$ 6,093,415 (2,517)

Source: Watson 1986a.

a DNP = Denali National Park

b The estimated total expenditures of 1983 Dall sheep hunters based on the expenditures of responding hunters.

Table 4. Total and Average Increased Costs (by Area and Residency) Given by the Sample of Alaska's Dall Sheep Hunters in Response to the Question: "How much greater would your total 1983 costs have to have been before you would have decided not to go sheep hunting?"

Location	Residents	(n)	Nonresidents	(n)	Total	(n)
AK Range, east of DNP[a]	$ 354,075	(372)	$ 65,513	(50)	$ 419,588	(422)
	$\bar{x}$= 952		1,310		994	
AK Range, west of DNP[a]	69,455	(91)	55,300	(47)	125,755	(138)
	$\bar{x}$= 763		1,177		904	
Brooks Range	181,275	(176)	2,747,325	(75)	2,928,600	(251)
	$\bar{x}$= 1,030		36,631		11,668	
Chugach Mt Range	169,392	(248)	42,300	(34)	211,692	(282)
	$\bar{x}$= 683		1,244		751	
Kenai Mt Range	67,013	(116)	22,500	(6)	89,513	(122)
	$\bar{x}$= 578		3,750		734	
Talkeetna, Chulitna, Watana Mts	95,060	(163)	30,625	(24)	125,685	(187)
	$\bar{x}$= 583		1,276		672	
Tanana-Yukon uplands	32,487	(38)	1,250	(2)	33,737	(40)
	$\bar{x}$= 855		625		843	
Wrangell Mts	337,530	(392)	128,888	(70)	466,418	(462)
	$\bar{x}$= 861		1,841		1,010	
Unspecified area	9,175	(6)	4,025	(5)	13,200	(11)
	$\bar{x}$= 1,529		805		1,200	
Total	$ 1,315,462	(1,602)	$ 3,097,726	(313)	$ 4,413,188	(1,915)
	$\bar{x}$= 821		9,897		2,305	

Source: Watson 1986a.

a DNP = Denali National Park

$1,943) hunting other species, visiting relatives, or vacationing. The estimated total for all nonresident hunters is approximately $777,480. This brought minimum estimated expenditures associated with sheep hunting to almost $6.0 million for respondents or approximately $6.9 million for all 1983 Dall sheep hunters. Nonresident hunters accounted for about half of these expenditures, even though resident hunters outnumbered them 6:1.

Approximately $5.1 million (85% of total expenditures) was spent in Alaska. Transportation to the hunting area was the largest expenditure made in Alaska for resident hunters, whereas guide fees, which typically include some transportation, food, and lodging, accounted for 58% of nonresidents' expenditures within the state. This information indicates that Dall sheep hunting provides a significant direct economic impact/benefit to the Alaska economy. The indirect or multiplier effects would be even greater. This information indicates that Dall sheep hunting provides a significant direct economic impact/benefit to the Alaska economy. The indirect or multiplier effects would be even greater.

F. Contingent Valuation Results

The survey also asked hunters willingness-to-pay and willingness-to-sell questions to estimate hunter net benefits. Net benefits are the difference between willingness-to-pay or sell and what was actually paid. For hunters who responded to the question (n=1,915), the difference between what they actually paid and what they were willing to pay was over $4.4 million. In response to the willingness-to-sell question, or the amount hunters would have to be compensated for the sale or loss of their 1983 hunting area during the following year(1984), the statewide total value was over $3.2 billion (table 5, fig. 1). When the foregone opportunity for sheep hunting was not limited to their 1983 hunt area but to all areas for the following year (1984), responding hunters (n=1,648) would have to be compensated over $4.5 billion (table 6). If sheep hunters lost forever the opportunity to hunt in their 1983 area (as would be the case if an alternative land use were to preclude sheep and/or sheep hunting), the total amount that would be required in compensation for the responding hunters (n=1,514) would be at least $16.6 billion (table 7). When the loss of all future Dall sheep hunting opportunities is expanded to all of Alaska, the lowest price required to compensate responding hunters (n=1,317) would be over $28.4 billion. It is very important to realize that these figures represent only values of 1983 hunters who actually responded to the particular question in the survey and do not include survey or question nonrespondents, people who obtained harvest report cards but did not hunt (4,967 hunters), people who hunt Dall sheep but

Table 5. Total and Average Price (by Hunt Area and Residency) Given by the Sample of Alaska's 1983 Dall Sheep Hunters in Response to the Question: "What is the lowest price you would charge for the sale of your opportunity to hunt Dall sheep in 1984 in your 1983 hunting area?"

Location	Residents	(n)	Nonresidents	(n)	Total	(n)
AK Range, east of DNP[a]	$ 2,007,647,043 $\bar{x}$= 5,939,784	(338)	$ 552,688 12,853	(43)	$ 2,008,199,731 5,270,865	(381)
AK Range, west of DNP[a]	101,326,368 $\bar{x}$= 1,125,849	(90)	1,140,050 26,513	(43)	102,466,418 770,424	(133)
Brooks Range	1,001,777,037 $\bar{x}$= 610,836	(164)	4,840,975 72,253	(67)	1,006,618,012 4,357,654	(231)
Chugach Mt Range	9,517,009 $\bar{x}$= 43,259	(220)	110,200 3,241	(34)	9,627,209 37,902	(254)
Kenai Mt Range	1,434,950 $\bar{x}$= 13,287	(108)	15,750 2,625	(6)	1,450,700 12,725	(114)
Talkeetna, Chulitna, Watana Mts	11,024,114 $\bar{x}$= 73,007	(151)	101,350 4,223	(23)	11,125,464 63,939	(174)
Tanana-Yukon uplands	109,700 $\bar{x}$= 3,324	(33)		(0)	109,700 3,324	(33)
Wrangell Mts	107,109,793 $\bar{x}$= 404,781	(243)	234,738 3,504	(67)	107,344,531 346,273	(310)
Unspecified area	59,000 $\bar{x}$= 11,800	(5)	6,675 2,225	(3)	65,675 8,209	(8)
Total	$ 3,240,005,014 $\bar{x}$= 2,396,453	(1,352)	$ 7,002,426 24,484	(286)	$ 3,247,007,440 1,970,272	(1,648)

Source: Watson 1986a.

a DNP = Denali National Park

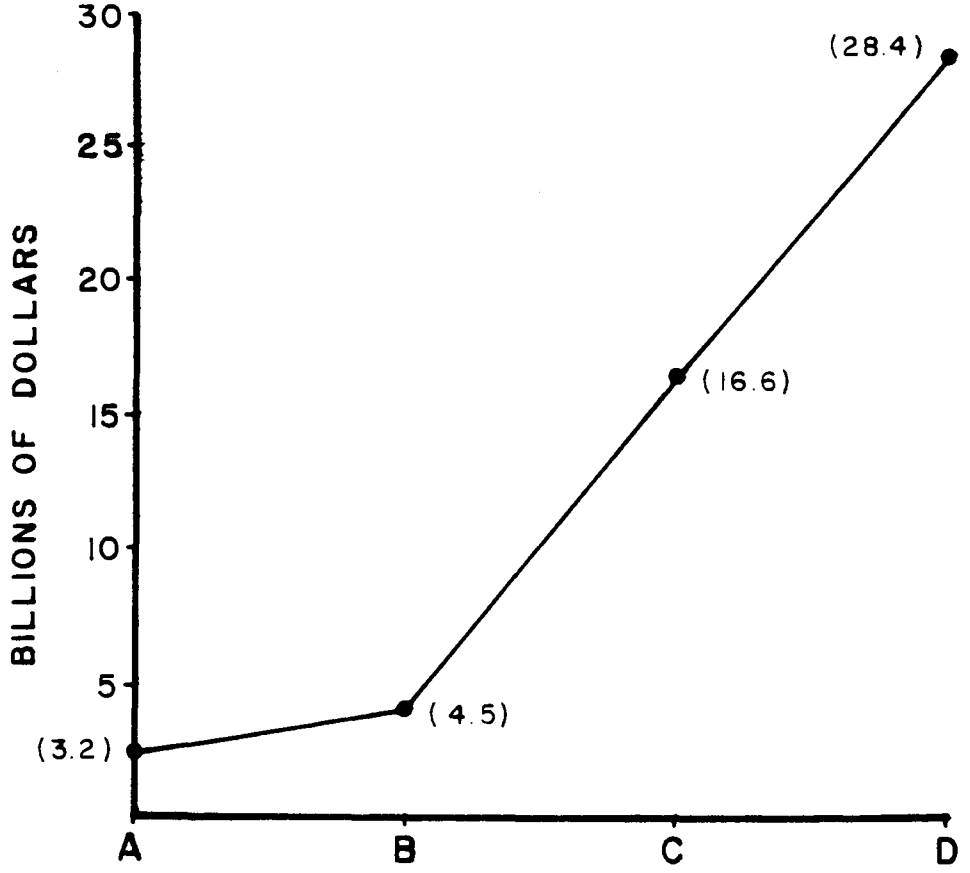


Figure 1. Total dollar amounts the sample of Alaska's 1983 Dall sheep hunters gave in response to the following questions:
What is the lowest price you'd charge for the sale of:

A....your opportunity to hunt Dall sheep in 1984 in your 1983 hunting area?
B....your opportunity in 1984 to hunt Dall sheep in any mountain range in Alaska?
C....all of your future opportunities to hunt Dall sheep in your 1983 hunting area?
D....all of your future opportunities to hunt Dall sheep in Alaska?

Table 6. Total and Average Price (by Hunt Area and Residency) Given by the Sample of Alaska's 1983 Dall Sheep Hunters in Response to the Question: "What is the lowest price you'd charge for the sale of your opportunity in 1984 to hunt Dall sheep in any mountain range in Alaska?" Area Listed Below Based on Respondents' 1983 Hunt Area

Location	Residents	(n)	Nonresidents	(n)	Total	(n)
AK Range, east of DNP[a]	$ 2,015,501,635 $\bar{x}$= 6,318,187	(319)	$ 165,126 3,840	(43)	$ 2,015,666,761 5,568,140	(362)
AK Range, west of DNP[a]	100,353,992 $\bar{x}$= 1,223,829	(82)	1,197,450 27,848	(43)	101,551,442 812,412	(125)
Brooks Range	100,297,825 $\bar{x}$= 651,285	(154)	4,799,710 73,842	(65)	105,097,535 479,897	(219)
Chugach Mt Range	18,574,060 $\bar{x}$= 90,165	(206)	101,385 3,168	(32)	18,675,445 78,468	(238)
Kenai Mt Range	104,255,530 $\bar{x}$= 922,615	(113)	20,200 3,367	(6)	104,275,730 876,267	(119)
Talkeetna, Chulitna, Watana Mts	1,110,197,067 $\bar{x}$= 7,873,738	(141)	149,101 6,777	(22)	1,110,346,168 6,811,940	(163)
Tanana-Yukon uplands	1,130,800 $\bar{x}$= 36,477	(31)		(0)	1,130,800 36,477	(31)
Wrangell Mts	1,060,929,007 $\bar{x}$= 3,294,811	(322)	248,612 4,010	(62)	1,061,177,619 2,763,483	(384)
Unspecified area	55,000 $\bar{x}$= 13,750	(4)	7,500 2,500	(3)	62,500 8,929	(7)
Total	$ 4,511,294,916 $\bar{x}$= 3,288,116	(1,372)	$ 6,689,084 24,236	(276)	$ 4,517,984,000 2,741,495	(1,648)

Source: Watson 1986a.

a DNP = Denali National Park

Table 7. Total and Average Price (by Hunt Area and Residency) Given by the Sample of Alaska's 1983 Dall Sheep Hunters in Response to the Question: "What is the lowest price you'd charge for the sale of all of your future opportunities to hunt Dall sheep in your 1983 hunting area?"

Location	Residents	(n)	Nonresidents	(n)	Total	(n)
AK Range, east of DNP[a]	$ 5,151,694,667 $\bar{x}$= 17,058,592	(302)	$ 1,594,088 41,950	(38)	$ 5,153,288,755 15,156,732	(340)
AK Range, west of DNP[a]	9,257,808 $\bar{x}$= 120,231	(77)	2,332,125 58,303	(40)	11,589,933 99,059	(117)
Brooks Range	2,117,697,800 $\bar{x}$= 16,165,632	(131)	37,086,800 607,980	(61)	2,154,784,600 11,222,836	(192)
Chugach Mt Range	3,048,932,675 $\bar{x}$= 15,168,819	(201)	163,750 6,298	(26)	3,049,096,425 13,432,143	(227)
Kenai Mt Range	8,914,300 $\bar{x}$= 96,895	(92)	20,500 4,100	(5)	8,934,800 92,111	(97)
Talkeetna, Chulitna, Watana Mts	517,934,083 $\bar{x}$= 4,245,361	(122)	2,726,400 118,539	(23)	520,660,483 3,590,762	(145)
Tanana-Yukon uplands	2,308,825 $\bar{x}$= 79,614	(29)		(0)	2,308,825 79,614	(29)
Wrangell Mts	5,687,198,008 $\bar{x}$= 18,894,346	(301)	2,900,088 50,879	(57)	5,690,098,096 15,894,129	(358)
Unspecified area	1,044,000 $\bar{x}$= 174,000	(6)	14,000 4,667	(3)	1,058,000 117,556	(9)
Total	$ 16,544,982,166 $\bar{x}$= 13,120,525	(1,261)	$ 46,837,751 185,129	(253)	$ 16,591,819,917 10,958,930	(1,514)

Source: Watson 1986a.

a DNP = Denali National Park

Table 8. Total and Average Price (by Hunt Area and Residency) Given by the Sample of Alaska's 1983 Dall Sheep Hunters in Response to the Question: "What is the lowest price you'd charge for the sale of all of your future opportunities to hunt Dall sheep in Alaska?"

Location	Residents	(n)	Nonresidents	(n)	Total	(n)
AK Range, east of DNP[a]	$ 9,374,220,255 $\bar{x}$= 33,841,950	(277)	$ 2,640,001 69,474	(38)	$ 9,376,860,256 29,767,810	(315)
AK Range, west of DNP[a]	20,945,833 $\bar{x}$= 299,226	(70)	2,477,326 58,984	(42)	23,423,159 209,135	(112)
Brooks Range	3,135,971,525 $\bar{x}$= 26,133,096	(120)	36,575,760 653,139	(56)	3,172,547,285 18,025,837	(176)
Chugach Mt Range	3,115,831,092 $\bar{x}$= 18,328,418	(170)	214,500 8,500	(25)	3,116,045,592 15,979,721	(195)
Kenai Mt Range	2,017,450,290 $\bar{x}$= 24,017,265	(84)	32,800 6,560	(5)	2,017,483,090 22,668,349	(89)
Talkeetna, Chulitna, Watana Mts	2,040,708,322 $\bar{x}$= 18,722,095	(109)	3,798,000 18,000	(21)	2,044,506,322 15,726,972	(130)
Tanana-Yukon uplands	2,995,100 $\bar{x}$= 119,804	(25)		(0)	2,995,100 119,804	(25)
Wrangell Mts	8,655,308,542 $\bar{x}$= 31,938,408	(271)	1,068,501 21,370	(50)	8,656,377,043 26,966,907	(321)
Unspecified area	2,035,000 $\bar{x}$= 407,000	(5)	37,000 12,333	(3)	2,072,000 259,000	(8)
Total	$ 28,365,465,959 $\bar{x}$= 25,079,988	(1,131)	$ 46,843,888 195,183	(240)	$ 28,412,309,847 20,723,785	(1,371)

Source: Watson 1986a.

a DNP = Denali National Park

did not intend to in 1983, or subsistence hunters. Therefore, these contingent value figures are merely an indication of value based on a relatively limited sample of 1983 hunters. If all hunters or future hunters were sampled, the results would probably be higher.

Many of the respondents indicated that they had difficulty answering some or all of the contingent value questions. This was indicated either by not answering the question or writing "priceless" instead of a value. The frequency of this occurrence increased from 18 to 57% with the increased hypothetical nature of the questions (i.e., from willingness-to-pay or willingness-to-sell hunting opportunities for one year in a particular area to all future opportunities in all areas). Residents and nonresidents had similar percentages of nonresponses or priceless answers until the last question; 62% of the residents and 33% of the nonresidents indicated that the opportunity to hunt was priceless or gave no answer (fig. 2).

The results of the willingness-to-sell question were approximately 736 times the value of the willingness-to-pay question for resident and nonresident respondents. This is an unusually large difference in these questions (see the economic methods section in this statewide hunting overview for examples of results from other contingent value surveys). The large differences could be attributed to the fact that the large expenditures required to hunt Dall sheep by both residents and nonresidents make little allowance for the ability to pay more. In economic terms, this is the income constraint effect. Nonresidents, on average, had larger incomes than residents and were therefore willing and able to pay more to assure their hunting opportunity. Nonresidents would have more than doubled their costs to be able to hunt (127% increase), whereas residents would increase their costs by 53%. Also, the greater the relative importance a particular item or activity is to a person, the greater the discrepancy between willingness-to-pay and sell questions (Meyer 1979). This could account for large differences in the pay and sell questions and the differences in the way residents and nonresidents responded to the questions. The ratio between what nonresidents were willing to pay and their compensation value was 1:2.5, whereas the ratio for residents was 1:2,919, suggesting that Dall sheep hunting is a much more important activity to residents than to nonresidents. This is supported by the demographic information, which indicates that most residents had hunted and killed Dall sheep a number of times. Contingent valuation results are also affected by the availability of substitutes. Hunting in Yukon, Canada is a relatively perfect substitute for nonresidents but not for Alaska residents because they are required to hire a guide in Canada. For Alaska residents, the price of sheep hunting would significantly increase if they were to hunt in Canada while the

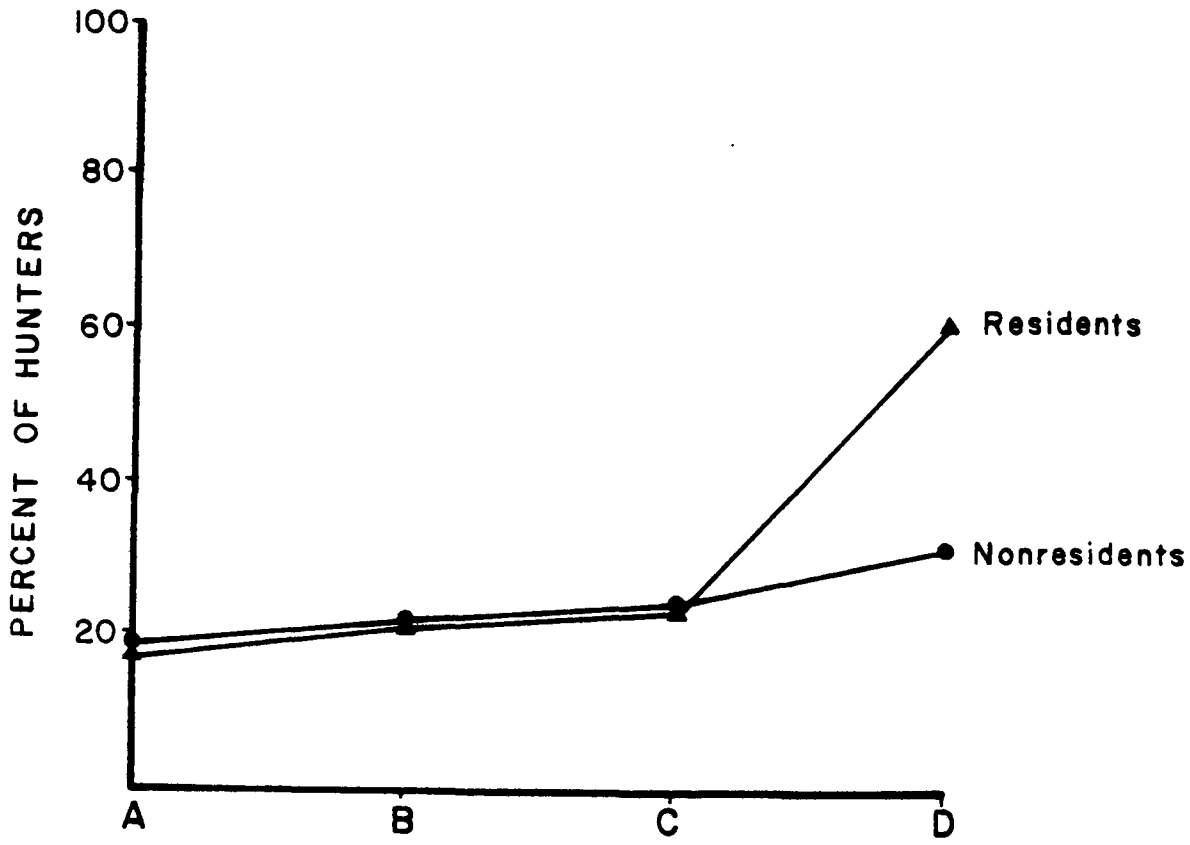


Figure 2. Percent of sample of Alaska's 1983 Dall sheep hunters who did not answer or answered "priceless" in response to the following questions:

What is the lowest price you'd charge for the sale of:

A....your opportunity to hunt Dall sheep in 1984 in your 1983 hunting area?
B....your opportunity in 1984 to hunt Dall sheep in any mountain range in Alaska?
C....all of your future opportunities to hunt Dall sheep in your 1983 hunting area?
D....all of your future opportunities to hunt Dall sheep in Alaska?

price difference would be relatively insignificant for nonresidents.

As discussed in the hunting statewide economic methods section in this volume, contingent value answers are affected by implicit or explicit property rights assumptions. In this Dall sheep survey, residents probably believed that they should not have to pay more but should be compensated not to hunt because hunting is a right as a resident of Alaska (some respondents explicitly expressed this as written comments on their questionnaires). On the other hand, nonresidents were probably willing to pay more for a unique, maybe once-in-a-lifetime hunting opportunity but did not feel they had the implicit right to sell the Alaska hunting opportunity.

G. Travel Cost Evaluation

At this time no results of the travel cost method are available for the Dall sheep hunter economic survey.

H. Summary

In the winter of 1984, a survey was sent to all people who had legally hunted Dall sheep in Alaska in 1983. The questionnaire contained demographic, expenditure, contingent value, and travel cost questions. The response rate to the survey was 65%. Results of the survey indicate that Dall sheep hunters provide a significant level of expenditures into the state and regional economies in the process of hunting and visiting the state, in the case of nonresident hunters. The average resident hunter spent $1,567 and the average nonresident spent $9,850 directly related to their Dall sheep hunt. Nonresidents also spent on average another $1,943 hunting other species, visiting relatives, or vacationing. Total expenditure for all respondents was approximately $6.0 million or an estimated $6.9 million for the total population of 1983 Dall sheep hunters. Eighty-five percent of these expenditures were in Alaska, which results in even larger secondary expenditure effects.

Results of the contingent valuation questions indicate that the responding Dall sheep hunters (n=1,915) would pay an additional $4.4 million (an increase of 85%) rather than forfeit their 1983 hunt area opportunity. However, because changes in land use or status would result in Dall sheep hunters being "net losers," the most appropriate question for benefit-cost analyses related to potential impacts on Dall sheep hunting or habitat would be the willingness-to-sell questions. The lowest value hunters would accept for the sale or loss in 1984 of their 1983 Dall sheep hunt area was $3.2 billion. The compensation required for the loss to

only the responding hunters for all future hunting opportunities in the state is over $28.4 billion. Obviously, the value of Dall sheep hunting to hunters and the state of Alaska is very large.

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Alaska Resident Dall Sheep Hunter Survey

ALASKA DEPARTMENT OF FISH AND GAME

STATE OF ALASKA

BILL SHEFFIELD, GOVERNOR

DEPARTMENT OF FISH AND GAME

DIVISION OF GAME

P.O. BOX 3-2000
JUNEAU, ALASKA 99802
PHONE: (907) 465-4190

February 10, 1984

Dear Sheep Hunter:

Thanks for returning your sheep hunter report form to us at the Alaska Department of Fish and Game. According to your report, you hunted Dall sheep in Alaska in 1983. We hope you are willing to participate in an important survey about sheep hunting in Alaska.

This survey is designed to estimate the economic value of Dall sheep hunting by asking how much hunters spend to hunt sheep and how much they value this experience. With this information we can estimate the importance of sheep hunting to Alaska's economy.

There is a critical need for this information. As Alaska moves ahead with programs that designate land for uses such as agriculture, housing, industry, and recreation, it makes sense to compare these potential land uses in terms of their economic value to the State. At present we do not have enough information on the value of sheep hunting to make fair comparisons between it and other land uses. With this information land allocation decisions may be improved by being based on more complete information.

We are not attempting to measure all economic values of Dall sheep. Certainly, other values exist such as the worth of unhunted sheep, but those values are more difficult to measure.

As you fill out the enclosed questionnaire, you will find some questions similar to those on your hunter report form. There are also questions about how you traveled to and from your hunting area. The purpose of these questions is to apply a travel-cost analysis technique used in resource economics. We then ask how much you spent on your 1983 sheep hunt and what, in general, you purchased. The answers to these questions will help show sheep hunting's value to the State's economy. To determine the value of sheep hunting to you, the hunter, we then ask questions that place you in imaginary situations of being able to buy and sell sheep hunting opportunities. These questions are very important, and we hope you will enjoy answering them.

Please take this opportunity to provide information that will help assure adequate evaluation of Dall sheep hunting in Alaska. Please complete this questionnaire today and return it in the postage-paid envelope provided for your convenience. Your answers will be kept confidential and anonymous and released only as part of total figures in a comprehensive report.

Should you have any questions about this questionnaire or its use, please telephone Wayne Heimer or Sarah Watson at (907) 456-5156.

Thank you.

Sincerely,

W. Lewis Pamplin, Jr.

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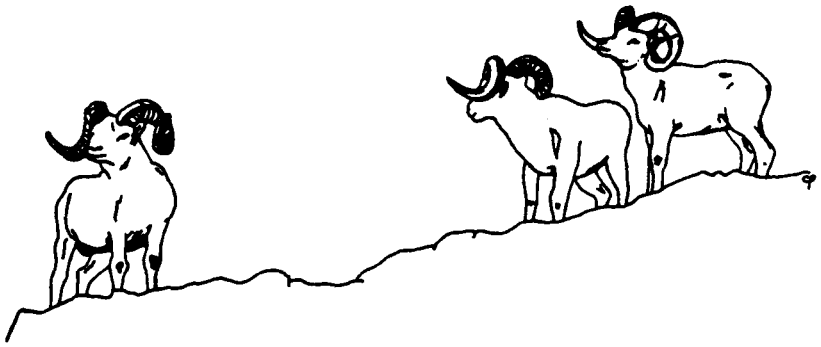


This questionnaire is being sent to those who hunted Dall sheep in Alaska in 1983. Your answers to this questionnaire are very important. They will help define an economic value for Dall sheep hunting which will be used to help plan for the future availability of Dall sheep hunting opportunities in Alaska.

Directions:

Most questions require a simple check mark (√) to answer. Please write your answers clearly in dark pen or pencil. Your answers will be kept anonymous and confidential, released only as part of total figures in a comprehensive report.

Please answer this questionnaire and return it today in the postage-paid envelope provided for your convenience. We appreciate your help.

First, we would like to know a little about you as a Dall sheep hunter.

1. Please list all the years you have gone sheep hunting in Alaska:
1983, _____

_____

2a. How many times have you killed a Dall sheep in Alaska including your 1983 hunt? _____times

2b. Did you kill a Dall sheep in Alaska in 1983? ____yes ____no

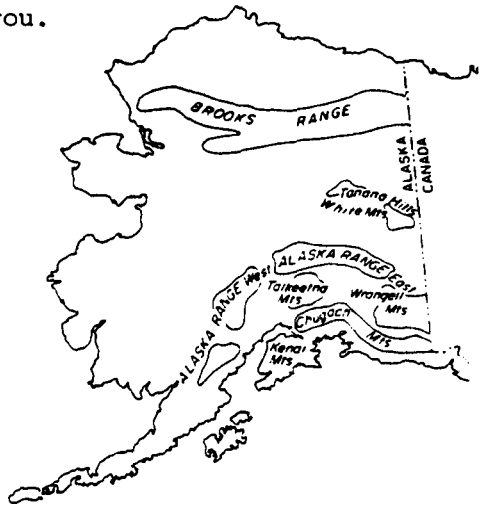
3a. Do you plan to hunt Dall sheep in Alaska in the future?
____yes ____no ____don't know

3b. If yes, about how often in your life do you expect to go? (Check (√) one.)

____one or twice more in my life
____once every 5 years of my life
____once every 3-4 years of my life
____every other year
____every year

Now we would like to know a little about your 1983 Dall sheep hunt.

4. Where was your hunting area? Please check (✓) the mountain range location(s) where you hunted Dall sheep in 1983. The map of Alaska may help you.



____Alaska Range, east of Denali National Park
____Alaska Range, west of Denali National Park
____Brooks Range
____Chugach Mountains
____Kenai Mountains
____Talkeetna, Chulitna, Watana Mountains
____Tanana Hills-White Mountains
____Wrangell Mountains

5. What type(s) of transportation did you use to get to and from your hunting area (before you started walking)?

____commercial airplane
____single engine/"bush" plane
____horse
____off-road vehicle
____snow machine
____highway vehicle
____other _____
(please specify)

6. About how long did you spend traveling round-trip to your hunting area (not including walking time)? _____days traveling

7a. If you couldn't have gone to the moutain range where you hunted in 1983, would you have gone sheep hunting? ____yes ____no ____don't know

7b. If yes, where would you have gone?

_____
(Pick one from the list in Question 4.)

8. At the time of your Dall sheep hunt, were you

____self-employed
____employed by someone else (please check (✓) one to answer)
____unemployed

9a. If you were employed or self-employed, did you take time off from your work to go sheep hunting? ____yes ____no

9b. If yes, how many days? _____days

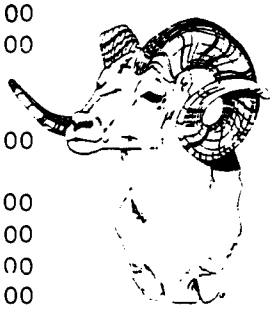
9c. Were any of those days off from work covered by paid vacation? ____yes ____no

9d. If yes, how many days? _____days

10. About how much more could you have earned not including paid vacation had you not gone sheep hunting? $_____.00

11. How much did your Dall sheep hunt cost? We are interested in how much you spent and how you spent your money on your 1983 Dall sheep hunt in Alaska. Your answers to these questions will help us evaluate what Dall sheep hunting is worth and, specifically, its worth to Alaska's economy.

Please estimate your total expenses for the following categories. The cost of your guide's services, if any, may have included some of the other services as a "package hunt." Please account for as many separate costs as possible.



A. Guide fee: $_____.00
Tips and bonuses: $_____.00

B. Additional expenses to your sheep hunt:
License and tag fees: $_____.00
Transportation to and from your sheep hunting area: $_____.00
Lodging: $_____.00
Restaurants and entertainment: $_____.00
Tourism and gifts: $_____.00

C. You may have bought equipment and services from businesses outside of Alaska. Please estimate your expenses to businesses in and outside of Alaska in the space given below. This will help us evaluate sheep hunting's effect on the economy. Please include only your 1983 expenditures.

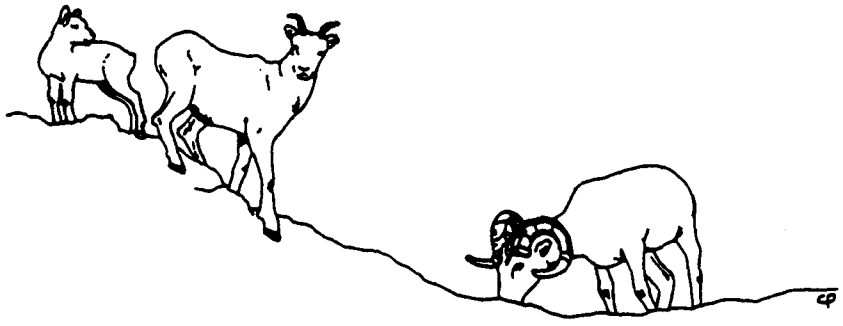
Paid to businesses outside of Alaska		Paid to businesses inside of Alaska
$_____.00	Guns, ammunition, scope	$_____.00
$_____.00	Binoculars, camera, film	$_____.00
$_____.00	Camping equiment and supplies	$_____.00
$_____.00	Taxidermy and butchering	$_____.00
	Please list any other expenses:	
$_____.00	_____	$_____.00
$_____.00	_____	$_____.00
$_____.00	_____	$_____.00
$_____.00	_____	$_____.00

Total cost (A + B + C) = $_____.00 (This is optional. We will add this for you if you would like.)

As long as we are talking about costs, we would like to ask you some "what if" questions. These questions involve entirely imaginary situations; they are the best way we know to determine the economic value of sheep hunting to YOU, the hunter. The questions may seem long, but we think you'll find them an enjoyable challenge. Please give us your best estimate.

12. "What if" all of your 1983 sheep hunting costs were greater than your estimate in Question 11? Assume your hunt was exactly the same, but costs were higher. (We have no intention of increasing license or tag fees. This is an entirely imaginary situation to help determine the economic value of sheep hunting.) HOW MUCH GREATER (over and above what you paid in Question 11) WOULD YOUR TOTAL 1983 COSTS HAVE TO HAVE BEEN BEFORE YOU WOULD HAVE DECIDED NOT TO GO SHEEP HUNTING?

$ 0.00	____	$ 751.00-1,000.00	____
$ 1.00- 50.00	____	$1,001.00-1,500.00	____
$ 51.00-100.00	____	$1,501.00-2,000.00	____
$101.00-250.00	____	$2,001.00-3,000.00	____
$251.00-500.00	____	$3,001.00-5,000.00	____
$501.00-750.00	____	more than $5,000.00	$_____.00 (Please specify)



Here is another "what if" situation:

13a. "What if" you could sell your 1984 opportunity to hunt Dall sheep in your hunting area (where you hunted in 1983)? (This is not possible to do. This is just an imaginary situation to help determine economic value.) We want to know what price you'd charge. If you were given this amount of money, you'd sell! And if you sold your hunting opportunity, you could not hunt Dall sheep in 1984 in your hunting area. WHAT IS THE LOWEST PRICE YOU'D CHARGE FOR THE SALE OF YOUR OPPORTUNITY TO HUNT DALL SHEEP IN 1984 IN YOUR 1983 HUNTING AREA?

$ 0.00	____	$ 751.00-1,000.00	____
$ 1.00- 50.00	____	$1,001.00-1,500.00	____
$ 51.00-100.00	____	$1,501.00-2,000.00	____
$101.00-250.00	____	$2,001.00-3,000.00	____
$251.00-500.00	____	$3,001.00-5,000.00	____
$501.00-750.00	____	more than $5,000.00	$_____.00 (Please specify)

(Note: we have no intention of increasing license or tag fees based on your answer.)

13b. We'd like to slightly change the question. WHAT IS THE LOWEST PRICE YOU'D CHARGE FOR THE SALE OF YOUR OPPORTUNITY IN 1984 TO HUNT DALL SHEEP IN ANY MOUNTAIN RANGE IN ALASKA? $_____.00

Here is the last "what if" situation:

14a. "What if" you could sell all of your future opportunities to hunt Dall sheep in your 1983 hunting area? We want to know what price you'd charge. If you were given this amount of money, you'd sell! And if you sold your hunting opportunities, you could not hunt Dall sheep in your hunting area in the future. WHAT IS THE LOWEST PRICE YOU'D CHARGE FOR THE SALE OF ALL OF YOUR FUTURE OPPORTUNITIES TO HUNT DALL SHEEP IN YOUR 1983 HUNTING AREA?

$ 0.00	____	$ 751.00-1,000.00	____
$ 1.00- 50.00	____	$1,001.00-1,500.00	____
$ 51.00-100.00	____	$1,501.00-2,000.00	____
$101.00-250.00	____	$2,001.00-3,000.00	____
$251.00-500.00	____	$3,001.00-5,000.00	____
$501.00-750.00	____	more than $5,000.00	$_____.00 (Please specify)

(Note: we have no intention of increasing license or tag fees based on your answer.)

14b. Again, we'd like to slightly change the question. WHAT IS THE LOWEST PRICE YOU'D CHARGE FOR THE SALE OF ALL OF YOUR FUTURE OPPORTUNITIES TO HUNT DALL SHEEP IN ALASKA? $_____.00

Finally, we would like to know a little about you. As with all answers in this questionnaire, your responses will be kept anonymous.

15. How many years have you been a resident of Alaska? _____years

16. Where do you live? _____(City, town, or village)

17. Which group below best describes your age?

____under 20	____50-59
____20-29	____60-69
____30-39	____70-79
____40-49	____80 and over

18. Which of the following categories best describes your household income, before taxes, in 1983? Please check one.

____under $10,000	____$50,000 - 59,999	____$100,000 - 109,999
____$10,000 - 19,999	____$60,000 - 69,999	____$110,000 - 119,999
____$20,000 - 29,999	____$70,000 - 79,999	____$120,000 - 129,999
____$30,000 - 39,999	____$80,000 - 89,999	____$130,000 - 139,999
____$40,000 - 49,999	____$90,000 - 100,999	____$140,000 and higher

Thank you very much for your help. If there is anything you would like to comment on or suggest, please let us know on the back of this page.

PLEASE RETURN THIS QUESTIONNAIRE IN THE POSTAGE-PAID ENVELOPE PROVIDED. THANK YOU!

Alaska Nonresident Dall Sheep Hunter Survey

ALASKA DEPARTMENT OF FISH AND GAME

STATE OF ALASKA

BILL SHEFFIELD, GOVERNOR

DEPARTMENT OF FISH AND GAME

DIVISION OF GAME

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February 10, 1984

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Thank you.

Sincerely,

W. Lewis Pamplin, Jr.

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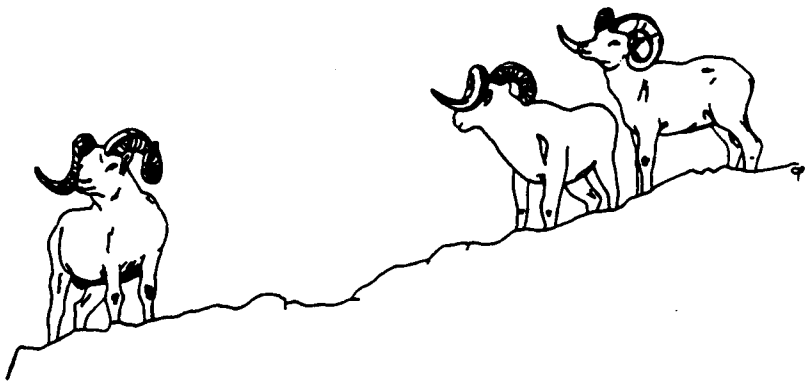


This questionnaire is being sent to those who hunted Dall sheep in Alaska in 1983. Your answers to this questionnaire are very important. They will help define an economic value for Dall sheep hunting which will be used to help plan for the future availability of Dall sheep hunting opportunities in Alaska.

Directions:

Most questions require a simple check mark (✓) to answer. Please write your answers clearly in dark pen or pencil. Your anwswers will be kept anonymous and confidential, released only as part of total figures in a comprehensive report.

Please answer this questionnaire and return it today in the postage-paid envelope provided for your convenience. We appreciate your help.

First, we would like to know a little about you as a Dall sheep hunter.

1. Please list all the years you have gone sheep hunting in Alaska:
1983,_____
_____

2a. How many times have you killed a Dall sheep in Alaska including your 1983 hunt? _____times

2b. Did you kill a Dall sheep in Alaska in 1983? _____yes _____no

3a. Do you plan to hunt Dall sheep in Alaska in the future?
_____yes _____no _____don't know

3b. If yes, about how often in your life do you expect to go? (Check (✓) one.)

____once or twice more in my life
____once every 5 years of my life
____once every 3-4 years of my life
____every other year
____every year

Now we would like to know a little about your 1983 Dall sheep hunt.

4a. Why did you visit Alaska in 1983? Rank the reasons which apply to you, letting #1 be the most important reason for visiting Alaska.

____visit relatives
____tourism/vacation
____hunt Dall sheep only
____hunt big game
____other_____
(please specify)

4b. If you came to Alaska in 1983 to hunt big game, rank in order of preference the species you hunted. Let #1 be the species you most wanted to hunt.

____black bear
____brown bear (grizzly)
____caribou
____Dall sheep
____deer
____elk
____moose
____mountain goat
____muskoxen
____wolf
____wolverine

5. Would you have made your 1983 trip to Alaska if you couldn't have hunted Dall sheep? ____yes ____no ____don't know

6a. What type(s) of transportation did you use to travel round-trip to Alaska?

____commercial airline
____highway vehicle
____boat
____other _____
(please specify)

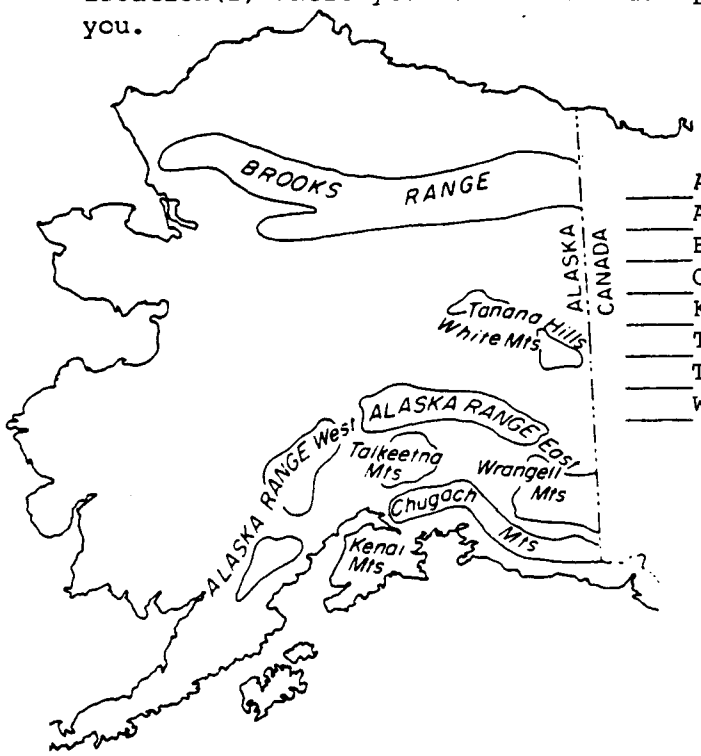
6b. About how long did you spend traveling round-trip to Alaska?
_____days traveling

7a. Once in Alaska, what type(s) of transportation did you use to get to and from your sheep hunting area (before you started walking)?

____commercial airline
____single engine/"bush" plane
____horse
____off-road vehicle
____snow machine
____highway vehicle
____other _____
(please specify)

7b. Once in Alaska, how long did you spend traveling round-trip to your sheep hunting area (not including walking time)? _____days traveling

8. Where was your hunting area? Please check (√) the mountain range location(s) where you hunted Dall sheep in 1983. The map of Alaska may help you.



____Alaska Range, east of Denali National Park
____Alaska Range, west of Denali National Park
____Brooks Range
____Chugach Mountains
____Kenai Mountains
____Talkeetna, Chulitna, Watana Mountains
____Tanana Hills-White Mountains
____Wrangell Mountains

9a. If you couldn't have gone to the mountain range where you hunted in 1983, would you have gone sheep hunting? ____yes ____no ____don't know

9b. If yes, where would you have gone?

_____
(Pick one from the list in Question 8.)

10. At the time of your Dall sheep hunt, were you

____self-employed
____employed by someone else (please check (√) one to answer)
____unemployed

11a. If you were employed or self-employed, did you take time off from your work to go sheep hunting? ____yes ____no

11b. If yes, how many days? _____days

11c. Were any of those days off from work covered by paid vacation? ____yes ____no

11d. If yes, how many days? _____days

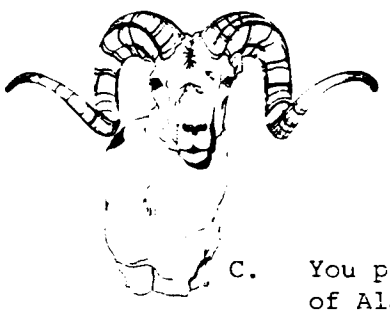
12. About how much more could you have earned not including paid vacation had you not gone sheep hunting?

$_____.00

13. How much did your Dall sheep hunt cost? We are interested in how much you spent and how you spent your money on your 1983 Dall sheep hunt in Alaska. Your answers to these questions will help us evaluate what Dall sheep hunting is worth and, specifically, its worth to Alaska's economy.

Please estimate your total expenses for the following categories. The cost of your guide's services may have included some of the other services as a "package hunt." Please account for as many separate costs as possible.

A. Transportation to and from Alaska: $_____.00
Guide fee: $_____.00
Tips and bonuses: $_____.00



B. Additional expenses to your sheep hunt:
License and tag fees: $_____.00
Transportation within Alaska to and from your sheep hunting area: $_____.00
Lodging: $_____.00
Restaurants and entertainment: $_____.00
Tourism and gifts: $_____.00

C. You presumably bought equipment and services from businesses outside of Alaska. Please estimate your expenses to businesses in and outside of Alaska in the space given below. This will help us evaluate sheep hunting's effect on the economy. Please include only your 1983 expenditures.

Paid to businesses outside of Alaska		Paid to businesses inside of Alaska
$_____.00	Guns, ammunition, scope	$_____.00
$_____.00	Binoculars, camera, film	$_____.00
$_____.00	Camping equiment and supplies	$_____.00
$_____.00	Taxidermy and butchering	$_____.00
	Please list any other expenses:	
$_____.00	_____	$_____.00
$_____.00	_____	$_____.00
$_____.00	_____	$_____.00
$_____.00	_____	$_____.00

Total cost (A + B + C) = $_____.00 (This is optional. We will add this for you if you would like.)

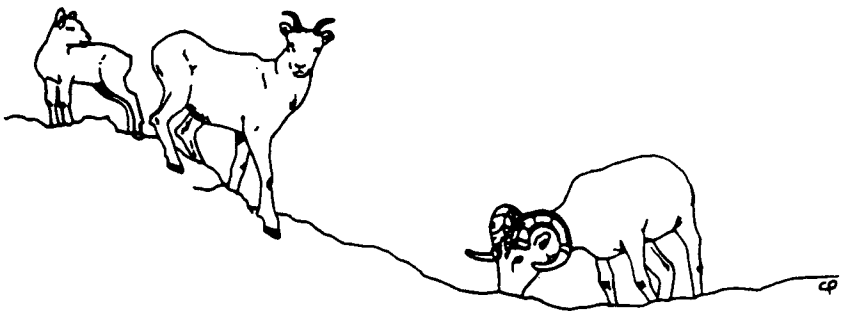
14. If you came to Alaska for reasons other than to hunt Dall sheep, what fraction of your expenses can you attribute to your Dall sheep hunt? Circle one.

1/8 1/4 3/8 1/2 5/8 3/4 7/8

As long as we are talking about costs, we would like to ask you some "what if" questions. These questions involve entirely imaginary situations; they are the best way we know to determine the economic value of sheep hunting to you, the hunter. The questions may seem long, but we think you'll find them an enjoyable challenge. Please give us your best estimate.

15. "What if" all of your 1983 sheep hunting costs were greater than your estimate in Question 13? Assume your hunt was exactly the same, but costs were higher. (We have no intention of increasing license or tag fees. This is an entirely imaginary situation to help determine the economic value of sheep hunting.) HOW MUCH GREATER (over and above what you paid in Question 12) WOULD YOUR TOTAL 1983 COSTS HAVE TO HAVE BEEN BEFORE YOU WOULD HAVE DECIDED NOT TO GO SHEEP HUNTING?

$ 0.00	____	$ 751.00 - 1,000.00	____
$ 1.00 - 50.00	____	$1,001.00 - 1,500.00	____
$ 51.00 - 100.00	____	$1,501.00 - 2,000.00	____
$101.00 - 250.00	____	$2,001.00 - 3,000.00	____
$251.00 - 500.00	____	$3,001.00 - 5,000.00	____
$501.00 - 750.00	____	more than $5,000.00	$_____.00 (Please specify)



Here is another "what if" situation:

16a. "What if" you could sell your 1984 opportunity to hunt Dall sheep in your hunting area (where you hunted in 1983)? (This is not possible to do. This is just an imaginary situation to help determine economic value.) We want to know what price you'd charge. If you were given this amount of money, you'd sell! And if you sold your hunting opportunity, you could not hunt Dall sheep in 1984 in your hunting area. WHAT IS THE LOWEST PRICE YOU'D CHARGE FOR THE SALE OF YOUR OPPORTUNITY TO HUNT DALL SHEEP IN 1984 IN YOUR 1983 HUNTING AREA?

$ 0.00	____	$ 751.00 - 1,000.00	____
$ 1.00 - 50.00	____	$1,001.00 - 1,500.00	____
$ 51.00 - 100.00	____	$1,501.00 - 2,000.00	____
$101.00 - 250.00	____	$2,001.00 - 3,000.00	____
$251.00 - 500.00	____	$3,001.00 - 5,000.00	____
$501.00 - 750.00	____	more than $5,000.00	$_____.00 (Please specify)

(Note: we have no intention of increasing license or tag fees based on your answers.)

16b. We'd like to slightly change the question. WHAT IS THE LOWEST PRICE YOU'D CHARGE FOR THE SALE OF YOUR OPPORTUNITY IN 1984 TO HUNT DALL SHEEP IN ANY MOUNTAIN RANGE IN ALASKA? $_____.00

Here is the last "what if" situation:

17a. "What if" you could sell ALL of your future opportunities to hunt Dall sheep in your 1983 hunting area? We want to know what price you'd charge. If you were given this amount of money, you'd sell! And if you sold your hunting opportunities, you could not hunt Dall sheep in your hunting area in the future. WHAT IS THE LOWEST PRICE YOU'D CHARGE FOR THE SALE OF ALL OF YOUR FUTURE OPPORTUNITIES TO HUNT DALL SHEEP IN YOUR 1983 HUNTING AREA?

$ 0.00	____	$ 751.00 - 1,000.00	____
$ 1.00 - 50.00	____	$1,001.00 - 1,500.00	____
$ 51.00 - 100.00	____	$1,501.00 - 2,000.00	____
$101.00 - 250.00	____	$2,001.00 - 3,000.00	____
$251.00 - 500.00	____	$3,001.00 - 5,000.00	____
$501.00 - 750.00	____	more than $5,000.00	$_____.00 (Please specify)

(Note: we have no intention of increasing license or tag fees based on your answers.)

17b. Again, we'd like to slightly change the question. WHAT IS THE LOWEST PRICE YOU'D CHARGE FOR THE SALE OF ALL OF YOUR FUTURE OPPORTUNITIES TO HUNT DALL SHEEP IN ALASKA? $_____.00

Finally we would like to know a little about you. As with all answers in this questionnaire, your responses will be kept anonymous.

18. Where do you live? _____ _____
City State

19. Which group below best describes your age?

____under 20	____50-59
____20-29	____60-69
____30-39	____70-79
____40-49	____80 and over

20. Which of the following categories best describes your household income, before taxes, in 1983? Please check one.

____under $10,000	____$50,000 - 59,999	____$100,000 - 109,999
____$10,000 - 19,999	____$60,000 - 69,999	____$110,000 - 119,999
____$20,000 - 29,999	____$70,000 - 79,999	____$120,000 - 129,999
____$30,000 - 39,999	____$80,000 - 89,999	____$130,000 - 139,999
____$40,000 - 49,999	____$90,000 - 99,999	____$140,000 and higher

Thank you very much for your help. Are there any further comments you'd like to make? Please put them on a separate sheet and mail them to us in the envelope provided.

PLEASE RETURN THIS QUESTIONNAIRE IN THE POSTAGE-PAID ENVELOPE PROVIDED. THANK YOU!

IV. HUNTING IN THE SOUTHWEST REGION

A. Introduction

This section presents information on the economic value of hunting in Southwest Alaska. However, very few data are available for assessing the value of hunting activities in the region. Therefore, this analysis is limited in scope and principally provides some background information that would facilitate future economic analyses. General information on hunting in the region is supplemented by the presentation of existing data (season lengths and hunter numbers) that reflect changes in the demand for the opportunity to hunt wildlife. Although these changes cannot be directly translated into dollar values, they are nevertheless important indicators of increasing demand and the consequent scarcity of hunting opportunities, which in turn imply increasing economic value. This section also presents the results of the few economic surveys that have been completed in the region. Background and hunter survey information are organized by species. Following that, the results of a survey of professional game guides who operate in the Kodiak and Aleutian islands areas are given.

An assessment of the economic value of wildlife in Alaska is especially difficult because the allocation of hunting opportunities does not occur through the market economy. Therefore, in order to maintain wildlife populations at sustainable yield levels, a complex system of hunting regulations has developed that controls hunting effort by such means as bag limits, season lengths, and drawing and registration permits. This allocation process is an extremely important consideration when assessing the economic value of wildlife resources and hunting activities in the state because it restricts their potential and measurable economic "value." If, for example, the opportunity to hunt brown bear on Kodiak Island were auctioned off by a broker in London, England, rather than being allocated primarily to Alaska residents, both the apparent and measurable value of the resource would undoubtedly be greatly increased.

Although the allocation system clearly limits the measurable value and income-generating potential of hunting activities, one type of analysis of the system nevertheless provides a surrogate for an economic demand analysis. This type of analysis was done for some species in the Southwest Region by means of a category referred to as "season days," which reflects the reduction in hunting-season lengths necessary to maintain wildlife populations in the face of increasing demand for hunting opportunities. An analysis of drawing and registration permit hunts in the Southwest Region also

uses existing data to evaluate the changes in demand for hunting opportunities and may be found in the Statewide Overview section of this volume.

B. Data Limitations

As discussed above, a thorough economic analysis of hunting in the Southwest Region is not possible because of a severe shortage of information. The same general data limitations described in the Statewide Overview section pertain to economic information for the Southwest Region. A few of them warrant repeating. Data have not been collected consistently over the years. Collection methods have varied, as has the kind of information collected and the ways it has been sorted and filed. In particular, economic information has only recently become available as a result of surveys specifically designed to ascertain the economic impacts of various aspects of hunting. However, because of the department's relative unfamiliarity with economic assessment methodology, changes in staffing, and budget constraints, few surveys have been conducted. Among the surveys that have been conducted, methods have not always been consistently or accurately applied, and some of the resulting data are therefore not fully usable.

Information on bear hunting is of limited usefulness to an economic analysis because only information on successful hunters is collected. There is no count of unsuccessful bear hunters by management area in the data files. From a biological management standpoint, information on unsuccessful hunters is not as critical as information on total harvest numbers by successful hunters. For economic demand analyses, however, unsuccessful hunters are significant because they place a value on the hunting opportunity and make expenditures in order to hunt. Bear hunting provides substantial income to the Southwest Region's economy, and it would therefore be extremely pertinent to routinely collect information on both successful and unsuccessful hunters.

Information on means of hunter transport can be quite useful for economic analyses because transportation costs are one way that hunting activities affect regional and local economies. However, not all hunters furnish that information on permit or harvest report forms, and much more baseline information from expenditure surveys is necessary before transportation information can be used to assess regional economic impacts. Transport means also depend a great deal on the characteristics of the particular area hunted, its proximity to the road system, and its type of terrain. For instance, ORVs are popular in areas of level terrain near road systems, whereas aircraft are employed in rugged, more remote locations. Therefore, caution must be exercised in analyzing transport data for regions as a whole. (See the Statewide

Overview section for a more detailed discussion regarding economic methods and data limitations.)

C. Hunting Background

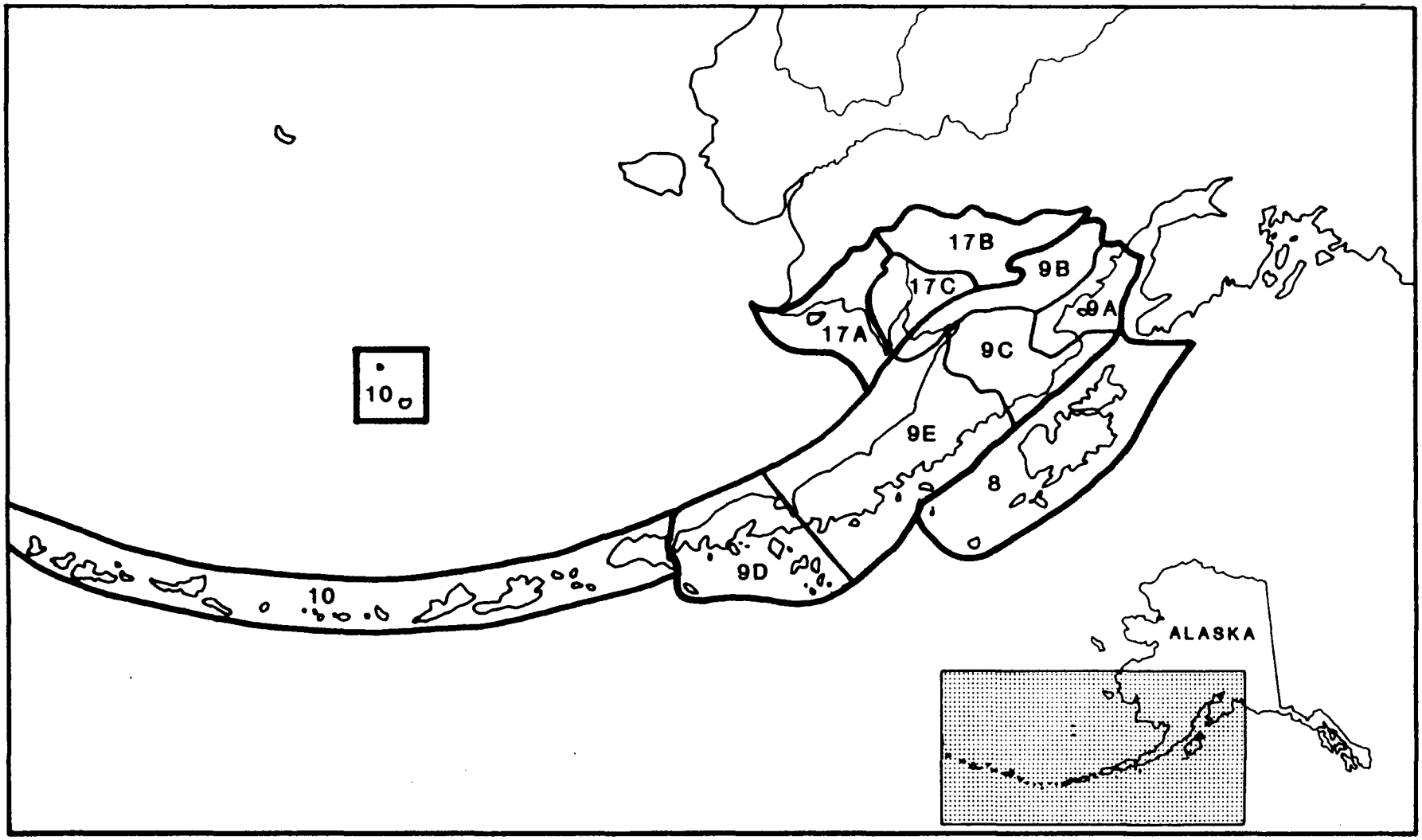
1. Regional overview. The five big game animals of most importance in terms of human use in the Southwest Region are brown bear, Sitka black-tailed deer, caribou, elk, and moose. Deer and elk are not indigenous but were introduced to the region through transplants on Kodiak, Afognak, and surrounding islands in the 1920's and 1930's (Burris and McKnight 1973). The moose population in the southern part of the region began increasing at the turn of the century until it peaked in the 1960's. It has declined a third to one half since (ADF&G 1985).

Map 1 shows the game management units for which harvest information is collect in the Southwest Region.

Whereas, a large majority of deer, elk, moose, and caribou hunters are residents, most brown bear hunters (65-70%) are nonresidents (see tables and narratives following). Bears are hunted primarily for trophies, although some local users do hunt them for meat. Nonresident bear hunters are required to hire professional guides unless they hunt with next of kin who are residents. Nonresidents may hunt other species without a guide, but it is also common for them to use guides for other big game in combination with their fall bear hunts.

Information on harvest and hunter numbers for each species was drawn from the Human Use narratives in Volume 2 of the Alaska Habitat Management Guide for the Southwest Region and from an examination of permit hunt data. Because permit data often include the number of applicants for specific hunts, they give an indication of the demand for a resource. (For more complete background information on wildlife and hunting in the Southwest Region, see volumes 1 and 2 of the Alaska Habitat Management Guide for the Southwest Region.)

Lack of data makes it difficult to specifically identify the contribution of hunting to the regional economy; however, some generalizations can be made. Hunting is important to local residents. Game use varies in the subregions because of the great natural diversity within the region. Caribou and moose are the most important big game personal use species on the mainland and in the northern part of the region. Deer are the principal species hunted on Kodiak Island.



Map 1. Game management units in the Southwest Region.

Two recent surveys of hunting in the region indicate that guided hunting in general and brown bear hunting in particular contribute significantly to the economy of the region and state. The surveys sampled spring brown bear hunters on the Alaska Peninsula in 1984 and queried Southwest Region hunting guides in 1983. Results and discussions of the surveys can be found in the following sections on brown bear and guided hunts.

2. Season days. In some cases, hunting seasons are designated for a whole game management unit (GMU); in others they are designated for game management subunits. Subunits are smaller management units that were developed as a means of making management regulations, such as season lengths and bag limits, more flexible within large and biologically varied GMUs. Over the years, some GMU's have been divided into subunits and, whereas regulations previously applied to a GMU as a whole, they will now vary among the subunits. Thus, in effect, several management units have been created out of one. This development causes problems in comparing hunter use and harvest figures over time.

   In order to compare season lengths as an indication of hunter demand and resource availability, or supply, for this analysis, a category was created called "season days." These "season days" were determined by totalling up season lengths for the smallest management areas for which seasons were designated. To maintain consistency in the "season days" category in those GMUs that were managed both as wholes in early years and by subunits in later years, subunits were assumed to exist throughout the period being analyzed, and the number of hunting days available under regulation in the "old" GMU was multiplied by the number of subunits for which seasons are now designated.

   For instance, in 1973-1974 the moose season was set at 134 days for GMU 9 as a whole. In subsequent years, GMU 9 was divided into five subunits (9A-E) with varying season lengths. In 1976-1977 area 9D was closed to hunting completely, and the season lengths of other subunits were shortened considerably. Were one simply to total the number of days in that season in GMU 9, one would get 187 days, more than the total of 134 in 1973-1974 even though hunting opportunities had been considerably restricted in large portions of the GMU. By using the "season days" method, a more accurate portrayal of the change in hunting seasons can be made. Thus, "season days" for GMU 9 in 1973-1974 is determined by multiplying 134 by the five subunits that were eventually created, giving 670 season days, a more accurate

reflection of the year's hunting opportunities as compared with those in 1976-1977.

Although "season days" provides a good means for comparing season lengths in one GMU over time, problems arise in comparing one GMU with another. Any difference in the number of management areas within GMUs will result in one GMU's seasons being over- or underrepresented in relation to another's.

The calculation of season days was done only for caribou and moose in the Southwest Region. Elk and deer seasons were uniform within GMU 8, and brown bear season lengths for GMUs were already computed in the Human Use section of the guide for the Southwest Region.

D. Brown Bear

1. Regional overview. Brown bear is the only game animal hunted in spring as well as fall. Bears are hunted in four GMUs in the region (8, 9, 10, and 17). Although seasons were shortened by 57% in the period 1972-1982, the annual harvest declined by only 20%. Total kill ranged from a high of 453 in 1972 to a low of 312 in 1976. Since 1976 the total has fluctuated considerably from year to year but remained below 400 bears. Nonresident hunters' proportion of the take remained between 65 and 70% (table 1, fig. 1).

   Season days were determined by adding the season lengths of each GMU as depicted in tables 95-107 in volume 2 of the guide for the Southwest Region. Maximum season length was 469 days in 1972. Seasons shortened progressively to 206 days in 1980 and have remained at that level.

   Despite the substantially shorter seasons, total harvest during 1980-1982 remained similar to harvest levels during previous years with longer seasons (fig. 2). Brown bear hunts are highly regulated in GMUs 8, 10, and portions of 9. Hunting is by drawing or registration permit. A more detailed discussion of hunter demand and the allocation system for those hunts can be found in the Permit Data Analysis portion of the Statewide Hunting Economic Overview section in this volume.

2. Game Management Unit 9 questionnaire. Brown bear hunting contributes significantly to the economy of the region, especially hunts by nonresidents. In late fall 1983, a GMU 9 Brown Bear Hunter Questionaire was mailed to 200 successful fall season brown bear hunters. The final return rate was

Table 1. Brown Bear, Southwest Region GMUs 8, 9, 10, 17, 1972-82

Year	Total Kill	No. by Resident	No. by Nonresident	No. by Nonresident	Season Days
1972	453	151	302	67	469
1973	441	134	307	70	428
1974	340	91	249	73	412
1975	373	124	249	67	407
1976	312	125	187	60	392
1977	361	128	233	65	391
1978	333	109	224	67	362
1979	360	116	244	68	361
1980	380	134	246	65	206
1981	370	128	242	65	205
1982	371	130	241	65	206

Source: BGDIF 1972-1982.

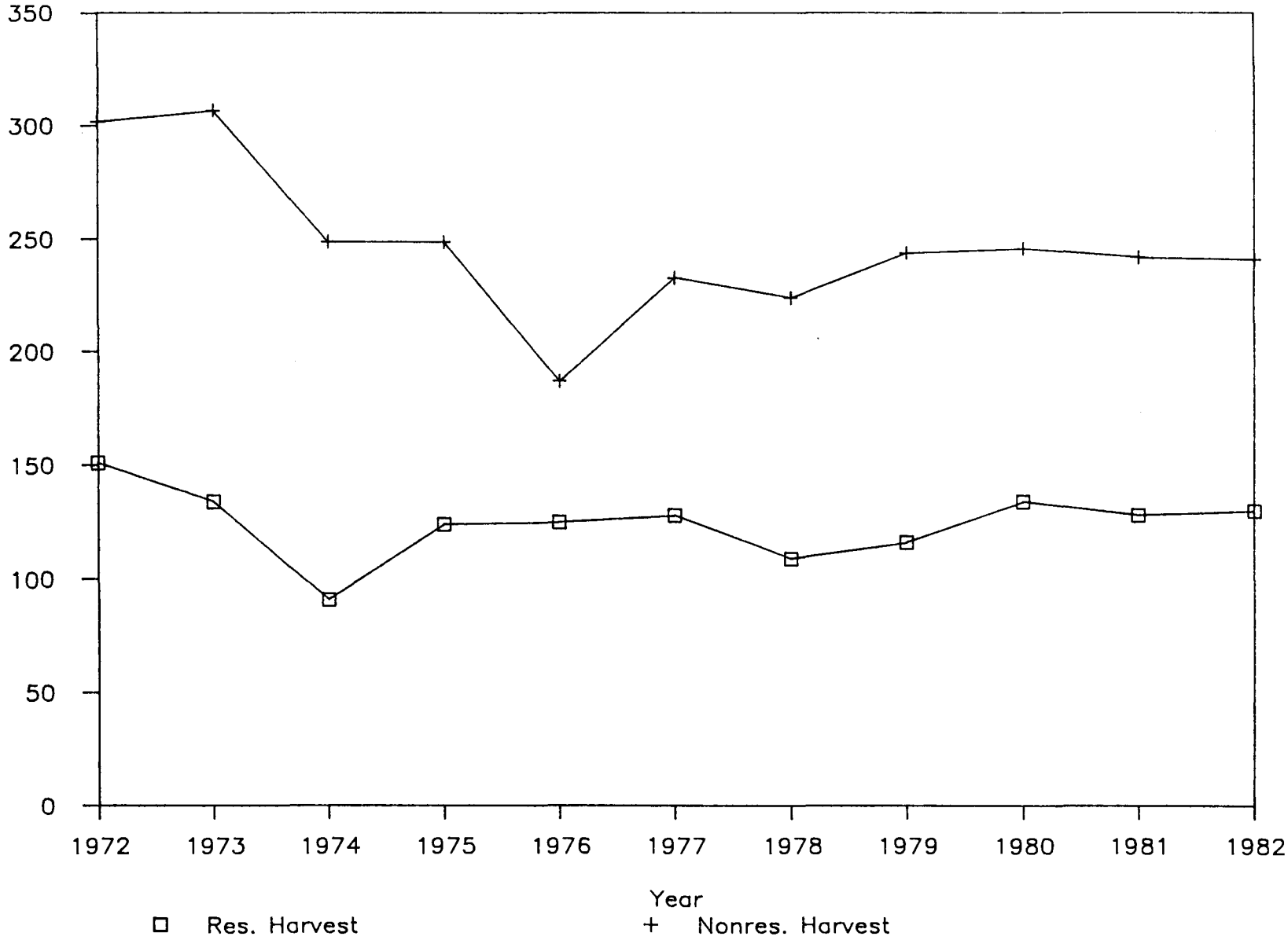


Figure 1. Southwest Region brown bear resident and nonresident harvest (BGDIF 1972-1982).

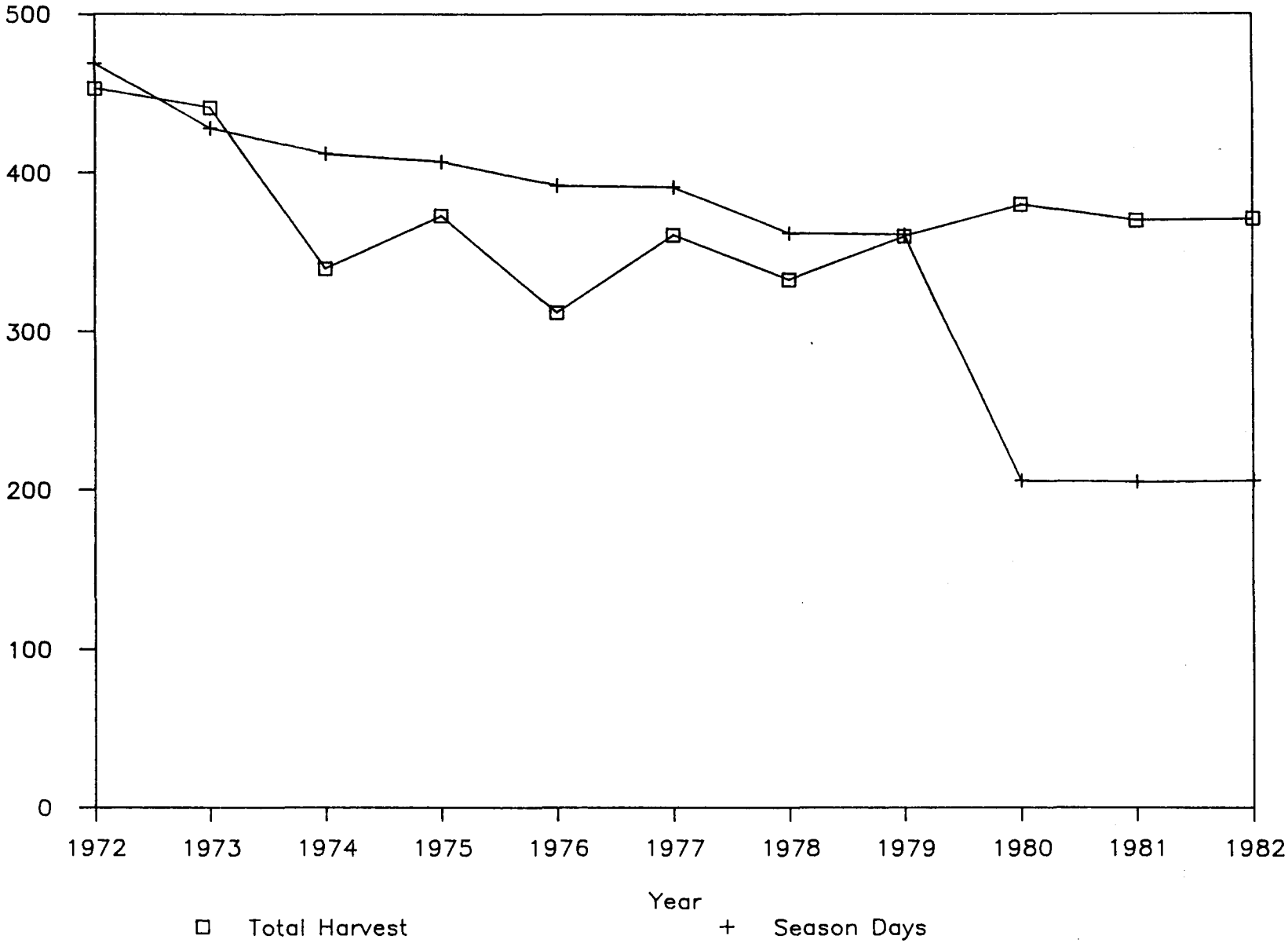


Figure 2. Southwest Region brown bear harvest and season lengths (BGDIF 1972-1982).

86%, a very high survey return rate. A reminder letter was sent out to nonresponding hunters approximately one month after the initial mailing. It appears, however, that the response rate would have been 70-80% even without the reminder (McNay 1984a). A sample questionnaire (attachment 1) is located at the end of this Southwest Region chapter.

Because the fall survey was so successful, the decision was made to send questionaires to successful spring GMU 9 brown bear hunters. The same survey was used, with the addition of a question on economic expenditures hunters made for their spring bear hunt. In July 1984, the ADF&G mailed a questionnaire to 223 successful brown bear hunters who hunted in GMU 9 on the Alaska Peninsula in spring 1984. Among the questions asked by the survey were ones on the number of bears hunters saw, why they killed a particular bear, what factors are important to them in a good bear hunt, whether their hunt met those criteria, how often they hunted, and what expenses they incurred in the hunt. With the assistance of reminder letters, 180 (80%) of the hunters responded. Completed questionnaires were returned by 66 of 79 (84%) Alaska residents and by 114 of 144 (79%) nonresidents. The expenditure question was answered by 91% of the respondents and apparently did not lower the overall response rate. Five residents were guided and three nonresidents were guided by next of kin. Otherwise, all nonresidents were guided, and residents were not guided (McNay 1984b). Not all respondents answered every question. With a few minor exceptions, the results of the spring 1984 survey were very similar to those from the fall 1983 survey (ibid.). Therefore, the spring results are presented here, with any differences being noted as such. Results from the questions related to hunt attributes and hunter expenditures are presented while more strictly biological questions are not presented or covered to a lesser extent.

For both guided and unguided hunters the factors that ranked highest in making up a satisfactory bear hunt were 1) quality of bear, 2) number of bears seen, 3) wilderness experience, and 4) few other hunters. Guided hunters thought the amount of other game seen on the hunt ranked next in importance, followed by scenery. Unguided hunters thought scenery was more important than other game. Both groups ranked good weather, just taking a bear, and opportunity for photographs seventh, eighth, and ninth, respectively (table 2). Although the relative ranking of hunt attributes is significant and provides an indication of the importance of the response, the question also asked if a hunt characteristic was experienced on the trip. Of the spring hunters who answered the question, 100% of the nonguided hunters experienced the scenery and took photographs. Of the guided hunters, 99% of

Table 2. Characteristics of a Satisfactory Bear Hunt

Characteritics (In Order of Asking)	Nonguided		Guided	
	Ranking	Sample Size	Ranking	Sample Size
Good weather	7	44	7	91
Scenery	5	49	6	93
Wilderness experience	3	51	3	94
Quality of bear	1	55	1	109
Just taking a bear	8	41	8	76
Number of bears seen	2	54	2	92
Amount of other game seen	6	52	5	87
Few other hunters	4	51	4	90
Opportunity for photographs	9	39	9	78

Asked whether they did or did not experience the various elements of a satisfactory bear hunt, hunters responded as follows:

Elements	Percentage of Hunters Reporting Who Gave An Affirmative Response	
	Nonguided	Guided
	% (n)	% (n)
Good weather	76 (42)	77 (84)
Scenery	100 (43)	99 (91)
Wilderness experience	94 (48)	98 (92)
Quality of bear	94 (48)	91 (106)
Number of bears seen	88 (99)	74 (87)
Amount of other game seen	91 (46)	85 (82)
Few other hunters	89 (44)	85 (88)
Opportunity for photographs	100 (33)	91 (76)

Fifteen percent of the responding hunters (N=180) had previsouly killed a bear in Alaska; only 1% (2 of 180) had previously killed a bear on the Alaska Peninsula.

Source: McNay 1984b.

them experienced the scenery, and 98% of them had a wilderness experience.

More than a quarter (26%) of the guided hunters who responded expressed disappointment in the number of bears seen, 23% disliked the weather, and 15% indicated they saw too many other hunters. However, a high percentage expressed satisfaction with the two other most important elements of a satisfactory hunt, the wilderness experience (98%) and the quality of bear they killed (91%).

Almost the same percentage of unguided as guided hunters were disappointed in the weather (24%); 12% were not satisfied with the number of bears seen; and 11% saw too many other hunters for their liking. However, 100% were satisfied with the scenery, and 94% were pleased with the wilderness experience of the hunt and the quality of bear taken (table 2). Resident hunters gave good weather a ranking of three in the fall and seven in the spring, whereas good weather was ranked seventh by nonresident hunters in both the fall and spring (McNay 1984a,b).

Fifteen percent of the responding hunters (27 of 180) had previously killed a bear in Alaska; only 1% (2) had previously killed a bear on the Alaska Peninsula (McNay 1984b).

Hunters were asked to itemize and total their expenses for their Alaska Peninsula bear hunt. Values included all expenses, not just money spent in Alaska; no differentiation was made for dollars spent in or outside Alaska. Ninety-one percent (163 of 180) of the hunters who returned questionnaires calculated the total cost of their hunt. An additional 4% itemized some of their expenses but were unable to give an accurate estimate of their total cost because some of their expenses were still pending (such as taxidermy fees). A breakdown of hunter expenses is given in table 3 (McNay 1984b).

This spring brown bear hunt survey provides useful information about the characteristics of hunts that are considered desirable by the hunter. Although the quality of the killed bear and the number of bears observed were considered most important by both guided and unguided hunters, it is notable that esthetic factors of the hunt, such as wilderness experience and the absence of other hunters, were considered next in importance by both groups of hunters. This is important information because it indicates that the economic benefit to the region derived from bear hunters (especially nonresident guided brown bear hunters)

Table 3. Itemized Expenses of Brown Bear Hunters on the Alaska Peninsula, Spring 1984

Items	Unguided Hunters		
	Reported Cost	N	Mean Cost/Hunter
Taxidermy	$ 50,934.00	56	$ 910.00
Air fare	27,926.00	58	481.00
Food & lodging	7,598.00	58	131.00
Equipment	14,783.00	58	255.00
Misc. costs (souvenirs, tips, gifts, etc.)	9,085.00	58	157.00
License fees	3,265.00	58	56.00
Total reported cost*	112,881.00	56	2,016.00

Items	Guided Hunters		
	Reported Cost	N	Mean Cost/Hunter
Taxidermy	$ 184,815.00	107	$ 1,727.00
Air fare	133,651.00	112	1,193.00
Guide fee	729,450.00	110	6,631.00
Food & lodging	33,201.00	112	296.00
Equipment	42,445.00	112	379.00
Misc. costs (souvenirs, tips, gifts, etc.)	31,728.00	112	283.00
License fees	44,875.00	114	394.00
Total reported cost*	1,159,921.00	107	10,840.00

Source: McNay 1984b.

* Because some questionnaires gave a partial list of itemized costs but not total cost, itemized costs do not sum to the total cost figure.

depends not only on the abundance of bears but on the total hunt experience as well. The unique opportunity to hunt in the remote wilderness scenery of Alaska ranks relatively high in terms of the value hunters derive from the dollars they spend on a hunt.

This spring brown bear hunt questionnaire is an example of an expenditure survey that does not portray the "economic value" of the hunt itself but instead is an indication of the regional or statewide economic impacts of hunter expenditures as a result of the hunt. Because the economic question was related to hunter expenditures, the survey and resulting data could be substantially improved if all brown bear tag holders had been surveyed rather than just successful hunters because it is assumed that unsuccessful hunters also make expenditures to hunt. Another aspect that would improve future surveys is to include questions that determine where a hunter hunted (effort per area), characteristics of a given site, more detailed access information, expenditures per area, and information on whether expenditures were made inside or outside Alaska. Information on hunter effort and expenditures by area for brown bear would be extremely valuable for assessing the impacts of specific developmental or habitat-altering activities. (For more information on economic survey methodologies, see the Statewide Hunting Economic Methods section in this volume.)

E. Caribou

1. Regional overview. Two herds occur in the Southwest Region, the Alaska Peninsula Herd and the Mulchatna Herd. They are hunted in three GMUs in the region (9, 10, and 17).

The Mulchatna Herd ranges over four GMUs; two of those are not in the region, but hunting statistics for the entire herd (and thus all four GMUs) are combined in this regional analysis. The Alaska Peninsula Herd roams in GMU 9 and on Unimak Island in GMU 10. The official figures from tables 109-113 in the AHMG, Southwest Region, caribou Human Use section should be considered underestimates because unreported harvest may account for over half of actual harvest. For the Mulchatna Herd in 1982-1983, the estimated harvest is four times the reported harvest of 313 animals (tables 109-113). The estimated harvest for the Alaska Peninsula Herd during the period 1977-1983 is two to three times higher than the reported harvest (tables 114, 119, 124, 129, 134, 139, ADF&G 1985). The ADF&G believes the unreported harvest is largely taken by local residents who

use different transport means than the official tables indicate.

2. Transportation. Airplanes were by far the most common transport means reported by all categories of caribou hunters, resident and nonresident, successful and unsuccessful (ADF&G 1985). More than 80% of all Mulchatna Herd hunters and nearly 90% of the successful hunters from 1977 through 1983 used airplanes for transportation. Airplanes transported about 70% of Alaska Peninsula Herd hunters over the same period. Beginning in the 1980-1981 season, there was a sudden increase in the numbers of resident Alaska Peninsula hunters using highway vehicles. From 1979 to 1983, the percentage of road hunters increased from 4 to 18%, almost all of them residents.

3. Season length. On the Alaska Peninsula, the length of the harvest season remained the same from 1977 through 1983 (table 4). Reported harvest increased slightly over that period from 970 animals to 1,038. Estimated harvest went from 1,500-2,000 to 2,000 (ADF&G 1985, tables 109-113). The reported hunter success rate on the Alaska Peninsula Herd was between 85 and 90%.

   The seasons on the Mulchatna Herd fluctuated between 1977 and 1983; but, comparing the beginning of that period to the end, season days decreased by more than 25%, from 1,529 to 1,173 (table 4). While the reported harvest decreased from 473 to 313 over that period, the estimated harvest jumped from 500-800 to 1,300 (ADF&G 1985, tables 114, 119, 124, 129, 134, 139). Mulchatna Herd hunters had a success rate that was usually between 70 and 80%.

   No economic survey information has been collected for caribou in the Southwest Region. However, the hunter effort (total number of hunters) and transportation methods information provide a good basis for economic analysis. If, for example, more baseline information was developed relating to hunter effort by specific area, transportation means, and trip length and corresponding information on hunters' expenditures was obtained, caribou hunters expenditures could be modelled and maintained on a routine basis. (For information regarding economic methodology and drawing permit and registration hunts for caribou in the region, see the Permit Data Analysis and Methods sections in the statewide hunting section in this volume.)

Table 4.

Season Days for the Mulchatna Caribou Herd, 1977-83

Year	Season Days
1977-78	1,529
1978-79	959
1979-80	1,144
1980-81	1,144
1981-82	1,029
1982-83	1,173

Season Days for the Alaska Peninsula Caribou Herd, 1977-83

Year	Season Days
1977-78	702
1978-79	702
1979-80	702
1980-81	702
1981-82	702
1982-83	702

Source: Alaska Game Regulations 1977-83.

F. Elk

Elk were found only on Afognak and Raspberry islands (GMU 8) prior to 1985. They are not indigenous to the region but were transplanted by the ADF&G in the 1920's and 1930's (Burris and McKnight 1973). From 1970 to 1982 the number of hunters almost quadrupled from 184 to 705 (table 5, fig. 3). The season length remained the same, 153 days. The hunter success rate ranged from a high of 34% in 1970 to a low of 11% in 1976 and mirrored the decline in the elk population from an estimated high of 1,300 in the early 1970's to about 500 animals in 1975. Severe winters are thought to be responsible for the decrease. Since the mid 1970's, elk numbers have increased to near or above the previous high. Hunter success improved to approximately 20% in the early 1980's. In 1982, the reported harvest was 151 elk. Most hunters are Alaska residents, and transportation means have remained primarily aircraft or boat.

No economic survey information has been collected for elk in the Southwest Region. Elk hunts have been held exclusively on a drawing or registration permit basis. (More detailed information on changes in demand and the allocation of hunting opportunities can be found in the Permit Data Analysis section in the statewide hunting section of this volume.)

G. Deer

1. Regional overview. Sitka black-tailed deer are found only in the Kodiak/Afognak islands area in the Southwest Region (GMU 8). Only Kodiak Island residents were contacted in the surveys that provided the information for table 6. Other Alaskans and nonresidents are left out of the compilations, and figures are thus all underestimated. Nevertheless, some trends are apparent.

   a. Harvest levels. Deer numbers have increased steadily on the islands since deer were transplanted there in the 1920's and 1930's (ibid.). With the increase in supply came an increase in demand. The number of Kodiak hunters more than doubled in the decade 1972-1982, from 689 to 1,648 (table 6). The mean number of deer harvested per hunter increased from less than one in 1972 to 2.4 in 1982. Effort, in terms of the number of days per deer harvested, declined over that period from over five days to less than three days.

      Access for hunters on most of Kodiak Island is poor, causing overcrowding in local areas close to population centers and the few access points that exist.

Table 5. Southwest Region Reported Elk Harvest, GMU 8, 1970-82

Year	No. Hunters	Reported Harvest	Hunter Success %	Season Days
1970	184	62	34	153
1971	190	27	14	153
1972	112	18	16	153
1973	116	18	16	153
1974	118	30	25	153
1975	123	23	19	153
1976	239	26	11	153
1977	200	24	12	153
1978	242	45	19	153
1979	375	68	18	153
1980	538	101	19	153
1981	619	112	18	153
1982	705	151	21	153

Source: BGDIF 1970-82.

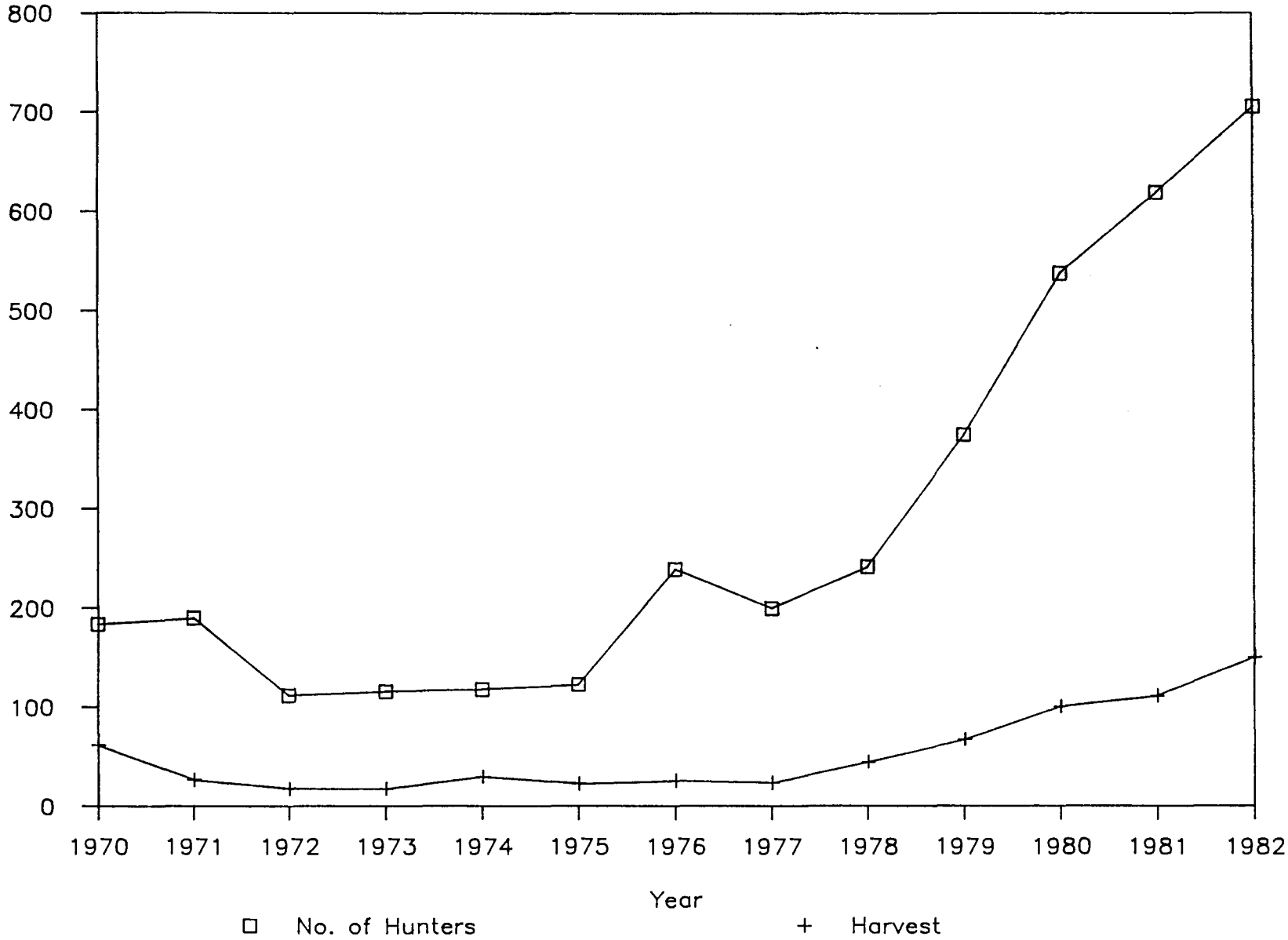


Figure 3. Southwest Region elk harvest and hunter numbers (BGDIF 1970-1982).

Table 6. GMU 8 Sitka Black-Tailed Deer Harvest, 1972-82

	1972	1973	1974	1975	1976	1977	1978*	1979	1980**	1981	1982***
No. hunters (Estimated no. hunters)	689	1,127	1,141	1,068	1,088	957	582	1,333 (1,096)*	1,783 (2,738)	1,541	1,648
No. deer harvested (Estimated harvest)	587	1,166	1,754	1,057	1,111	1,857	991	2,732 (2,365)	3,294 (5,347)	3,190	4,000 (6,000)
% hunter success	46%	47%	61%	47%	51%	81%	70%	75% (80%)*	70%	74%	71%
Mean no. deer per hunter	0.9	1.0	1.5	1.0	1.5	1.9	1.7	2.1 (2.1)*	1.8	2.1	2.4
Mean no. hunting days per deer	5.2	5.0	3.7	4.8	3.8	2.3	---	3.1 (1.8)*	2.7	---	2.7

Source: BGDIF 1972-82.

--- means no data were available.

* Based on incompleted returns of hunter harvest reports.

** Based on 1969 hunters responding to mail questionnaire.

*** Based on extrapolation of 148 questionnaires representing 7% sample of Kodiak hunting license buyers.

No economic information has been collected regarding deer hunting in the Southwest Region.

H. Moose

1. Regional Overview. Moose are found and hunted only in GMUs 9 and 17 in the region. Reported moose harvest in GMU 17 remained relatively static over the decade between 1973 and 1983. However, the harvest in GMU 9 has declined dramatically since the early 1970's. The decline is attributed to an overuse of range by moose in the late 1960's and early 1970's; however, lack of range is not a problem at present. Brown bear predation on calves appears to be a significant factor keeping the current population at low-to-moderate levels (ADF&G 1985).

   There probably are substantial numbers of moose killed each year in the Southwest Region that are not reported. Many of those are probably taken by local residents.

   a. Hunter numbers. The total number of hunters dropped substantially over the period from 1,209 in 1973-1974 to 453 in 1982-1983 (table 7). However, these figures are reported hunters only and are likely to be low. Hunting seasons were severely restricted in both GMUs over the decade, almost 75% overall. Season days totalled 1,072 in 1973-1974 but only 233 in 1982-1983 (table 8). The hunter success rate declined from 68 to 37%, and the total reported harvest in the region declined from 881 to 167 over the decade (table 7, fig. 4).

   b. Hunter residency. The percentage of nonresident moose hunters declined from a high of 37% in 1974-1975 to 18% in 1982-1983. The reason for that may be because of the decline in the hunter success rate and because moose and brown bear seasons are no longer concurrent. Guides had difficulty booking nonresidents for separate moose hunts when success rates and trophy quality were down (Faro, pers. comm.). Until in the 1976-1977 season, more hunters reported bagging a moose than missing one. However, since then, with the exception of 1979-1980, unsuccessful moose hunters have reportedly outnumbered successful ones in the region.

      No information has been collected regarding the economic value of moose hunting in the Southwest Region.

Table 7. Southwest Region Moose Harvest, GMUs 9 & 17, 1973-82

	Successful Hunters				Unsuccessful Hunters						
Year	Resident	Non-res.	Unknown	Total	Resident	Non-res.	Unknown	Total	Total Hunters	Success Ratio	Hunter Total Harvest
1973	441	328	52	821	321	57	10	388	1,209	0.68	881
1974	392	355	27	774	325	81	11	417	1,191	0.65	774
1975	176	159	12	347	243	40	13	296	642	0.54	347
1976	170	120	7	297	363	60	11	404	701	0.42	297
1977	139	76	24	239	204	36	20	260	499	0.48	239
1978	168	108	13	289	302	41	14	357	646	0.45	289
1979	108	124	20	252	119	26	6	151	547	0.46	252
1980	179	111	5	295	308	67	11	386	681	0.43	295
1981	158	79	11	248	306	48	22	376	624	0.40	248
1982	92	40	30	167	219	42	25	286	453	0.37	167

Source: BGDIF 1973-82.

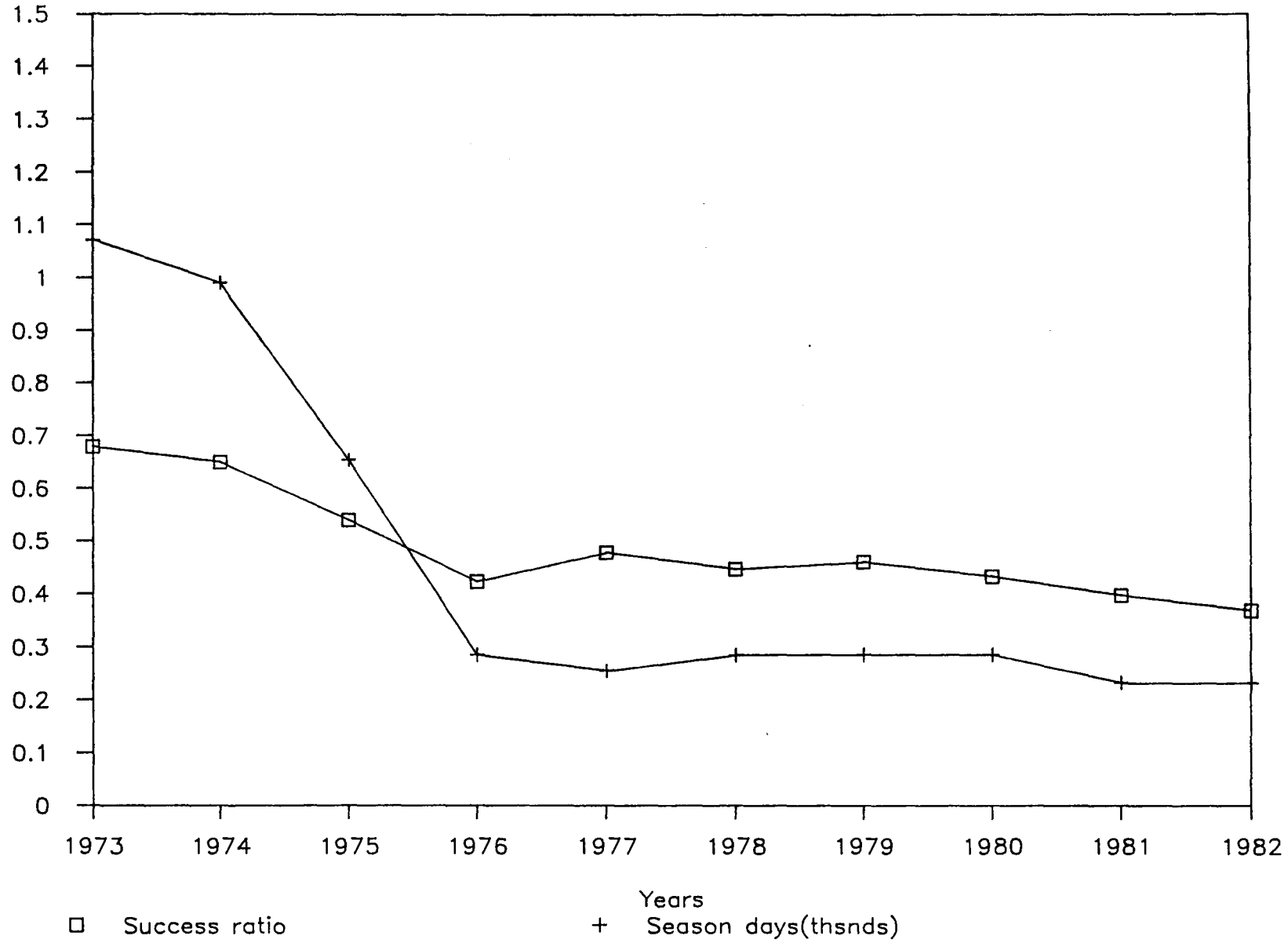


Figure 4. Southwest Region moose hunter success rate and season length (BGDIF 1973-1982).

Table 8. Season Days for Southwest Region Moose Hunting, GMUs 9 and 17, 1973-83

Year	Season Days
1973-74	1,072
1974-75	990
1975-76	654
1976-77	286
1977-78	255
1978-79	286
1979-80	286
1980-81	286
1981-82	233
1982-83	233

Source: Alaska Game Regulations 1973-83.

I. Professional Hunting Guides Survey

1. Introduction. The professional game guiding industry is one avenue through which the wildlife resources of the state contribute to the economic livelihood of Alaska residents. In January 1983, the ADF&G's habitat management guides project sent a mail questionnaire to game guides and air charter companies who operated in the Southwest Region (GMUs 8, 9, 10, and 17). This survey was the first of its type in the Southwest Region.

2. Objectives. The first major objective of the survey of professional hunting guides was to determine some of the general characteristics of the industry, such as the types of services offered, periods of operation, and employment numbers. The second major objective was to estimate the volume of business conducted by guides in Southwest Alaska in terms of the number of hunters and gross income.

3. Methodology. A mailing list was prepared from the state register of licensed hunting guides (ADCED 1984). The 87 guides registered for Southwest Alaska were mailed a brief six-question survey under a cover letter from the ADF&G, Division of Habitat, describing the purpose of the survey. Two separate mailings of the questionnaire were conducted during January.

4. Results. The survey response rate is summarized in table 9. Of the original 87 surveys sent out, 52 questionnaires were returned (61%). Of these, 51 were active guides who completed the questionnaire, or 98% of the 52 returned. The 35 unusable questionnaires were made up of 33 who did not return surveys and two surveys that were returned as undeliverable. If the same proportion of the nonresponding guides (33) were active in the Southwest Region as the responding guides (98%), then an additional 32 guides were in the population (33 x 98% = 32), for an estimated total of 83 or (51+32) active guides in the region. A summary of the results of each question is presented below. A sample questionnaire, attachment 2, is at the end of this section.

   a. Question one. The first question of the guide survey asked what kind of services were offered by the guide. Responses are summarized in table 10. All professional guides are by law responsible for the safety, comfort, licenses, tags, and harvest reports of their clients. Client safety and comfort includes first-aid supplies, survival gear, emergency food, comfortable shelter, and reasonable transportation arrangements, including the transportation of harvested game animals (12 AAC 38.070,

Table 9. Southwest Game Guide Survey Mailing Results

Surveys mailed	87
Undeliverable surveys	2
Surveys returned by guides	52
Response rate	61%

Table 10. Services Offered by Southwest Region Game Guides

Services Offered	Number of Respondents	%*
Lodging, daily air transportation and guide service	34	67%
Lodging, daily boat transportation and guide service	25	49
Guided air charter hunting trips	14	27
Guided float hunting trips	11	22
"Drop off" air charter	3	6

* Totals over 100% because some guides offered more than one kind of service.

.080, .110). Fifty-one guides answered this question. The majority of guides offered lodging, guide service, and either daily air or boat transportation. Guided air charter hunting trips without lodging were offered by 27% of the guides and guided float hunting trips without lodging were offered by 22%. Very few (6%) of the guides offered only "drop off" air charter service.

b. Question two. The second question asked what time during each year services were normally provided to hunters in Southwest Alaska. Guides generally operated during the spring (May) brown bear hunting season and in the fall for brown bear and other big game species. Table 11 summarizes the answers given to this question.

Most respondents indicated that their operations were limited to specific hunting seasons (fall and/or spring). A high percentage (70%) offered services in the fall; 65% guided for spring hunts. These periods of operation are similar to commercial fishing operations in that the seasons are set annually by regulations (Alaska Hunting Regulations in the case of game), and the period of operation is largely out of the operators' control. This question does not ask about time spent maintaining equipment and facilities, securing bookings, field reconnaissance, or other necessary activities.

c. Question three. This question asked for information on the number of clients served by the guiding industry in Southwest Alaska in 1978 through 1982. Table 12 summarizes these responses. There was a 17% increase in the number of hunters guided from 1978 to 1982. The average number of clients per guide also increased from 10 to 12, which is approximately the same percentage. Most of the guides who answered the survey had guided in all the years (1978-1982). The increase in the number of hunters was primarily accommodated by guides serving more clients.

d. Question four. Question four asked for the number of hunter-days (i.e., one person hunting any portion of one day) each guide provided services for clients per year from 1978 to 1982. The results of this question are presented in table 12. On the whole, hunter-days increased steadily from 1978 to 1982. The increase over the period was 24%. This increase in hunter-days was accommodated by a corresponding increase (26%) in hunter-days per guide. The hunter-days per hunter remained constant at nine days per hunter during 1978-1982.

Table 11. Seasons of Operation of Southwest Region Game Guides

Period of Operation	Number of Respondents	%
Spring	34	65
Fall	40	77
Spring, Summer, and Fall	12	23

Table 12. Guided Hunter Days and Numbers of Guided Hunters in Southwest Alaska, 1978-82

Year	Total Number of Hunters Guided	Total Number of Guided Hunter Days *	Average Number of Hunters per Guide	Average Number of Hunter Days per Hunter	Average Number of Hunter Days Served per Guides
1978	524	4,615	10	9	90
1979	531	4,686	10	9	92
1980	564	5,159	11	9	101
1981	595	5,538	12	9	109
1982	612	5,738	12	9	113

* Minimum estimate

e. Question five. Question five asked the game guides to indicate the approximate range of their gross earnings during the years 1978-1982. The results of this question are presented in table 13. No guides earned over $500,000 during any of the years. The two highest and lowest applicable income categories on the questionnaire were combined in table six because of nondisclosure regulations. Generally speaking, the income curves defined by the categorized responses had a fairly normal distribution; the income curve tended to shift upward over time and become slightly more skewed at the upper end. This is in keeping with the results of questions three and four because the number of guides increased only slightly from 1978 to 1982, but the number of clients increased in the later years.

The large dollar range of the individual income categories makes calculation of the industry average annual gross earnings difficult. To develop an approximate estimation, however, the number of guides in a given category was multiplied by the mean value of the category. These results are shown in table 14. The estimated gross earnings of the responding guides increased 75% from 1978 to 1982 (from approximately $2.4 million to $4.2 million). The estimated average gross earnings of the responding guides increased 45%, from $56,900 in 1978 to approximately $82,600 in 1982. If the nonresponding but active guides (33 x 98%), or 32 guides, had similar gross earnings as the responding guides, then the total estimated gross earnings in 1982 approximately was $6,860,000 for game guides in the Southwest Region.

f. Question six. Question six related to the number of persons employed by the game guides who served hunters in Southwest Alaska in 1982. Sufficient data were not collected to differentiate between part-time, full-time, and seasonal employment. Despite this limitation, the 51 guides who answered this question employed 342 persons (average=6.5; range=0-10). Only two guides ran single-person operations. Approximately, 20% employed 4 persons, 50% employed 6 or more persons, and 20% employed 10 or more persons. If it is assumed that the nonresponding active guides in the region also employed the same average number of persons, then the total number of persons directly employed in the game-guiding industry in Southwest Alaska in 1982 would be 623 or (83 + 83 x 6.5 =623).

Table 13. Number and Percentage of Game Guides by Gross Income Category, Southwest Alaska, 1978-81

Gross Income Category ($)	Years														
	1978			1979			1980			1981			1982		
	#	%	Cumulative %	#	%	Cumulative %	#	%	Cumulative %	#	%	Cumulative %	#	%	Cumulative %
0 - 9,999	6	14	14	5	11	11	5	11	11	6	13	13	6	12	12
10,000 - 24,999	6	14	28	8	19	30	8	17	28	4	9	22	7	14	26
25,000 - 49,999	13	31	59	8	19	49	16	35	63	15	33	55	13	25	51
50,000 - 99,999	12	29	88	15	35	84	7	15	78	9	19	74	12	24	75
100,000 - 500,000	5	12	100	7	16	100	10	22	100	12	26	100	13	25	100
Total	42	100	100	43	100	100	46	100	100	46	100	100	51	100	100

Table 14. Gross Earnings of Game Guides in Southwest Alaska, 1978-82

Year	Gross Earnings of Surveyed Guides	Number of Surveyed Guides Operating	Average Gross Earning per Surveyed Guide
1978	$2,388,500	42	$56,869
1979	$2,810,500	43	$65,360
1980	$3,031,000	46	$65,891
1981	$3,629,500	47	$77,223
1982*	$4,215,000	51	$82,647
1982	$6,859,704	83	$82,647

* Estimated gross earnings of all operating game guides in Southwest Alaska for 1982.

e. Question five. Question five asked the game guides to indicate the approximate range of their gross earnings during the years 1978-1982. The results of this question are presented in table 13. No guides earned over $500,000 during any of the years. The two highest and lowest applicable income categories on the questionnaire were combined in table six because of nondisclosure regulations. Generally speaking, the income curves defined by the categorized responses had a fairly normal distribution; the income curve tended to shift upward over time and become slightly more skewed at the upper end. This is in keeping with the results of questions three and four because the number of guides increased only slightly from 1978 to 1982, but the number of clients increased in the later years.

The large dollar range of the individual income categories makes calculation of the industry average annual gross earnings difficult. To develop an approximate estimation, however, the number of guides in a given category was multiplied by the mean value of the category. These results are shown in table 14. The estimated gross earnings of the responding guides increased 75% from 1978 to 1982 (from approximately $2.4 million to $4.2 million). The estimated average gross earnings of the responding guides increased 45%, from $56,900 in 1978 to approximately $82,600 in 1982. If the nonresponding but active guides (33 x 98%), or 32 guides, had similar gross earnings as the responding guides, then the total estimated gross earnings in 1982 approximately was $6,860,000 for game guides in the Southwest Region.

f. Question six. Question six related to the number of persons employed by the game guides who served hunters in Southwest Alaska in 1982. Sufficient data were not collected to differentiate between part-time, full-time, and seasonal employment. Despite this limitation, the 51 guides who answered this question employed 342 persons (average=6.5; range=0-10). Only two guides ran single-person operations. Approximately, 20% employed 4 persons, 50% employed 6 or more persons, and 20% employed 10 or more persons. If it is assumed that the nonresponding active guides in the region also employed the same average number of persons, then the total number of persons directly employed in the game-guiding industry in Southwest Alaska in 1982 would be 623 or (83 + 83 x 6.5 =623).

5. Summary. The Alaska Habitat Management Guides project sent 87 questionnaires to big game guides in the Southwest Region who operated during 1982. The survey asked questions about the guides' operations from 1978 to 1982. Useable responses were obtained from 52 guides (61%) and provided valuable information on the game-guiding industry in that region. A variety of services were offered by game guides who primarily operated in the spring and fall seasons (which corresponds to the majority of regulation hunting dates). The average number of hunters increased from 10 per guide in 1978 to 12 per guide in 1982. The total number of hunters guided increased 17%, from 524 in 1978 to 612 in 1982. Guided hunter-days had a similar increase, from approximately 4,615 in 1978 to 5,738 in 1982. Client hunter-days per guide increased from 90 per guide in 1978 to 113 per guide in 1982; hunter-days per client remained constant at nine days. Estimated gross earnings of professional game guides who completed the survey increased from approximately $2.4 million ($56,900 average per guide) in 1978 to $4.2 million ($82,700 average per guide). If it is assumed that the percentage of nonresponding but active game guides earned comparable gross incomes in 1982, then the total estimated game-guiding income in Southwest Alaska in 1982 was approximately $6.9 million. Fifty-two guides employed a total of 342 people in 1982 for an average of 6.5 employees per guide. The approximate total number of persons directly employed in the big-game-guiding industry in 1982 (including extrapolation for nonresponding guides) was 623.

The survey data are insufficient to determine the secondary economic effects of the professional game-guiding industry in the Southwest Region. If, however, the percentage of nonresident hunters served in the Southwest Region is similar to that of the Southcentral Region (over 77% as determined by the Southcentral Region game guide survey), then game guiding in the Southwest Region provides a considerable input of revenue into the region. How much of the guides' income remains in the region is not certain from this survey. Nor is it apparent from the survey where the permanent residences of Southwest Region game guides are. Both factors would affect the overall economic impact of game guiding on the region. It is also not unlikely that Alaska residents who are guided in the Southwest Region are from more urban areas and other regions. If this is the case, professional game guiding provides a mechanism for urban dollars to flow to rural areas. Professional game guiding is also labor intensive and provides a significant amount of employment with the income it generates. This increases the secondary economic impacts as compared to a more capital-intensive economic activity.

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Attachment 1

BEAR HUNTER QUESTIONNAIRE

1. How many bears in total did you see while actually hunting?_____

2. How many bears did you see while hunting that were not legal?_____

   Females with 1 cub_____
   Females with 2 cubs_____
   Females with 3 cubs_____
   Females with 4 or more cubs_____
   Cubs not with a female_____
   Only legal bears seen_____
   Can't remember_____

3. Did you shoot or try to shoot the first legal bear you saw? Yes No (circle one)

4. If no, how many legal bears did you pass up before killing your bear?_____

5. After you shot your bear and examined it, was it larger, smaller, or about equal to the size you had estimated when preparing to shoot?

   Larger Smaller Equal (circle one)

6. Please rank (1 being most important, 2 being second, etc.) the following factors as to their importance in your decision to shoot the bear you killed.

   _____coat condition
   _____coat color
   _____bear's size
   _____guide's recommendation
   _____lack of other opportunity
   _____other (list)_____

   Overall, are you satisfied with your bear? Yes No (circle one)
   Comments?_____

7. Had you previously killed a brown or grizzly bear in Alaska? Yes No (circle or
   If yes, where?_____
   How do you rank (1 being most important) the following factors in deciding to hunt on the Alaska Peninsula?

   _____wanted a better coat condition
   _____wanted a different coat color
   _____wanted a larger bear
   _____other reasons (list)_____

8. If the regulations were changed so that you did not have to wait 4 years before taking another bear, realistically how often would you hunt brown bears on the Alaska Peninsula?

   _____never again
   _____every year
   _____every other year
   _____every third year

9. Based on your own opinion, please rank (1 being most important) the following elements of a satisfactory bear hunt. Then to the right indicate whether you experienced (yes) or did not experience (no) these things on your hunt.

Rankings		Yes	No
_____	Good weather	____	____
_____	Scenery	____	____
_____	Wilderness experience	____	____
_____	Quality of bear taken	____	____
_____	Just taking a bear	____	____
_____	Number of bears seen	____	____
_____	Amount of other game seen	____	____
_____	Few other hunters	____	____
_____	Opportunity for good photos	____	____
_____	Other_____	____	____
_____	Other_____	____	____

10. Did you hunt other game on the Alaska Peninsula this year and if so, how many did you shoot?

	Yes	No	How many taken
Caribou	____	____	_____
Moose	____	____	_____
Ptarmigan	____	____	_____
Ducks	____	____	_____
Geese	____	____	_____
Wolf	____	____	_____
Rabbits	____	____	_____
Wolverine	____	____	_____
Other (list)_____	____	____	_____

Alaska's hunting areas are receiving increasing demands for other uses, including: oil, gas and mineral development, residential subdivision, agricultural development, and timber harvesting. In our continuing effort to maintain large areas of suitable habitat necessary for vigorous wildlife populations and for high quality hunting opportunities, the Department of Fish and Game increasingly finds it necessary to express Alaska's wildlife resources in terms of economic value. Therefore, the following question is designed to determine the economic value of brown bear hunting on the Alaska Peninsula. Your individual response will be kept confidential. It will be combined with the responses of other hunters to calculate total economic values for brown bear hunting on the Alaska Peninsula. Thank you for your cooperation in response to this question.(next page).

11. In total (include all air fares, guide fares, taxidermist costs, equipment costs, food, lodging, license fees, and any other related costs) what is your best, true estimate of the amount of money you spent for your brown bear hunt on the Alaska Peninsula.

Item	Amount Spent $
Hunting license and tag	_____
Guide fee	_____
Taxidermist fee	_____
Air fares	_____
Food and lodging (en route to Alaska and in Alaska)	_____
Cost of equipment you bought specifically for this bear hunt (i.e. would not include your rifle unless you purchased it especially for this hunt)	_____
Other related costs (list items):	
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
Total cost of your bear hunt	$_____

nonresident = $410.00
resident = $ 37.00

12. Your comments or recommendations _____

Attachment 2

TO: Game Management Unit 8, 9, 10, and 17 Game Guides and Air Charter Operators

Changing land ownership and accelerating resource development activities in the Alaska Peninsula/Mulchatna and Kodiak/Aleutian Islands area are ever-increasing threats to fish and wildlife habitat and user opportunities. The game guide industry, of which game guiding and air charter operations are an important part, has not had a significant influence in land use planning due to the lack of data on the magnitude of the industry. Through this survey the Alaska Department of Fish and Game (ADF&G) is attempting to gather reliable information which will help to determine the economic value of the game resource in this area. The information collected will aid the Department in accurately portraying the importance of the guiding industry to your region in many land and water management planning processes in the future.

Please take a few minutes to answer the important questions which are attached and return the form in the enclosed pre addressed, prepaid envelope or mail to:

Mike McDonald
Game Biologist
Alaska Department of Fish and Game
Game Division
333 Raspberry Road
Anchorage, Alaska 99502
(907) 344-0541

Please return this questionnaire by November 15, 1983. The identity of those returning the questionnaire will remain anonymous. Thank you for your cooperation.

SURVEY OF GAME GUIDES AND AIR CHARTER
OPERATORS OF
THE KODIAK/ALEUTIAN ISLANDS AREA

1. Please check the following services which you provide:

_____ Lodging with daily air transportation and guide service.

_____ Lodging with daily boat transportation and guide service.

_____ Guided air charter hunting trips.

_____ Guided float hunting trips.

_____ "Drop off" air charter service.

2. Between what dates do you annually provide services to sport hunters?

Dates _____

3. How many clients did you have in each of the following years?

1982 _____ 1981 _____ 1980 _____ 1979 _____ 1978 _____

4. How many hunter days did your business provide services for in each of following years? [A hunter day is equal to one person hunting any portion of a day.]

1982 _____ 1981 _____ 1980 _____ 1979 _____ 1978 _____

5. Please check the appropriate box to indicate the gross income your business received from sport hunters for the last five years:

Gross Income	1982	1981	1980	1979	1978
$999 or Less					
1,000 - 9,999					
10,000 - 24,999					
25,000 - 49,999					
50,000 - 99,999					
100,000 - 249,999					
250,000 - 499,999					
500,000 - 749,999					
750,000 - 999,999					
1,000,000 or more					

6. How many people are earning an income from your business including your working family? _____

Thank you very much for your cooperation. Please return this questionnaire by November 15, 1983.

V. HUNTING IN THE SOUTHCENTRAL REGION

A. Introduction

This section presents information on the economic value of hunting in Southcentral Alaska. Very few data are available, however, for assessing the value of hunting activities in the region. This analysis is, therefore, limited in scope and principally provides some background information for future economic surveys or studies. General information on hunting in the region is supplemented by the presentation of existing data (season lengths and hunter numbers) that reflect changes in the demand for the opportunity to hunt wildlife. Despite the impossibility of directly describing these changes in dollar values, they are nevertheless important indicators of increasing demand and the consequent scarcity of hunting opportunities, which in turn imply increasing economic value. This section also presents results of the few economic surveys that have been completed in the region. The presentation of background and hunter survey information is by species.

An assessment of the economic value of wildlife in Alaska is especially difficult because the allocation of hunting opportunities does not occur through the market economy. Therefore, in order to maintain wildlife populations at sustainable yield levels, a complex system of hunting regulations has developed that controls hunting effort by such means as bag limits, season lengths, and drawing and registration permits. This allocation process is an extremely important consideration when assessing the economic value of wildlife resources and hunting activities in the state because it limits their potential and measurable economic "value." If, for example, the opportunity to hunt moose in the region were auctioned off by a broker in London, England, rather than being allocated primarily to Alaska residents, both the apparent and measurable value of the resource would undoubtedly be greatly increased.

Although the allocation system clearly limits the measurable value and income-generating potential of hunting activities, one type of analysis of the system nevertheless provides a surrogate for an economic demand analysis. This type of analysis was done for the Southcentral Region by drawing and registration permits in order to evaluate the changes in demand for hunting opportunities. This analysis is located in the Statewide Overview section of this volume.

B. Data Limitations

As discussed above, a thorough economic analysis of hunting in the Southcentral Region is not possible at this time because of a severe shortage of information. The same general data limitations discussed in the Statewide Overview section pertain to economic information for the Southcentral Region; please see the discussion in that section.

C. Hunting Background

Caribou, moose, Sitka black-tailed deer, brown bear, and Dall sheep are the big game hunting species covered in this narrative, although black bear and bison are also hunted. Deer are not indigenous to the region but were introduced to islands in Prince William Sound beginning in 1916. They have since spread to other islands in the sound and the surrounding mainland. Map 1 shows the location of game management units in the Southcentral region.

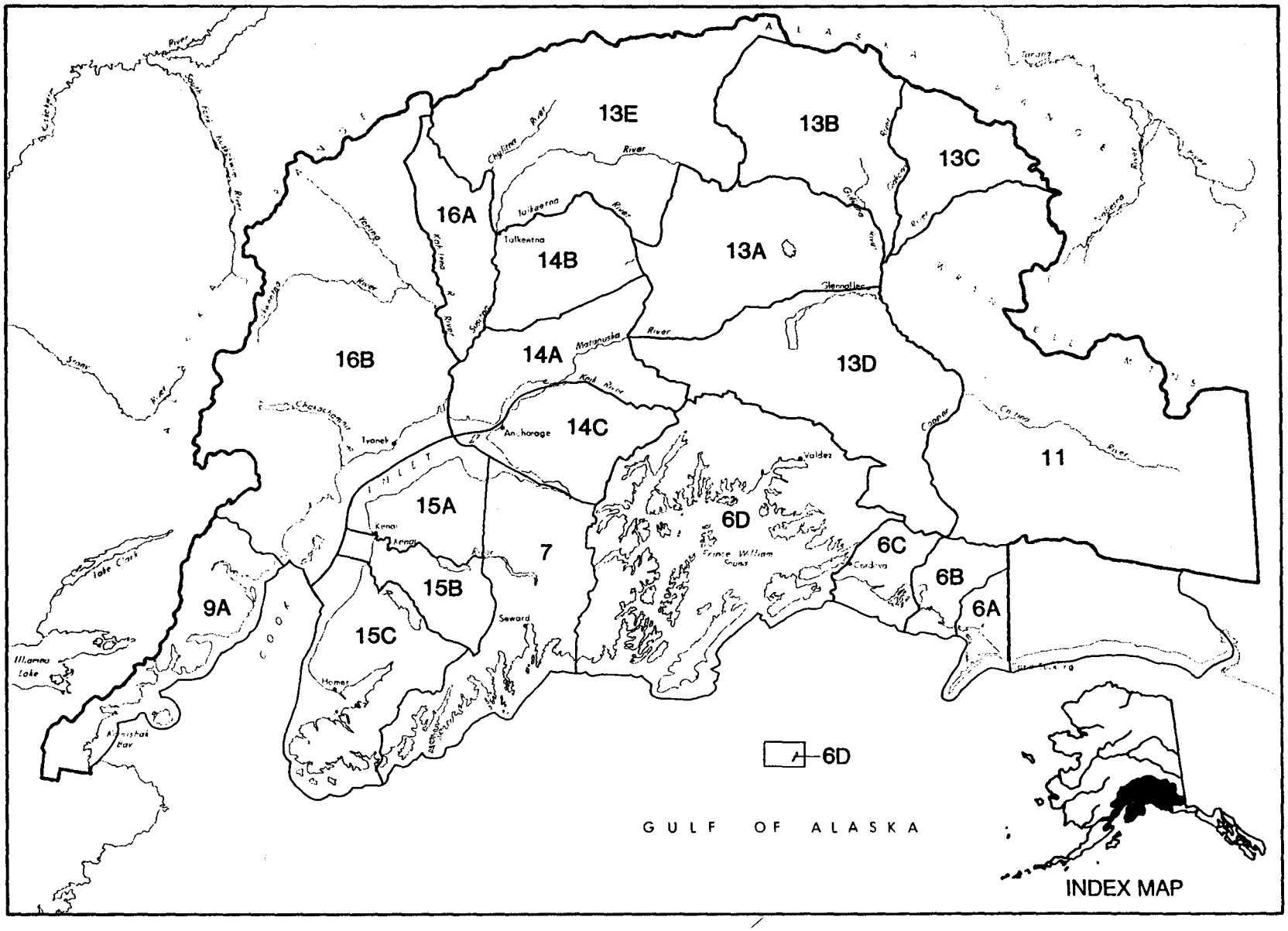
Information on harvest and hunter numbers for each species was drawn from the Human Use narratives in volume 2 of the Alaska Habitat Management Guide for the Southcentral Region and from an examination of permit hunt data. Because permit data often include the number of applicants for specific hunts, they give an idea of the demand for a resource. The Southcentral Region is the most populous in the state. As a consequence, more hunts are conducted on a permit basis in that region than in any other.

One economic survey of hunters conducted by ADF&G, Division of Game, personnel is presented in this section. This is a survey of Denali Highway hunters conducted during a special spike/fork antler moose season in the fall of 1984. A statewide survey of Dall sheep hunters that provides data pertinent to the Southcentral Region was also conducted in 1984. (See the Statewide Overview section in this volume for more complete results of the Dall sheep survey.)

Also in 1984, a professional hunting guide questionnaire on the economic value of big game guiding in Southcentral Alaska was mailed to game guides who were licensed to operate in the region in 1984. An analysis of the results of this survey is included in this section.

D. Sitka Black-tailed Deer

Black-tailed deer were transplanted to the Prince William Sound area from 1916 through 1923. The first hunting season was 12 years later. The population grew rapidly and peaked about 1945.



Map 1. Game management units in the Southcentral Region.

Since then, there have been large fluctuations in deer numbers due to a combination of two factors: a lack of predators, which permits the population to exceed its limited range, and periodic severe winters. The hunting regulations prior to 1964 varied considerably from year to year, reflecting these population fluctuations. Since then, the regulations have remained liberal, with a 153 day season, four deer bag limit prior to 1981 and a five deer bag limit after 1981 (ADF&G 1976, 1980). The deer population has continued to fluctuate in response to environmental conditions independent of human harvest.

Table 1 summarizes data available on harvest of Sitka black-tailed deer for the years 1972-1981. Most information came from interviews with Cordova hunters. Those interviews were not done in 1978 or 1979; instead, information was obtained from harvest ticket reports. Underreporting of harvest information is apparent in the harvest reports. A thorough questionnaire survey of a cross section of all hunters was conducted in 1980, and the harvest total reported is triple that of the previous years when harvest ticket reports were relied on for information (Reynolds 1982, 1983). Because table 1 presents data collected by three different sampling techniques, direct comparison between years with different sampling methods should be done with qualification.

The number of days spent in the field for each deer harvested was obtained from the interviews with Cordova hunters. The time ranges from a high of 5.2 hunting days per deer to a low of 1.6. The average for the seven years of data is 3.2 hunting days per deer.

The 1980 hunter survey found that most GMU 6 deer hunters came from the Anchorage area (39%), with local hunters second at 34%. Cordova hunters account for about 25% of deer hunters in the Southcentral Region.

No hunter economic information has been collected regarding deer in the Southcentral Region. A survey of professional game guides in the region indicated that in 1983 no deer hunters were guided.

E. Caribou

Caribou range over a great deal of the region in several distinct herds. The Mentasta Herd is concentrated in GMU 11. The much larger Nelchina Herd ranges over GMUs 13 and 14 and often winters in GMUs 11 and 12. Two small herds roam in areas of the Kenai Peninsula in GMUs 7 and 15. The herd in GMU 7 is named for its range in the Kenai Mountains, the one in GMU 15 for its range in the Kenai lowlands. Portions of the Mulchatna Herd from the Southwest Region can be found in GMU 16. In 1985, all caribou

Table 1. Deer Hunting in Prince William Sound, Southcentral, Alaska, 1972-81

Year	Cordova License Buyers	No. of Nonhunters	No. of Hunters	Successful	Harvest	Deer/hunter	Days/deer
1972	600	306	294	97	180	0.6	5.2
1973	600	144	456	301	720	1.6	2.5
1974	---	---	354	188	414	1.2	4.2
1975	743	334	409	252	631	1.54	2.6
1976	807	428	379	186	412	1.1	3.7
1977	800	352	448	360	992	2.2	1.6
1978*	---	---	445	198	391	0.9	---
1979*	---	---	368	204	452	1.2	---
1980**	---	---	1,251	610	1,337	1.1	---
1981	700	210	490	329	784	1.6	2.8

Source: ADF&G survey and inventory reports; 1972-77 data from interviews with 100 Cordova hunting license holders.

--- means no data were available.

* Data taken from hunter harvest reports.

** Data from postal survey of GMU 6 deer harvest ticket holders.

hunting in the region except in GMU 16 came under subsistence regulations. Tier II permits were required for hunts in GMUs 7, 11, 13, and 14.

The reported harvest of caribou in the Southcentral Region is probably an accurate estimate of the total harvest because all hunts have been on a permit-drawing system since 1977. For the region as a whole, reported harvest of caribou has increased from 475 in 1977 to 1,116 in 1983, an increase of 135%. A measure of hunter effort is available for the region only for the years 1981, 1982, and 1983. The number of hunter-days reported during those years is 5,775, 7,061, and 6,603, respectively (BGDIF 1977-83).

Seasons and bag limits on the Kenai Mountains Herd (GMU 7) have remained constant since 1977. The number of hunting permits was raised from 100 to 150 in 1982, and the number of applicants for permits has steadily increased as well, but because the herd is relatively inaccessible the number of hunters in the field is well below the number of permits (ADF&G 1985).

Unlike those of other herds, a majority of hunters of the Kenai Mountains caribou use highway vehicles and then walk 5 to 12 miles to hunt, or they use horses for transportation. Almost all hunters live on the Kenai Peninsula (55%) or in the Anchorage area (40%). Average days hunted has decreased slightly over the three years for which data are available (table 2).

The number of permits available for hunters of the Mentasta Herd (GMU 11) has remained constant since 1978. The number of applicants for those permits has more than doubled. However, the actual number of reported hunters in the field has remained about constant and was actually lower in 1983 than in the previous six years. The harvest was also at a six-year low in 1983. The average number of days hunted in GMU 11 has increased slightly from 1981 to 1983. Roughly 58% of all hunters from 1978 to 1983 used airplanes as their chief mode of access to the herd; 21% used a highway vehicle, and 15% used ORVs. Aircraft users have a considerably higher success rate than those using other means (table 3). About 43% of those hunting Mentasta caribou were from the Nelchina Basin and Valdez, 37% from the Anchorage area, 8% from Southeast Alaska, and 7% from Palmer-Wasilla (ADF&G 1984a).

Between 1977 and 1983, the number of permits available for hunters of the Nelchina Herd more than doubled, from 750 to 1,750, and the number of applicants ballooned, from 1,383 to over 9,700 (600%). An applicant's chance of receiving a permit has dropped from one in two to one in five or six. Days hunted has averaged 4.0 over the three years 1981-1983. Highway vehicles and ORVs are the most popular means of transport for Nelchina hunters (table 4). Over half of the Nelchina hunters in 1983 came from the Anchorage area

Table 2. Total Reported Human Use of Kenai Mountain Caribou Herd in GMU 7, 1977-83

		By Mode of Access							By Hunter Origin							
	Total	Air-plane	Hwy. Vehicle	Boat	ORV	Horse	Snow-machine	Unspeci-fied	Res.	Non-res.	Alien	Unspeci-fied	Total Appli-cation	No. Permits	% Success	Avg. Days Hunted
1977																
No. hunters	59	6	38	0	0	12	0	3	---	---	0	---				
Days hunted	---	---	---	---	---	---	---	---	---	---	0	---	236	100	44	---
Harvest	26	0	19	0	0	7	0	0	---	---	0	---				
1978																
No. hunters	73	4	49	0	0	18	0	2	70	1	0	2				
Days hunted	---	---	---	---	---	---	---	---	---	---	---	---	212	100	41	---
Harvest	30	2	18	0	0	10	0	0	30	0	0	0				
1979																
No. hunters	69	8	43	0	1	17	0	0	67	1	0	1				
Days hunted	---	---	---	---	---	---	---	---	---	---	0	---	354	100	48	---
Harvest	33	3	22	0	1	7	0	0	32	0	0	1				
1980																
No. hunters	61	8	40	0	0	13	0	0	59	2	0	0				
Days hunted	---	---	---	---	---	---	---	---	---	---	0	0	391	100	34	---
Harvest	21	1	15	0	0	5	0	0	19	2	0	0				
1981																
No. hunters	63	10	30	0	1	20	0	2	59	2	0	2				
Days hunted	253	36	123	0	2	82	0	10	237	10	0	6	315	100	33	4.0
Harvest	21	0	12	0	0	9	0	0	21	0	0	0				
1982																
No. hunters	81	6	37	2	0	31	0	5	78	3	0	0				
Days hunted	282	20	122	8	0	107	0	25	272	10	0	0	449	150	35	3.5
Harvest	28	0	17	0	0	11	0	0	28	0	0	0				
1983																
No. hunters	69	5	52	0	0	9	0	3	66	2	0	1				
Days hunted	224	---	---	---	---	---	---	---	212	12	0	0	459	150	42	3.2
Harvest	29	3	21	0	0	5	0	0	28	1	0	0				

Source: ADF&G 1984; BGDIF 1977-83.

--- means no data were available.

Table 3. Total Reported Human Use of Mentasta Caribou Herd in GMU 11, 1977-83

		By Mode of Access							By Hunter Origin							
	Total	Air-plane	Hwy. Vehicle	Boat	ORV	Horse	Snow-machine	Unspeci-fied	Res.	Non-res.	Alien	Unspeci-fied	Total Appli-cation	No. Permits	% Success	Avg. Days Hunted
1977																
No. hunters	93	---	---	---	---	---	---	---	---	---	---	---				
Days hunted	---	---	---	---	---	---	---	---	---	---	---	---	277	150	56	---
Harvest	52	37	3	0	8	4	0	0	---	---	---	---				
1978																
No. hunters	217	143	29	0	33	4	0	8	203	12	0	2				
Days hunted	---	---	---	---	0	---	---	---	---	---	0	---	363	350	69	---
Harvest	149	102	14	0	28	4	0	1	139	9	0	1				
1979																
No. hunters	184	106	43	1	18	2	0	14	178	5	0	1				
Days hunted	---	---	---	---	---	---	0	---	---	---	0	---	408	350	54	---
Harvest	99	84	8	0	4		0	3	96	3	0	0				
1980																
No. hunters	226	142	31	1	36	3	0	13	222	4	0	0				
Days hunted	---	---	---	---	---	---	---	---	---	---	0	---	421	350	64	---
Harvest	144	108	11	1	22	1	0	1	140	4	0	0				
1981																
No. hunters	224	139	55	3	24	0	0	3	206	14	0	4				
Days hunted	714	420	174	9	106	0	0	5		45	0	9	619	350	60	3.2
Harvest	135	103	20	0	11	0	0	1	124	8	0	3				
1982																
No. hunters	215	124	48	2	26	5	0	10	198	13	0	4				
Days hunted	790	426	165	15	125	19	0	40		46	0	8	732	350	66	3.7
Harvest	141	99	18	1	20	2	0	1	126	11	0	4				
1983																
No. hunters	181	71	51	4	44	8	0	3	162	16	0	3				
Days hunted	673	---	---	---	---	---	0	---	---	---	0	---	757	350	50	3.8
Harvest	91	52	12	0	19	6	0	2	78	10	0	3				

Source: ADF&G 1984, 1973-84.

--- means no data were available.

Table 4. Total Reported Human Use of Nelchina Caribou Herd in GMUs 13, 14A, and 14B, 1977-83

		By Mode of Access							By Hunter Origin							
	Total	Air-plane	Hwy. Vehicle	Boat	ORV	Horse	Snow-machine	Unspeci-fied	Res.	Non-res.	Alien	Unspeci-fied	Total Appli-cations	No. Permits	% Success	Avg. Days Hunted
1977																
No. hunters	580	---	---	---	---	---	---	---	---	---	---	---	1,383	750	62	
Days hunted	---	---	---	---	---	---	---	---	---	---	---	---				---
Harvest	360	---	---	---	---	---	---	---	---	---	---	---				
1978																
No. hunters	747	226	173	50	281	12	0	5	710	30	0	7	2,775	1,000	72	
Days hunted	---	---	---	---	---	---	0	---	---	---	0	---				---
Harvest	539	190	88	31	222	8	0	0	510	25	0	4				
1979																
No. hunters	972	268	257	59	328	29	0	31	912	50	0	10	5,600	1,300	65	
Days hunted	---	---	---	---	---	---	0	---	---	---	0	---				---
Harvest	630	230	110	37	228	22	0	3	585	41	0	4				
1980																
No. hunters	981	302	275	71	276	19	0	38	933	45	0	3	6,841	1,300	63	
Days hunted	---	---	---	---	---	---	0	---	---	---	0	---				---
Harvest	621	245	124	44	188	13	0	7	578	41	0	2				
1981																
No. hunters	1,286	313	431	139	341	22	8	32	1,232	50	0	4	6,819	1,600	70	
Days hunted*	4,501	916	1,328	593	1,356	83	10	215	4,255	226	0	20				3.5
Harvest	901	274	250	101	243	18	6	9	858	40	0	3				
1982																
No. hunters	1,334	237	555	123	295	13	65	46	1,331	0	0	3	9,110	1,750	65	
Days hunted*	5,818	2,738	760	415	970	69	524	342	5,805	0	0	13				4.6
Harvest	861	204	276	89	227	12	41	12	756	0	0	1				
1983																
No. hunters	1,431	240	507	153	411	13	63	44	1,429	0	0	2	9,720	1,750	68	
Days hunted*	5,458	---	---	---	---	---	---	---	---	0	0	---				3.9
Harvest	971	214	268	121	319	8	33	8	969	0	0	2				

Source: ADF&G 1984; unpublished data in caribou files, ADF&G, Anchorage.

--- means no data were available.

* Does not represent total days hunted by all hunters because a small number of hunters did not report this information.

(51%). Almost one-fifth each came from the Glennallen-Cantwell area (19%) and the Matanuska-Susitna valley (18%), 8% from Fairbanks, and 4% from other regions of the state (ADF&G 1984a).

Only one hunting season has been held for the Kenai Lowlands Herd in GMU 15. Predation and possibly poor range are thought to be the reasons limiting population growth since the herd was transplanted (Holdermann 1983). Present human use is limited to nonconsumptive uses such as viewing and photography (ADF&G 1977).

No economic surveys have been conducted for caribou hunters in the Southcentral Region. However, survey results on professional game guides include information on guided caribou hunts. See the guide survey results in this section for more information. For more information regarding drawing permit and registration hunts for caribou in the region, see the permit data analysis in the Statewide Hunting Economic Overview section in this volume. (See the caribou Human Use section in volume 2 of the Alaska Habitat Management Guide for the Southcentral Region for more information.)

F. Dall Sheep

The Southcentral Region contributes an average of about 285 sheep out of the 1,100 harvested annually statewide (ADF&G 1984b, Heimer 1984). From 1979 to 1983, the amount of hunting effort in Southcentral Alaska, as indicated by the number of hunter-days, has averaged 4,692, with a low of 3,948 days in 1982 and a high of 5,185 days in 1983 (ADF&G 1984b). Table 5 shows the regionwide harvest, number of hunters, and effort in terms of hunter days for the period 1979-1983.

Variations in harvest and hunter effort in particular areas during recent years is in part due to changes in land status and management policy. Specifically, almost all of GMU 11 is located within Wrangell-St. Elias National Park and Preserve. Exclusion of all but subsistence hunters from the area when it was a National Monument in the 1979 and 1980 seasons cut down on both effort and harvest considerably and apparently directed hunter effort into other areas. An unusually high number of hunters appeared in GMU 13 in 1979, but hunter effort declined in GMU 13 in subsequent years following establishment of preserve areas in GMU 11, where general hunting is allowed. Both the number of hunters and the harvest in GMU 11 doubled when general hunting was reestablished there (ADF&G 1985).

Tables 6 and 7 show information on hunter origin and means of transportation for Dall sheep hunters in the Southcentral Region in 1980. The data were compiled from harvest reports returned by

Table 5. Southcentral Region Dall Sheep Harvest and Hunter Effort, 1979-83

Year	Harvest	No. of Hunters	Days Hunted
1979	261	1,033	5,018
1980	246	843	5,013
1981	306	911	4,296
1982	285	878	3,948
1983	287	1,059	5,185

Source: ADF&G 1979-84.

Table 6. Origin of Southcentral Region Dall Sheep Hunters, 1980

GMU Hunted	No. of Hunters(#)	Alaska Residents(#)	Region Residents(#)	Non-Residents(#)	Unspecified(#)
7	95	94	93	1	0
15	66	57	54	8	1
14	208	181	172	27	0
11	204	168	148	31	5
13	416	315	284	65	36
Total	989	815	751	132	42

Source: ADF&G 1979-84.

Table 7. Transport Mode of Southcentral Region Dall Sheep Hunters, 1980

GMU Hunters	No. of Hunters	Aircraft	Highway Vehicle	Boat	ORV	Horse	Snow-machine	Motor Bike	Unspec-ified
7	95	11	51	14	0	3	0	0	16
15	66	40	6	9	0	7	0	1	3
14	208	33	102	16	11	7	0	0	39
11	204	137	30	1	11	10	0	0	15
13	416	166	143	9	36	22	0	4	36

Source: ADF&G 1979-84.

hunters. Only one year's data were compiled from harvest reports. The 1980 data, however, are thought to be representative of the general type of use occuring in these areas (ibid.). Of those hunters who identified their residence (96%), Alaska residents made up 86% of the sheep hunters in the region, and better than 90% of resident hunters lived in the Southcentral Region (ibid.).

Transportation means varied, depending on GMU (table 7). Half the hunters in GMUs 7 and 14 (54% and 49%, respectively) used a highway vehicle to reach their hunt areas. This reflects the proximity of those areas to the road system. Use of airplanes (39%) and highway vehicles (34%) was about evenly divided in GMU 13, while a larger percentage of hunters there relied on ORVs (9%) and horses (5%) for access than in any other GMU. The majority of hunters in GMUs 15 (61%) and 11 (72%) used airplanes to reach sheep areas (table 7).

Table 8 shows hunter effort and harvest in 1980. Beginning in 1983-1984, such information has been available by minor tributaries within each GMU. This makes it considerably more useful for economic analysis and land use planning. (See the Dall sheep Human Use section in volume 2 of the Alaska Habitat Management Guide for the Southcentral Region for more information.)

In 1984, a questionnaire was mailed to all residents and nonresidents who legally hunted Dall sheep in Alaska during 1983. The survey focused on economic aspects of Dall sheep hunting, particularly the costs incurred by sheep hunters. See the Statewide Hunting Economic Overview section in this volume for survey results. Survey results on Southcentral professional game guide include information on guided Dall sheep hunts. See the guide survey results in this section for more information.

G. Moose

Moose are hunted in all areas of the region. Both the harvest and the number of hunters fluctuated over the six years between 1978 and 1983; however, overall both increased. Hunter numbers increased more than the harvest over the period. The percentages of increase were 56 and 30%, respectively. Days hunted increased at an even higher rate, 63% (table 9).

The database for Southcentral Region moose hunting, however, is inconsistent. In 1979, because reminder letters were not sent out, only 37% of hunters supplied harvest ticket information, rather than the usual 65-70%. In 1983, permit hunt information is included in the data for the first time. In previous years, only general harvest information was compiled (ADF&G 1985).

Table 8. Southcentral Region Dall Sheep Harvest and Hunter Effort, 1980

GMU Hunted	No. of Hunters	Days Hunted	Harvest	Avg. Days/ Sheep	Avg. Day Afield/ Hunter	Avg. Sheep/ Hunter
7	95	372	5	74.40	3.92	0.05
15	66	473	18	26.28	7.17	0.27
14	208	1,587	70	22.67	7.63	0.34
11*	204	1,097	96	11.43	5.38	0.47
13	416	1,994	105	18.99	4.79	0.25
Region totals	989	5,523	294	18.79	5.58	0.30

Source: ADF&G 1979-84.

* Data for GMU 11 is from 1981, a more typical year than 1980 due to land status changes.

Table 9. Southcentral Region Moose Harvest and Hunter Effort, 1978-83

Year	No. of Hunters	Days Hunted	Harvest	Avg. Days/ Moose	Days Afield/ Hunter	Moose/ Hunter
1978	10,298	53,279	2,646	20.14	5.17	0.26
1979	7,072	39,146	1,989	19.68	5.54	0.28
1980	10,646	58,477	2,120	27.58	5.49	0.20
1981	12,045	67,008	2,692	24.89	5.56	0.22
1982	11,553	67,265	2,237	30.07	5.82	0.19
1983	16,076	86,981	3,428	25.37	5.41	0.21

Source: BGDIF 1978-83.

Over the six years of data, information on hunter origins was remarkably consistent. Of the 96% of the hunters who revealed where they lived, 97% were Alaska residents. About 9 of every 10 resident moose hunters lived in the Southcentral Region (table 10).

Some trends are evident in the ways hunters get to their chosen hunting grounds (table 11). In 1978, 21% of Southcentral Region moose hunters used aircraft for access to moose grounds. By 1983, the percentage had decreased to 15%. In contrast, the percentage of hunters using highway vehicles increased from 44% in 1978 to 51% in 1983. Boaters and ORV users consistently made up 13% and 18-21%, respectively, of the hunting population over the six-year period.

The foregoing percentages are for the region as a whole. In practice, the type of transportation used can vary greatly in each game management subunit, depending on its proximity to the road system and its type of terrain. The relatively extensive road system makes highway vehicles by far the favorite transportation means of hunters. ORVs are quite popular in areas with relatively level terrain and good trail systems. Only 3% of hunters in the region rely on horses for access, but in some areas, particularly on the Kenai Peninsula, they have the highest success rate (ibid.). (See the moose Human Use section in volume 2 of the Alaska Habitat Management Guide for the Southcentral Region for more information.)

No economic surveys have been conducted for moose hunters in the Southcentral Region. The Denali check station survey does include some hunter economic information, however. See those results in this section for more information. For information regarding drawing permit and registration hunts for moose in the region, see the permit data analysis in the Statewide Hunting Economic Overview section in this volume. The Southcentral Region game guide survey results include information on guided moose hunts in the region. See the game guide survey results in this section for more information.

H. Brown Bear

Brown bear harvest in the Southcentral Region varied considerably in the decade 1975 to 1985. The harvest generally increased over the period but not at the same rate as season lengths (fig. 1). Season lengths have steadily increased in all GMUs of the region. In 1975, the season lengths in the region's GMUs totalled 264 days, whereas in 1984 season totals were 698 days (table 12).

Table 10. Origin of Southcentral Region Moose Hunters, 1978-83

Year	No. of Hunters(#)	Alaska Residents(#)	Region Residents(#)	Non-residents(#)	Unspecified(#)
1978	10,298	9,671	8,724	282	345
1979	7,072	6,410	5,765	284	378
1980	10,646	9,983	9,176	330	333
1981	12,045	11,340	10,308	421	284
1982	11,553	10,732	9,857	335	486
1983	16,076	15,137	---	346	593

Source: BGDIF 1978-83.

--- means no data were available.

Table 11. Transport Modes of Southcentral Region Moose Hunters, 1978-83

Year	No. of Hunters	Aircraft	%	Highway Vehicle	%	Boat	%	ORV	%	Horse	%	Snow-machine	%	Unspec-ified	%
1978	10,298	1,784	21	3,700	44	1,033	12	1,593	19	263	3	2	0	1,923	19
1979	7,072	1,166	21	2,411	43	748	13	1,115	20	188	3	1	0	1,443	20
1980	10,646	1,526	18	3,983	48	1,088	13	1,503	18	233	3	7	0	2,306	22
1981	12,045	1,614	18	4,223	47	1,168	13	1,665	19	299	3	5	0	3,071	25
1982	11,553	1,436	18	3,601	45	1,064	13	1,693	21	266	3	5	0	3,488	30
1983	16,076	2,000	15	6,782	51	1,850	14	2,399	18	329	2	31	0	2,805	17

Source: ADF&G 1983a, BGDIF 1978-83.

All percentages are based on number of hunters who specified transport means, except for the last column. That is a percentage of hunters who did not specify transport based on total number of hunters.

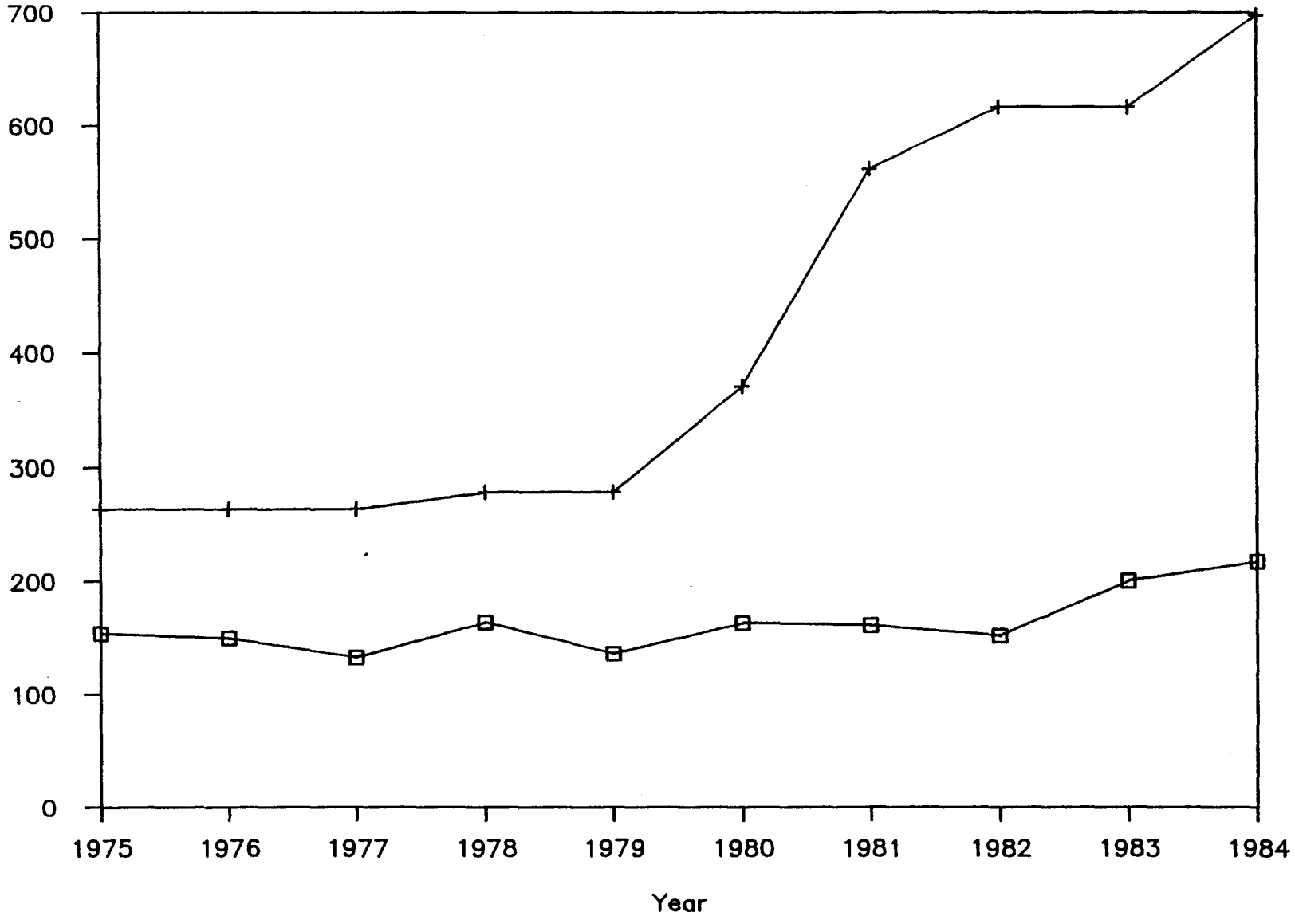


Figure 1. Southcentral Region brown bear harvest and season lengths (BGDIF 1975-1984).

Table 12. Southcentral Region Brown Bear Harvest, 1975-84

Year	Total Harvest	By Resident		By Nonresident		Season Length/ Days
		#	%	#	%	
1975	154	85	55	69	45	264
1976	150	95	63	55	37	264
1977	133	76	57	57	43	264
1978	164	101	62	63	38	279
1979	136	78	57	58	43	279
1980	163	115	71	48	29	371
1981	161	100	62	61	38	562
1982	152	99	65	53	35	617
1983	201	133	66	68	34	617
1984	218	150	69	68	31	698
Average	163	103	63	60	37	

Source: BGDIF 1975-84.

Greatest harvest occurred in 1984, when 218 bears were killed. The lowest harvest of the period was in 1977 when 133 bears were taken. The annual average for the period 1975-1984 is 163 bears. Unlike the Southwest Region, most Southcentral brown bear hunters are residents. This may be due to Southcentral's proximity to the state's large population centers and the lower expense and ease of access for resident hunters compared to that of the Southwest Region (Chihuly, pers. comm.). Nonresident harvest has ranged from 45% of the total in 1975 to 29% in 1980 and averaged 37% for the 10 years (table 12).

No hunter economic survey information has been collected for brown bears in the Southcentral Region. Nonresident brown bear hunters must employ guides in Alaska unless they hunt with next of kin. Information about the economic contribution of guiding to the region and state can be found in the analysis of the economic survey of professional game guides operating in Southcentral Alaska in this section.

I. Denali Check Station Hunter Survey

1. Introduction. In September 1984, the ADF&G, Division of Game, established a special "spike/fork antler" season for moose in the portion of GMU 13 subunits B and E between the MacLaren and Nenana rivers. The season allowed each hunter to take only a young bull moose with at least one spiked or forked antler from the period September 1 to 20, 1984. Check stations were set up at the Brushkana Creek crossing of the Denali Highway on the western border of the area and at the MacLaren River bridge on the eastern border of the area. The primary purposes of these check stations were to inform hunters of the new regulation, solicit hunter response to the special season, and collect biological data. However, as part of the questionnaire, a set of questions related to the monetary value of hunting was also asked by the game biologists at the check station (attachment 1). Although the answers to the monetary questions give some idea of what hunters spend on a road-accessed hunt, no firm conclusions can be drawn or consistent estimates made because of inconsistencies in the methodology.

   Most questionnaires were completed by the biologist while interviewing the hunter. Because of crowded conditions at the station, some questionnaires were also completed by hunters themselves or given to hunters to complete and return by mail. The survey was conducted during the first weekend of September and of the moose hunting season (also Labor Day weekend).

2. Results. A total of 44 hunters completed the survey; caribou hunters were also interviewed in the same manner as moose hunters. Of the total number of hunters, 18 (41%) were moose hunters, 11 (25%) were caribou hunters, and 15 (34%) were of unknown target species. This small sample size did not allow striation of the sample by target species. The estimated number of moose hunters in drainages within the boundaries of the special hunt area of GMU's 13E and 13B (some of whom hunted outside of the spike/fork area) for the 1984-1985 season was 483 hunters (BGDIF 1985). Therefore, this check station survey sampled less than 10% of the total possible population of moose hunters; results should be viewed conservatively.

a. Residency. The 44 hunters surveyed indicated their residency as follows:

- 26 in the Greater Anchorage area
- 11 in the Mat-Su Borough area
- 5 in the Fairbanks area
- 1 in Valdez
- 1 unknown

b. Success. Seventeen (39% of the total) hunters were successful. Of these, six were moose hunters, four were caribou hunters, and seven were unknown. Of the 27 (61%) unsuccessful hunters, 12 were moose hunters, 7 were caribou hunters, and 8 were unknown. The overall success rate for moose hunters in the subunits during the season was 21%.

c. Days spent hunting. Thirty-one (70%) of the hunters were on two-to-three-day weekend trips. Although this is not unusual for road-accessed moose and caribou hunts in the region (ADF&G 1984), the timing of the Denali check station sampling biased towards this result. The specific survey results were as follows:

Days in Field	No. of Hunters
Unknown	3
1/2 day	1
1 day	2
2 days	11
2 1/2 days	3
3 days	17
4 days	5
5 days	1

d. Expenditures. Hunters were asked to estimate their expenditures for six categories of hunting expenses and, where relevant, to indicate what percentage of the equipments' use was for hunting. Unfortunately, some of the categories were annual expenses (license and tag fees), some were per-trip expenses (food, lodging, and transportation), and some were equipment expenses that can be used for a number of years, as well as for other activities. Because the survey asked for 1984 expenses, it is assumed that hunters understood that they should include only the portion of equipment expenses applicable to one year (though this is not certain). Because some expenses were annual and others trip-related, these values cannot be added. For them to be comparable, the annual hunting expenses need to be proportioned over the total number of hunting trips or days for the year, or the trip expenses need to be summarized for the year. The information is not available for these calculations, so annual and trip expenses are subtotalled independently below.

Expense Category	Range	Average
Trip		
Food & lodging	$ 20-300	$ 95.00
Transportation to and from area	45-250	140.00
Trip subtotal	$ 65-550	235.00
Annual		
License and tags	$ 5-75	$ 28.00
Hunting equipment	0-1,500	245.00
Camping equipment	0-1,575	277.00
ORVs/trailers	140-12,000	3,220.00
Annual subtotal	$145-15,150	$3,770.00

e. Willingness to pay above cost. The final question hunters were asked in the survey was how much more than their present costs would they be willing to pay to hunt in GMU 13. The results of this type of question make possible the construction of a demand curve for hunting opportunities in GMU 13. A demand curve shows the relationship, at any one time, between the price (or cost) of a good (service or activity) and the quantity demanded of that good. Graphically, it is a plot of price and quantity at a given time. Therefore, costs or prices must all be for the same time period.

The estimation of this demand curve is hampered by the fact that, as mentioned above, expenses are not in a consistent time period; some expenses are annual,

whereas others are per trip. The portion of annual expenditures to be allocated per trip is uncertain. The willingness-to-pay question did not specify a time period or a specific activity (for example, a weekend special spike/fork hunt in GMUs 13 B and E between the Nenana and MacLaren rivers) and then ask hunters to specify their willingness to pay above their present weekend costs. The willingness to pay question was related to the preceding expenditure questions, which contain both annual and trip expenses and thus compound the interpretation problem. It is uncertain as to whether the respondents would pay the additional indicated sum of money for a season or weekend of moose or caribou hunting. Therefore, the time period over which to allocate the willingness-to-pay figures is uncertain. Dollars are often viewed as independent of time, but instead the time dimension is usually of critical importance in economic analyses.

The specific hunter response to the willingness to pay question was a total of $13,240 by 34 hunters for an average of $389.41 each. Three hunters said there was no limit to what they would pay. Because of the problems mentioned above, these results have not been interpreted.

J. Professional Hunting Guides Survey

1. Introduction. The professional game guiding industry is one avenue through which the wildlife resources of the state contribute to the economic livelihood of Alaska residents. In 1984, the ADF&G's Habitat Management Guides project conducted a mail survey of professional game guides active in the Southcentral Region. Professional game guides are licensed by the state. They are familiar with financial aspects of hunting, and their activities provide an indication of the level of guided hunting in Southcentral Alaska. For these reasons, the mail survey was quite successful in obtaining information. This survey is the first of its type in the Southcentral Region.

2. Objectives. The first major objective of the survey of professional hunting guides was to determine some of the general characteristics of the industry, such as the facilities and services offered, periods of operation, employment numbers, and where guiding income tends to be spent. The second major objective was to estimate the volume of business conducted by guides in Southcentral Alaska by species hunted in terms of the number of hunters and gross

income. The third objective was to solicit comments regarding the problems currently facing the industry.

3. Methodology. A mailing list was prepared from the state register (ADCED 1984) of 144 active guides authorized to guide for big game in Southcentral Alaska (GMUs 6,7,11,13,14,15, and 16 and GMS 9A). The guides were mailed a brief eight-question survey under a cover letter from the ADF&G, Office of the Commissioner, describing the purpose of the survey. Three mailings of the questionnaire were conducted from February through July 1984 (February 22, April 9, and June 4). The responses to the mailings were analyzed as separate response groups and then collated. These responses are presented below, together with summaries for the entire survey.

4. Results. The survey had a high response rate, as summarized in table 13. Of the original 144 surveys sent out in three mailings, 100 questionnaires were returned (69%). Of these, 75 were active guides who completed the questionnaire, or 75% of the 100 returned. The 69 unusable questionnaires were made up of 44 who did not return surveys, 20 who did not guide in the Southcentral Region, and five surveys that were returned as undeliverable. If the same proportion of the nonresponding guides (44) are active in the Southcentral Region as the responding guides (75%), then an additional 37 guides were in the population (44-5 x 75% = 37), for an estimated total of 112 (75+37) active guides in the region. A summary of the results of each question is presented below. A sample questionnaire is in attachment 2 in this section.

   a. Question one. The first question of the guide survey provided a checklist of the facilities and services offered by the guide. Responses are summarized in table 14. All professional guides are by law responsible for the safety, comfort, licenses, tags, and harvest reports of their clients. Client safety and comfort includes first-aid supplies, survival gear, emergency food, comfortable shelter, and reasonable transportation arrangements, including the transportation of harvested game animals (12 AAC 38.070, .080, .110). All respondents indicated that they provided these facilities and services, but the kinds of facilities and services varied considerably. Housing varied from luxury lodges to tents; food varied from sack lunches to gourmet dinners; transportation varied from backpacks to private aircraft. A few guides were also taxidermists and fur processors who provided finished mounts and products as part of their hunting service.

Table 13. Responses to Southcentral Alaska Hunting Guides to ADF&G Questionnaire by Date of Mailing

	Number by Date of Mailing			
	2/22/84	4/9/84	6/4/84	Total
Number mailed	144	94	60	144
Undeliverable	3	1	1	5
Does not guide in Southcentral	10	8	2	20
Returned completed for Southcentral	39	23	13	75
Nonrespondents	92	62	46	44
Total returned	52 (36%)	32 (34%)	16 (26%)	100 (69%)
Cumulative returns	52	84	100	100

Table 14. Facilities and Service Offered by Southcentral Alaska Game Guides

	Number of Responses by Mailing				
	2/22/84	4/9/84	6/4/84	Total	% of Total Response Group
Housing					
Lodging	21	8	8	37	49
Cabin	18	17	8	43	57
Base camp	20	13	10	43	57
Spike camp	21	19	12	52	69
Other	3	0	1	4	5
Meals	36	22	12	70	93
Transportation					
Boats	24	12	10	46	61
Own aircraft	29	14	11	54	72
Chartered aircraft	21	6	7	34	45
Horses	10	5	2	17	23
ATV	13	10	6	29	39
Other	3	0	1	4	5
Additional service					
Skinning/packing	38	22	12	72	96
Taxidermy	1	0	0	1	1
Manufactured products	1	0	1	2	3
Raw furs	0	0	1	1	1
Total respondents	39	23	13	75	

A typical response from a "full service" guide showed that all types of housing specified on the survey were provided, as well as all categories of transportation (except horses), and skinning and field-packing service. Thirty-seven of the 75 respondents who completed the survey for the Southcentral Region, or 49%, indicated that they offered lodge facilities and meals in combination with privately owned aircraft. These were taken as indicators of the highest level of service. In contrast, at the opposite end of the spectrum, 4% provided no air service or only charter transportation services and only one or two categories of housing. These figures indicate that many guides offer a "full service" package to a limited clientele.

b. Question two. The second question asked what time during each year services are normally provided to hunters in Southcentral Alaska. Guides generally operated during the spring (May) brown bear hunting season and in the fall for all big game species. Table 15 summarizes the answers given to this question.

Most respondents (73%) indicated that their operations were limited to specific hunting seasons (fall and/or spring); a high percentage (40%) offered services in the fall only. These periods of operation are similar to commercial fishing operations in that the seasons are set annually by regulations (Alaska Hunting Regulations, in the case of game), and the period of operation is largely out of the operators control. This question did not ask about time spent maintaining equipment and facilities, securing bookings, field reconnaissance, or other necessary activities.

c. Question three. This question asked for information on the number of resident and nonresident hunters (by species) served by the guiding industry in Southcentral Alaska in 1983. Table 16 summarizes these responses for each mailing of the questionnaire. The largest number of clients were hunting moose, Dall sheep, brown bear, and caribou. Dall sheep and brown bear attracted the highest number of nonresident guided hunters. This was expected because state regulations require nonresidents to hire guides (or hunt with resident next of kin) for these species. Moose and caribou had a relatively large number of resident clients (approximately one-third of the total number of clients for these species).

The number of nonconsumptive users who were guided to view or photograph wildlife was greater than the number

Table 15. Seasons Game Guides Provide Service in Southcentral Alaska

Seasons	2/22/84	4/9/84	6/4/84	Total	%
Year-round	4	0	0	4	6
Spring/summer/fall	9	1	5	15	21
Spring/fall hunting seasons only	8	11	4	23	33
Fall only	17	8	3	28	40
Total respondents	38	20	12	70	

Table 16. Number of Resident (R) and Nonresident (NR) Guided Clients Served by 75 Survey Respondents in Southcentral Alaska, 1983 by Species

	2/22/84			4/9/84			6/4/84			Total		
	NR	R	Total	NR	R	Total	NR	R	Total	NR	R	Total
Moose	86	43	129	23	16	39	27	24	51	136	83	219
Dall sheep	88	14	102	43	15	58	19	7	26	150	36	186
Mountain goat	19	1	20	4	8	12	0	1	1	23	10	33
Caribou	63	19	82	6	19	25	8	15	23	77	53	130
Black bear	61	18	79	17	2	19	12	8	20	90	28	118
Brown bear	87	7	94	25	6	31	32	11	43	144	24	168
Wolf/wolverine	31	8	39	4	1	5	0	4	4	35	13	48
Waterfowl	48	11	59	2	0	2	1	0	1	51	11	62
Combined hunts:												
Bear/moose	28	6	34	16	0	16	7	1	8	51	7	58
Sheep/caribou	19	0	19	1	0	1	0	0	0	20	0	20
Moose/caribou	10	0	10	0	0	0	2	0	2	12	0	12
Bear/caribou	7	0	7	5	0	5	2	0	2	14	0	14
Sheep/bear	6	1	7	4	0	4	3	0	3	13	1	14
Moose/sheep/bear	2	0	2	0	0	0	0	0	0	2	0	2
Goat/bear	0	0	0	6	0	6	0	0	0	6	0	6
Sheep/moose	0	0	0	0	0	0	4	0	4	4	0	4
Fishermen	9	3	12	0	0	0	0	0	0	9	3	12
Nonconsumptive users	---	---	109	---	---	108	---	---	61	---	---	278
Total	564	131	804	156	67	331	117	71	249	837	269	1,384
Respondents			39			23			13			75

of hunting clients for any given species; nonconsumptive users constituted 20% of the total number of guided clients. This was an unexpectedly high statistic, given that the survey was sent only to game guides and did not sample wilderness outfitter/guides who specifically serve nonconsumptive users.

For the entire response group (75 guides), each guide averaged approximately 11 nonresident, five resident, and four nonconsumptive clients for the 1983 season. However, there was a fairly wide range in the number of clients served by responding guides (table 17). The majority of guides (53%) served 1 to 10 clients. Another 35% had 11 to 25 clients. Twelve percent of the guides had more than 26 clients during 1983.

d. Question four. Question four pertained to the average 1983 price charged by guides for various hunts in the Southcentral Region. These answers were used to calculate the average price per trip per hunter and the gross income to guides for that type of hunt in 1983 (table 18). It is important to note that no length of trip was specified and that consequently the price ranges were large. Because trip length was not specified in the survey, this average price figure is not a reliable statistic and should be used with caution. In almost all hunt categories, the average price charged was higher for nonresidents than for residents.

Surveyed guides received over $3.2 million from nonresident and $555,375 from resident hunters in 1983. As would be expected, nonresident clients hunting Dall sheep and brown bear contributed the largest gross income to the responding guides in 1983, $601,450 and $572,500, respectively. Nonconsumptive users added another $315,100 in gross income. The total gross income of responding guides was approximately $4.1 million. If it is assumed that 37 of the nonresponding guides were active (see section D. Results, above) and earned comparable gross incomes, then the total estimated game guiding income in Southcentral Alaska in 1983 was approximately $6.1 million ($4.1 million + 37 guides x $55,000/guide = $6.1 million).

e. Question five. This question related to the number of persons employed by the game guides who served hunters in Southcentral Alaska in 1983. Sufficient data were not collected to differentiate between part-time, full-time, and seasonal employment. Despite this

Table 17. Number of Responding Guides by Size of Operation

No. of Guides	Average Number of Clients	Percentage (%) of Respondents
4	50+ hunters/yr	5
5	26 - 50 hunters/yr	7
26	11 - 25 hunters/yr	35
40	0 - 10 hunters/yr	53
Total 75		

Table 18. Price Ranges, Average Prices, Clients Served, and Gross Income by Species for 75 Surveyed Game Guides, Southcentral Alaska, 1983

Species	Nonresident				Resident				Total Income All Clients $
	Price Range	Average Price per Hunter per Trip($)*	No. of Hunters[a]	Gross Income	Price Range	Average Price per Hunter per Trip($)*	No. of Hunters	Gross Income	
Moose	1,200 - 4,500	2,750	131	360,000	400 - 3,500	1,550	83	128,400	488,400
Dall sheep	1,200 - 6,200	4,010	150	601,450	750 - 5,000	2,825	36	101,375	702,825
Mountain goat	1,000 - 5,500	2,900	23	66,600	1,500 - 3,000	2,550	10	25,500	92,100
Caribou	1,000 - 4,500	2,750	77	211,090	100 - 2,250	2,000	53	84,650	295,740
Black bear	750 - 3,500	1,970	90	177,450	150 - 4,800	1,325	28	37,000	21,445
Brown bear	2,000 - 7,500	3,980	144	572,500	500 - 6,500	3,755	24	90,100	662,600
Wolf/wolverine	700 - 3,600	1,040	35	36,400	2,500 - 3,500	2,975	13	38,600	75,000
Waterfowl	500 - 2,500	850	51	42,960	1,000 - 1,500	1,150	11	12,500	55,460
Combined hunts:									
Bear/moose	2,000 - 10,000	6,340	51	323,200	6,250 - 10,000	3,900	7	27,250	350,500
Sheep/caribou	5,000 - 6,000	6,775	20	135,500	---	---	0	---	135,500
Moose/caribou	2,000 - 10,000	5,700	12	68,300	---	---	0	---	68,300
Bear/caribou	2,000 - 7,500	7,310	14	102,350	---	---	0	---	102,350
Sheep/bear	6,500 - 10,000	9,525	13	123,800	10,000	10,000	1	10,000	133,800
Moose/sheep/bear	---	10,000	2	20,000	---	---	0	---	20,000
Goat/bear	6,500 - 10,000	8,250	6	49,500	---	---	0	---	49,500
Sheep/moose	6,500 - 10,000	8,200	4	32,800	---	---	---	---	32,800
Other combined hunts	---	7,800	36	280,800	---	---	---	---	280,800
Nonconsumptive users[b]	---	---	---	---	---	---	---	---	315,100
Total			844	3,204,700			251	555,375	4,075,175

a From table 16 above.

b Nonconsumptive users numbered 278, residency unknown.

* No trip length was specified on the survey; therefore, this categoriy is not standardized and should be used with caution.

limitation, the 73 guides that answered this question employed 384 persons (average=5.3; range=0-16). If it is assumed that the nonresponding active guides in the region also employed the same average number of persons, then the total number of persons (guides plus employees) directly employed in the game guiding industry in Southcentral Alaska in 1983 would be 706 persons or (75+37) + (75 + 37) x 5.3 =706.

f. Question six. This question asked guides if they provided services to nonconsumptive users such as photographers, bird watchers, or other nonhunters. Of the 75 guides who answered the question, 50 (67%) did offer these services. Of the 50, 28 had guided a total of 278 nonconsumptive users in 1983 for a minimum gross income of approximately $315,100. The price level to nonconsumptive users varied considerably. Prices per person per day ranged from $100 to $300. No data were obtained from the survey on the type of services offered to nonconsumptive users.

g. Question seven. Number seven asked guides the percentage of their 1983 income that was spent in Alaska and the Southcentral Region. Of the 68 guides who answered this question, 44 (66%) stated that they spent 95-100% of their gross income in Alaska. Of this group, 34 (50%) spent 95-100% of their income in Southcentral Alaska. Only three (4%) of the responding guides spent over 50% of their gross income outside of Alaska.

h. Question eight. Question eight solicited comments regarding the major problems game guides believed faced the industry. The most frequently identified problems are summarized in table 19.

5. Summary. The Alaska Habitat Management Guides project sent questionnaires to 144 big game guides who were registered to operate in the Southcentral Region during 1983. Useable responses were obtained from 75 guides (52%) and provided valuable information on the game guiding industry in that region. A wide variety of services were offered by game guides who primarily operated in the spring and fall seasons (which corresponds to the majority of hunt dates set by regulation). Most of the guides served one to 25 clients in 1983, which, on average, included 11 nonresidents, 5 residents, and 4 nonconsumptive (residency unknown) clients. Nonresident hunters paid $3.2 million, resident hunters paid $555,375, and nonconsumptive users paid $315,100 to the game guides who responded to the 1983 survey. If it is assumed

Table 19. Problems Facing the Guiding Industry as Identified by 74 Survey Respondents, July 1984

Topic	Frequency (Times Mentioned)
Response Group 1	
State and federal management practices and regulations	20
Crowding	15
Subsistence preference	10
Miscellaneous	14
Air charter service operating as guides	7
Decreasing land area available for hunting	7
Response Group 2	
State management practices	17
Crowding	9
Decreasing land area available for hunting	5
Overregulation	5
Miscellaneous	4
Response Group 3	
Reduced land area	4
State management practices	4
Guiding industry problems	4
Subsistence preference	2
Miscellaneous	2

that the percentage of nonresponding game guides who were presumably active earned comparable gross incomes as the responding guides, then the total estimated game guiding income in Southcentral Alaska in 1983 was approximately $6.1 million. Seventy-three guides employed a total of 384 people in 1983. The approximate total number of persons employed in the big game guiding industry in 1983 (including extrapolation for nonresponding guides) was 706. Most game guides (66%) spent 95-100% of their income in Alaska; 50% of these spent 95-100% of their income in Southcentral Alaska. These reponses indicate that game guiding injects substantial income into the Southcentral economy. A significant number of problems were reported by guides. The majority of these problems were related to government management and regulations. Other frequently cited concerns included subsistence preference, crowding, and loss of hunting areas from habitat destruction and land management decisions.

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Attachment 1

GMU 13
Hunter Questionnaire
Denali Highway
September 1984

1. Zip code: _____
2. Successful? yes _____ no _____
3. How many days did you hunt in this GMU on this trip? _____
4. How many big game hunting trips have you made in this GMU this season? _____
5. What were your 1984 expenses for this GMU 13 moose/caribou (specify) hunt for the following categories?
   For the items used in other outdoor activities (tent, sleeping bag, trailers, etc.) what % of the time are they used for hunting?

		% Used for Hunting
° License and tag fees	_____	
° Food and lodging	_____	
° Transportation to and from area (include vehicle costs & maintenance & air charter [if any])	_____	
° Hunting equipment (guns, ammo, scopes, binocs, clothing, camera)	_____	_____
° Camping equipment (sleeping bags, tent, stove, packs)	_____	_____
° ORV's, trailers (rental and/or maintenance)	_____	_____
Total $	_____	_____

6. The costs of hunting may continue to increase in the future (e.g., gasoline, guide fees, etc.). If future hunting conditions are similar to present, and if costs do increase, how much <u>more</u> than the above costs would you be willing to pay to hunt in GMU 13? _____

STATE OF ALASKA

BILL SHEFFIELD, GOVERNOR

DEPARTMENT OF FISH AND GAME

OFFICE OF THE COMMISSIONER

P.O.BOX 3-2000
JUNEAU, ALASKA 99802
PHONE: (907) 465-4100

Dear Professional Hunting Guide:

Some time has passed since we first requested economic information on hunting activities in the Southcentral area. In order to make an accurate assessment of the economic value of game resources in the area, we need as complete a survey response as possible. Your responses are extremely important to this task. Your answers will be averaged with others when reporting the results, and your responses will remain anonymous.

If you have not mailed your response, would you please take a few minutes to fill out the enclosed questionnaire and return it to us by April 27th in the pre-paid envelope? If you have already sent in your response, please ignore the enclosed questionnaire.

Once we complete the compilation and analysis of submitted questionnaires we would be happy to provide you with the results upon your request. Thank you for your valuable participation in this study.

Sincerely,

Dennis D. Kelso
Deputy Commissioner

Enclosure

ECONOMIC SURVEY OF HUNTING GUIDES OPERATING IN SOUTHCENTRAL ALASKA

Southcentral Alaska includes GMU's 6 (West of Cape Suckling), 7, 9A, 11, 13, 14, 15 and 16. Please review the accompanying map for boundary descriptions.

1. What facilities and services do you normally provide your clientele in Southcentral Alaska in addition to services required under 12 AAC 38.070 "Responsibility of Guide to His Client."

Housing	Transportation	Additional Services
_____ lodge	_____ boats	_____ skinning and field packing
_____ cabin	_____ personnaly owned	_____ taxidermy (mounts, hides)
_____ base camps	air transportation	_____ manufactured products,
_____ spike camps	_____ chartered aircraft	(furs, gloves, etc.)
_____ meals	_____ horses	_____ other (please specify)
_____ other (please	_____ ATV	
specify)	_____ other (please specify)	

2. Between what dates do you normally provide services for hunters in Southcentral Alaska?

_____.

3. Please enter the number of resident and non-resident hunters you guided in Southcentral Alaska in 1983 for the following species.

Non-resident		Resident
_____	moose	_____
_____	Dall sheep	_____
_____	mountain goat	_____
_____	caribou	_____
_____	black bear	_____
_____	brown bear	_____
_____	wolf/wolverine	_____
_____	waterfowl	_____
	combined hunts:	
_____	bear/moose	_____
_____	sheep/caribou	_____
_____	moose/caribou	_____
_____	bear/caribou	_____
_____	other (specify)	_____

4. What is an average 1983 price for your type of resident and non-resident hunt?

Non-resident		Resident
_____	moose	_____
_____	Dall sheep	_____
_____	mountain goat	_____
_____	caribou	_____
_____	black bear	_____
_____	brown bear	_____
_____	wolf/wolverine	_____
_____	waterfowl	_____
	combined hunts:	
_____	bear/moose	_____
_____	sheep/caribou	_____
_____	moose/caribou	_____
_____	bear/caribou	_____
_____	other (specify)	_____

5. How many people are earning an income from your business serving hunters in Southcentral Alaska, including your working family? _____

6. Are you providing services to photographers, birders or other non-hunters ("non-consumptive" users)? _____ yes, _____ no If so, how many did you guide in 1983? _____ What is the average price for your type of "non-consumptive" trip? _____

7. Please estimate what proportion of your 1983 gross income from guiding hunters in SC Alaska was spent in each of the following areas:

_____ % Outside Alaska

_____ % Alaska and of this, what percentage was spent in SC Alaska _____?

8. What do you think are the major problems facing the game guiding industry today?

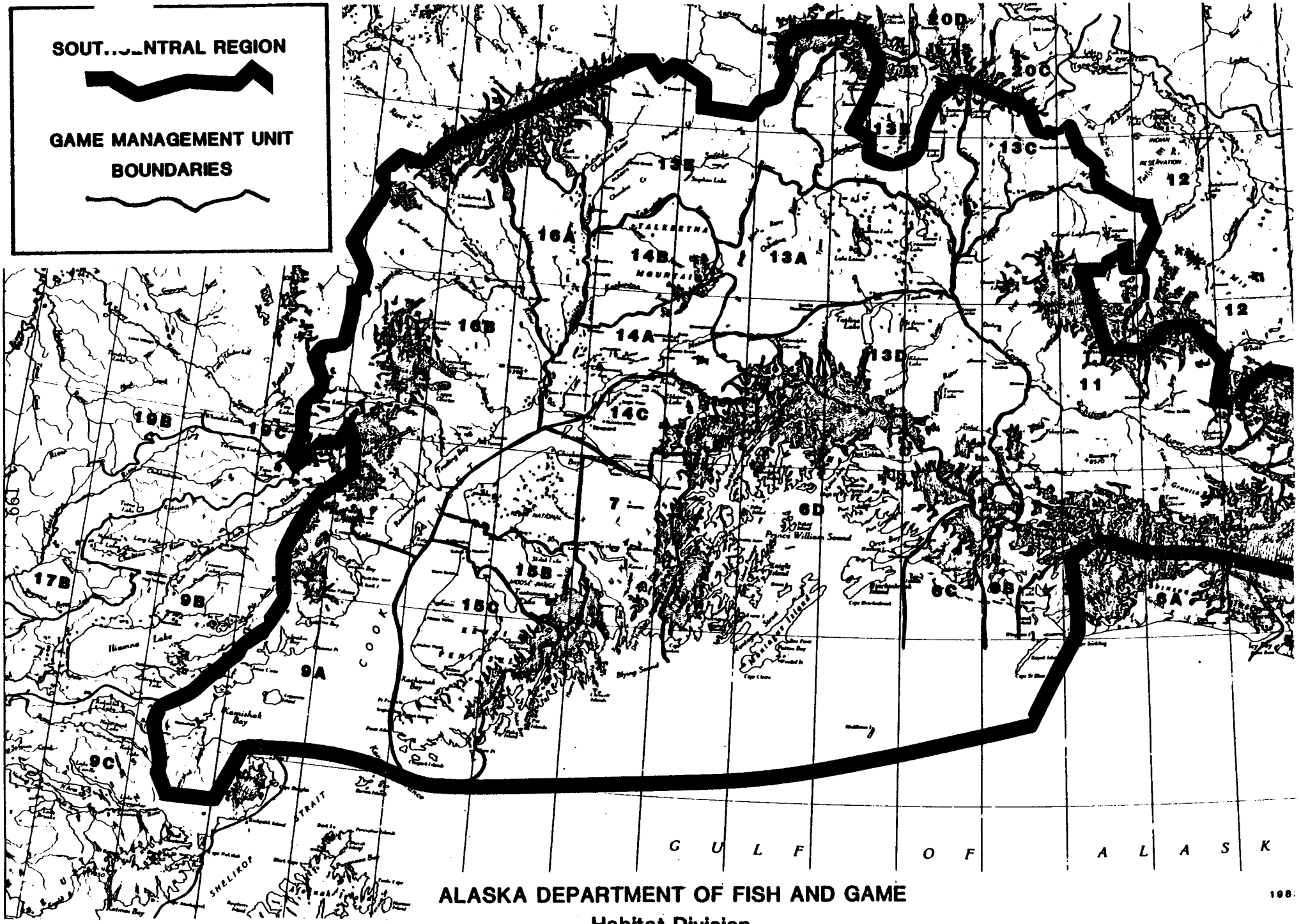
_____

_____

_____

_____

Thank you very much for contributing to a better understanding of the economic val of game resources in SC Alaska. Please return the questionnaire in the enclosed stamped envelope by April 27, 1984.



ALASKA DEPARTMENT OF FISH AND GAME

Habitat Division

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VI. HUNTING IN THE WESTERN AND INTERIOR REGIONS

A. Introduction

This section presents information on the economic value of hunting in Western and Interior Alaska. However, very few data are available for assessing the value of hunting activities in the regions. Therefore, this analysis is limited in scope and principally provides some background information to facilitate future economic analyses. General information on hunting in the region is supplemented by the presentation of existing data (season lengths and hunter numbers) that reflect changes in the demand for the opportunity to hunt wildlife resources. Despite the impossibility of directly describing these changes in terms of dollar values, they are important indicators of increasing demand and the consequent scarcity of hunting opportunities, which in turn imply increasing economic value. The presentation of background information is by species. No professional game guide or hunter surveys have been conducted specifically for these regions. A statewide Dall sheep hunter survey was conducted in 1984. Some of the preliminary results that are pertinent to these regions can be found in the Statewide Overview section of this volume.

An assessment of the economic value of wildlife in Alaska is especially difficult because the allocation of hunting opportunities does not occur through the market economy. Therefore, in order to maintain wildlife populations at sustainable yield levels, a complex system of hunting regulations has been developed that controls hunting effort by such methods as the imposition of bag limits, season lengths, and drawing and registration permits. This mode of allocation is an extremely important consideration when assessing the economic value of wildlife resources and hunting activities in the state because it limits their potential and measurable economic "value." If, for example, the opportunity to hunt Dall sheep in the Alaska Range could be bought and sold by nonresidents rather than being allocated primarily to Alaska residents, the level of both the apparent and the measurable value of the resource would undoubtedly be greatly increased.

Although this allocative system clearly limits the measurable value and income-generating potential of hunting activities, an analysis of the system nevertheless provides a surrogate for an economic demand analysis. This type of analysis was done for the Western and Interior regions by means of a drawing and registration permit analysis to evaluate the changes in demand for hunting opportunities. The Permit Data Analysis is in the Statewide Overview section of this volume.

B. Data Limitations

A thorough economic analysis of hunting in the Western and Interior regions is not possible because of a severe shortage of information. For such species as moose and caribou, because of a widespread lack of reporting by hunters, especially in rural areas (ADF&G 1986), there is less information available than was obtainable for the Southcentral Region. Harvest data are generally more accurate for those species and/or areas where a harvest permit is required or where a larger percentage of hunters are from more urban areas (ibid.). The same general data limitations discussed in the Statewide Overview section pertain to economic information for the Western and Interior regions. The hunting background information contained in this section (especially transportation means data) are necessary to determining the most appropriate means of estimating economic values of hunting in the region.

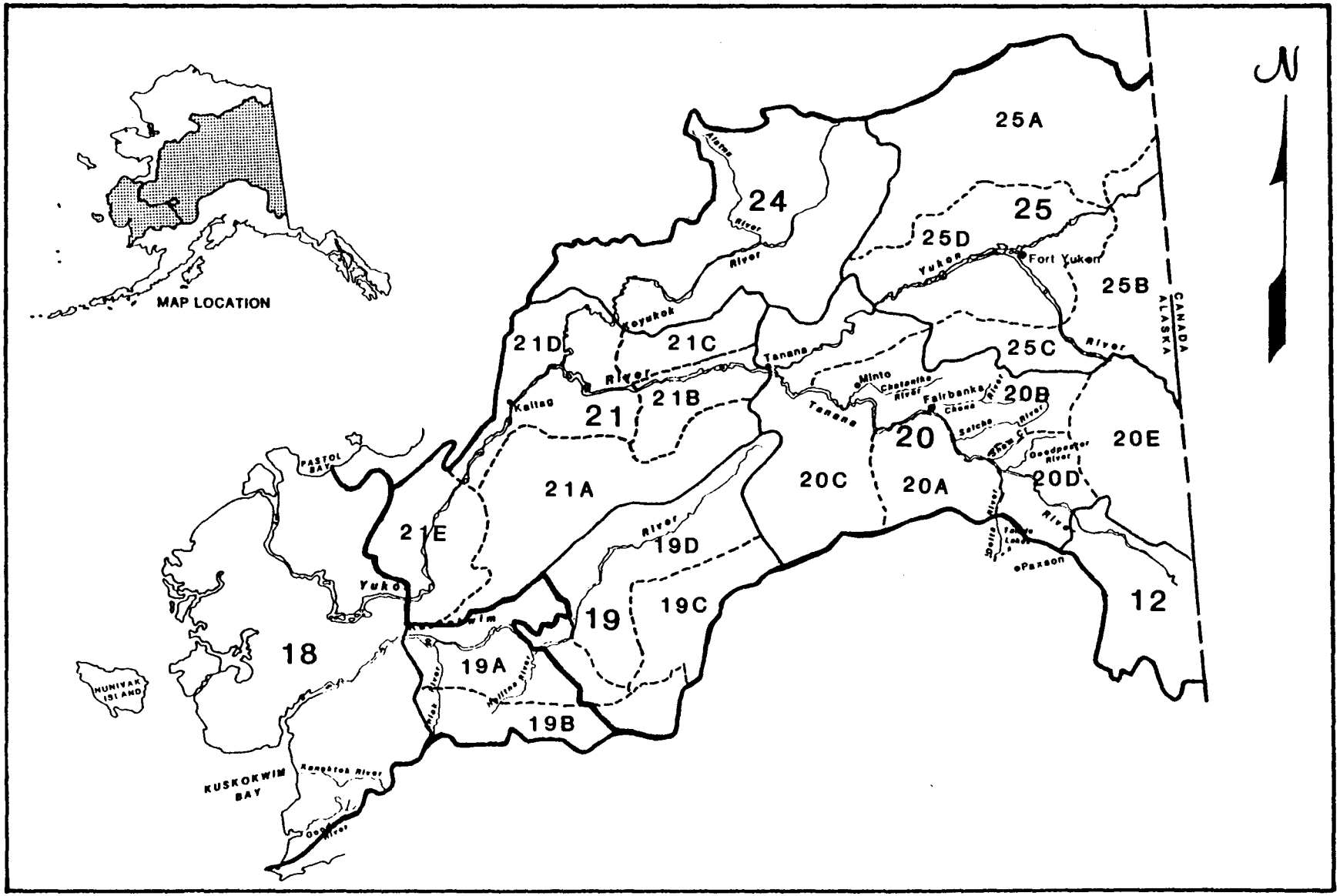
C. Hunting Background

Moose, caribou, Dall sheep, and brown bear are the principal big game species hunted in the Western and Interior regions, although black bear, bison, and muskoxen are also hunted. Map 1 shows the location of game management units (GMUs) in the Western and Interior regions.

Information on harvest and hunter numbers for each species was drawn from the human use narratives of the Alaska Habitat Management Guide for the Western and Interior regions, and from an examination of permit hunt data. Because permit data often include the number of applicants for specific hunts, they give an idea of the demand for a resource.

D. Brown Bear

Brown bears are hunted in all seven GMUs of these two regions. Brown bear populations and hunting patterns vary considerably among GMUs. Different management actions have greatly affected harvest totals from year to year within GMUs as well (ibid.). For that reason, it is somewhat misleading to draw conclusions from regionwide harvest tables. The harvest has ranged from 55 in 1961 to 186 in 1981. The average annual harvest from 1961 through 1984 has been about 120 bears. However, in the more recent six-year period 1979 through 1984, the harvest, excluding defense-of-life-and-property kills, has averaged 166 bears (table



Map 1. Game management units in the Western and Interior regions.

Table 1. Western and Interior Regions Brown Bear Harvest, 1979-84

Year	Resident Harvest	Non-Res. Harvest	% Non-resident	Total Harvest	DLP* Harvest
1979	72	102	58	174	3
1980	68	114	62	182	3
1981	77	109	56	186	10
1982	65	69	50	134	7
1983	80	79	47	159	8
1984	100	62	37	162	6
Total	462	535		997	37
Average	77	89	52	166	6

Source: ADF&G 1985a.

* Defense of life and property.

1). Harvest from 1979 through 1984 varied from a high of 186 in 1981 to a low of 134 the next year.

The large fluctuations in harvest figures for the regions as a whole are likely the result of different management strategies in the GMUs. The average percentage of nonresident hunters was 52% over the period, but the trend was decidedly downward. Nonresidents accounted for 62% of the harvest in 1980, but by 1984 it had dropped to only 37%. Relatively large increases in harvests by residents in GMUs 12 and 20 due to liberal seasons and bag limits are the most likely explanations for the trend (ibid.).

In GMU 12, the harvest season increased from 21 days in the early 1970's to 283 days in 1985. In addition, brown bears taken in this unit do not count against the one-every-four-years bag limit in other parts of the state. Beginning in 1984, the resident brown bear tag was no longer required. That year, the harvest rose from 13 to 36 bears. Liberal hunting seasons and bag limits account for the steady harvest increase in GMU 20 since 1979. Resident harvest rose from 32 to 55 bears annually over the period. The brown bear management strategy has focused on predator control so that the low ungulate population of the unit can recover (Jennings 1984).

In 1979, registered game guides began moving into GMU 18 and offering hunts. Prior to that, brown bears were seldom hunted in the unit (Nelson 1980, Dinneford 1981). A permit drawing system instituted in GMU 19B in 1981 has resulted in fewer hunters and a decreased harvest for GMU 19 as a whole (Pegau 1984). Harvest in this GMU is also apparently affected by alternate-year closures in nearby GMU 9. Hunters displaced by those closures seek their quarry in GMU 19, and GMU 19 harvest figures fluctuate accordingly (Pegau 1982).

Interest in brown bear hunting in GMU 21 is low (Osborne 1984). Low reproductive capacity of bears in units 24 and 25 has resulted in a permit system designed to prevent overharvest of brown bears in the Brooks Range (Reynolds 1984a, 1984b).

Details of harvest in each GMU and subunit can be found in the distribution, abundance, and human use sections of the Alaska Habitat Management Guide for the Western and Interior regions. No economic surveys have been done on brown bear hunting in the Western and Interior regions.

E. Caribou

There are several caribou herds in the Western and Interior regions, but harvest data for all but four of them are unreliable

because of an incomplete reporting of harvests by hunters. Unreported harvest is thought to exceed the reported harvest. Data are more accurate for the Delta and Macomb herds, for which a permit is required, and the Fortymile and Chisana herds, which have a larger percentage of hunters from more urban areas. Many of the Interior herds have never experienced intensive hunting because of their relative inaccessibility and the ability of the other more accessible herds in the state to satisfy hunter demand (ADF&G 1986).

The reported harvest of caribou for the Delta and Fortymile herds has ranged from 114 animals in 1980-1981 to 894 animals in 1983-1984 (ADF&G 1986). In addition, Hinman (1985) reports the harvest for the remaining herds within the Western and Interior regions at 143 caribou during the 1983-1984 regulatory year.

The Delta Herd declined precipitously in the late 1960s and early 1970's. Hunting was closed from 1973 to 1980 (ADF&G 1986). From 1980 to 1983 hunting was limited under drawing permit hunts in the fall. Registration permit hunts were held in the winter of 1982 and 1983. During the 1983-1984 season, the Delta Herd was open to a general hunt. A registration permit system was reestablished for both fall and winter hunts during the 1984-1985 season (table 2). These large changes in management techniques make assessment of user resource demand difficult.

The number of permit applicants for drawing hunts has increased steadily since 1980. In that year, 640 people applied for 200 permits and had a 31% chance of getting one. In 1981, a hunter's chance of getting a permit dropped to 15% as 938 people applied for 150 permits. In 1982, there were 1,011 applicants for 175 permits, and the change of getting a permit rose slightly to 17%. Demand for registration permits nearly doubled, from 844 in 1981-1982 to 1,538 the following year. Registration permits for the fall 1984-1985 season were approximately 1,500 (table 2). More information on drawing and registration permit information can be found in the Permit Data Analysis section in this volume.

Means of access to the Delta Caribou Herd have depended on the timing of the hunt (table 2). Data on transportation types used by successful hunters are available only since 1980. Aircraft, which were used by 77% of successful hunters in 1980-1981, are being superseded by ORVs and 3-wheel motorbikes during fall hunts. Sixty percent of successful hunters during the fall 1984-1985 season used motorbikes or ORVs for access. Only 32% used aircraft. However, hunters transported by aircraft had an 81% success rate, as compared to a 65% success rate for ORV hunters in the 1983-1984 season. Snowmachines were the vehicle of choice for winter hunts in 1981-1982 and 1982-1983 by 68% and 45%, respectively, of successful hunters (table 2).

Table 2. Reported Human Use Data for the Delta Caribou Herd, 1980-84

	1980-81[a]	1981-82[a]	1981-82[b]	1982-83[a]	1982-83[b]	1983-84[c]	1984-85[b]
No permit applicants	640	938	880	1,011	1,538	---	1,500
No permits issued	204	150	880	175	1,538	---	1,500
No successful hunters	110	87	181	104	169	692	414
Total hunters	125	108	462	122	---	1,029	---
Transportation mode of successful hunters (%):							
Aircraft	77	56	---	49	30	48	32
Horse	11	---	---	15	0	5	2
Motorbike (3-wheeler)	2	---	---	2	1	0	52
ORV	10	---	---	21	5	33	8
Highway vehicle	0	---	---	12	2	8	2
Snowmachine	0	---	68	0	45	1	0
Dog team	0	---	---	0	8	0	0
Unknown	0	---	---	0	8	5	1
Boat	---	---	---	---	---	1	3
Total resident hunters (%)	---	---	---	84	---	88	93
Successful resident hunters (%)	---	---	---	72	---	86	93

Sources: ADF&G 1984, 1985b; Jennings 1981, 1983, 1984; Sexton 1982, 1985, or memos.

--- means no data were available.

a Drawing permit hunt.

b Registration permit hunt.

c General harvest.

Approximately 90% of Delta Caribou Herd hunters were Alaska residents in the 1983-1984 and 1984-1985 seasons. Approximately 60% lived in the Fairbanks area, about 12% in the Anchorage-Matanuska Valley area, and about 10% from the Clear area (ADF&G 1984a, 1985b). In the 1983-1984 season, hunters (both successful and unsuccessful) spent an average of four days in the field (ADF&G 1984a).

In the decade since 1975, season and bag limits on the Fortymile Caribou Herd have been liberalized slightly. Seasons are open for general hunting; no permits are required. Information on hunter access and origins is available only for the 1983-1984 season. That year, over 90% of hunters were Alaska residents (ibid.). About one-third of reporting hunters came from Fairbanks, almost 22% from Tok, and 16% from the Anchorage-Matanuska valley area. Of those hunters reporting means of transport, 38% used a highway vehicle and/or walked, 26% used aircraft, and 20% used ORVs. About 93% of aircraft users and 58% of ORV users were successful, as compared to only 27% of those on foot or using highway vehicles. Both successful and unsuccessful hunters averaged five days in the field hunting the Fortymile Herd, above the statewide average of slightly more than four days (ADF&G 1986).

Two smaller herds for which harvest and hunter information are available are the Macomb and Chisana herds. The Chisana Herd is hunted in GMU 12. In most years, from one-half to two-thirds of all hunters are Alaskan residents. Nonresident hunters, however, because they are usually accompanied by a guide, have a higher success rate (usually greater than 90%). More than half of all successful hunters use aircraft as the primary means of transportation, with the remainder using horses. Most resident hunters come from the Fairbanks vicinity, the local area (Tok, Glennallen, Northway, etc.), and southeast Alaska (ibid.).

The Macomb Herd has been hunted on a drawing permit basis since 1977. Most hunters of the Macomb Herd have been Alaska residents. In 1983, only 32% of all hunters were local residents of the range of the Macomb Herd (Johnson 1985). Also in 1983, all hunters spent slightly less than three days in the field. More than half the hunters (51%) walked into their hunting areas, and 30% used horses. Almost two-thirds of the successful hunters (64%) used horses (ADF&G 1986). Harvest information on both the Chisana and Macomb herds is presented in the Alaska Habitat Management Guide for the Western and Interior regions: Distribution, Abundance, and Human Use of Fish and Wildife.

No economic surveys have been done on caribou hunting in the Western and Interior regions.

F. Moose

For the Western and Interior regions as a whole, the total reported number of hunters and moose harvested has increased since 1979 (table 3). Until the 1983-1984 season, data were inconsistent from one GMU to another. Even now, hunter harvest ticket reporting remains less than adequate in these regions. In all cases, the reported numbers of hunters and moose harvested should be considered minimums (ADF&G 1986).

Little information is available on hunter origins and access. The following information was summarized from the Alaska Habitat Management Guide for the Western and Interior regions: Distribution, Abundance, and Human Use of Fish and Wildlife.

GMU 18 -- Local residents are responsible for 80% of harvest and use mostly boat access. Nonlocals use mostly aircraft.
GMU 19 -- Nonresident hunters are required to use a guide as of 1982.
GMS 20A -- Aircraft hunters are most successful; boat and ORV users are second and third respectively.
GMS 20B -- Fairbanks subunit had the most hunters (2,258) in 1983-1984.
GMS 20C -- Good access, human demand high, ORV use increased in 1983-1984.
GMS 20F -- Virtually all hunting is by state residents.
GMS 21A -- Mainly boat access.
GMS 21B -- Most of subunit is unhunted. Most hunting is along waterways where access by boats and floatplanes is possible.
GMS 21C -- Nearly all access is by aircraft.
GMU 24 -- Road hunting is high along the Dalton Highway.
GMU 25 -- Registration hunt was held in the western portion of Subunit 25D in 1983-1984 and 1984-1985.

No economic survey information has been collected on moose hunting in the Western and Interior Regions. Information on registration permit hunts in the regions can be found in the Permit Data Analysis section of this volume.

G. Dall Sheep

Dall sheep are found in mountainous terrain of several different ranges in the Interior and Western regions. Information on Dall sheep hunting was collected and organized in the past by mountain range. In 1983, a new system for coding harvest data was introduced. The Uniform Coding System (UCS) keeps track of harvest by drainages within GMUs and subunits. For details, see

Table 3. Moose Harvest and Hunter Effort in the Western and Interior Regions, 1980-85

Year	No. of Hunters	No. of Hunter Days	Total Harvest
1980-81	3,459 *	---	1,542 **
1981-82	4,965 ***	---	1,846 +
1982-83	5,132 ++	---	1,800
1983-84	7,387	42,414	2,312
1984-85	7,953	47,282	2,606

Source: BGDIF 1980-85.

--- means no data were available.

* Means no data were available for GMSs 20D, E, F, and GMU 21.

** Means no data were available for GMSs 20E and F.

*** Means no data were available for GMSs 20D, E, and 21A.

\+ Means no data were available for GMS 20E.

++ Means no data were available for GMSs 20D, and 21A and B.

the Human Use section of the AHMG for the Interior and Western regions.

In the Interior and Western regions, Dall sheep are hunted in portions of the Alaska Range both east and west of Denali National Park (GMUs 12, 19, and 20), in the Tanana Hills/White Mountain area (GMU 20), and in the Nutzotin and Mentasta mountains (GMU 12). The ADF&G has developed Dall sheep management plans for some specific areas in the region. For details, see the Alaska Habitat Management Guide for the Interior and Western regions: Distribution, Abundance, and Human Use of Fish and Wildlife.

Dall sheep harvest in the regions fluctuated between 1980 and 1984 (table 4). Lowest harvest was in 1984, when 408 sheep were taken. Highest harvest was 511 in 1982. Number of hunters afield peaked in 1982 at 1,032, although figures are not available for all areas the following year. Hunter effort in terms of hunter-days ranged from a low of 3,948 in 1981 to a high of 6,042 in 1983 for the regions as a whole (table 4).

Information on Dall sheep hunter transport means in the regions is presented in tables 5-9. Airplane is the principal means of access in all ranges of the regions. Highway vehicle is the next most important access mode in ranges where roads exist.

A statewide economic survey of Dall sheep hunters was conducted in 1984. Preliminary results of the survey can be found in the Statewide Overview section in this volume.

Table 4. Dall Sheep Harvest and Hunter Effort in the Western and Interior Regions, 1980-84

Year	Harvest	Hunters	Hunter-Days
1980	413	858	---
1981	472	882	3,948
1982	511	1,032	4,198
1983	490*	1,011**	6,042**
1984	408*	1,012	5,447

Source: ADF&G 1980, 1981, 1982, 1985; Kelleyhouse 1983, 1984a, 1984b.

--- means no data were available.

* includes harvest in GMU 16B.

** does not include hunters in Tok Management Area; data unavailable.

Table 5. Dall Sheep Hunter Transport Means in the Western and Interior Regions by Mountain Range, 1980

Transport Means	Alaska Range East[a] #	Alaska Range East[a] %	Alaska Range West[b] #	Alaska Range West[b] %	Tanana Hills/ White Mtns. #	Tanana Hills/ White Mtns. %	Wrangell Mtns. (GMU 12)
1	128	(36)	134	(83)	10	(50)	---
2	38	(11)	1	(1)	0	(0)	---
3	2	(0)	0	(0)	1	(5)	---
4	0	(0)	0	(0)	0	(0)	---
5	0	(0)	0	(0)	0	(0)	---
6	43	(12)	5	(3)	4	(20)	---
7	104	(30)	5	(3)	4	(20)	---
Unknown	37	(11)	17	(10)	1	(5)	---
Total	352		162		20		

Source: ADF&G 1980.

--- means of data were available.

a East of Denali National Park.

b West of Denali National Park.

Transport means:
1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Off road vehicle
7. Highway vehicle

Table 6. Dall Sheep Hunter Transport Means in the Western and Interior Regions by Mountain Range, 1981

Transport Means	Alaska Range East[a] #	%	Alaska Range West[b] #	%	Tanana Hills/ White Mtns. #	%	Wrangell Mtns. (GMU 12) #	%
1	156	(50)	127	(90)	10	(34)	178	(48)
2	36	(12)	2	(1)	0	(0)	32	(9)
3	2	(1)	0	(0)	1	(3)	6	(2)
4	4	(1)	0	(0)	1	(3)	4	(1)
5	0	(0)	0	(0)	0	(0)	0	(0)
6	36	(12)	3	(2)	7	(24)	35	(9)
7	62	(20)	1	(1)	9	(32)	95	(26)
Unknown	17	(5)	8	(6)	1	(3)	20	(5)
Total	313		141		29		370	

Source: ADF&G 1981.

a East of Denali National Park.

b West of Denali National Park.

Transport means:
1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Off road vehicle
7. Highway vehicle

Table 7. Dall Sheep Hunter Transport Means in the Western and Interior Regions by Mountain Range, 1982

Transport Means	Alaska Range East[a] #	Alaska Range East[a] %	Alaska Range West[b] #	Alaska Range West[b] %	Tanana Hills/ White Mtns. #	Tanana Hills/ White Mtns. %	Wrangell Mtns. (GMU 12) #	Wrangell Mtns. (GMU 12) %
1	178	(42)	124	(89)	14	(39)	192	(52)
2	36	(8)	2	(1)	0	(0)	35	(9)
3	2	(0)	3	(2)	3	(8)	8	(2)
4	0	(0)	0	(0)	0	(0)	1	(0)
5	1	(0)	0	(0)	0	(0)	0	(0)
6	48	(11)	2	(1)	5	(14)	32	(9)
7	72	(17)	4	(3)	11	(31)	72	(19)
Unknown	88	(21)	5	(4)	3	(8)	30	(8)
Total	425		140		36		370	

Source: ADF&G 1982.

a East of Denali National Park.

b West of Denali National Park.

Transport means:
1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Off road vehicle
7. Highway vehicle

Table 8. Dall Sheep Hunter Transport Means in the Western and Interior Regions by Mountain Range, 1983

Transport Means	Alaska Range East[a] #	Alaska Range East[a] %	Alaska Range West[b] #	Alaska Range West[b] %	Tanana Hills/ White Mtns. #	Tanana Hills/ White Mtns. %	Wrangell Mtns. (GMU 12)
1	225	(44)	142	(81)	18	(40)	---
2	35	(7)	4	(2)	3	(7)	---
3	2	(0)	5	(3)	0	(0)	---
4	3	(1)	0	(0)	0	(0)	---
5	0	(0)	1	(1)	0	(0)	---
6	67	(13)	14	(8)	7	(16)	---
7	92	(18)	1	(1)	15	(33)	---
Unknown	84	(17)	9	(5)	2	(4)	---
Total	508		176		45		

Source: ADF&G 1983.

--- means no data were available.

a East of Denali National Park.

b West of Denali National Park.

Transport means:
1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Off road vehicle
7. Highway vehicle

Table 9. Dall Sheep Hunter Transport Means in the Western and Interior Regions by Mountain Range, 1984

Transport Means	Alaska Range East[a] #	Alaska Range East[a] %	Alaska Range West[b] #	Alaska Range West[b] %	Tanana Hills/ White Mtns. #	Tanana Hills/ White Mtns. %	Wrangell Mtns. (GMU 12)
1	194	(41)	155	(84)	20	(48)	---
2	41	(8)	4	(2)	0	(0)	---
3	6	(1)	2	(1)	2	(5)	---
4	20	(4)	0	(0)	7	(17)	---
5	1	(0)	0	(0)	0	(0)	---
6	43	(9)	4	(2)	3	(7)	---
7	132	(28)	4	(2)	3	(7)	---
Unknown	27	(6)	14	(8)	7	(17)	---
Total	464		183		42		

Source: ADF&G 1980-1985.

--- means no data were available.

Transport means:
1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Off road vehicle
7. Highway vehicle

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VII. HUNTING IN THE ARCTIC REGION

A. Introduction

This section presents information on the economic value of hunting in Arctic Alaska. However, very little data are available for assessing the value of hunting activities in the region. Therefore, this analysis is limited in scope and principally provides some background information to facilitate future economic analyses. General information on hunting in the region is supplemented by the presentation of existing data (season lengths and hunter numbers) that reflect changes in the demand for the opportunity to hunt wildlife resources. Despite the inability to directly describe these changes in dollar values, they are important indicators of increasing demand and the subsequent scarcity of hunting opportunities which in turn equate to increasing economic value. The presentation of background and hunter survey information is by species. No professional game guide or hunter surveys have been conducted specifically for this region. A statewide Dall sheep hunter survey was conducted in 1984. Some of the preliminary results, that are pertinent to the Arctic Region, can be found in the Statewide Overview section of this volume.

An assessment of the economic value of wildlife in Alaska is especially difficult because the allocation of hunting opportunities does not occur through the market economy. Therefore, in order to maintain wildlife populations at sustainable yield levels, a complex system of hunting regulations has developed that controls hunting effort by methods such as bag limits, season lengths, and drawing and registration permits. This allocation process is an extremely important consideration when assessing the economic value of wildlife resources and hunting activities in the state because it limits the potential and measurable economic "value". If for example, the opportunity to hunt Dall sheep in the Brooks Range was auctioned on a world "hunting market" rather than being allocated primarily to Alaska residents, then the level of both the apparent and measurable value of the resource would undoubtedly be greatly increased.

Although the allocation system clearly limits the measurable value and income generating ability of hunting activities, an analysis of the system also provides a surrogate for an economic demand analysis. Few data are available, however, for such an analysis in the Arctic Region. Information on Arctic Region drawing and registration permit hunts can be found in the Permit Data Analysis section in this volume.

B. Data Limitations

A thorough economic analysis of hunting in the Arctic Region is not currently possible because of a severe shortage of information. This is further compounded by the problem of nonreporting of harvest in the Arctic Region, particularly for moose (Grauvogel 1983), caribou (James, pers. comm.), and Dall sheep (Watson, pers. comm.). The same general data limitations discussed in the Statewide Overview section pertain to economic information for the Arctic Region. This regional information primarily provides a background for information to consider (transport means, and reliability of hunter response rates, for example) when developing economic surveys.

C. Hunting Background

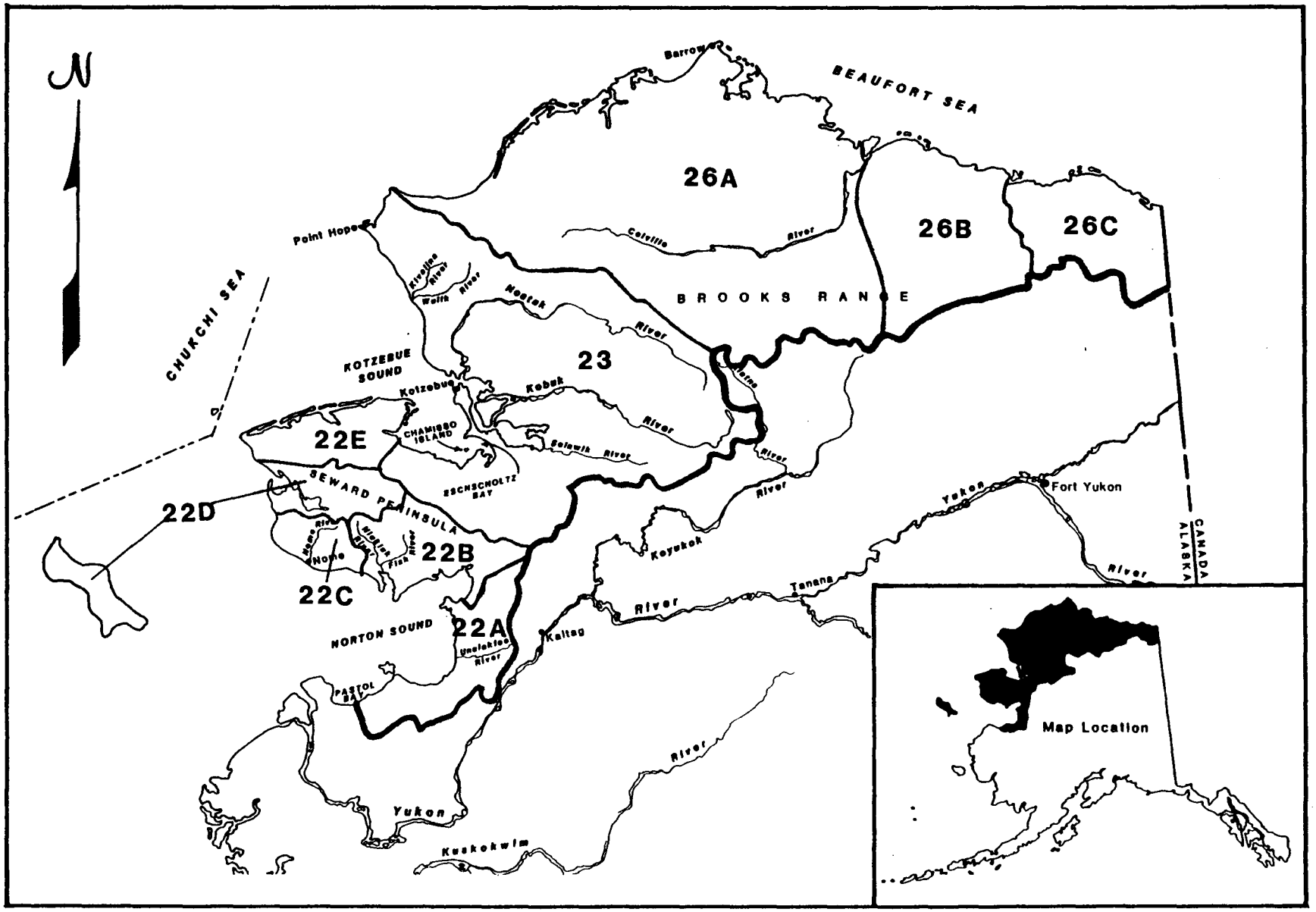
Moose, caribou, Dall sheep, and brown bears are the principal big game species hunted in the Arctic Region, although black bears and muskoxen are also hunted. Map 1 shows the location of game management units in the Arctic Region.

Information on harvest and hunter numbers for each species was drawn from the human use narratives in volume 2 of the Alaska Habitat Management Guide for the Arctic Region, and from an examination of permit hunt data. Because permit data often include the number of applicants for specific hunts, they give an idea of the demand for a resource.

Only one economic survey of hunting has been done that provides data about hunting in the Arctic Region. It is a statewide survey of Dall sheep hunters. Results of the sheep survey as they pertain to hunting in the Arctic Region specifically are not available at this time. See the Statewide Overview section in this volume for the statewide results of the sheep survey.

D. Brown Bear

Brown bears are hunted in all three GMUs (22, 23, and 26) of this region. Harvest has ranged from 7 in 1962 to 126 in 1984. The average annual harvest from 1961 to 1984 has been about 49 brown bears (ADF&G 1985). Table 1 shows Arctic Region brown bear harvest from 1979 through 1984. Nonresident harvest declined from a majority of the harvest in 1979 and 1980 to average less than 50% of the harvest in subsequent years as a result of three management changes. In 1980, a nonresident drawing permit system was implemented for GMUs 22 and 23, in 1984, portions of GMU 26 were opened to hunting by residents without permits, and also in



Map 1. Game management units in the Arctic Region.

Table 1. Reported Brown Bear Harvest in the Arctic Region, 1979-84

Year	Harvest by Residents	%	Harvest by Nonresidents	%	Total Harvest
1979	40	(34)	79	(66)	119
1980	31	(41)	45	(59)	76
1981	44	(72)	17	(28)	61
1982	44	(69)	20	(31)	64
1983	46	(51)	45	(49)	91
1984	76	(60)	50	(40)	126

Source: ADF&G 1980, 1981, 1982, 1984a, 1984b, 1985.

1984, the requirement of a resident brown bear tag was eliminated in GMUs 22 and 23. No information is available on brown bear hunter transport means.

Detailed information on drawing permit hunts can be found in the Permit Data Analysis section of this volume. No economic surveys have been done on brown bear hunting in the Arctic Region.

E. Caribou

Three caribou herds inhabit the Arctic Region: the Central Arctic Herd (CAH), the Western Arctic Herd (WAH), and the Porcupine Herd (PH). All three herds are important for subsistence use to local residents of the region as well as for harvest by nonlocal residents of Alaska. Harvest information on all three herds is poor and reported harvests are considerably less than estimated harvests (ADF&G 1986).

The Central Arctic Herd inhabits GMU 26B. From statehood through 1975 there was no closed season or bag limit on the CAH. From 1976 to 1980, harvest was by registration permit only. In 1981, two-month fall and spring seasons were implemented with a three bull bag limit. Since 1982, a 10-month season (Oct.- April) with a five caribou bag limit has been in effect (ibid.).

Until 1983-1984, hunter access to the herd was about evenly split between airplanes and highway vehicles. Lax enforcement of the commercial-traffic-only restriction on the northern sections of the Dalton Highway (pipeline haul road) in 1983-1984 resulted in about two-thirds of all hunters using the highway for access to caribou (ADF&G 1986). Use of firearms is not allowed within five miles of the highway.

Based on 1983-1984 season data, which are generally applicable to most recent years (ibid.), more than 72% of all reporting hunters were Alaska residents, and more than half of all resident hunters were from the Fairbanks area. Table 2 shows harvest data for the CAH. Reported hunter success averaged 76% over the period 1980-1984.

The Western Arctic Herd inhabits GMUs 22A, 22B, 23, and 26A in the region. It is the largest herd in the state and one of the largest in North America. From statehood through 1975 there was no closed season or bag limit on the WAH. Shorter seasons and bag limits were imposed in the late 1970s to enable the herd to recover from a serious decline (ADF&G 1984c). In 1984 the season extended from July 1 through April 30 and the bag limit was five caribou.

Table 2. Human Use of the Central Arctic Caribou Herd, 1980-84

Regulatory Year	Reported Harvest	Estimated Harvest	Reported Hunters	Success. Hunters
1980-81	65	115-165*	54	47
1981-82	95	195-210*	98	65
1982-83	81	---	78	55
1983-84	170	---	108	91

Source: Smith 1985; Whitten 1984; Whitten and Cameron 1982, 1983.

--- means no data were available.

* Author's minimum estimate.

In 1983-84, more than two-thirds of all reporting hunters used either aircraft or boats for their caribou hunts. More than 90% of all hunters of the WAH were Alaska residents and only a minor portion of the harvest can be attributed to hunters living outside the herd's range (ADF&G 1986). Table 3 shows harvest data for the WAH.

The Porcupine Herd inhabits GMUs 25 and 26C in the region. The PH migrates between Alaska and Canada. As with the other herds of the region, there was no closed season or bag limit from statehood through 1975. Since 1976, seasons of nine to ten months duration have been in effect. A 10 caribou bag limit was reduced to 5 caribou for the 1985-86 season.

The majority of Porcupine Herd caribou harvested in Alaska are taken by residents of Arctic Village, Venetie, and Kaktovik (Whitten 1985). Local residents harvest most caribou with snomachines and boats, whereas most nonlocal hunters use aircraft and occasionally boats. (ADF&G 1986). Table 4 shows harvest data for the Porcupine Herd.

No economic surveys have been done on caribou hunting in the Arctic Region.

F. Moose

Moose are hunted in all three GMUs of the Arctic Region. In GMU 22, moose were virtually absent from the Seward Peninsula until the 1930s. Since the early 1970s, aerial surveys have shown a substantial increase in the moose population (Grauvogel 1983). Recent hunting seasons in both GMU 22 and 23 have been the longest in the state, ranging from five to eight months. Recent hunting seasons in GMU 26 have been four months long.

Harvest data for the Arctic Region as a whole are presented in table 5. Figures on the registration permit hunts held in GMUs 22 and 23 in recent years can be found in the Permit Data Analysis section of this volume.

Hunting access and hunter origins vary somewhat within the region. Despite a limited road system in GMU 22, highway and offroad vehicles account for the largest percentage of the reported harvest. Boats and snowmachines are the next most frequently reported means of access in the unit, followed by aircraft (ibid.). In GMU 23, boats and aircraft are the most frequently reported means of hunter access. Snowmachines are used to a much lesser extent (Quimby and James 1985). In GMU 26, hunter access is primarily aircraft, boats, and highway vehicles, with snow machines used to a lesser extent (ADF&G 1986).

Table 3. Reported and Estimated Harvest of the Western Arctic Caribou Herd, 1976-85

Regulatory Year	Reported Harvest	Estimated Harvest
1976-77	1,100	1,687
1977-78	672	---
1978-79	1,166	3,635
1979-80	852*	3,000
1980-81	458	3,000
1981-82	906	3,000
1982-83	1,509	---
1983-84	1,249	5,000-12,000
1984-85	2,351	7,000-10,000

Sources: ADF&G 1984c; Johnson 1981; Johnson and James 1982; Anderson and James 1983, 1984; Anderson 1985, pers. comm.

--- means no data were available.

* Bulls-only season.

Table 4. Reported and Estimated Human Use of the Porcupine Caribou Herd, 1976-84

Regulatory Year	Reported Harvest	Sport Hunt*	Estimated Alaska Harvest	No. Reported Alaska Hunters	Estimated Canada Harvest
1976-77	15	---	200-500	59	1,500-3,000
1977-78	76	---	450-550	92	1,519-1,619
1978-79	48*	48	375-690	63	300-500
1979-80	---	---	---	---	---
1980-81	110	78+	875-1,200	49	700
1981-82	141	---	1,680	123	3,300-5,600
1982-83	93	65	600-1,000	101	2,400
1983-84	81	---	---	83	---

Source: LeBlond 1979; Davis 1978; Whitten 1982, 1984, 1985; Whitten and Cameron 1983; Reynolds 1978.

--- means no data were available.

* Represents reported harvest of "out-of-unit" hunters only.

Table 5. Reported Moose Harvest and Hunter Data in the Arctic Region, 1979-84

Year	Reported Harvest	No. of Hunters[a]	Estimated Harvest
1979-80	499	347	725-810
1980-81	424	343	275-300*
1981-82	573	384	325-350*
1982-83	532	369	344-400*
1983-84	599	382	780-965**

Sources: Grauvogel 1980, 1981, 1983, 1984, 1985; ADF&G 1984d; Johnson 1980; Quimby and Moser 1981; Quimby 1983; James 1984; Quimby and James 1985; Melchior 1980; Coady 1981; Anderson 1983; Trent 1984, 1985; Boertje 1985.

a Numbers for GMUs 23 and 26 only.

* Estimates for GMU 22 only.

** Estimates for GMUs 22 and 23 only.

From 1978 to 1984, nearly 90% of those who reported moose hunting in GMU 22 were local residents of the GMU. Alaska residents accounted for most of the rest, with nonresidents making up only 2% of the hunters. In GMU 23, between 80% and 90% of reporting moose hunters are Alaska residents (ADF&G 1984d). In GMU 26, the majority of reporting hunters are Alaska residents, but more than half are nonlocal residents (Melchior 1980, Coady 1981, Anderson 1983, Trent 1984 and 1985, Boertje 1985).

No economic surveys have been done on moose hunting in the Arctic Region.

G. Dall Sheep

In the Arctic Region, Dall sheep inhabit mountainous terrain in the Brooks Range, which includes GMUs 23 and 24 and GMSs 25A, and 26A, B, and C. GMU 24 and GMS 25A are within the Interior Region; however, all sheep habitat within those units occurs in the Brooks Range. The ADF&G has attempted to present data and manage Dall sheep populations on the basis of the mountain range they inhabit (ADF&G 1986). Because available data on transportation means and hunter numbers are filed by mountain range, GMU 24 and GMS 25A are included in this Arctic Region discussion. Additional human use information on Dall sheep in GMU 24 and GMS 25A however, is located in the Alaska Habitat Management Guides for the Western and Interior regions: Distribution, Abundance, and Human Use of Fish and Wildlife. Western and Interior Regions Alaska Habitat Management Guide.

Since 1960, a general hunting season for Dall sheep in the Brooks Range has been held from mid August to mid September. In 1980, large areas of Alaska were placed in new or expanded national parks, park/preserves, or wildlife refuges. Some national park lands are closed to hunting completely, and others remain open for subsistence hunting by local residents (ADF&G 1986). Extended-season subsistence hunts by registration permit were established in 1982 for areas both inside and outside the Gates of the Arctic National Park and Noatak National Park and Preserve (ibid.). (See the most recent Alaska game regulations for current seasons and restrictions.)

The Arctic Region contributes about 200 sheep annually to the statewide harvest, of which about 60% are taken by guided, nonresident hunters (Heimer 1984a). Table 6 shows harvest and hunter effort for the years 1980 through 1984 for both the early season general hunt and the extended-season subsistence hunts where available. Hunter compliance with harvest reporting regulations is notoriously low in many areas of the Arctic Region (ADF&G 1986). Harvest data must be considered imprecise.

Table 6. Arctic Region** Dall Sheep Harvest and Hunter Effort, 1980-84

Year	General Hunt Harvest	Registration Hunt Harvest	General Hunt Hunters	Registration Hunt Hunters	No. of Hunter-days
1980	104	98	209	162	---
1981	123	99	262	113	1,124[a]
1982	180	56*	313	---	1,608
1983	171	41*	315	---	2,134
1984	207	39*	359	---	1,955

Sources: Unpubl. Dall sheep statistical reports 1980-84; Heimer 1982, 1984b, 1984c; Watson 1983, 1985a.

--- means no data were available.

* Approximate figures only.

** Includes GMUs 23, 24, 25A, and 26

a Does not include GMS 25A.

Table 7 shows reported transportation means used by Dall sheep hunters in the Brooks Range from 1980 through 1984. Information on hunter transportation means is only available for the early season general hunt. Aircraft are the predominant means of access to hunting areas. The percentage of hunters using highway vehicles increased substantially in 1981 (the year the Dalton Highway was open to public traffic) but remained relatively constant for the rest of the period.

Table 7. Dall Sheep Hunter Transportation in the Brooks Range (Arctic Region), 1980-84

Transport Means	1980		1981		1982		1983		1984	
	#	%	#	%	#	%	#	%	#	%
Aircraft	177	(83)	192	(73)	219	(70)	237	(74)	281	(75)
Horse	6	(3)	10	(4)	14	(4)	15	(5)	7	(2)
Boat	12	(6)	10	(4)	14	(4)	5	(2)	8	(2)
Motorbike	0	(0)	1	(0)	0	(0)	0	(0)	2	(1)
Snowmachine	0	(0)	1	(0)	0	(0)	0	(0)	0	(0)
ORV	2	(1)	1	(0)	1	(0)	5	(2)	7	(2)
Highway vehicle	10	(5)	34	(13)	38	(12)	46	(14)	44	(12)
Unknown	7	(3)	13	(5)	27	(9)	12	(4)	24	(6)
Total	214	(101)	262	(99)	313	(99)	320	(101)	373	(100)

Source: ADF&G 1980-1984.

* Data for general hunts only; does not include registration hunts.

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VIII. ECONOMIC METHODOLOGY

Estimating the value of hunting and/or wildlife is difficult because neither derives its value from the market economy. The term market refers to that process of allocating goods or services in which the forces of supply and demand interact to determine a price (rather than a physical location of a hunt, for example). Implicit within the notion of a market is ownership. A commodity under private ownership can be bought and sold; these interactions of selling and buying, or supply and demand, constitute a market that then determines prices.

Nonmarket goods are usually public goods (national parks and forests, fish and wildlife, clean air, rivers) that are held in public trust and/or managed by a public agency (government) with the responsibility of maximizing social well-being, or benefit. Public lands and waters provide opportunities for a variety of market and nonmarket activities and products, some of which are incompatible. Clearcut timber harvesting and wilderness recreation are examples of incompatible uses.

In order to achieve a balanced and socially optimal mixture of market and nonmarket uses of lands and natural resources, some knowledge of the value society places on nonmarket activities and goods is needed. This is because the value of market goods and activities is much more readily discernible and consistently used when comparing alternative land uses. Without economic assessments of the value of nonmarket goods and activities, the losses to society involved in development of incompatible uses cannot be adequately addressed.

One argument against evaluating natural resources in economic terms is that it is morally undesirable to put dollar values on natural environmental amenities. In the past, many resource managers were unwilling to think of the values of some natural resources as anything other than intangibles rooted in personal values that could not be measured on a monetary scale. As a result, decisions about the uses to be made of the environment were arrived at in an unsystematic, subjective way that involved implicit trade-offs between dollars and the natural resources in question. Environmental quality attributes and activities such as clean air or water, wildlife viewing or hunting opportunities, or sport fishing, were either ignored or debated in emotional arguments about their "infinite" value. In practice, planning was limited to incremental changes in the availability and/or quality of nonmarket uses of land and natural resources rather than more long-ranged planning that explicitly recognized and provided for these values (Hyman 1981).

Most techniques for determining the value of nonmarket resources underestimate their true value, and the quantification of such "immeasurable" values can be opposed for this reason. In many circumstances, however, minimum values are sufficient to prove that a resource is more valuable preserved than developed (ibid.) or at least that a compromise

between preservation and development is warranted in terms of both economic cost-benefit criteria and social equity.

Assuming that evaluating nonmarket resources in economic terms is appropriate for a particular land management consideration, it is important to use economic methodology that will most accurately estimate the true value and benefits to users of the resource in question. Attainment of this accuracy necessitates a thorough examination and understanding of all available information regarding use patterns prior to developing a specific methodology. For this reason, regional narratives from the Alaska Habitat Management Guide on the human use of wildlife have been summarized in this volume. These summaries provide a synopsis of background data that is essential to the development of any specific economic methodology.

Two major methods have been developed for the economic evaluation of nonmarket goods: the direct and the indirect methods. The word "direct" denotes that value and benefit estimates are obtained directly from users, whereas in the indirect approach, values are computed from the observed behavior of users. These methodologies were recently developed in response to the increasing evidence that nonmarket, or noncommercial, uses of natural resources contribute substantial value to society and that existing market-oriented methodologies for evaluating and allocating resources are inadequate when applied to nonmarket uses of resources (Larson 1982). (This is not to say that markets always accurately value and allocate market commodities but - given free markets and prices - markets should reflect social preferences.)

The indirect methods rely on observations of user behavior to estimate value. Indirect methods are also called "revealed preference studies" because they rely on observable behavior rather than on user statements of preference. One of the most widely used indirect methods is the "travel cost method," which was conceived by Hostelling (1947) and developed by Clawson (1959). A relatively newer approach, the "household production function" (Charbonneau and Hay 1978, Deyak and Smith 1978, Bockstael and McConnell 1981), evaluates "products" such as activity-days, size of kill, or number of sightings. "Expenditure surveys," which gather data on the dollars spent on a particular activity such as hunting, are also in the category of indirect methods.

The direct methods use techniques to elicit the responses of users regarding how much they value a particular activity or site and how their use of a site would change in response to a hypothetical change in the conditions or price of use. "Contingent valuation" or willingness to pay or sell techniques are examples of a direct method (Larson 1982).

In order to estimate the value to users and/or society of nonmarket or unpriced values, these nonmarket evaluation techniques (with the exception of the expenditure approach) attempt to estimate user net

benefits, or "consumer's surplus." Consumer's surplus, a theoretical concept related to demand, is the difference between the price that a consumer pays for a good, service, or activity and the price that he/she would be willing to pay rather than be deprived of the good, service, or activity. For example, figure 1 shows a demand curve (line DF) and a supply curve (line ST). The demand curve shows the relationship between price and quantity demanded; the higher the price, the less demanded. The supply curve also shows the relationship between price and the quantity offered for sale or supplied; the higher the price, the more supplied. At equilibrium, supply and demand are in balance, with the quantity, Q, supplied at price, p. The difference between what is actually paid, price P, and what people would be willing to pay for quantity, Q, is the triangle, DPE. The area of this triangle equals the net benefits, or consumer's surplus, for the good or activity under consideration. Nonmarket evaluation methods attempt to accurately estimate the areas of triangles analogous to triangle DFE.

Consumer's surplus is often used as a measure of net social benefit and is frequently used to evaluate fish and wildlife uses because they are nonmarket uses. Because net benefits are the difference between what users pay and what they are willing to pay, estimating expenditures is an initial step in the process of determining net benefits, but it must be emphasized that <u>expenditures alone are inadequate for determining net benefits</u>.

Controversy exists, however, within the economics profession regarding consumer's surplus. One of the limitations of consumer's surplus is that the empirical measurement of demand is difficult. Measurement of consumer's surplus is especially difficult, therefore, because it is derived from measurements of demand. Also, indirect costs and benefits (externalities) that are important aspects of social well-being are not reflected in consumer's surplus, which further limits its ability to fully estimate social value. Despite these difficulties and limitations, many economists contend that consumer's surplus can provide a practical, if imperfect, measure of social well-being (Willig 1976). Economic methodologies for estimating nonmarket values have only been extensively developed and utilized in the last ten years, and, therefore, has some of the above mentioned theoretical and technical problems. Advances within this new, but complex, branch of economics continue to be made. The rest of this section discusses some practical considerations of expenditure surveys and travel cost and contingent value methods.

A. Expenditure Approach

The expenditure approach assumes that people will buy a good or service or participate in an activity if the benefits exceed the costs. If the benefits cannot be determined directly, the costs

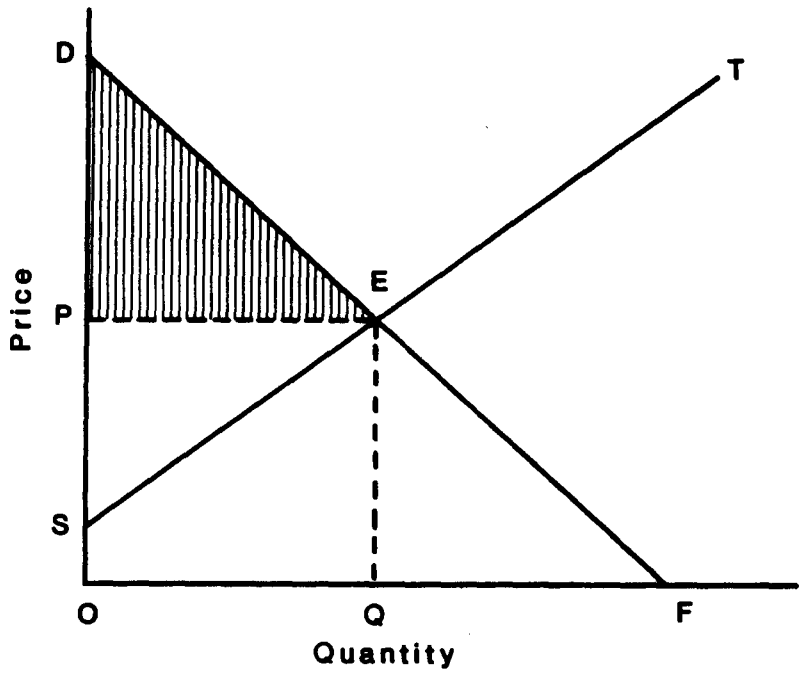

Figure 1. Demand (line DF) and supply (line SE) curves illustrating the concept consumer's surplus*.

* The area of triangle DPE is the consumer's surplus, or users' net benefits. The supply curve represents the functional relationship between the quantity supplied and the price. Similarly, the demand curve represents the functional relationship between the quantity demanded and price.

of a good or activity can be used as a minimum estimate of the users' benefits. The expenditure approach has been most frequently used for estimating the value of recreational activities, such as hunting and camping. It continues to be used largely because it is relatively easy to apply and does not require as much analytical rigor as do more sophisticated economic methods. The expenditure approach underestimates benefits because it measures what is paid for an activity or environmental amenity but does not measure the user's net benefit from the activity or amenity. It is important, therefore, not to use the results of expenditure surveys as if they were estimates of user values to justify environmental amenity values in land use planning because they underestimate the actual net benefits to users.

The expenditure approach can, however, provide useful information regarding the interaction of goods and services within a regional economy or between regions or areas. An analysis of such a movement is called an input-output analysis. Within Alaska's relatively undeveloped economy, the patterns of production and consumption can be especially important to the complete assessment of the value of different or competing resource uses. This is because the final destination or turnover (multiplier effect) of dollars from an economic activity can vary considerably. This, in turn, determines who are ultimately the beneficiaries of a particular activity. For example, a private business operation (such as professional game guiding) that provides employment and attracts dollars into a rural area where employment and income are less stable than in urban areas can be especially useful in the development of the state's or a region's local economy. From a public policy standpoint, the benefits of competing uses of natural resources are often weighted differently, based on the flow of production and consumption dollars within the region, state, or out-of-state. For example, offshore oil development may produce benefits to the nation and out-of-state private interests with the costs or impacts of development accruing to Alaska regional or community economies. Economic assessments need to clearly identify the distribution (or identify who are the "gainers" or "losers", both directly and indirectly, resulting from a particular activity) of costs and benefits as well as the levels of costs and benefits.

When designing the expenditure portion of an economic survey of users, it is important to consider some critical aspects. Expenditures need to be per user (e.g., ask respondents to list only their portion of the total group costs), and all expenditures need to be on the same temporal basis. For example, most hunting or recreational activities have per-trip costs (gas), per-year costs (license fees), and long-term costs (guns or ORVs). These need to be standardized to a unit of time for the data to become meaningful. For this reason, surveys are best conducted at the end of

seasons because on a per-trip basis during a season the allocation of annual or long-term costs per trip is uncertain. (The drawback to this is that people tend to forget costs associated with numerous trips during a season.)

Long-term costs or capital investments present complicating considerations. Surveys should ask for just the annual portion of long-term equipment costs. This, in effect, is asking the user to estimate the item's lifetime and to depreciate the cost of the item for the year in question. Another complicating but important consideration in calculating the costs of long-term equipment is that many items are used for a number of activities. For this reason, users should be asked to indicate the proportion of time the item is used for the particular activity.

B. Travel Cost Method

The basic concept of the travel cost method is that if a series of concentric zones were drawn around a particular use site and data on user numbers and costs of travel were collected for each zone, there would be an inverse relationship between the per capita number of visitors and the average cost of travel from each zone. In other words, as the distance travelled to a site increases, travel costs increase, and the proportion of the people in the associated geographic area willing to make the trip decreases. The visitor from a specific "zone" that has the highest travel cost is assumed to be the marginal user for that zone, which means that the cost of travel is completely offset by the benefits of travelling. This implies that what the visitor is willing to pay equals what he/she did pay and that his/her consumer's surplus, or net benefit, is equal to zero. All the other visitors within the zone had lower costs, so that the difference between their costs and the marginal visitor's costs is their net benefits, or consumer's surplus. The total of all the users' net benefits is the social net benefit, or value, of the site.

Some of the assumptions of the travel cost method are that 1) all users obtain the same benefit and that this is equal to the travel cost of the most distant user within each zone; 2) that the net benefit of the most distant user is zero; 3) that travel costs are a reliable proxy or substitute for price; and 4) that people from all distances would use the site equally if faced with the same cost of doing so (Snider and Worrel 1979). In order to improve the validity of these assumptions, the travel cost method has been refined considerably since it was first developed. Some of the modifications include the addition of 1) travel time as a component of travel costs, 2) user fees, 3) site characteristics, 4) user characteristics, and 5) availablilty of substitutes for the site.

One of the most significant limitations of the traditional travel cost methodology is that it is site- and time-specific. The estimated values are not applicable to other sites and do not give an indication of how use would change if characteristics at the site or adjacent sites changed (Brown and Mendelsohn 1980). The derived value of a specific site at a specific time does address the problem of the social costs incurred from loss of a particular site but does not readily lead to estimates of the benefits or costs of changing site characteristics. The "hedonic travel cost method" developed by Brown and Mendelsohn (1980) directly evaluates site characteristics. This is an important improvement in evaluation techniques for fish and wildlife management in Alaska because determining the impacts on costs of changes in site quality is an important consideration. The ability to evaluate the effects of changes on site characteristics is a significant addition to the ability to evaluate the loss of particular site. This is because some alternative land uses are not mutually exclusive but instead make changes in site characteristics or quality. These changes require the ability to estimate the value of incremental changes as opposed to only evaluating "all or none" situations.

The hedonic travel cost method in a sense reverses the traditional travel cost method by taking a user origin (Anchorage, for example) and analyzing the characteristics of the sites users from that origin go to for a particular activity (moose hunting, for example). Information on user characteristics (age, income, education), travel costs, and travel distances are also analyzed. The hedonic travel cost method has been used to evaluate hunting demand and opportunities (Brown and Mendelsohn 1980, Mendelsohn and Roberts 1983, Brown 1983, Mendelsohn 1984). Aspects such as age, income, and education are important variables to consider because they can account for systematic biases in user data which can have important management implications.

Travel cost methodology was developed in the continental United States, which has an extended road system. In most situations, therefore, travel is by automobile and a simple value is used for the cost of travel per mile. The estimate of travel time has been made by identifying road types and specifying approximate travel time for segments (Brown 1983). In Alaska, the lack of an extensive road system makes use of the travel cost method much more complicated. Data on the transportation means of users should be carefully reviewed to determine whether, in any given case, the travel cost method is most appropriate or will give reliable results. In cases where a variety of transportation means are routinely used, both travel costs and time are significantly affected, and adjustments in methodology are required to produce reliable results. To date, very little empirical work has been done on the adaption of travel cost methodology to Alaska user

data. Were such an adaption to be accomplished, it would provide valuable land use planning data and simultaneously improve the methodologies of economic evaluation.

C. Contingent Value Methods

Contingent value techniques ask the users how much more they are willing to pay not to be deprived of a particular opportunity or how much they would accept to forfeit or sell a particular opportunity. Many earlier economic theorists (Pareto, Hicks, Scitovsky, Coase, and others) seemed to agree that in decisions regarding changes in social welfare it was insignificant as to whether the "gainer" compensated the "loser" or whether the "loser" paid the "gainer" in order to prevent a portion of the loss (Meyer 1979) (welfare here does not refer to any kind of government payment but rather to social well-being; a branch of economic study, "welfare economics," primarily focuses on the social well-being aspects of economic activities). However, more recent research (Mishan 1974, Krutilla and Fisher 1975) indicates that:

> "values will vary with the assignment of property rights. Where a competing use (say mining) has the initial rights, value to the recreationist is determined by the person's income-constrained maximum willingness to pay to buy out the miner. Where the recreationist has the initial rights, value is determined by the unconstrained minimum amount the person will accept in exchange for their rights. Since these two measures of value are in general not the same, assignment of property rights could determine the outcome of a decision to allocate a resource to its optimal, or highest valued, use in an appreciable proportion of the cases" (Krutilla and Fisher 1975).

Application of this economic welfare theory, which argues that, for any reallocation of society's resources, gainers must be able to compensate losers, requires that "losses" of fish and wildlife amenities be measured by a willingness-to-sell approach (Meyer 1979). Dwyer et al. (1976) argue that "the willingness-to-sell to measure the lost benefits [for cost/benefit analyses that measure the economic tradeoffs of alternative land uses] is fully consistent with the use of willingness-to-pay to measure increased benefits and, in fact, is basic to the spirit of benefit-cost analysis." The distinction between willingness-to-pay and willingness-to-sell recognizes that a rational person can be expected to "purchase" more fish and wildlife as long as his/her use value is greater than the price demanded, provided he/she has the income to do so. A rational "owner" of fish and game, on the other hand, has no such income constraint (Meyer 1979). So, in

practice, the selling price of a resource will be much higher than the user is willing to pay to "purchase" it.

In analytical studies comparing willingness to pay to willingness to sell, the divergence in the values was positively associated with the relative importance of the activity or product (table 1) (ibid.). One of the studies conducted by personal interviews asked respondents to value all saltwater recreation within one day's round trip travel according to 1) willingness to pay; 2) need to be compensated if excluded; 3) a "community decision-making" approach, where respondents were given per-household information on local government expenditures and asked to assess recreational "value" in light of this information; and 4) a judicial award for damages (table 1) (Meyer 1975).

The study results indicated that the willingness-to-pay question can be expected to produce the lowest value responses and that the willingness-to-sell question produces the highest responses. The community decision-making and the judicial award questions can be expected to produce in-between values that are statistically similar (ibid.).

A significant problem with contingent valuation methods concerns the verification of results obtained by asking a hypothetical question. To prevent bias in results, surveys should be carefully designed and administered. With willingness-to-sell questions, it is difficult to determine whether an unusually high-value response indicates "not for sale at any price" or whether it is an unrealistic value or data point. However, this does not rule out willingness-to-sell in preference for willingness-to-pay applications to avoid the potential problem of irrational demands for compensation (Meyers 1979).

It is likely, however, that hunters will "learn" that increasing value responses to contingent valuation questions is in their best interest. Also, because contingent valuation responses are not "verifiable," it can readily be argued in land planning situations that they are inaccurate. Another problem with contingent valuation is that the questions have primarily been used to address all-or-nothing criteria (the complete loss of a hunting opportunity) rather than changes in quality characteristics (reduced species density or increased congestion). This does not mean that contingent valuation could not be applied to measure the value of changes in site characteristics but this would require experimentation and adaptation for specific purposes.

In summary, for economic evaluations in Alaska, that are intended to estimate the net benefits of wildlife opportunities, willingness-to-sell questions are most appropriate when changes in land use result in losses to users of wildlife. In situations

Table 1. Comparative Responses: Alternative Direct Questions Concerning Recreational Value

	Product	Author	Ratio of Responses: Willingness to Sell To Willingness to Pay	Ratio of Responses: Community (Gov't) Decision To Willingness to Pay	Method
1.	All saltwater recreation within a day's round trip	Meyer (1975)	19:1	11:1	Personal interview
2.	"Favorite" fishing site in region	Sinclair (1976)	20:1		Mail and telephone
3.	Elk hunting in Wyoming	Brookshire and Randall (1978)	7:1		Personal interview
4.	Wetland hunting in area	Hammack and Brown (1974)	4:1		Mail and telephone
5.	Park	Romm (1969)		3:1	Personal interview
6.	Fishing in a park	Eby (1975)	3.5:1		Personal intervi of 2 populations
7.	Local postal service	Banford (1977)	4:1		Personal interview
8.	Fish pier	Banford (1977)	3:1		Personal interview
9.	A television program	Bohm (1972)		1.4:1	Personal interview (Questions I through V vs. Question VI)

Source: Meyer 1979.

where enhancement of wildlife habitats (amenities) is considered, willingness-to-pay questions should be used to determine whether the net benefits of enhancement are greater than the costs.

However, the answers to these contingent value questions or any economic assessment of land uses do not always clearly define the most appropriate action or policy. Within all economic analyses are embedded both the socioeconomic questions of who benefits or loses from alternative uses, as well as the question as to whether the activities are profitable or economically sound (Okun 1975). Economic or benefit-cost analyses are not limited to financial accounting sheets but must fully identify the socioeconomic effects of alternative activities.

D. Economic Evaluation in Alaska

There are two significant economic evaluation considerations that are specific to Alaska and have broad implications for using economic analyses: 1) the political allocation of fish and wildlife resources and 2) the changing patterns of land ownership, jurisdiction, and management.

In most areas in the United States, the use of fish and wildlife is primarily recreational, and no distinctions are made regarding the allocation of resources among groups. This is largely a reflection of the homogeneity of the overall user group, their valuation of the resources, and their motivation for using wildlife. Some distinctions are made for resident and nonresident license fees, but this is a user fee rather than a part of an allocative process.

In Alaska, the range of user types, their motivation for use, and the cultural value of their use varies widely. On one end of the spectrum is local subsistence use; on the other end is trophy hunting. Public policy in the state has allocated highest priority to subsistence and other local use of fish and wildlife. However, empirically evaluating economic data on subsistence hunter use is difficult at best (see the subsistence statewide overview section in this volume for more discussion of subsistence economic methodology). In contrast, big game sport hunting (especially by nonresidents) generates verifiable income to the state, which is somewhat less complex to evaluate.

The variety of wildlife users in Alaska makes it statistically and theoretically difficult to design hunter surveys (economic or otherwise) that adequately address the use patterns and motivation of different user groups. In Alaska, wildlife is managed to maintain population abundance, which indirectly benefits users by making use and access less costly. Where expenditure survey data

(if any are available within the state or borrowed from studies elsewhere) have been used in land use planning to estimate values, results have been inaccurately low. It should be no surprise that Alaska expenditure surveys appear to undervalue wildlife resources because per user costs are relatively low.

Wildlife in Alaska is also managed to maintain its relative abundance; sound management of wildlife resources prevents them from becoming increasingly "scarce" resources. This in turn means that each individual animal appears to be worth less because there appears to be an inverse relationship between species abundance and hunter costs. This is why it is important that net benefits be estimated. Because wildlife is managed to be relatively abundant, the cost to users is relatively low (what the user actually pays). At the same time, the use of wildlife by Alaskans is very important (the price they would sell their opportunity for is high), and there are a large number of users. Therefore, the total net social benefit of wildlife use across all user groups is very high (the contingent value minus the value paid and summarized for all users is the net social benefit).

Another difficulty in the economic evaluation of fish and wildlife resources in Alaska derives from the dynamic change in land ownership and jurisdiction. Public land use designations predominantly distinguish the extent and conditions of private use of public resources. Uses of public land can range from the viewing of wildlife, which does not prevent a particular animal from being a "public good" for others (barring congestion or harrassment); through hunting, which is the noncommercial taking of a public resource into private possession (under sound management this is the sustained yield of a renewable resource and does not prevent the future use of the resource); to private, commercial land use (such as forestry or mining) that utilizes renewable or nonrenewable resources and alters the land base that otherwise might provide other commodities or services. User fees (stumpage, for example) and taxes on revenues are often charged as public compensation for commercial, private use (similar to hunting license fees). The private use of resources, as described above, increasingly removes opportunities and benefits to other potential users. As population has grown in the United States, demands for natural resource use have also increased. Public land management law has developed, which provides more stringent guidelines to users of public resources so all user groups can equally enjoy the goods and services of public lands and waters.

The history of land use policy in Alaska (as well as in all of the United States in years past) has been the encouragement of land development through homesteading and other incentives to encourage human settlement and economic stability. Because of Alaska's immense size and the predominance of public lands, all users have

traditionally had liberal access to lands for a variety of uses. Changes in land use designations and ownership (statehood, Alaska Native Claims Settlement Act (ANCSA), Alaska National Interest Conservation Act (ANILCA), for example), as well as changes in public policy towards land use (National Forest Management Act (NFNA) and National Environmental Policy Act (NEPA), for example), continue to disrupt explicit and implicit property rights, which in turn affects the economic values of resources, as discussed above. It is not always clear who the "gainer or loser" is in Alaska and who requires compensation when land ownership and laws are changing rapidly. At this time, Alaska is experiencing a rapid increase in population growth, rapid increase in land development, and significant changes in land ownership and designations. This dynamic setting makes economic evaluations of wildlife very important in order to ensure that wildlife and wildlife habitat are adequately protected to satisfy public values and needs.

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Economic Value of Furbearer Trapping
Statewide Overview

I. INTRODUCTION

The purpose of this section is to present an overview of information available for economic analysis of furbearer trapping in Alaska. Time and data limitations make it impossible to do a comprehensive evaluation of furbearer economics and values. The information contained in this overview does, however, provide a very useful, consolidated background for further analyses of furbearer economic values. Estimates of statewide and regional raw fur harvests and values are based on the methodologies developed by the ADF&G, Division of Game, and are described below. Some information on nonmarket uses of furbearers is also presented, with discussion of methods to determine the economic importance of these uses, given detailed information for specific localities. The nonmarket and instate commercial use furbearer values, however, are the weakest portions of the department's furbearer harvest and value data. Therefore, this report provides information on only a portion of furbearer harvest values and indicates areas in need of further study. An example of one method of conducting an analysis of the economics of fur trapping for a particular area is attached to this section.

A. Data Limitations

Despite the fact that a large portion of trapping effort is market-oriented to selling furs, determining economic values for furbearer harvesting is difficult because many of the data available are not precise. There are no exact figures on the number of trappers or the intensity of their effort for the state because no systematic method for determining trapper numbers or effort has been established. (Within some areas or communities, however, more detailed information has been collected as part of a particular study or survey.) Also, because furbearers' pelts are a differentiated product, in which the price varies with several factors described below, the calculation of meaningful average prices (by the Division of Game) is an imprecise and difficult task.

In addition, documented harvest figures are available for only five species in the form of sealing data. All pelts of these species must be sealed by law, and to the extent that the law is complied with, harvest figures for sealed species are accurate. For the majority of species, the only documentation of harvest are export figures or dealer purchase figures. Because not all furs

are exported or sold to dealers, it is necessary to estimate the total harvest for unsealed species (this methodology is described below).

Besides harvest number data, another very useful category of information for determining the importance of furbearer trapping to a particular area is location of harvest. For the five species required to be sealed, sealing documents indicate area of harvest. But for the unsealed species, only trapper export documents and dealer purchase documents record the residence of the trapper; dealer export documents do not. Also, trappers do not always trap where they live, so precise breakdowns of harvest by area are not possible from fur acquisition documents. (See appendix A in this volume for samples of furbearer sealing and export forms.)

In this report, export data have been relied on as a basis for calculating harvest of unsealed species in order for this narrative to be compatible with the human use sections of the Alaska Habitat Management Guides. But it is important to remember that exports do not equal harvest and that export data for each region do not indicate harvest for each region. Because more fur dealers live in the Interior and Southcentral regions than in other regions of the state, those regions may have larger reported harvest figures in the regional tables than is actually the case.

Another serious data limitation with respect to the contribution of furbearer trapping to the Alaska economy relates to the nature and extent of both the home manufacture of fur products and the nonmarket uses of furbearers. There appears to be a large number of people who receive income from the processing of fur handicrafts at home. Such activities provide a critical source of income to the residents of many rural communities, yet there is little information available on the magnitude of this home industry. Also, although some information is available on uses of furbearers for food, clothing, and other nonmarket uses (primarily through research by Division of Subsistence) for some communities and areas, it is not available on a comprehensive statewide basis. Accurate estimates of the value of nonmarket uses is, therefore, limited in scope. This is a topic in need of much further study, which is beyond the possible scope of this overview.

Additional data are also needed to make meaningful estimates of the social value of furbearer trapping, whether recreational or commercial. At the present time, there is insufficient information to estimate even imperfect measures of social value.

B. Methods

This report provides an estimate of the total raw fur harvest and values for each of the six regions of the state. Data are not

available to make such estimates precise. Estimates of fur harvests and values based solely on figures from ADF&G reporting documents are acknowledged to be low, by both ADF&G biologists and other experts. Harvest information is available through three documents: sealing reports, export reports, and dealer purchase reports.

Sealing reports provide the most accurate estimates of furbearer harvest because, if sealing is required for a species, all pelts taken must, by law, be sealed and recorded. But only five species, beaver, otter, lynx, wolf, and wolverine (and since 1984-1985, marten only in Southeast Alaska), are required to be sealed after harvesting. Therefore, for all other species, the only harvest documentation are export reports, which record only pelts shipped out of the state for processing or sale, and dealer purchase reports, which record only pelts bought by dealers. Pelts retained by trappers for their own use or those sold and traded locally or held by trappers in anticipation of higher prices do not show up on export or dealer purchase documents. There are probably also some trappers who, for one reason or another, do not seal all of the pelts they are required to (Dinneford, pers. comm.).

One study by a private consulting firm listed two reasons why harvest figures on ADF&G documents are underestimates of the actual number of pelts sold: 1) the trapper's reluctance to have his/her harvests tied by government authorities to his/her income tax statements and 2) the buyer's reluctance to fill out paperwork during the very busy and competitive bargaining periods (Calista Professional Services 1984). That study produced its own estimates of the average annual furbearer harvest in the Yukon-Kuskokwim area (Western Region) for the years 1971-1981, which, in most cases, are considerably higher than numbers from state documents (ibid.).

A more accurate estimate of fur harvests than relying strictly on data from fur acquisition documents was devised by Melchior (1982). Because of the reasons listed above, the reported number of pelts exported is consistently less than the number of pelts sealed. The degree to which export data underestimate the harvest can be evaluated by examining the proportion of sealed pelts that were exported. Of the five species required to be sealed, only beaver, otter, and lynx have both sealing and export data available. Melchior (1982, 1983, 1984, 1985), following a similar method pioneered by Burris, combined sealing data for beaver, otter, and lynx and divided it by total reported exports of the species to get a mean ratio of sealing to export data. Estimated total harvest for all species can then be derived by multiplying exports by this ratio, which varies from year to year (table 7). The ratios in table 7 were calculated on a statewide basis.

During technical review of the draft, Melchior suggested a better method would be to calculate sealing-to-export ratios for each region individually. Time constraints on this project did not allow a recalculation of harvest estimates based on regional sealing-to-export ratios.

The extent to which this method of estimating harvests is accurate depends on the following four assumptions: 1) that all beaver, otter, and lynx that are trapped are sealed; 2) that pelts are sealed the same season they are harvested; 3) that the ratio of pelts sealed to pelts exported is the same for all species as the mean of beaver, otter, and lynx; and 4) that all furs exported are exported the same season they are harvested. Evidence that there were many exceptions to the last assumption led Melchior to change his methodology and replace "fur exports" with "dealer purchases" of furs in the calculations in 1985. But in order to preserve continuity in the data we have calculated estimated harvest for unsealed species by using the earlier method.

II. IMPORTANCE OF TRAPPING IN ALASKA

A. Historical Background

Trapping has a long and important history in Alaska. Long before Alaska was explored by Europeans, Natives trapped furbearers with deadfalls and babiche snares. Although a relatively minor activity compared to hunting and fishing, trapping was part of the seasonal cycle of activities and provided material for clothing as well as food (Schneider 1980). The introduction of steel traps, wire snares, and firearms, as a result of trade with whites, increased the efficiency of Native trappers in capturing land mammals, and cash incentives provided by a commercial market increased trapping effort in many areas (Francis 1966). At least one (and probably many) Native group altered its social and economic patterns because of the fur trade (Reckord 1983).

Furs were the chief reason for the early colonization of the Alaska coast by the Russians. Marine mammals, chiefly fur seals and sea otters, were the most valued species. With the establishment of trading posts in the interior and at the mouths of rivers in the first half of the nineteenth century, the importance of land mammal pelts to the fur trade increased. Among the factors that motivated the Russians to sell Alaska to the United States in 1867 was the decline of the sea otter trade (Rogers et al. 1980). Until the discovery of gold at the turn of the century, the chief economic interest of the United States in the Alaska territory was also furs. Fur seal and sea otter were initially the most important, but with the beginning of federal

regulation of the fur seal harvest in 1870 and the decline of sea otter numbers, furs from land mammals increased in importance. In 1890, excluding those of the Pribilof fur seals, 216,285 pelts worth over $1.5 million were exported from Alaska (NPS 1961). During the gold rush years of the early 1900's, the fur trade declined. The value of land mammal furs shipped from the territory was less than $500,000 in 1915 but increased again to over $1 million in 1917 (USDOI 1918).

Fox farming became an important activity early in the twentieth century, but it declined sharply after 1939 as a result of falling prices during the 1940's. Since 1983, ADF&G licenses or fees for fur farms have not been required (AS 16.05.340 (a)15). Alaska Department of Revenue records indicate around 20 business licenses for fur farms were issued in 1986.

For additional information on past and present uses of furbearers, see the Alaska Habitat Management Guides' human use section for each region, except Arctic.

B. Present-day activity

There are no precise data on the number of trappers in Alaska. However, a 1978 survey of trappers and data on the number of licenses sold provide some information on trapper numbers and trends in participation. In addition, a count could be made of trappers listed on dealer purchase and trapper export documents, which are filed with the state. Because trapper residency is listed on those documents, Dinneford (1981) used the latter method to estimate the number of trappers who resided in the Western Region during the 1979-1980 season (see section on Western Region trapping in this economics volume). Because some trappers keep all their furs for domestic use or local manufacture and do not sell furs to dealers or export them, the count of trappers obtained from this method can only be considered a minimum.

Kellert (1980), as part of a national survey, conducted a household survey of Alaska residents in 1978 in which he defined a trapper as a member of the National Trappers Association or as one who answered "yes" to the question, "Have you trapped in the last two years?" He estimated that there were nearly 28,000 active trappers in Alaska. That is considerably more than the 19,522 trapping licenses issued in 1978 (table 1).

Trapping licenses issued are another indication of the number of trappers; however, license figures can over- or under-estimate the actual number of trappers. Overestimates can occur because some trapping licenses may be purchased by people who decide not to trap. Trapping licenses cost only $10.00 ($3.00 before 1985) separately or in combination with other licenses, and many people buy one every year in case they get the chance to trap or take a

Table 1. Number of Trapping Licenses Sold in Alaska, 1974-84

Calendar Year	Number of Licenses Sold					
	Resident-Trap	Resident-Trap/Hunt	Resident-Trap/Hunt/Fish	Nonresident-Trap/Hunt	Resident 25¢-Trap/Hunt/Fish	Total Number Licensed to Trap
1974	890	1,109	6,239	24	6,256	14,518
1975	759	1,181	7,551	26	5,004	14,521
1976	1,210	1,328	9,606	37	5,281	17,462
1977	1,589	2,063	9,153	52	5,463	18,320
1978	1,480	1,947	9,141	67	6,887	19,522
1979	1,465	2,170	9,328	53	8,334	21,350
1980	1,526	2,378	9,953	61	9,498	23,416
1981	1,633	2,510	10,620	86	10,669	25,518
1982	1,430	2,534	11,983	70	11,882	27,899
1983	1,349	2,723	13,236	46	12,540	29,894
1984	1,155	2,301	13,620	67	13,176	30,319

Source: ADR 1974-84.

a No hunting or trapping license is required of an Alaska resident over 60 yr of age; however, an identification card issued by the ADR is required. No trapping license is required of Alaska residents under 16 yr of age.

b Resident trapping licenses are valid from October 1 through the following September 30, inclusive. All other licenses, resident and nonresident, are valid from January 1 through December 31 of the year in which they were issued.

furbearer by shooting, which is a legal method under the trapping regulations. Trapping privileges are also included in the 25-cent licenses for low-income persons (see current Alaska Game Regulations) whether or not the purchaser has any intention of trapping. In addition, eight furbearers can be hunted as well as trapped, and hunters have a chance to increase their harvest of some species with the increased season and bag limits available under a trapping license.

Underestimates can occur because a trapping license is valid from the date of purchase through September of the following year. Thus, the number of people licensed to trap during the 1983-1984 season (approximately fall 1983 through spring 1984) would be the sum of licenses sold from January 1983 through the end of trapping season in spring 1984. In addition, no license is required of residents over 60 years of age or under 16.

Despite problems with trapping license figures, they are useful as indicators of trends. The number of people licensed to trap has increased steadily since 1973. More than 30,000 people were licensed in 1984, double the number in 1973. The two largest categories of trapping licenses were "resident hunting and trapping" and "resident hunting, fishing, and trapping," both of which might overestimate trapper numbers for the reasons mentioned above. "Resident trapping" licenses have not shown much growth over the 10-year period, although fluctuations are evident from year to year. Nonresident hunting and trapping licenses also fluctuate from year to year but represent a very small proportion of the total number of people entitled to trap.

Only some general information is available on how much trapping is primarily recreationally or commercially motivated. Trappers residing in Anchorage presumably trap primarily for recreational purposes (Chihuly, pers. comm.). On the other hand, many residents of outlying villages, where employment opportunities are limited and often seasonal, trap to supplement their incomes. Some are involved in commercial fishing activities, fire fighting, or construction during the summer and trap during the winter.

An annual ADF&G mail survey of trappers in the Interior Region of Alaska provides some information on the reasons for trapping in that area. For the 1982-1983 season (Ernest n.d.), in response to a question asking if trapping provided an important source of income, 61.5% of the respondents (75) answered yes, 25.4% (31 respondents) indicated they trapped for recreation only, and 11.5% (14 respondents) reported they trapped both for recreation and for a source of income. Two others (1.6%) stated that trapping was not a major source of income but that it helped.

III. FUR MARKETING

A. Export Markets and Prices

Ultimately, a majority of Alaska furs are exported to Europe for manufacture into garments. Raw pelts (untanned or undressed) are preferred by Europeans in order to avoid import tariffs. Since many of the final products are manufactured and sold in European markets, European economic conditions have a dominant influence on Alaska fur prices. Fur prices are a major determinant of trapping effort for many species and thus influence harvest levels. Beaver and muskrat are exceptions in some localities, because these species are often used as food and for the home manufacture of hats, mittens, and other clothing (Melchior, pers. comm.).

Foreign buyers purchase many Alaska pelts at fur auctions such as the Seattle Fur Exchange and several Canadian auctions (table 2). There are two major fur auction houses in the United States and five in Canada.

The Seattle Fur Exchange is typical of how Alaska furs and those from other regions enter the market. The exchange acts as a selling agent on a commission basis for trappers or fur buyers who have assigned their pelts. Buyers representing primarily foreign manufacturers have an opportunity to inspect the pelts and bid for them. The fur exchange generally has the authority to agree on the sales price and receives a 6% commission plus a membership assessment charge that varies with the association to which the seller belongs. Several auctions are usually held each year. During 1984, for example, auctions were held in January, March, and May (Seattle Fur Exchange 1984).

Trappers can sell directly through the fur auction houses or to fur dealers, who then sell to brokers or other buyers. Prices paid by fur dealers who operate in Alaska are not usually as high as fur exchange prices. An advantage to trappers of selling to fur dealers is the convenience; some dealers travel from community to community to purchase pelts and generally pay at the time of purchase. Often, village stores become fur dealers as a service to the community (Machida, pers. comm.). The lower prices usually paid by dealers can be partially attributed to their transportation costs and risks related to shifts in the fur market, although such shifts might also provide unexpected profits.

ADR figures show 151 licensed fur dealers within the state (table 3). The Interior and Southcentral regions have the most fur dealers, although fur dealers do not necessarily limit their activities to their region of residency (map 1). The Southeast and Southwest regions had the fewest fur dealers.

Table 2. Major Fur Auction Houses in the United States and Canada

United States

Hudson's Bay Company Fur Sales, Inc.
151 West 30th Street
New York, NY 10001
Phone: (212) 736-4230

Seattle Fur Exchange
240 Andover Park West
P.O. Box 88159
Seattle, WA 98188
Phone: (206) 246-7611

Canada

Dominion/Soudack Fur Auction Sales*
589 Henry Avenue
Winnipeg, Manitoba
Canada R3A 0V1
Phone: (204) 774-1705

Edmonton Fur Auction Sales*
10505-106th Street
Edmonton, Alberta
Canada T5H 2X5
Phone: (403) 426-7790

Hudson's Bay Company*
Internation Fur Sales Centre
65 Skyway Avenue
Rexdale, Ontario
Canada M9W 6C7
Phone: (416) 675-8320

Ontario Trappers Association
Fur Sales Service
Box 705
North Bay, Ontario
Canada P1B 8J8
Phone: (705) 472-5850

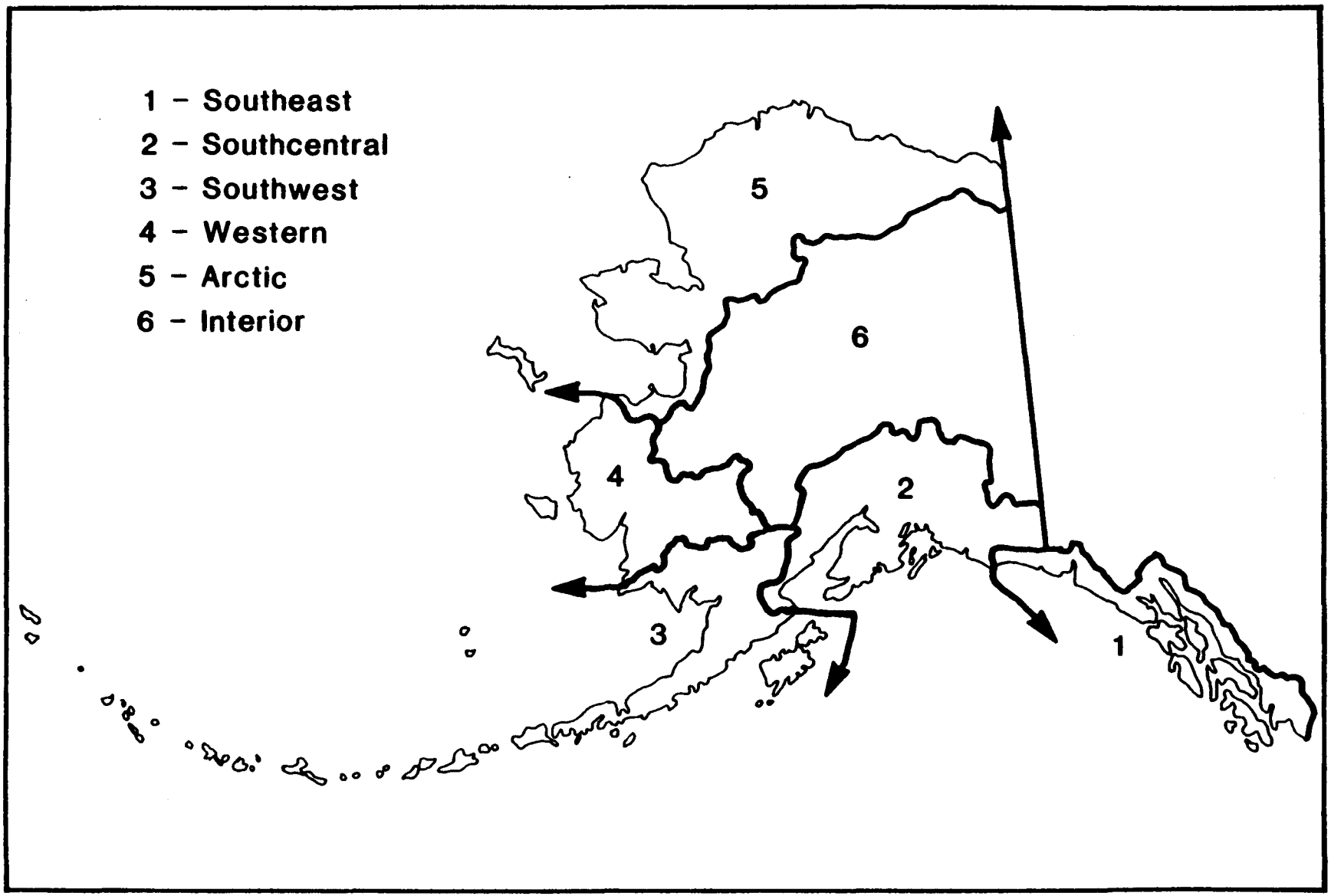
Western Canadian Raw Fur Auction Sales Ltd.
303 A West Pender Street
Vancouver, British Columbia
Canada V6B 1T3
Phone: (604) 683-5881

* Owned by the Hudson Bay Company.

Table 3. Alaskan Fur Dealers by Region, 1985-86

Region	No. Fur Dealers by Mailing Address
Arctic	23
Interior	43
Southcentral	32
Southeast	10
Southwest	15
Western	28
Total within Alaska	151
Out of state	2
Grand total	153

Source: ADNR 1986.



Map 1. The six regions of the Alaska Habitat Management Guides.

Some furs are also sold within the state for local processing but prices for those are generally not competitive with the export prices paid for most species in good condition. Exceptions are wolf and wolverine pelts, which can often be sold for higher prices within the state (Whitaker, pers. comm.). Most wolf and wolverine pelts never leave the state because there is such a high instate demand for them (Melchior, pers. comm.). These two species are usually manufactured into souvenirs such as rugs or mounts, or they are sought by Natives and other craftsmen to produce ruff and trim items for garments. Sometimes trappers sell premium furs themselves at local fur sales (e.g., at the Anchorage Fur Rondy or the Alaska Trappers' Association Fairbanks fur sales) for considerably higher prices than could be obtained from a fur dealer or outside auction.

Some factors that influence prices are evident on the preseason price estimates and price lists periodically published by the Seattle Fur Exchange (fig. 1). Larger pelts generally command higher prices. Lynx pelts are an exception, with high-quality smaller pelts, especially those of kittens, being worth more because of the color and finer texture of the belly fur (Melchior, pers. comm.). Color alone can be a factor influencing price; silvery lynx pelts, for example, are priced over twice as high as red pelts. Price differentiation by color is also specified for marten, red fox, timber wolf, wolverine, and occasionally for beaver.

Furs from some locations have a reputation for quality and will bring higher prices. Mink pelts originating in the lower Yukon-Kuskokwim delta region, for example, are priced substantially higher than pelts from other regions. South coastal (Southeast, Southcentral, and Southwest regions coastal areas) mink have the lowest pelt values. In contrast, Yukon and Kuskokwim white fox pelts are priced lower than those from more northern regions of the state. Land otter pelts from Southeast Alaska, Kodiak, and the Gulf of Alaska coast are among the most desirable in North America because of high quality and large size (Johnson, pers. comm.).

Other factors influencing pelt prices are the density and condition of the fur. Although primeness is a major factor in pricing pelts, the skill with which pelts are handled also affects their quality and, hence, the price. One problem with speculative purchasing (when pelts are retained in anticipation that prices will rise over time) is that fur quality begins to deteriorate as soon as the animal is skinned, and the pelt thus tends to loose value over time (Chihuly, pers. comm.).

Fur prices tend to fluctuate according to the time of year in which the furs are sold (table 4); several reasons account for

ALASKAN AND NORTHERN CANADIAN

WILD FURS

PREVAILING MARKET PRICES

on seasonable 1's and 2's. All damaged, unprime or other inferior skins must be discounted proportionately.

MINK — Strong Demand For Large Sizes

	Lower Yukon Kuskokwin	*Upper*	*Kenai and Interior B.C.*	*Coast*
Large and Extra Large	$50.00 and up	$32.00 - 42.00	$24.00 - 30.00	$18.00 - 2
Medium and Small	25.00 and up	17.00 - 25.00	12.00 - 15.00	8.00 - 1

MARTEN — Very Strong Demand

ALASKA NORTHERN CANADA	*Naturals*	*Blending Types*	*Pales*
Large and Extra Large	$70.00 and up	$60.00 - 70.00	$50.00 - 60.0
Large Medium	40.00 - 48.00	35.00 - 42.00	33.00 - 38.0
Medium and Small	30.00 - 35.00	25.00 - 30.00	23.00 - 26.0

BEAVER — Next seasons prices to be issued during mid-winter.

MUSKRATS — Next seasons prices to be issued during mid-winter.

OTTER — Fair Demand For Straight Hair

	Alaskan & Northern Canadian Sections	*Alaskan & Cana Coast Sectio*
Large and Extra Large	$45.00 - 65.00	$45.00 - 65.(
Medium and Small	25.00 - 30.00	25.00 - 30.(

LYNX — Strong Demand

	Silvery	*Pale*	*Brown*	*Red*
Large and Extra Large	$350.00 and up	$300.00 - 350.00	$225.00 - 270.00	$100.00 - 15
Medium and Small	400.00 and up	330.00 - 380.00	270.00 - 330.00	150.00 - 20

WHITE FOX — Fair Demand

	Canadian Arctic-Alaskan and Heavy	*Alaskan and Canadian Arctic-Ordinary*	*Yukon and Kuskokwim*
1s and 2s	$35.00 and up	$28.00 - 32.00	$24.00 - 30.0(
Low 2s	25.00 - 30.00	15.00 - 20.00	12.00 - 16.0(
3s and 4s	12.00 - 18.00	10.00 - 13.00	7.00 - 10.0(

Stained - 25% off from Each Grade

TIMBER WOLF — Strong Demand

Fine Grey	*Ordinary*	*Dark*
$225.00 and up	$125.00 - 175.00	$110.00 - 15(

WOLVERINE — Strong Demand

Extra Pale & Fine Dark	*Pale*	*Dark*
$225.00 and up	$150.00 - 200.00	$150.00 - 20:

BLUE FOX — Fair Demand

1s and 2s	*Off Colors*	*Lows*
$25.00 and up	$18.00 - 22.00	$12.00 - 15.

RED FOX — Good Demand

	1s and 2s	*Slight Rubbed*	*Poor*
Depending on Quality	$80.00 and up	$50.00 - 65.00	$20.00 - 30.

CROSS FOX — Good Demand

	Good Colors	*Slight Rubbed*	*Poor*
Depending on Quality	$110.00 and up	$60.00 - 70.00	$20.00 - 35.

Figure 1. Example of preseason price estimates from the Seattle Fur Exchange, October 1983.

Table 4. Prices for Alaskan and Canadian Wild Furs as Reported by the Seattle Fur Exchange, 1983-84 Season

Species	January 1984 9-12			March 1984 5-9			May 1984 9-11		
	Type of Collection	Top Prices $	Average Price $	Type of Collection	Top Price $	Average Price $	Type of Collection	Top Price $	Average Price $
Beaver	---	---	---	---	---	---	Small	51.00	21.69
Cross fox	Average	135.00	96.14	Poor	125.00	81.10	Average	155.00	85.89
Lynx	Ordinary	410.00	284.80	Average	520.00	301.30	Good	530.00	348.54
Marten	Good	71.00	53.19	Good	100.00	51.41	Good	66.00	47.83
Mink	Fair	48.00	32.65	Good	39.00	24.82	Small	37.00	24.07
Muskrat	---	---	---	---	---	---	Small	4.25	3.10
Otter	---	---	---	Fair	84.00	35.13	Small	53.00	29.42
Red fox	Good	122.00	68.11	Good	170.00	79.31	---	---	---
Timber wolf	---	---	---	Small	450.00	335.67	Small	275.00	188.67
White fox	Average	45.00	25.28	Fair	38.00	15.30	---	---	---
Wolverine	Good	370.00	272.48	Small	360.00	254.84	Small	260.00	203.75

Source: The Seattle Fur Exchange, Seattle, WA.

--- means no data were available.

this fluctuation, including fur quality, primeness, and supply relative to demand. Furs of different species tend to become prime during different periods of the season and thus are subject to seasonal price fluctuations. Some furs that prime early tend to deteriorate in quality later in the season. Short-run shifts in the demand-supply situation can also have a pronounced influence on prices.

The prices reported by fur exchanges should be interpreted with caution because they reflect the market value of furs actually sold and do not include those offered for sale that failed to receive bids equal to the minimal acceptable price. Also, true weighted averages are not made available to the public by the auction houses, thus making it nearly impossible to calculate a realistic value.

Even through the inflationary period of the 1970's and the recession of the early 1980's, average pelt prices tended to fluctuate from year to year by species rather than to follow general economic trends (table 5). The absence of any clear trend might be expected because of the multitude of factors that determine fur prices. Besides fur availability and quality, factors that influence pelt prices are changes in fashion, the economic climate of importing nations, international exchange rates, tariffs, and the other aspects of international commerce. There are no cases in which the average price per pelt for any species increased each year during the 1972-1973 to 1982-1983 time period.

Lynx prices, which averaged less than $100 between 1920 and 1972, have been consistently higher than $100 since 1972 (Melchior, pers. comm.). Lynx average prices climbed each year to a peak of $395 per pelt during the 1978-1979 season. Prices fell the next year and fluctuated somewhat for four years. These relatively small changes in average prices from year to year might reflect differences in quality or other factors and not necessarily be due to changes in the market demand. However, the large increase in 1983-1984 does reflect an improved market for lynx. Lynx had the greatest absolute range in average pelt prices over the 11-year period, $280.00 ($115.00 to $395.00).

It should be noted that the average raw pelt prices listed in table 5 are based on export prices. Prices for unexported pelts that are processed within Alaska and made into products for sale are unknown.

Table 5. Average Market Values for Furbearer Pelts, 1972-73 through 1983-84 Seasons[a]

Species	1972-73[b] $	1973-74[b] $	1974-75[b] $	1975-76[b] $	1976-77[b] $	1977-78[c] $	1978-79[e] $	1979-80[e] $	1980-81[d] $	1981-82[d] $	1982-83[d] $	1983-84[d] $
Beaver	35.00	35.00	40.00	40.00	50.00	30.00	24.89	47.46	43.00	25.42	25.42	22.00
Muskrat	2.50	2.50	3.00	4.00	4.50	4.00	4.20	5.05	4.00	3.05	2.80	3.50
Mink	35.00	30.00	40.00	45.00	50.00	30.00	46.67	45.61	49.00	46.43	31.19	27.00
Marten	25.00	30.00	35.00	40.00	45.00	35.00	51.15	46.40	38.00	42.34	56.61	51.00
River otter	55.00	45.00	60.00	60.00	65.00	55.00	84.05	79.29	44.00	41.43	39.10	32.00
White fox	30.00	35.00	40.00	45.00	50.00	45.00	48.50	53.41	33.00	34.56	25.55	22.00
Red fox	35.00	40.00	60.00	75.00	90.00	85.00	120.50	97.00	90.00	88.86	51.66	75.00
Lynx	115.00	125.00	150.00	175.00	200.00	240.00	395.09	289.15	235.00	275.86	263.07	312.00
Weasel	1.00	1.20	1.50	1.75	1.75	1.50	1.45	1.40	1.40	.88	5.00	2.00
Squirrel	.50	.75	.75	.75	.75	.50	1.00	1.00	1.40	1.00	1.48	1.00
Wolf	---	---	---	---	---	140.00	197.00	220.33	255.00	227.50	180.38	262.00
Wolverine	---	---	---	---	---	140.00	268.07	224.24	171.00	232.24	203.00	230.00
Coyote	---	---	---	---	---	40.00	85.00	---	99.00	61.87	27.46	45.00

--- means no data were available.

a Approximate average value paid to trappers per pelt for all sizes and qualities, based on fur market reports, fur auction reports, and occasional reports from trappers and dealers.

b Ernest 1978.

c Van Ballenburghe 1979.

d Melchior 1984.

e Melchior, pers. comm.

B. Fur Processing in Alaska

Although most furs leave Alaska before undergoing any form of processing, there is a fur-processing industry within the state. Several commercial manufacturers are located in Fairbanks and Anchorage (Melchior, pers. comm.). Discussions with fur dealers and others familiar with the local industry indicate that the home manufacture of fur handicrafts is quite prevalent in some rural communities. There are also a small number of tanneries, but most tend to be related to taxidermy or individual consumer demands for tanned furs rather than functioning as part of the garment-processing industry (Brunner, pers. comm.).

Home manufacture of fur handicrafts involves clothing such as mittens, mukluks, slippers, hats, and parkas. Although such home processing is often for personal use or for sale or barter of products to neighbors and friends, there are individuals who produce products for retail trade. Home manufacture also provides an outlet for furs with minor damage that would not command a good price in the export market (Wilson, pers. comm.). In most cases, furs are sent outside the state for tanning before further processing within the state.

A report on the potential for an arts and crafts industry in the Yukon-Kuskokwim area (Calista Professional Services 1985) estimated that there were 600 artisans (mostly women) in the study area producing skinsewn clothing and other items, much of it using furs. Artisans are found in virtually all of the 47 villages in the study area. Several thousand pieces of clothing are made annually in the area. Most of the seamstresses are over 40 years old, however, and the report notes that "very few of the younger generation seem to be interested in continuing in the footsteps of their elders." Fewer garments are being sewn each year and more "non-Native" materials are being used (ibid.). Few garments are sold in the retail trade and no estimate has been made of their value as items of personal use.

The magnitude of home processing of furs and handicraft manufacture in other areas of the state is unknown. Consequently, there is no estimate of the economic contribution of this activity. All estimates of the economic value of furbearers must be considered low insofar as they fail to include fur processing and trade within the state.

C. Fur Harvests and Values

Estimates of the total raw fur value for Alaska based on export prices for the four years 1980-1981 to 1983-1984 are presented in table 6. Harvest estimates were derived by multiplying reported exports by sealing-to-export ratios found in table 7. A detailed explanation of the assumptions and methods used in developing

harvest estimates can be found in the "methods" portion of this economic overview of furbearer trapping. Estimated harvest was multiplied by the average pelt prices for each year, as depicted in table 5.

The average annual value of wild raw furbearer pelts taken in Alaska is estimated to be $5,265,624 over the four trapping seasons beginning in 1980-1981 ($5,888,173 in 1980-1981, $6,058,529 in 1981-1982, $4,724,233 in 1982-1983, and $4,391,560 in 1983-1984).

Marten was the only species for which the estimated value of pelts exceeded $1 million for each of these seasons (table 6). Lynx, mink, and red fox each had annual pelt values in excess of $1 million during two seasons. Some of the higher priced furs, such as wolf and wolverine, were not harvested in sufficient numbers (at least according to available data, though underestimates of harvests are likely with these two species, which have important instate and local uses) to constitute a major component of the total value of Alaska wild fur values. It should be noted that these estimates of the total Alaska raw fur value were considered quite low by several fur dealers; this criticism was based primarily on their assertion that the ADF&G underestimates the harvest of nonsealed species (Brunner, pers. comm.; Calista 1985).

The estimated total raw pelt values in table 6 should not be considered the entire value of the animals trapped. Not included is the value of meat, which is used by trappers for dogs or humans, and the value of beaver castors and other animal parts that are sold or used for bait and in making lures. (See section on Nonmarket Uses of Furbearers.) Some unexported pelts are processed within the state and made into hats, mittens, or other products for personal use or sale. The value of these manufactured items generally exceeds the value of raw pelts used to make them.

Table 8 shows how the values of raw fur exports have been distributed by region from 1977-1978 through 1983-1984. These are totals from the tables in the regional sections that follow. It is important to note that these values are based on exports from each region and do not necessarily reflect values of fur production in the regions. It is common for furs to be exported by dealers and trappers who reside in regions different from where the furs originated. Also, because these figures are based only on average raw pelt export prices they are probably underestimates, but they do give an idea of the order of magnitude of fur trapping values.

The Interior Region has the highest estimated furbearer export values of any region in the past few years. Values exceeded $2

Table 6. Reported Fur Exports, Estimated Harvest, Average Pelt Prices, and Estimated Total Raw Fur Value for Alaska, 1980-81 to 1983-84

Species	Trapping Season 1980-81				Trapping Season 1981-82			
	Reported Exports	Estimated[a] Harvest	Average Pelt Price $	Estimated Value $	Reported Exports	Estimated[a] Harvest	Average Pelt Price $	Estimated Value $
Beaver	7,366	12,002	43.00	516,086	5,961	8,400	25.42	213,528
Coyote	---	150	99.00	14,850	---	150	61.87	9,281
Lynx	2,483	3,301	235.00	775,735	3,984	5,243	275.86	1,446,334
Marten	24,284	38,126	38.00	1,448,788	25,251	34,089	42.34	1,443,328
Mink	14,852	23,318	49.00	1,142,582	18,922	25,545	46.43	1,186,054
Muskrat	57,546	90,347	4.00	361,388	18,147	24,498	3.05	74,719
Land otter	1,425	2,397	44.00	105,468	1,470	1,849	41.43	76,604
Red fox	8,002	12,563	90.00	1,130,670	10,309	13,917	88.86	1,236,665
Squirrel	619	972	1.40	1,361	513	693	1.00	693
Weasel	228	358	1.40	501	188	254	.88	223
White fox	1,936	3,040	33.00	100,320	1,478	1,995	34.56	68,947
Wolf	---	754	255.00	192,270	---	684	227.50	155,610
Wolverine	---	574	171.00	98,154	---	631	232.24	146,543
Total				5,888,173				6,058,529

(continued)

Table 6 (continued).

Species	Trapping Season 1982-83 Reported Exports	Estimated[a] Harvest	Average Pelt Price $	Estimated Value $	Trapping Season 1983-84 Reported Exports	Estimated[a] Harvest	Average Pelt Price $	Estimated Value $
Beaver	3,331	7,056	25.42	179,364	2,362	7,152	22.00	157,344
Coyote	---	150	27.46	4,119	---	150	45.00	6,750
Lynx	3,220	5,689	263.07	1,496,605	1,925	3,148	312.00	982,176
Marten	16,370	31,922	56.61	1,807,104	13,594	32,081	51.00	1,636,131
Mink	7,706	15,027	31.19	468,692	9,024	21,297	27.00	575,019
Muskrat	6,193	12,076	2.80	33,813	9,936	23,449	3.50	82,072
Land otter	869	1,726	39.10	67,487	907	1,969	32.00	63,008
Red fox	3,238	6,314	51.66	326,181	2,980	7,033	75.00	527,475
Squirrel	201	392	1.48	580	198	467	1.00	467
Weasel	240	468	5.00	2,340	232	548	2.00	1,096
White fox	646	1,260	25.55	32,193	574	1,355	22.00	29,810
Wolf	---	824	180.38	148,633	---	731	262.00	191,522
Wolverine	---	774	203.00	157,122	---	603	230.00	138,690
Total				4,724,233				4,391,560

Source: Melchior 1982, 1983, 1984, 1985; ADF&G furbearer files.

--- means no data were available.

a For beaver, otter, lynx, wolf, and wolverine, figure is the number of sealed pelts (ADF&G furbearer files). Coyote is an estimate. For all other species the number is exports multiplied by a mean sealing-to-export ratio (table 7).

Table 7. Annual Mean Ratios of Sealing-to-export Data for Beaver, Lynx, and Land Otter, 1977-78 - 1983-84

Trapping Season	Mean Sealing-to-Export Ratio for Beaver, Lynx, and Otter
1977-78	1.36
1978-79	1.31
1979-80	1.31
1980-81	1.57
1981-82	1.35
1982-83	1.95
1983-84	2.36

Source: Melchior 1982, 1983, 1984, 1985; ADF&G furbearer files.

Table 8. Estimated Raw Fur Value by Region, 1977-78 through 1983-84

Trapping Season	Southeast	Southcentral	Southwest	Interior	West	Arctic
1977-78	220,340	775,418	340,615	1,497,354	602,902	721,042
1978-79	364,087	1,346,563	336,928	2,227,505	903,617	887,844
1979-80	526,273	934,310	358,695	1,980,314	679,237	683,828
1980-81	452,824	1,058,659	305,828	2,348,943	1,182,091	518,928
1981-82	325,336	894,351	330,432	2,724,839	1,074,350	688,528
1982-83	227,394	1,037,736	230,383	2,492,004	333,429	389,823
1983-84	356,917	859,088	146,163	2,400,982	331,960	274,659

Source: Melchior 1984, 1986; ADF&G furbearer files.

million for the years 1980-1981 through 1983-1984. Export values in other regions tended to decline over the period, although those of the Southcentral Region remained near $1 million. Statewide yearly totals in table 6 do not equal the sum of regional totals in table 8 for several reasons. Region of harvest is not always indicated on reporting documents, and therefore small portions of the statewide harvest for each species cannot be assigned to regions. The estimated harvest for coyote is not known by region. Insignificant harvest of some species in Southeast Alaska is not included in that region's tables, and table 8 reflects this exclusion.

IV. TRAPPING PRACTICES AND COSTS

A. Trapline Characteristics and Costs

Trappers may incur a wide variety of furbearer harvesting expenses, but only limited data on these costs are available. Trappers' costs are apt to vary with the length of the trapline, the number of sets, the mode of transportation, the number of times they check their traps, the time of year, and the equipment used for both the actual trapping and care of the pelts.

Several surveys have been completed by the ADF&G, Division of Game, which give some information about the length of traplines but not about the cost of operating them. In Southcentral Alaska, a mail survey for the 1980-1981 trapping season revealed a range in trapline lengths from 1 to 250 mi (table 9). The average length of trapline by area ranged from 15.8 mi in the Seward-Portage-Cooper Landing area to 81.6 mi in the Glennallen-Paxton-Lake Louise area.

Interior Region trappers have been surveyed by mail by the ADF&G since 1975. Approximately 300 active trappers a year respond to the survey questions about harvest, length of traplines, modes of transportation, species trapped, and reasons for trapping, among others. Table 10 shows the responses to the survey for the 1982-1983 trapping season in the Interior Region. In this case, the range in length of traplines was from 2 to 475 mi. Nonetheless, over three-fourths of the respondents reported traplines of 59 mi or less. Nearly 46% (57) of those trappers responding had lines that were 29 mi or less. By contrast, only 4% (five) of the respondents indicated that they had traplines that were 200 mi or longer.

In much of Alaska, a system of informal property rights has developed governing traplines. The Alaska Trappers Association maintains a voluntary trapline registration throughout the state.

Table 9. Average and Range of Trapline Lengths in Southcentral Alaska by Area, 1980-81 Trapping Season

Area	No. Trappers Responding	Average Length of Trapline (mi)	Range of Trapline Length (mi)
Cantwell, Denali	5	35.6	15-58
Cordova, Valdez	8	24.8	3-60
Glennallen, Paxson Lake, Lake Louise	20	81.6	2-250
Kenai, Sterling, Homer	16	30.1	1-160
McCarthy, Nabesna, Chitina	8	46.4	6-70
Palmer, Wasilla	9	29.1	2-115
Seward, Portage, Cooper Landing	6	15.8	2-45
Skwenta	8	61.8	1-125
Miscellaneous[a]	9	54.0	10-120

Source: Machida 1981.

a Results from individuals who trapped outside Southcentral Alaska or who did not specify an area were grouped here.

Table 10. Miles of Trapline Utilized by Trappers in the Interior Region, 1982-83 Season

	Miles of Trapline													
	9 or Less	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100-109	110-119	120-149	200 or More
No. trappers	16	23	18	14	9	15	4	5	5	1	7	1	2	5
Percentage of all trappers	12.8	18.4	14.4	11.2	7.1	12.0	3.2	4.0	4.0	0.8	5.6	0.8	1.6	4.0
Cumulative no. trappers	16	39	57	71	80	95	99	104	109	110	117	118	120	125
Cumulative percentage of all trappers	12.8	31.2	45.6	56.8	64.0	76.0	79.2	83.2	87.2	88.0	93.6	94.4	96.0	100.0

Source: Ernest, unpubl. data. Region 3 annual trapper questionnaire files. ADF&G, Div. Game, Fairbanks.

However, in most rural areas of Alaska, trapping areas are maintained by tradition. Although these "trapline ownership rights" tend to break down near heavily populated areas and along some major road systems, they are respected in most rural areas (Tobey, pers. comm.; Martin 1983; Shinkwin and Case 1984; Marcotte and Haynes 1985).

For instance, on the Innoko NWR most trapping areas are identified with specific individuals and considered as "belonging" to certain trappers by local village residents and trappers. The "owner" is someone who has used the area consistently for an unspecified period of time and whose use is recognized by others in the area. Other trappers who want to use the area must ask the "owner" first (Robert 1984). The rights of these trapping area owners only extend to the use of the land for trapping. Hunting, fishing, and other uses of the area are open to other people (ibid.).

The mode of transportation used to check traplines can also be an important factor determining cost. Responses from the 1982-1983 Interior Region survey indicated that snowmachines were used most frequently - in nearly 81% of the cases (table 11). However, trappers typically use a combination of transportation modes. For instance, snowshoes are used in combination with snowmachines, aircraft, dog teams, and automobiles. Some trappers minimize costs by checking their short traplines on foot or by using the road system in combination with walking. But some form of motorized transportation is generally necessary to operate longer traplines. Longer lines offer the potential of greater revenues but also have greater costs.

Estimates of the costs associated with trapping were developed for the Tanana Basin Area Plan (McLean 1983). Travel costs were estimated for various combinations of transportation equipment, and total operating costs per year were calculated (table 12). Although total costs vary considerably with the length of the trapline and the distance to it from the operating base, the method of estimating per unit costs should be applicable to many other areas in Alaska. Estimates were also made of miscellaneous trapping equipment costs (table 13). Here again, the estimation methods of costs for traps and miscellaneous equipment are applicable to areas outside the Tanana basin. The combinations and prices of equipment owned for trapping would likely vary from place to place with the characteristics of the trappers and the principal furbearer species sought, but McLean's basic cost information can be useful in making estimates. (McLean also made estimates of total trapping costs and "producer's surplus," but this information is specific to the Tanana basin.)

Table 11. Modes of Transportation Used by Furbearer Trappers in the Interior Region of Alaska, 1982-83 Season

Mode of Transportation[a]	No. Respondents	% of Total Respondents
Snowmachine	102	81.6
Dog team	23	18.4
Foot	12	9.6
Aircraft	15	12.0
Automobile	9	7.2
Skis	1	0.8
Motorcycle	1	0.8
Pack dog	1	0.8

Source: Ernest, unpubl. data. Region 3 annual trapper questionnaire files. ADF&G, Div.Game, Fairbanks.

a Many respondents used two or more modes of transportation. Obviously, foot travel was utilized to varying extents in combination with other modes of transportation.

Table 12. Estimated Annual Travel Costs Per Trapper by Mode of Transportation in the Tanana Basin, 1981

Mode	Mi or Hr to Start of Line[a] (Roundtrip)	Cost/Mi or Hr	Total Cost to Start of Line	No. Times/ Season Cost Incurred	Total Cost/ Yr to Reach Line	Average Line Length (Mi) (Roundtrip)	Cost/ Mi	Total Transport. Cost to Run Line	No. Times/ Season Cost Incurred	Total Cost/ Yr for Transport. to Run Line	Total Transport Cost Yr/ to reach and Run Line
Airplane and foot	1.5 hr	10.20/hr[b]	15.30	16[d]	244.80	0	---	---	---	---	244.80
Airplane and dog team	1.0	10.20/hr[b]	10.20	16[d]	163.20	65	---	---	---	864.00[f]	1,027.20
Airplane and snowmachine	1.5 hr	10.20/hr[b]	15.30	16[d]	244.80	30	0.10/mi	3.00[c]	16[d]	48.00	292.80
Passenger vehicle and foot	23 mi	.40/mi	9.20	24[e]	220.80	5	---	---	---	---	220.80
Passenger vehicle and dog team	60 mi	.40/mi	24.00	24[e]	576.00	60	---	---	---	864.00[f]	1,440.00
Passenger vehicle and snowmachine	63 mi	.40/mi	25.20	24[e]	604.00	63	0.10/mi	6.30[c]	24[e]	151.20	756.00
Dog team only	---	---	---	---	---	35	---	---	---	864.00[f]	864.00
Snowmachine only	---	---	---	---	---	41	0.10/mi	4.10[c]	24[e]	98.40	98.40
Foot only	---	---	---	---	---	4	---	---	---	---	0

Source: McLean 1983.

--- means no data were available.

a ADF&G 1982-83 Trapper Survey. Unpubl. Fairbanks.

b One hour flying times uses up six gallons of gas. Six gallons at $1.70/gal equals $10.20/hr.

c Assumes 15 mi/gal gas at $1.50/gal = $0.10/mi.

d Trappers who use airplanes fly their line once a week or 16 times each season, and then spend two days running the line.

e Average of 1.5 trips a week over a 16-week season equals 24 trips a season.

f Trappers using dog teams do not expend a certain amount of money for fuel on each trip they take. They do, however, have to feed their dogs. Each dog costs approximately $12/month. 10 at $12/month = $120/month x 12 months/year = $1,440/year. However, only 60% of the yearly cost of the dogs is attributable to trapping since the dogs are used for other activities as well. 60% of $1,440 = $864/year.

Table 13. Estimated Miscellaneous Equipment Cost Per Year for Trapping in the Tanana Basin Area

Equipment	Cost of Equipment	Average No. Items Owned	Expected Life of Equipment	Estimated Annual Cost of Equipment	% of Yearly Cost Due to Trapping
Mink/marten traps	35.09/doz[a]	50.33[b]	5 yr	29.43	100
Fox traps	41.45/doz[a]	20.29[b]	5 yr	14.02	100
Otter traps	83.84/doz[a]	0.29[b]	5 yr	0.41	100
Lynx traps	57.25/doz[a]	27.23[b]	5 yr	25.98	100
Beaver traps	103.95/doz[a]	0.78[b]	5 yr	1.35	100
Wolverine traps	103.95/doz[a]	5.03[b]	5 yr	8.71	100
Wolf traps	59.95/ea[a]	5.03[b]	5 yr	60.31	100
Misc. traps	65.00/doz[a]	14.41	5 yr	15.61	100
Stretcher boards for beaver	7.50/doz[a]	6	5 yr	9.00	100
Stretcher boards for fox	19.25/doz[a]	1.0 doz	10 yr	1.95	100
Stretcher boards for muskrat	12.95/doz[a]	1.0 doz	10 yr	5.18	100
Stretcher boards for mink and marten	10.00/doz[a]	2.0 doz	10 yr	2.00	100
Stretcher boards for lynx	50.00/doz[a]	6	10 yr	2.50	100
Stretcher boards for wolf	20.00/bd[c]	2	10 yr	4.00	100
22 rifle or pistol	125.00/ea[c]	1	10 yr	12.50	75
Knives, ax, and saws	60.00[c]	---	10 yr	6.00	25
Other misc. gear	75.00	---	10 yr	7.50	100
Bailing wire	15.00/roll	1	0	15.00	100
Lures and scent	---	---	---	30.00[c]	100

Source: McLean 1983.

--- means no data were available.

a Average prices from the Trapper, 8(11) July 1983.

b Based on the average number of traps set per trapper, increased by 25% to reflect spare and replacement traps, as reported in the 1982-83 ADF&G Trapper Survey.

c Estimated by the ADF&G, based on conversations with Tanana basin trappers.

B. Income

Although information on trapping income is not readily available, consultation with furbuyers indicates that the highest gross revenues of individual trappers in the state exceed $20,000, with a few even exceeding $30,000. Net revenues, however, are lower (Wilson, pers. comm.).

Although income attributable to trapping may not be extremely high by urban Alaska standards, it may be of vital importance to rural families. Trapping harvest levels have been observed to increase during years when cash income from alternative sources, such as commercial fishing, fire fighting, and construction, was lower than usual (ADNR/USFWS 1983). Trapping provides a source of cash for rural mixed cash economies. For example, in Minto in 1983-1984, 46% of all households had a member who trapped. The potential raw fur value of pelts that season ranged from $120 to $2,851 per trapping household. Trapping income is of particular importance in Minto since no village residents have permits to enable them to fish commerically. This is true of many residents of Interior Region communities and several communities in toto (Andrews, pers. comm.).

Besides the monetary value of pelts, furbearers contribute to the well-being of many people by providing meat for direct consumption and as the raw material for the home manufacture of fur products for personal use or sale (see section below on nonmarket uses of furbearers). In some cases, the importance of furbearers as food exceeds the monetary value of the pelts. In four villages in the Kaiyuh Flats area of west central Alaska in 1981-1982, beaver pelts were bringing an average price of $20 each, or $6,780. The value of the meat from the beaver harvest, based on an average of 20 lbs of meat per carcass and a replacement cost of $4.50/lb of beef from the local stores was $30,510. This replacement cost should be considered low because it does not reflect nutritional differences between beaver meat and beef, nor does it account for any cultural and taste preferences of residents for beaver (Robert 1984).

Because trapping activities are usually self-employment, no information on trapping income is available through the Alaska Department of Labor and trapping income is usually not included in family income calculations for taxing purposes. Another advantage of income from trapping is that under certain circumstances individuals can qualify for unemployment compensation during the time they are running their traplines, income restrictions applying only to the weeks during which they actually sell furs.

V. NONMARKET USE OF FURBEARERS

A. Consumption of Furbearers as Food

Limited information is available regarding the extent to which furbearers are eaten by humans. Some species, such as beaver, muskrat, and lynx, are used widely in Alaska and are a preferred food in some areas. With respect to Tyonek, Fall et al. (1984) state: "Many village households enjoyed eating beaver meat, and beaver were harvested for their meat as well as for their pelts. Beaver meat was usually prepared during festive occasions and potlatches."

Consumption of other species varies considerably by locality and the availability of alternative sources of meat. Residents of the Yukon-Kuskokwim delta, for example, eat mink and otter. Even if not used for human consumption, most species of furbearers are used as dog food.

Based on a household survey of the Copper River basin, Stratton and Georgette (1985) estimated household consumption of a wide range of fish and wildlife species, including furbearers. Among the traditional furbearers, people used beaver, muskrat, and lynx the most. Most families used a few pounds per year in the selected communities over this time period, but there were some notable exceptions. Households in the Nabesna Road area and north Wrangell Mountains area, for example, consumed 38 lb and 16 lb beaver and lynx, respectively. Beaver use was also relatively high by household in the Nabesna Road area (10 lb) and Mentasta (7 lb). Because this survey included only one season, cyclic patterns and other population dynamics that may be important factors in the level of consumption of furbearers were not considered.

During the 1981-1982 season, trappers from the villages of Nulato, Koyukuk, Kaltag, and Galena, harvested an estimated 6,780 lb of beaver meat from the Innoko NWR. All the meat was used for human consumption, and none was fed to dogs (Robert 1984). At that time in that area, beaver were trapped primarily for their meat rather than their pelts because the value of the meat to residents was 4.5 times greater than that of the pelt (ibid.).

Beaver are eaten in villages in the upper Koyukuk area (Marcotte and Haynes 1985). Beaver, muskrat, and occasionally lynx are regularly eaten in Nenana, Dot Lake, Sleetmute, and Chuathbaluk (Shinkwin and Case 1984, Martin 1983, Charnley 1984).

Deriving economic values for furbearer meat is necessary in order to make a more complete assessment of furbearer harvesting values. Harvests, however, vary with location, and values would vary, depending on the availability and cost of commercial substitutes, in each location. For those reasons, estimating the contribution

of furbearers to food values on a statewide or regional basis would not be a very accurate estimate of the inportance of furbearer use for food in specific communities where use is high (because of considerable variation in the level of use and prices of substitutes between communities in a region). It is also unlikely that the effects of any resource development that is incompatible with furbearer harvesting would be regionwide. Instead, impacts would be in a specific area, and nonmarket values would best be calculated on a site-specific basis. (See Statewide Overview of Subsistence in this economic volume for a discussion of methods of calculating economic values for wild food.)

B. Local Use, Manufacture, and Trade of Furbearer Pelts

Home processing of furs and handicraft manufacture for personal use and customary trade or barter does occur within the state. As noted by the study done in the Yukon-Kuskokwim delta cited earlier, these activities can be quite significant (Calista Professional Services 1985). Some information is available on these nonmarket uses of furbearers in other areas of the state, but in general the magnitude of such nonmarket uses is unknown.

In the vicinity of the Kaiyuh Flats in west central Alaska, some marten, mink, beaver, and otter furs are reportedly kept for home use rather than sold (Robert 1984). The uses described included the making of marten fur hats, beaver fur gloves and boots, and fur trim for other articles of clothing, and the giving of pelts at potlatches (ibid.). In the village of Minto, only 25% of all beaver harvested by community residents were sold on the market the same year they were trapped, indicating either local nonmarket use of pelts or retention in anticipation of selling them for a higher price the next season or both (Andrews, pers. comm.).

In the central Kuskokwim communities of Chuathbaluk and Sleetmute, muskrat are primarily harvested for food and parka materials. Wolves and wolverines are typically kept for domestic use in clothing. Otter are also used locally in making clothing (Charnley 1984).

VI. REGIONAL HARVESTS AND RAW PELT EXPORT VALUES

The regional reports that follow contain furbearer harvest and value estimates based on ADF&G documents and methodologies described earlier in this report. In addition, tables on the number of pelts exported from the Southeast and Arctic regions are presented. Identical export tables for the other regions can be found in the Human Use volumes of the Alaska Habitat Management Guide.

The harvest and value tables list reported exports, based on export documents, and the market value of those exports, based on average raw pelt prices listed in table 5. Because export figures are documented, estimated market values can be considered more reliable than those for estimated total harvests, except possibly in the case of sealed species whose total harvests are required to be recorded. The category "estimated harvest" is an attempt to include unexported pelts in a total harvest figure for each species. Likewise, "estimated total value" attempts to assess the value of the total harvest if all furs were sold on the export market. For the five sealed species, estimated harvest is the number of pelts sealed. For all other species, estimated harvest was determined as described in the Methods section of this report. These regional furbearer value tables provide information regarding the estimated export value of raw pelts and do not attempt to estimate or include the total value of furbearer use.

A. Southeast Region

The Southeast Region is consistently responsible for a large portion of the statewide exports of mink, marten, otter, and weasel. Table 14 gives export totals for 10 furbearers for the years 1977-1978 through 1983-1984. The percentage of the statewide mink exports from the Southeast Region ranged from a high of 45% in 1979-1980 to a low of 10% in 1983-1984. Otter fluctuated between 32% in 1978-1979 and 19% in 1983-1984. Marten ranged from a low of 5% of the statewide exports in 1980-1981 to a high of 15% in 1983-1984. The region accounts for only a small portion of the statewide total exports of other furbearers.

Table 15 shows the estimated number of raw pelts exported, their market value, the estimated harvest, and the estimated total value of pelts for nine furbearer species in the Southeast Region from 1977-1978 through 1983-1984. No data are available for wolf and wolverine exports. Harvests of red fox and muskrat are quite small in the region, and arctic fox do not occur there. Consequently, tables for those species were not included. Estimated total export pelt value from these three species in the region does not exceed $4,000 for any one year. In the case of beaver and lynx, sealing data are used for the harvest figures, and for some years exports exceed harvests. This may indicate that a majority of these species were actually trapped outside the region, although the pelts were exported from Southeast.

Highest total estimated pelt value for all species was about $526,000 in 1979-1980. Mink and marten are the most important furbearers in the region in terms of the numbers harvested and total pelt values. The peak year for mink was 1979-1980 with a value of about $262,200. Marten pelts were worth about $243,000 in 1983-1984. Southeast mink are quite small and brown in color and as a consequence are somewhat of an oddity in the fur trade. In recent years, they have been particularly prized by Italian fur

Table 14. Number of Raw Pelts Exported from the Southeast Region, 1977-78 through 1983-84

Year 1977-78

Species	Southeast: Fur Dealer Exports	Southeast: Trapper Exports	Southeast: Personal Use Exports	Southeast: Total	% of Statewide Export	Statewide Export
Beaver	8	47	0	55	1	5,417
Mink	500	1,732	0	2,232	20	11,030
Muskrat	1	11	0	12	0	47,564
Marten	639	864	0	1,503	6	24,995
Land otter	154	334	0	488	27	1,786
Arctic fox[c]	1	4	0	5	0	1,388
Red fox[a]	18	6	0	24	0	6,334
Weasel	0	58	0	58	6	908
Lynx	0	9	0	9	1	1,738
Squirrel[b]	0	9	0	9	3	317

Year 1978-79

Beaver	1	30	0	31	1	3,838
Mink	1,545	1,109	0	2,654	26	10,348
Muskrat	0	29	0	29	0	32,803
Marten	1,865	1,167	0	3,032	10	29,467
Land otter	300	196	0	496	32	1,545
Arctic fox[c]	0	0	0	0	0	2,661
Red fox[a]	0	2	0	2	0	10,018
Weasel	0	83	0	83	12	673
Lynx	0	0	0	0	0	2,383
Squirrel[b]	0	0	0	0	0	780

(continued)

Table 14 (continued).

Year 1979-80

Species	Southeast: Fur Dealer Exports	Southeast: Trapper Exports	Southeast: Personal Use Exports	Southeast: Total	% of Statewide Export	Statewide Export
Beaver	31	228	3	262	3	10,070
Mink	1,320	2,016	0	3,336	45	7,459
Muskrat	3	27	0	30	0	41,814
Marten	1,761	1,753	0	3,514	13	26,042
Land otter	137	364	1	502	35	1,436
Arctic fox[c]	0	0	0	0	0	970
Red fox[a]	0	1	0	1	0	9,499
Weasel	0	62	0	62	13	474
Lynx	0	1	0	1	0	1,829
Squirrel[b]	0	26	0	26	3	1,023

Year 1980-81

Beaver	3	140	0	143	2	7,366
Mink	196	2,960	134	3,290	22	14,852
Muskrat	0	60	0	60	0	57,546
Marten	252	902	7	1,161	5	24,284
Land otter	7	352	6	365	26	1,425
Arctic fox[c]	0	0	0	0	0	1,936
Red fox[a]	0	0	0	0	0	8,002
Weasel	0	29	0	29	13	228
Lynx	0	0	0	0	0	2,483
Squirrel[b]	0	36	0	36	6	619

(continued)

Table 14 (continued).

Year 1981-82

Species	Southeast: Fur Dealer Exports	Southeast: Trapper Exports	Southeast: Personal Use Exports	Southeast: Total	% of Statewide Export	Statewide Export
Beaver	15	61	0	76	1	5,961
Mink	405	1,887	0	2,292	12	18,922
Muskrat	0	33	0	33	0	18,147
Marten	337	2,097	0	2,434	10	25,251
Land otter	71	324	0	395	27	1,470
Arctic fox[c]	4	0	0	4	0	1,478
Red fox[a]	5	4	0	9	0	10,309
Weasel	1	27	0	28	15	188
Lynx	4	2	0	6	0	3,984
Squirrel[b]	0	78	0	78	15	513

Year 1982-83

Beaver	16	40	0	56	2	3,331
Mink	21	1,051	0	1,072	14	7,706
Muskrat	15	4	0	19	0	6,193
Marten	25	951	0	976	6	16,370
Land otter	11	195	0	206	24	869
Arctic fox[c]	1	0	0	1	0	646
Red fox[a]	8	5	0	13	0	3,238
Weasel	0	28	0	28	12	240
Lynx	1	32	0	33	0	3,220
Squirrel[b]	0	35	0	35	17	201

(continued)

Table 14 (continued).

Year 1983-84

Species	Southeast: Fur Dealer Exports	Trapper Exports	Personal Use Exports	Total	% of Statewide Export	Statewide Export
Beaver	0	194	1	195	8	2,362
Mink	102	625	192	919	10	9,024
Muskrat	12	23	0	35	0	9,936
Marten	246	1,287	489	2,022	15	13,594
Land otter	0	151	20	171	19	907
Arctic fox[c]	0	1	0	1	0	574
Red fox[a]	0	16	0	16	0	2,980
Weasel	0	40	0	40	17	232
Lynx	0	12	0	12	0	1,925
Squirrel[b]	0	3	7	10	5	198

Source: Computer printouts from Statistics Section, ADF&G, Div. Game, Anchorage.

a Includes the cross, black, and silver color phases.

b Includes red, flying, and ground squirrels.

c Species does not occur in region. Although furs are exported from the region, the animals are trapped elsewhere.

Table 15. Estimated Number of Raw Pelts Exported and Harvested, their Market Value and their Estimated Total Value for the Southeast Region, 1977-78 through 1983-84

Trapping Season	Exports	Market[c] Value $	Estimated[a] Harvest	Estimated[d] Total Value $	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $
	Beaver				Mink			
1977-78	55	1,650	157	4,710	2,232	66,960[f]	3,036	91,080[f]
1978-79	31	772	65	1,618	2,654	79,620[f]	3,477	104,310[f]
1979-80	262	12,513	259	12,292	3,336	200,160[f]	4,370	262,200[f]
1980-81	143	6,149	353	15,179	3,290	161,210	5,165	253,085
1981-82	76	1,932	107	2,720	2,292	106,418	3,094	143,654
1982-83	56	1,424	211	5,364	1,072	33,436	2,090	65,187
1983-84	195	4,290	434	9,548	919	24,813	2,169	58,563

(continued)

Table 15 (continued).

Trapping Season	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $	Exports	Market[c] Value $	Estimated[a] Harvest	Estimated[d] Total Value $
	Marten				Land Otter			
1977-78	1,503	52,605[f]	2,044	71,570[f]	488	26,840[f]	695	38,225[f]
1978-79	3,032	121,280[f]	3,972	158,880[f]	496	59,520[f]	605	72,600[f]
1979-80	3,514	137,046[f]	4,603	179,517[f]	502	38,654[f]	654	50,358[f]
1980-81	2,293	87,134	3,600	136,800	365	16,060	526	23,144
1981-82	2,434	103,056	3,286	139,129	395	16,365	467	19,348
1982-83	976	55,251	1,903	107,729	206	8,055	462	18,064
1983-84	2,022	103,122	4,772	243,372	171	5,472	443	14,176

(continued)

Table 15 (continued).

Trapping Season	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $
	Weasel				Squirrel[e]			
1977-78	58	87	79	119	9	5	12	6
1978-79	83	120	109	158	0	0	0	0
1979-80	62	87	81	113	26	26	34	34
1980-81	29	41	46	64	36	50	57	80
1981-82	28	25	38	33	78	78	105	105
1982-83	28	140	55	275	35	52	68	101
1983-84	40	80	94	188	10	10	24	24

(continued)

Table 15 (continued).

Trapping Season	Exports	Market[c] Value $	Estimated[a] Harvest	Estimated[d] Total Value $	Exports	Market[c] Value $	Estimated[a] Harvest	Estimated[d] Total Value $
	Wolf				Wolverine			
1977-78	---	---	75	10,500	---	---	28	3,920
1978-79	---	---	87	17,139	---	---	35	9,382
1979-80	---	---	72	15,864	---	---	25	5,606
1980-81	---	---	87	22,185	---	---	12	2,052
1981-82	---	---	68	15,470	---	---	21	4,877
1982-83	---	---	80	14,430	---	---	23	4,669
1983-84	---	---	104	18,760	---	---	29	6,670

(continued)

Table 15 (continued).

Trapping Season	Exports	Market[c] Value $	Estimated[a] Harvest	Estimated[d] Total Value $	Estimated Total Value of All Species $
			Lynx		
1977-78	9	2,160	1	240	220,340
1978-79	0	0	0	0	364,087
1979-80	1	289	1	289	526,273
1980-81	0	0	1	235	452,824
1981-82	6	1,656	0	0	325,336
1982-83	33	8,681	44	11,575	227,394
1983-84	12	3,744	18	5,616	356,917

Source: ADF&G furbearer files; Melchior 1982, 1983, 1984, 1985.

--- means no data were available.

a Sealed pelts.

b Exports multiplied by a ratio of sealing to export data (see table 7 and Statewide Furbearer Economic narrative for derivation).

c Exports multiplied by average raw pelt prices (table 5).

d Estimated harvest multiplied by average raw pelt value.

e Includes red, flying, and ground squirrels.

f Average per pelt prices for mink, marten, and otter in 1978-79 and 1979-80, based on prices received by Southeast Region trappers (Johnson, pers. comm).

1978-79 mink $30; marten $40; otter $120
1979-80 mink $60; marten $39; otter $ 77

buyers. From 1979-1980 through 1981-1982, a favorable exchange rate between the lira and the United States dollar encouraged the Italian market, and prices for Southeast mink were relatively high those years, averaging as much as $60.00 a pelt in 1979-1980 (Johnson, pers. comm.). Because of a worsening exchange rate since 1982, the Italian market has evaporated, and Southeast mink harvests and total values have declined precipitously (ibid.).

Values for land otters peaked in 1978-1979 and 1980-1981 for nearly the same reasons as mink. Italy is a major market for otter pelts. In 1979-1980, Southeast Region otter pelts brought an average of $120 each (ibid.) for a total value of $72,600. Land otters from Southeast, Kodiak, and the Gulf of Alaska coast of the state are among the most desirable in North America, chiefly for their size (ibid.).

Information on trapper residency is available from sealing documents, trapper export forms, and dealer purchase forms but has not been compiled.

A survey of Southeast Alaska residents conducted by several state and federal agencies and the University of Alaska found that 5.1% of Southeast Region males and 1.1% of females participated in trapping sometime during the 1978-1979 season. Participation was 11.3% by males and 1.7% by females in Native communities and 4.6% by males and 2.0% by females in predominantly non-Native communities. If all communities in the region are considered, the participation rate of Natives was 4.6% for males and 2.0% for females (Alves 1980).

Beginning with the 1985-1986 season, sealing certificates include information on trappers' means of transportation. Little or no documentation exists for earlier years. Because of the nature of the region, however, most trappers probably use boats to reach their trapline areas.

B. Southcentral Alaska

Several sources of information are available on trapping activity and related values for Southcentral Alaska. In general, participation rates for trapping in the region are not as high as they are for such activities as hunting, sportfishing, and wildlife observation (Clark and Johnson 1981).

Estimates based upon the Alaskan Public Survey (ibid.) indicate that there were approximately 4,910 trappers (18 years of age and older) active in Southcentral Alaska during the 1978-1979 season. Participation rates were highest in Cordova (17.9% of the population in that age group) and Prince William Sound (9.3%). By contrast, a very small percentage of the population in Anchorage and the Palmer-Wasilla area were involved in trapping. The mean

number of days spent trapping per year was also highest in Cordova (18.8) and Prince William Sound (16.6); this contrasted to Anchorage, where the average was only 1.4 days per trapper (ibid.).

The ADF&G conducted a mail survey of trappers in 1981 (Machida 1981). The questionnaire was sent to 430 trappers in the Southcentral Region who had reported taking furbearers on sealing documents during the 1979-1980 season. Of the 202 respondents, 70 indicated that they had not trapped during the 1980-1981 season. However, the 132 respondents who had trapped during that season provided some useful information about trapping activities in Southcentral Alaska. The information presented in the report pertained to characteristics of the respondents; no attempt was made to draw inferences for the entire trapping population in Southcentral Alaska.

Trapping activity and harvest were reported by nine subareas of the region (table 16). The number of trappers, average harvest per trapper, and average gross receipt are reported by species and in total. Based on discussions with fur dealers and area biologists, the statewide average figures used to estimate average market values per trapper by species in table 16 were reduced by one-third for mink, marten, lynx, coyote, wolf, wolverine, fox, and weasel taken in coastal areas, in order to allow for inferior quality (Whitaker, pers. comm.). One exception is that wolverine pelts taken in the Prince William Sound area tend to rival interior furs in quality (Wilson, pers. comm.).

The proportion of respondents who reported trapping each species varied considerably among the subregions. For instance, five of the six respondents from the Cantwell-Denali area and seven of the eight from the Talkeetna-Petersville area indicated that they had trapped beaver during the 1980-1981 season. By contrast, only three of 21 trappers responding from the Glennallen-Paxson-Lake Louise area reported that they trapped beaver, although beaver are relatively abundant. Obviously, abundance is only one factor influencing the degree to which given species are pursued. Others include pelt price, ease of access to a trapping area, and trapper preference.

The average harvest per trapper and thus the average value of the pelts varied considerably by subarea and species. Six individuals who reported they had trapped muskrats, one of the most abundant and easily trapped species, in the Matanuska Valley-Houston-Willow area averaged 120.5 pelts valued at $482 during the 1980-1981 season. By contrast, the single respondent who trapped wolves in the same area caught only two, but they were worth a total of $510. Some of the highest average revenues received by trappers were for lynx in the McCarthy-Nabesna area (six trappers averaged

Table 16. Number of Southcentral Alaska Respondents Who Trapped, by Species, Average Harvest, and Value per Trapper, 1980-81 Season[a]

Southcentral Area Trapped[b]	Total No. Respondents Who Trapped	Species Trapped								
		Beaver			Muskrat			Mink		
		No. Trappers	Average Harvest/ Trapper	Average Value/ Trapper[c] $	No. Trappers	Average Harvest/ Trapper	Average Value/ Trapper[c] $	No. Trappers	Average Harvest/ Trapper	Average Value/ Trapper[c] $
Cantwell, Denali	6	5	8.8	378.40	2	17.2	68.80	3	7.3	357.70
Cordova, Valdez	11	8	11.4	490.20	2	2.5	10.00	10	13.4	439.92
Glennallen, Paxson, Lake Louise	21	3	7.3	313.90	9	47.3	189.20	13	15.5	759.50
Kenai, Sterling Homer	21	14	4.6	197.80	8	19.3	77.20	16	7.1	347.90
Matanuska Valley, Houston, Willow	11	5	20.0	860.00	6	120.5	482.00	9	7.0	343.00
McCarthy, Nabesna	9	3	2.7	116.00	2	20.0	80.00	4	4.0	196.00
Seward, Hope, Portage	7	4	7.0	301.00	3	6.3	25.20	3	11.7	384.11
Skwenta, Tyonek	13	9	20.6	885.80	6	34.0	136.00	9	14.7	720.30
Talkeetna, Petersville	8	7	21.6	928.80	4	89.8	359.20	5	3.8	186.20

(continued)

Table 16 (continued).

Southcentral Area Trapped[b]	Total No. Respondents Who Trapped	Species Trapped: Land Otter — No. Trappers	Land Otter — Average Harvest/ Trapper	Land Otter — Average Value/ Trapper[c] $	Fox — No. Trappers	Fox — Average Harvest/ Trapper	Fox — Average Value/ Trapper[c] $	Marten — No. Trappers	Marten — Average Harvest/ Trapper	Marten — Average Value/ Trapper[c] $
Cantwell, Denali	6	---	---	---	6	8.5	765.00	3	17.0	646.00
Cordova, Valdez	11	8	3.8	167.20	---	---	---	7	7.3	185.86
Glennallen, Paxson, Lake Louise	21	5	3.0	132.00	12	18.3	1,647.00	13	14.5	551.00
Kenai, Sterling Homer	21	7	2.7	118.80	---	---	---	2	5.0	190.00
Matanuska Valley, Houston, Willow	11	3	3.7	162.80	4	3.5	315.00	4	3.5	133.00
McCarthy, Nabesna	9	1	1.0	44.00	4	3.3	297.00	4	9.0	342.00
Seward, Hope, Portage	7	1	8.0	352.00	---	---	---	1	2.0	50.92
Skwenta, Tyonek	13	6	4.0	176.00	5	4.6	414.00	10	32.9	1,250.00
Talkeetna, Petersville	8	4	1.5	66.00	4	2.8	252.00	6	11.0	418.00

(continued)

Table 16 (continued).

Southcentral Area Trapped[b]	Total No. Respondents Who Trapped	Species Trapped								
		Lynx			Coyote			Wolf		
		No. Trappers	Average Harvest/ Trapper	Average Value/ Trapper[c] $	No. Trappers	Average Harvest/ Trapper	Average Value/ Trapper[c] $	No. Trappers	Average Harvest/ Trapper	Average Value/ Trapper[c] $
Cantwell, Denali	6	1	1.0	235.00	1	5.0	495.00	5	1.6	408.00
Cordova, Valdez	11	---	---	---	2	3.5	232.15	---	---	---
Glennallen, Paxson, Lake Louise	21	5	3.2	752.00	7	3.0	297.00	4	3.3	841.50
Kenai, Sterling Homer	11	1	2.0	470.00	10	2.6	257.40	7	1.0	255.00
Matanuska Valley, Houston, Willow	9	---	---	---	3	6.3	623.70	1	2.0	510.00
McCarthy, Nabesna	7	6	7.0	1,645.00	3	2.0	198.00	2	1.0	255.00
Seward, Hope, Portage	13	---	---	---	4	1.8	119.39	2	1.5	256.27
Skwenta, Tyonek	8	---	---	---	4	1.3	128.70	1	3.0	765.00
Talkeetna, Petersville	---	---	---	---	3	2.7	267.30	---	---	---

(continued)

Table 16 (continued).

Southcentral Area Trapped[b]	Total No. Respondents Who Trapped	Species Trapped: Wolverine: No. Trappers	Wolverine: Average Harvest/ Trapper	Wolverine: Average Value/ Trapper[c] $	Weasel: No. Trappers	Weasel: Average Harvest/ Trapper	Weasel: Average Value/ Trapper[c] $	Average Gross Fur Value/Trapper, All Species[c] $
Cantwell, Denali	6	2	2.0	342.00	2	15.5	21.70	2,188
Cordova, Valdez	11	2	4.5	769.50	8	7.3	6.85	1,185
Glennallen, Paxson, Lake Louise	21	6	2.5	427.50	10	9.5	13.30	2,477
Kenai, Sterling Homer	21	2	1.0	171.00	5	3.6	5.40	731
Matanuska Valley, Houston, Willow	11	2	1.0	171.00	4	6.3	8.82	1,393
McCarthy, Nabesna	9	5	1.8	307.80	3	11.3	15.82	1,828
Seward, Hope, Portage	7	1	3.0	513.00	1	2.0	1.88	620
Skwenta, Tyonek	13	4	2.3	393.30	9	18.1	25.34	2,614
Talkeetna, Petersville	8	3	1.3	222.30	3	6.3	8.82	1,768

Source: Machida 1980, 1981.

--- means no data were available.

a Only trappers who indicated harvesting the designated species were used in determining the averages.

b Data were collected for Kodiak and Afognak islands also but were not included.

sed on average raw pelt prices (table 5).

$1,645); fox in the Glennallen-Paxson-Lake Louise area (12 trappers averaged $1,647); and marten in the Skwentna-Tyonek area (10 trappers averaged $1,250). Some species, such as wolf and wolverine, commanded high prices per pelt but had relatively low average harvests.

Gross income per trapper ranged from $2,614 in Skwentna-Tyonek to $556 in Kenai-Sterling-Homer. Other areas where the gross income per trapper exceeded $2,000 were Glennallen-Paxson-Lake Louise and Cantwell-Denali.

The Kenai National Wildlife Refuge administers a permit system for trapping within its boundaries. Most of the trapping in the western Kenai takes place on the refuge. During the 1981-1982 season, the total reported harvest of furbearers had an estimated value of $19,147. This was an average of $382.94 per successful trapper and $203.69 per permit holder who reported. Wolf pelts accounted for over one-half the total revenues.

Table 17 gives the estimated number of raw pelts exported and harvested, their market value, and the estimated total value for 12 furbearers in the Southcentral Region from 1977-1978 through 1983-84. No harvest figures have been entered for arctic fox because they do not occur in the region. However, pelts are exported from the region. In the case of beaver, otter, and lynx, sealing data are used for the harvest figures, and export figures usually exceed harvest figures. This may indicate that a majority of these species are actually trapped outside the region, although the pelts are exported from Southcentral. The same may be the case for other species, but the method of calculating estimated harvest ensures that, for species that are not sealed, harvest figures will exceed export figures. (See the Methods section in the introduction for a discussion of how estimated harvests and values were calculated.) In any event, estimated total values should not be considered the value of the furbearer harvest in the Southcentral Region. Wolf and wolverine harvest figures are based on sealing data; no export data are available for them.

The estimated total value of Southcentral Region furs fluctuated near $1 million from 1978-1979 through 1983-1984. The lowest value was about $775,000 in 1977-1978. Considerable fluctuations are apparent from year to year by species, as both the level of harvest and the price for pelts tend to vary. Marten consistently account for the largest portion of the fur values annually. The peak year for marten value was 1982-1983, at about $655,000. The following year, harvest was down, and the value dropped by half. Red fox usually account for the next highest values in the region. Peak value for red fox was $356,000 in 1978-1979.

Table 17. Estimated Number of Raw Pelts Exported and Harvested, their Market Value, and their Estimated Total Value for the Southcentral Region, 1977-78 to 1983-84

Trapping Season	Exports	Market[c] Value $	Estimated[a] Harvest	Estimated[d] Total Value $	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $
	Beaver				Mink			
1977-78	677	20,310	665	19,950	1,715	51,450	2,332	69,960
1978-79	1,039	25,860	519	12,918	2,057	96,000	2,695	125,775
1979-80	2,338	110,961	1,875	88,988	1,169	53,318	1,531	69,829
1980-81	2,223	95,589	1,553	66,779	3,019	147,931	4,740	232,260
1981-82	996	25,318	886	22,522	1,516	70,388	2,047	95,042
1982-83	1,119	28,445	779	19,802	677	21,115	1,320	41,171
1983-84	969	21,318	906	19,932	968	26,136	2,284	61,668

(continued)

Table 17 (continued).

Trapping Season	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $
	Muskrat				Marten			
1977-78	4,646	18,584	6,319	25,276	7,463	261,205	10,150	355,250
1978-79	6,197	26,027	8,118	34,096	9,097	465,312	11,917	609,555
1979-80	4,831	24,397	6,329	31,961	6,016	279,142	7,881	365,678
1980-81	4,931	19,724	7,742	30,968	6,709	254,942	10,533	400,254
1981-82	1,814	10,975	2,449	7,469	7,050	298,497	9,518	402,992
1982-83	773	2,164	1,507	4,220	5,940	336,263	11,583	655,714
1983-84	1,600	5,600	3,776	13,216	2,609	133,059	6,157	314,007

(continued)

Table 17 (continued).

Trapping Season	Exports	Market[c] Value $	Estimated[g] Harvest	Estimated[g] Total Value $	Exports	Market[c] Value $	Estimated[a] Harvest	Estimated[d] Total Value $
	Arctic Fox[g]				Wolverine			
1977-78	117	5,265	---	5,265	---	---	233	32,620
1978-79	472	22,892	---	22,892	---	---	106	28,415
1979-80	141	7,531	---	7,531	---	---	221	49,557
1980-81	139	4,587	---	4,587	---	---	134	22,914
1981-82	204	7,050	---	7,050	---	---	155	35,997
1982-83	65	1,661	---	1,661	---	---	186	37,758
1983-84	124	9,300	---	9,300	---	---	152	34,960

(continued)

Table 17 (continued).

Trapping Season	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $	Exports	Market[c] Value $	Estimated[a] Harvest	Estimated[d] Total Value $
	Red Fox[e]				Lynx			
1977-78	1,444	122,740	1,964	166,940	687	164,880	219	52,560
1978-79	2,258	272,089	2,958	356,439	1,070	422,746	182	71,906
1979-80	1,807	175,279	2,367	229,599	385	111,323	118	34,120
1980-81	1,616	145,440	2,537	288,330	769	180,715	115	27,025
1981-82	1,829	162,525	2,469	219,395	951	262,343	219	60,413
1982-83	1,025	52,952	1,000	103,268	1,349	354,881	496	130,483
1983-84	1,344	100,800	3,172	237,900	1,002	312,624	320	99,840

Trapping Season	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $
	Land Otter			
1977-78	290	15,950	197	10,835
1978-79	266	22,357	254	21,348
1979-80	260	20,615	277	21,963
1980-81	288	12,672	225	9,900
1981-82	192	7,955	199	8,245
1982-83	287	11,222	202	7,898
1983-84	273	8,736	206	6,592

(continued)

Table 17 (continued).

Trapping Season	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $	Exports	Market[c] Value $	Estimated[a] Harvest	Estimated[d] Total Value $
	Weasel				Wolf			
1977-78	199	299	271	407	---	---	259	36,260
1978-79	209	303	274	397	---	---	206	40,582
1979-80	251	351	329	460	---	---	156	34,371
1980-81	104	146	163	228	---	---	136	34,680
1981-82	64	56	86	76	---	---	153	34,807
1982-83	58	290	113	565	---	---	193	34,813
1983-84	148	296	349	698	---	---	232	60,784

(continued)

Table 17 (continued).

Trapping Season	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $	Estimated Total Value of All Species $
			Squirrel[f]		
1977-78	140	70	190	95	775,418
1978-79	212	212	277	277	1,346,563
1979-80	193	193	253	253	934,310
1980-81	334	468	524	734	1,058,659
1981-82	254	254	343	343	894,351
1982-83	133	197	259	383	1,037,736
1983-84	81	81	191	191	859,088

Source: ADF&G furbearer files; Melchior, 1982, 1983, 1984, 1985.

--- means no data were available.

a Sealed pelts.

b Exports multiplied by a ratio of sealing to export data (see table 7 and statewide furbearer economic narrative for derivation).

c Exports multiplied by average raw pelt prices (table 5).

d Estimated harvest multiplied by average raw pelt price.

e Includes all color phases.

f Includes red, flying, and ground squirrels.

g Species not found in region.

C. Southwest Region

Locally, furbearers are of great importance in the Southwest Region. In some portions of the region, beaver are particularly valued not only for their fur but as an important food for humans and dogs (Ernest, pers. comm.). Historically, in Bristol Bay drainages, beaver harvests increased in years of poor salmon runs (ADNR/USFWS 1983). The Bristol Bay drainages accounted for more than 15% of the average annual statewide beaver harvest from 1977 through 1984 (ADF&G furbearer files). That considerably more beavers are harvested most years than are exported (table 18) is evidence of the importance of beaver for domestic uses. Because beaver is used for food as well as fur and because estimated total values in table 18 are based only on average pelt prices, not on the value of the meat or other uses, the values of beaver and other species used domestically are underestimates.

Table 18 shows the estimated number of raw pelts exported, their market value, the estimated harvest, and estimated total harvest value for 12 furbearers in the region from 1977-1978 through 1983-1984. No export data for wolf and wolverine are available. The highest estimated total annual value of all species in the Southwest Region was about $359,000 in 1979-1980. The method of calculating estimated harvest is based on the number of exports from the region (see the Methods section of the furbearer economic overview). The Southwest Region has fewer fur dealers than most regions of the state, and, consequently, many furs harvested within the region may be bought and exported by dealers outside the region. It is likely, therefore, that both estimated total harvest and value depicted in table 18 are lower than the region's actual production. The high level of local use of furbearers may also mean the region's furbearer production value is underestimated, especially if the regional sealing-to-export ratio is higher than the statewide ratio used in calculating estimated harvest.

Red fox (including all color phases) is second only to beaver in harvest quantity, but fox pelts command a higher price on the market, and consequently estimated total value for fox pelts is the highest of any species in the region. The best year for red fox values in the Southwest Region was 1981-1982, when fox pelts were worth an estimated $172,000. Harvests declined dramatically the following two years. Red fox populations fluctuate widely as a result of variations in food supply and other factors, such as disease.

The Southwest Region is one of the most important for land otter harvest in the state. From 1977 through 1983, the region accounted for almost 30% of the annual statewide otter harvest (ADF&G Furbearer Files). Most wolverines in the region are in high demand for domestic use in garments, and few are sold commercially; most skins never leave the villages (Palmer 1976).

Table 18. Estimated Number of Raw Pelts Exported and Harvested, Their Market Value and Their Estimated Total Value for the Southwest Region, 1977-78 through 1983-84

Trapping Season	Exports	Market[c] Value $	Estimated[a] Harvest	Estimated[d] Total Value $	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $
	Beaver				Mink			
1977-78	1,400	42,000	1,666	49,980	172	5,160	234	7,020
1978-79	630	15,681	1,386	34,498	107	4,994	140	6,534
1979-80	1,008	47,840	1,797	85,286	279	12,725	365	16,648
1980-81	220	9,460	2,337	100,491	232	11,368	364	17,836
1981-82	1,029	26,157	2,124	53,992	311	14,440	420	19,501
1982-83	153	3,889	2,281	57,983	174	5,427	339	10,573
1983-84	71	1,562	1,628	35,816	173	4,671	408	11,016

(continued)

Table 18 (continued).

Trapping Season	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $
	Muskrat				Marten			
1977-78	522	2,088	710	2,840	397	13,895	540	18,900
1978-79	99	416	130	546	25	1,279	33	1,688
1979-80	98	495	128	646	88	4,083	115	5,336
1980-81	239	956	375	1,500	41	1,558	64	2,432
1981-82	93	284	126	384	79	3,345	107	4,530
1982-83	55	154	107	300	98	5,548	191	10,813
1983-84	5	18	12	42	80	4,080	189	9,639

(continued)

Table 18 (continued).

Trapping Season	Exports	Market[c] Value $	Estimated[a] Harvest	Estimated[d] Total Value $	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $
	Land Otter				Arctic Fox			
1977-78	332	18,260	552	30,360	94	4,230	128	5,760
1978-79	199	16,726	433	36,394	4	194	5	243
1979-80	283	22,439	648	51,380	51	2,724	67	3,578
1980-81	190	8,360	727	31,988	4	132	6	198
1981-82	262	10,855	583	24,154	21	726	28	968
1982-83	152	5,943	669	26,158	23	588	45	1,150
1983-84	63	2,016	436	13,952	15	330	35	770

(continued)

Table 18 (continued).

Trapping Season	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $	Exports	Market[c] Value $	Estimated[a] Harvest	Estimated[d] Total Value $
	Red Fox[e]				Lynx			
1977-78	1,253	106,505	1,692	143,820	85	20,400	231	55,440
1978-79	975	117,488	1,277	153,879	45	17,779	159	62,819
1979-80	1,244	120,668	1,630	158,110	44	12,723	168	48,577
1980-81	640	57,600	1,005	90,450	20	4,700	168	39,480
1981-82	1,431	127,159	1,932	171,678	28	7,724	77	21,241
1982-83	567	29,291	1,106	57,136	5	1,315	123	32,358
1983-84	233	17,475	550	41,250	19	5,928	39	12,168

(continued)

Table 18 (continued).

Trapping Season	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $
	Weasel				Squirrel[f]			
1977-78	17	26	23	35	0	0	0	0
1978-79	34	49	45	65	0	0	0	0
1979-80	43	60	56	78	23	23	30	30
1980-81	14	20	22	31	2	3	3	5
1981-82	7	6	9	8	5	5	7	7
1982-83	11	55	21	105	0	0	0	0
1983-84	2	4	5	10	0	0	0	0

Trapping Season	Exports	Market[c] Value $	Estimated[a] Harvest	Estimated[d] Total Value $
	Wolf			
1977-78	---	---	52	7,280
1978-79	---	---	37	7,289
1979-80	---	---	46	10,135
1980-81	---	---	29	7,395
1981-82	---	---	36	8,190
1982-83	---	---	58	10,462
1983-84	---	---	25	6,550

(continued)

Table 18 (continued).

Trapping Season	Exports	Market[c] Value $	Estimated[a] Harvest	Estimated[d] Total Value $	Estimated Total Value of All Species $
			Wolverine		
1977-78	---	---	137	19,180	340,615
1978-79	---	---	123	32,973	336,928
1979-80	---	---	111	24,891	358,695
1980-81	---	---	82	14,022	305,828
1981-82	---	---	111	25,779	330,432
1982-83	---	---	115	23,345	230,383
1983-84	---	---	65	14,950	146,163

Source: ADF&G furbearer files; Melchior, 1982, 1983, 1984, 1985.

--- means no data were available.

a Sealed pelts.

b Exports multiplied by a ratio of sealing to export data (see table 7 and statewide furbearer economic narrative for derivation).

c Exports multiplied by average raw pelt prices (table 5).

d Estimated harvest multiplied by average raw pelt price.

e Includes all color phases.

f Includes red, flying, and ground squirrels.

Because prime habitat is absent, marten and lynx are not plentiful in the region (ADF&G 1985).

Information on trapper residency is available from sealing documents, trapper export forms, and dealer purchase forms but has not been compiled.

Snowmachines and, to a much lesser extent, dog teams are the standard means of transportation for trappers in bush communities. Aircraft are also used for trapping in remote areas. Boats are used along the beach fringes on Kodiak and on the south side of the Alaska Peninsula (ADF&G 1978).

D. Interior Region

The furbearer harvest in the Interior is the largest of any region in the state. More beaver, muskrat, marten, wolf, wolverine, lynx, and weasel come from the Interior than from any other region. The estimated raw pelt values of the harvest are also highest in the Interior Region.

Table 19 shows the estimated number of raw pelts exported and harvested, their export market value, and the estimated total value for 10 furbearer species from the 1977-1978 season through 1983-1984. Fur harvests and values varied considerably over the period.

The highest estimated total value of furs in the Interior Region was about $2.7 million in the 1981-1982 season. Total value dropped slightly in the following two seasons but still exceeded $2 million. Marten and lynx consistently account for the largest portions of total furbearer value in the region. Lynx values exceeded $1 million in 1981-1982 and 1982-1983, and marten exceeded $1 million in 1978-1979 and 1983-1984. These estimates, which are likely to be low, are based on export data, average raw pelt export prices, and a mean export-to-sealing ratio described in the Methods section of this furbearer economic overview. Wolf and wolverine harvests are sealing data; no export data are available for these species.

A more extensive analysis of the economic impact of furbearers would yield larger values. McLean (1983), for example, analyzed the economic aspects of trapping for the Tanana Basin Area Plan. Using a similar methodology to the one in this section, McLean calculated gross trapping revenues in the Tanana basin area of $1.1 million in 1980-1981. Table 19 shows an estimated total value of $2.2 million for the entire Interior Region that year. McLean included the value of potential expansion of the fur trade to the average historical level as well as economic multipliers and secondary fur processing and manufacturing to derive an

Table 19. Estimated Number of Raw Pelts Exported and Harvested, Their Market Value and Their Estimated Total Value for the Interior Region, 1977-78 through 1983-84

Trapping Season	Exports	Market[c] Value $	Estimated[a] Harvest	Estimated[d] Total Value $	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $
	Beaver				Mink			
1977-78	2,207	66,210	3,682	110,460	1,996	59,880	2,715	81,450
1978-79	1,062	26,433	2,265	56,376	1,783	83,213	2,336	109,021
1979-80	4,199	199,285	6,762	320,925	1,134	51,722	1,486	67,776
1980-81	2,784	119,712	4,911	211,173	2,921	143,129	4,586	224,714
1981-82	1,945	49,442	3,367	85,589	4,096	189,358	5,530	256,758
1982-83	1,283	32,614	2,542	64,617	2,764	86,209	5,390	168,114
1983-84	704	15,488	3,071	67,562	3,416	92,232	8,062	217,674

(continued)

Table 19 (continued).

Trapping Season	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $
	Muskrat				Marten			
1977-78	35,110	140,440	47,750	191,000	14,576	510,160	19,823	693,805
1978-79	15,469	64,970	20,264	85,109	16,029	819,883	20,998	1,074,048
1979-80	7,279	36,759	9,536	48,157	11,874	550,954	15,555	721,752
1980-81	13,543	54,172	21,263	85,052	14,592	554,496	22,909	870,542
1981-82	7,124	21,728	9,617	29,332	14,539	615,581	19,628	831,050
1982-83	3,230	9,044	6,299	17,637	8,847	500,829	17,252	976,636
1983-84	7,741	27,094	18,269	63,942	8,756	446,556	20,664	1,053,864

(continued)

Table 19 (continued).

Trapping Season	Exports	Market[c] Value $	Estimated[a] Harvest	Estimated[d] Total Value $	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $
	Land Otter				Arctic Fox			
1977-78	224	6,720	280	8,400	0	0	0	0
1978-79	117	9,834	196	16,474	355	17,216	465	22,553
1979-80	107	8,484	288	22,836	99	5,288	130	6,943
1980-81	188	8,272	240	10,560	56	1,848	88	2,904
1981-82	133	5,510	199	8,245	124	4,285	167	5,772
1982-83	104	4,066	146	5,709	82	2,095	160	4,088
1983-84	163	5,216	251	8,032	40	880	94	2,068

(continued)

Table 19 (continued).

Trapping Season	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $
	Red Fox[e]				Weasel			
1977-78	260	22,100	354	30,090	529	794	719	1,079
1978-79	1,165	139,800	1,526	183,883	332	481	435	631
1979-80	1,086	105,342	1,423	138,031	77	108	101	141
1980-81	1,332	119,880	2,091	188,190	74	104	116	162
1981-82	2,375	211,043	3,206	284,885	60	53	81	71
1982-83	920	47,527	1,794	92,678	115	575	224	1,120
1983-84	858	64,350	2,025	151,875	36	72	85	170

(continued)

Table 19 (continued).

Trapping Season	Exports	Market[c] Value $	Estimated[a] Harvest	Estimated[d] Total Value $	Exports	Market[c] Value $	Estimated[a] Harvest	Estimated[d] Total Value $
	Lynx				Wolf			
1977-78	619	148,560	1,105	265,200	---	---	422	59,080
1978-79	619	244,561	1,372	542,063	---	---	484	95,348
1979-80	591	170,888	1,747	505,145	---	---	374	82,403
1980-81	1,369	321,715	2,569	603,715	---	---	400	102,000
1981-82	1,963	541,513	3,914	1,079,716	---	---	366	83,265
1982-83	1,247	328,048	3,828	1,007,031	---	---	428	77,203
1983-84	729	227,448	2,217	691,704	---	---	319	83,578

Trapping Season	Exports	Market[c] Value $	Estimated[a] Harvest	Estimated[d] Total Value $
	Wolverine			
1977-78	---	---	405	56,700
1978-79	---	---	332	88,999
1979-80	---	---	291	65,254
1980-81	---	---	289	49,419
1981-82	---	---	258	59,918
1982-83	---	---	380	77,140
1983-84	---	---	262	60,260

(continued)

Table 19 (continued).

Trapping Season	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $	Estimated Total Value of All Species $
			Squirrel[f]		
1977-78	132	66	180	90	1,497,354
1978-79	567	567	743	743	2,277,505
1979-80	726	726	951	951	1,980,314
1980-81	233	326	366	512	2,348,943
1981-82	176	176	238	238	2,724,839
1982-83	11	16	21	31	2,492,004
1983-84	107	107	253	253	2,400,982

Source: ADF&G furbearer files; Melchior, 1982, 1983, 1984, 1985.

--- means no data were available.

a Sealed pelts.

b Exports multiplied by a ratio of sealing to export data (see table 7 and statewide furbearer economic narrative for derivation).

c Exports multiplied by average raw pelt prices (table 5).

d Estimated harvest multiplied by average raw pelt price.

e Includes all color phases.

f Includes red, flying, and ground squirrels.

estimated gross economic value for trapping in the basin of $7.6 million that year. Operating, equipment, travel, and other costs associated with trapping were also examined by McLean.

A copy of McLean's analysis is attached to this chapter as an example of one method of conducting an analysis of the economics of furbearer trapping. Some of McLean's assumptions and methods may not be valid for other areas and so should be adjusted appropriately.

Although snowmachines are the dominant form of trapper transport regionwide, their use can vary greatly between localities.

No precise data are available on the number of trappers in the Interior Region. Trapper resident information is available from licenses, sealing documents, dealer purchase, and trapper export forms, but it is not always the case that trappers trap where they live.

E. Western Region

The Western Region is among the most important areas in the state for harvest of aquatic furbearers and arctic and red foxes. The region has contributed an average of 20% of the statewide harvest of beaver and land otter, 35% of the statewide exports of mink and muskrat, and 24% of the exports of arctic and red fox from 1977-1978 through 1983-1984. Red fox, mink, and land otter pelts from the Western Region are known for their consistently high quality and value compared to other regions.

Table 20 depicts the estimated number of raw pelts exported and harvested, their export market value, and the estimated total value for nine furbearers during the years 1977-1978 through 1983-1984. Harvests and values varied widely. Peak harvest for most furbearers during the period was in 1980-1981, except for mink, marten, and lynx. Harvest of the latter was highest in 1978-1979 and that of the others in 1981-1982. Although furbearer harvests are higher than they were in the early 1970's, the take is substantially less than the level of 20-30 years ago. Dinneford (1981) reports the historical high mink harvest was 40,000 pelts in 1953-1954. Although fur prices have increased in the interim, they have not kept up with inflation, and interest in trapping is lower than observed in past decades (Machida, pers. comm. 1986). Overtrapping is not a factor because the only significant effects of current trapping density are in areas immediately adjacent to villages (Machida 1984). A possible exception is lynx, which may have been overtrapped in some areas. There seems to be potential for trapping to expand in the region, given the necessary economic conditions.

Table 20. Estimated Number of Raw Pelts Exported and Harvested, Their Market Value and Their Estimated Total Value for the Western Region, 1977-78 through 1983-84

Trapping Season	Exports	Market[c] Value $	Estimated[a] Harvest	Estimated[d] Total Value $	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $
	Beaver				Mink			
1977-78	1,099	32,970	1,695	50,850	4,662	139,860	6,340	190,200
1978-79	1,042	25,935	1,223	30,440	3,621	168,992	4,744	221,402
1979-80	1,555	73,800	2,067	98,100	637	29,054	834	38,038
1980-81	1,736	74,648	2,502	107,586	4,939	242,011	7,754	379,946
1981-82	1,880	47,790	1,794	45,603	10,013	464,904	13,518	627,640
1982-83	669	17,006	1,185	30,123	3,007	93,788	5,864	182,898
1983-84	334	7,348	981	21,582	3,478	93,906	8,208	221,616

(continued)

Table 20 (continued).

Trapping Season	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $
	Muskrat				Marten			
1977-78	6,908	27,632	9,049	36,196	799	27,965	1,087	38,045
1978-79	8,833	37,099	11,571	48,598	783	40,050	1,026	52,480
1979-80	21,082	106,464	27,617	139,466	444	20,602	582	27,005
1980-81	31,391	125,564	49,284	197,136	466	17,708	732	27,816
1981-82	8,200	25,010	11,070	33,764	950	40,223	1,283	54,322
1982-83	1,793	50,204	3,496	9,789	392	22,191	764	43,250
1983-84	533	1,866	1,258	4,403	34	1,734	80	4,080

(continued)

Table 20 (continued).

Trapping Season	Exports	Market[c] Value $	Estimated[a] Harvest	Estimated[d] Total Value $	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $
	Land Otter				Arctic Fox			
1977-78	443	24,365	506	27,830	482	21,690	656	29,520
1978-79	500	42,025	686	57,658	493	23,910	646	31,331
1979-80	221	17,523	343	27,196	187	9,988	245	13,085
1980-81	386	16,984	645	28,380	922	40,568	1,448	47,784
1981-82	468	19,389	385	15,950	484	20,052	653	22,568
1982-83	103	4,027	222	8,680	76	1,942	148	3,781
1983-84	224	7,168	618	19,776	47	1,504	91	2,912

(continued)

Table 20 (continued).

Trapping Season	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $
	Red Fox[e]				Weasel			
1977-78	1,854	157,590	2,521	214,285	98	147	133	200
1978-79	2,712	326,796	3,553	428,137	9	13	12	17
1979-80	2,470	239,590	3,236	313,892	4	6	5	7
1980-81	2,679	241,110	4,206	378,540	6	8	9	13
1981-82	2,148	190,871	2,900	257,694	13	11	18	16
1982-83	339	17,512	661	34,147	0	0	0	0
1983-84	281	21,075	663	49,725	0	0	0	0

(continued)

Table 20 (continued).

Trapping Season	Exports	Market[c] Value $	Estimated[a] Harvest	Estimated[d] Total Value $	Exports	Market[c] Value $	Estimated[a] Harvest	Estimated[d] Total Value $
	Lynx				Wolf			
1977-78	21	5,040	56	13,440	---	---	2	280
1978-79	110	43,460	79	31,212	---	---	1	197
1979-80	39	11,277	66	19,084	---	---	0	0
1980-81	74	17,390	55	12,925	---	---	1	255
1981-82	94	25,931	55	15,172	---	---	1	228
1982-83	27	7,101	67	17,626	---	---	5	902
1983-84	2	624	23	7,176	---	---	0	0

(continued)

Table 20 (continued).

Trapping Season	Exports	Market[c] Value $	Estimated[a] Harvest	Estimated[d] Total Value $	Estimated Total Value of All Species $
			Wolverine		
1977-78	---	---	10	1,400	602,902
1978-79	---	---	8	2,145	903,617
1979-80	---	---	15	3,364	679,237
1980-81	---	---	10	1,710	1,182,091
1981-82	---	---	6	1,393	1,074,350
1982-83	---	---	11	2,233	333,429
1983-84	---	---	3	690	331,960

Source: ADF&G furbearer files; Melchior, 1982, 1983, 1984, 1985.

--- means no data were available.

a Sealed pelts.

b Exports multiplied by a ratio of sealing to export data (see table 7 and statewide furbearer economic narrative for derivation).

c Exports multiplied by average raw pelt prices (table 5).

d Estimated harvest multiplied by average raw pelt price.

e Includes all color phases.

The estimated total value for furs was about $1 million in both 1980-1981 and 1981-1982. As with the tables in the other regions, the figure is likely an underestimate. Total value declined substantially to about $330,000 in 1982-1983 and 1983-1984, mainly as a result of lower harvests and pelt prices.

Mink is the most important commercial furbearer in the Western Region, because of large size, high quality, and uniformity of color (Machida 1984). It consistently accounts for the largest portion of total furbearer values. The 1981-1982 season was the best for mink, which were worth about $627,000 that year. Red fox also account for a large portion of furbearer values in the region. Red fox brought nearly $380,000 in 1980-1981, but harvests and values dropped in following years.

Along with commercial use, domestic use of furbearers, both for clothing and food, is high in the region. Details of some domestic uses can be found in the Human Use section in volume 2 of the Alaska Habitat Management Guide for the Western and Interior regions.

By counting the total number of trappers listed on dealer purchase and trapper export forms who resided in the Western Region, Dinneford (1981) estimated 812 trappers in 38 villages for the 1979-1980 season. This method could be used for any region or area to estimate trapper numbers. In Western Alaska, almost all trappers use areas adjacent to their villages (Machida, pers. comm.). But trappers, especially those from urban areas, do not always trap where they live. Trapper resident information is also available on sealing documents. Information on the number of beaver trappers residing in the region is presented in the Human Use section of the Alaska Habitat Management Guide for the Western and Interior regions.

Trapper questionnaires for the Western Region have not asked about transportation used in trapping. In general, snowmachines are the primary means of access for trappers and furbearer hunters in the Western Region. Some discussion of types of access is presented in the Human Use section of the Alaska Habitat Management Guide for the Western and Interior regions.

F. Arctic Region

Table 21 shows export totals for 10 species of furbearers in the Arctic Region from 1977-1978 through 1983-1984. Arctic fox, red fox, and lynx are the most important export furbearers in the region. Wolf and wolverine, however, are the most highly prized species. People in the region utilize all they take and, in

Table 21. Numbers of Raw Pelts Exported From the Arctic Region, 1977-78 through 1983-84

Year 1977-78

Species	Arctic: Fur Dealer Exports	Arctic: Trapper Exports	Arctic: Personal Use Exports	Arctic: Total	% of Statewide Export	Statewide Export
Beaver	7	8	0	15	0	5,417
Mink	68	126	0	194	2	11,030
Muskrat	75	295	0	370	1	47,564
Marten	230	25	0	255	1	24,995
Land otter	5	2	0	7	0	1,786
Arctic fox	235	186	7	428	31	1,388
Red fox[a]	371	403	1	775	12	6,334
Weasel	1	6	0	7	1	908
Lynx	136	181	0	317	18	1,738
Squirrel[b]	36	0	0	36	11	317

Year 1978-79

Beaver	20	13	0	33	1	3,838
Mink	105	10	0	115	1	10,348
Muskrat	812	1,508	0	2,320	7	32,803
Marten	449	44	0	493	2	29,467
Land otter	12	1	0	13	1	1,545
Arctic fox	934	442	0	1,376	52	2,661
Red fox[a]	2,266	595	0	2,861	29	10,018
Weasel	0	1	0	1	0	673
Lynx	410	130	0	540	23	2,383
Squirrel[b]	1	0	0	1	0	780

(continued)

Table 21 (continued).

Year 1979-80

Species	Arctic				% of Statewide Export	Statewide Export
	Fur Dealer Exports	Trapper Exports	Personal Use Exports	Total		
Beaver	255	19	0	274	3	10,070
Mink	164	26	0	190	3	7,459
Muskrat	659	1,647	0	2,306	6	41,814
Marten	1,218	3	0	1,221	5	26,042
Land otter	39	0	0	39	3	1,436
Arctic fox	202	250	0	452	47	970
Red fox[a]	2,200	335	0	2,535	27	9,499
Weasel	0	2	0	2	0	474
Lynx	472	61	0	533	29	1,829
Squirrel[b]	0	0	0	0	0	1,023

Year 1980-81

Beaver	232	28	0	260	4	7,366
Mink	229	200	0	429	3	14,852
Muskrat	6,375	1,007	0	7,382	13	57,546
Marten	138	30	0	168	1	24,284
Land otter	7	1	0	8	1	1,425
Arctic fox	708	104	3	815	42	1,936
Red fox[a]	1,466	277	0	1,743	22	8,002
Weasel	0	0	0	0	0	228
Lynx	212	38	1	251	10	2,483
Squirrel[b]	14	0	0	14	0	619

(continued)

Table 21 (continued).

Year 1981-82

Species	Arctic: Fur Dealer Exports	Arctic: Trapper Exports	Arctic: Personal Use Exports	Arctic: Total	% of Statewide Export	Statewide Export
Beaver	6	26	0	32	1	5,961
Mink	549	115	0	664	4	18,922
Muskrat	691	184	0	875	5	18,147
Marten	119	24	0	143	1	25,251
Land otter	2	2	0	4	0	1,470
Arctic fox	560	75	6	641	43	1,478
Red fox[a]	2,133	375	0	2,508	24	10,309
Weasel	14	2	0	16	9	188
Lynx	815	64	0	879	22	3,984
Squirrel[b]	0	0	0	0	0	513

Year 1982-83

Beaver	0	15	0	15	0	3,331
Mink	226	8	0	234	3	7,706
Muskrat	5	98	0	103	2	6,193
Marten	29	15	0	44	0	16,370
Land otter	6	2	0	8	1	869
Arctic fox	373	24	0	397	61	646
Red fox[a]	266	47	0	313	10	3,238
Weasel	28	0	0	28	12	240
Lynx	543	8	0	551	17	3,220
Squirrel[b]	0	0	0	0	0	201

(continued)

Table 21 (continued).

Year 1983-84

Species	Arctic: Fur Dealer Exports	Arctic: Trapper Exports	Arctic: Personal Use Exports	Arctic: Total	% of Statewide Export	Statewide Export
Beaver	0	3	0	3	0	2,362
Mink	22	7	0	29	0	9,024
Muskrat	0	22	0	22	0	9,936
Marten	71	16	0	87	1	13,594
Land otter	2	11	0	13	1	907
Arctic fox	337	10	0	347	60	574
Red fox[a]	170	63	0	233	8	2,980
Weasel	6	0	0	6	3	232
Lynx	124	35	0	159	8	1,925
Squirrel[b]	0	0	0	0	0	198

Source: Computer printouts from Statistics Section, ADF&G, Div. Game, Anchorage.

a Includes the cross, black, and silver color phases.

b Includes red, flying, and ground squirrels.

addition, import pelts of these two species from other areas, including Canada (Melchior, pers. comm.). The region accounts for only a small portion of the total statewide exports of other furbearers. Large numbers of muskrats are taken, however, in the Selawik and Kobuk river deltas by residents for personal use of pelts and food (ibid.).

Table 22 shows the estimated number of raw pelts exported and harvested, their market value, and the estimated total harvest value for 12 furbearers from 1977-1978 through 1983-1984. As in tables for the other regions, there are no export data for wolf and wolverine. The estimated total value of all species was highest in 1978-1979, at about $888,000. The value declined to about $275,000 in 1983-1984. As in the other regions, the harvests and values were calculated based on exports from the Arctic Region and may underestimate the actual production from the region. Furs harvested in the Arctic may be exported by a dealer in another region of the state.

Information on trapper residency is available from sealing documents, trapper export forms, and dealer purchase forms but has not been compiled.

Table 22. Estimated Number of Raw Pelts Exported and Harvested, Their Market Value and Their Estimated Total Value for the Arctic Region, 1977-78 through 1983-84

Trapping Season	Exports	Market[c] Value $	Estimated[a] Harvest	Estimated[d] Total Value $	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $
	Beaver				Mink			
1977-78	15	450	15	450	194	5,820	264	7,920
1978-79	33	821	43	1,070	115	5,367	151	7,047
1979-80	274	13,004	257	12,197	190	8,666	249	11,357
1980-81	260	11,180	315	13,545	429	21,021	674	33,026
1981-82	32	813	111	2,822	664	30,830	896	41,601
1982-83	15	381	55	1,398	234	7,298	456	14,223
1983-84	3	66	65	1,430	29	783	68	1,836

(continued)

Table 22 (continued).

Trapping Season	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $
	Muskrat				Marten			
1977-78	370	1,480	503	2,012	255	8,925	347	12,145
1978-79	2,320	9,774	3,039	12,764	493	25,217	646	33,043
1979-80	2,306	11,645	3,021	15,256	1,221	56,654	1,600	74,240
1980-81	7,382	29,528	11,590	46,360	168	6,384	264	10,032
1981-82	875	2,669	1,181	3,602	143	6,055	193	8,172
1982-83	103	288	201	563	44	2,491	86	4,868
1983-84	22	77	52	182	87	4,437	205	10,455

(continued)

Table 22 (continued).

Trapping Season	Exports	Market[c] Value $	Estimated[a] Harvest	Estimated[d] Total Value $	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $
	Land Otter				Arctic Fox			
1977-78	7	385	35	1,925	428	19,260	582	26,190
1978-79	13	1,093	25	2,101	1,376	66,736	1,803	87,446
1979-80	39	3,092	39	3,092	452	24,141	592	31,619
1980-81	8	352	33	1,452	815	26,895	1,280	42,240
1981-82	4	166	15	621	641	22,153	865	29,894
1982-83	8	313	21	821	397	10,143	774	19,776
1983-84	13	416	15	480	347	7,634	819	18,018

(continued)

Table 22 (continued).

Trapping Season	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $
	Red Fox[e]				Weasel			
1977-78	775	65,875	1,054	89,590	7	11	10	15
1978-79	2,861	344,751	3,748	451,634	1	1	1	1
1979-80	2,535	245,895	3,321	322,137	2	3	3	4
1980-81	1,743	156,870	2,737	246,330	0	0	0	0
1981-82	2,508	222,861	3,386	300,880	16	14	22	19
1982-83	313	16,170	610	31,513	28	140	55	275
1983-84	233	17,475	550	41,250	6	12	14	28

(continued)

Table 22 (continued).

Trapping Season	Exports	Market[c] Value $	Estimated[a] Harvest	Estimated[d] Total Value $	Exports	Market[c] Value $	Estimated[a] Harvest	Estimated[d] Total Value $
	Wolf				Wolverine			
1977-78	---	---	106	14,840	---	---	113	15,820
1978-79	---	---	91	17,927	---	---	104	27,879
1979-80	---	---	37	8,152	---	---	55	12,333
1980-81	---	---	101	25,755	---	---	47	8,037
1981-82	---	---	60	13,650	---	---	80	18,579
1982-83	---	---	60	10,823	---	---	59	11,977
1983-84	---	---	54	14,148	---	---	92	21,160

Trapping Season	Exports	Market[c] Value $	Estimated[a] Harvest	Estimated[d] Total Value $
	Lynx			
1977-78	317	76,080	419	100,560
1978-79	540	213,349	625	246,931
1979-80	533	154,117	669	193,441
1980-81	251	58,985	392	92,120
1981-82	879	242,481	974	268,688
1982-83	551	144,952	1,116	293,586
1983-84	159	49,608	531	165,672

(continued)

Table 22 (continued).

Trapping Season	Exports	Market[c] Value $	Estimated[b] Harvest	Estimated[d] Total Value $	Estimated Total Value of All Species $
			Squirrel		
1977-78	36	18	49	25	721,042
1978-79	1	1	1	1	887,844
1979-80	0	0	0	0	683,828
1980-81	14	20	22	31	518,928
1981-82	0	0	0	0	688,528
1982-83	0	0	0	0	389,823
1983-84	0	0	0	0	274,659

Source: ADF&G furbearer files; Melchior, 1982, 1983, 1984, 1985.

--- means no data were available.

a Sealed pelts.

b Exports multiplied by a ratio of sealing to export data (see table 7 and statewide furbearer economic narrative for derivation).

c Exports multiplied by average raw pelt prices (table 5).

d Estimated harvest multiplied by average raw pelt price.

e Includes all color phases.

f Includes red, flying, and ground squirrels.

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Attachment A

TRAPPING

I. GROSS REVENUES

Gross revenues derived from commercial trapping in the Tanana Basin can be estimated by multiplying the number of furs harvested in the region by the average market price per pelt.

Number of Animals Harvested

The average fur harvest was calculated for the 1980-1981 season based on fur export data as reported to the Department of Fish and Game (Table A-1). However, it was necessary to adjust the estimated harvest because export reports have consistently underestimated actual harvests. Although the degree to which all fur harvests are underestimated is not known, based on a comparison of the number of pelts sealed to the reported number of pelts exported (for beaver, lynx and otter), Herb Melchior (ADF&G's Statewide Furbearer Biologist) has concluded that reported exports, on the average, underestimate the number sealed by 34 percent. In addition, although sealing data provide the best estimator of harvest that we have for certain furbearer species, they do not account for 100 percent of the harvest (i.e., many furs harvested are not reported to Fish and Game). Therefore, all harvest figures used in this analysis have been increased by a conservative 40% to account for both the fact that export data underestimates harvests and that many furs harvested are not reported.

Price/Pelt

Two separate prices were calculated to account for fur pelts which were not sold "raw", but rather were initially processed by the trapper to make hats, mukluks or coats. Fur that is processed at home brings a higher price than furs sold directly to buyers. In addition, it was necessary to determine the total number of furs which were processed at home. These estimates were determined by comparing the ratio of furs sold directly to dealers in-state plus fur exports to Lower 48 dealers with the number of furs personally exported for tanning. Table A-1 summarizes these assumptions and depicts the total current gross revenues derived from trapping in the TBAP area.

II. OPERATING COSTS

The total amount of money spent by a trapper to participate in this activity, when subtracted from gross revenues as established in the previous section, results in a net profit, or individual producer benefit, for the trapper.

A trapper's operating costs include the amortized costs of owning various combinations of airplane, snowmachine, dog team, and highway vehicles, miscellaneous equipment (traps, dog harnesses, gas cans, etc.) and the annual cost of fuel to run equipment. Each of these costs are calculated in separate sections of this analysis.

For the purpose of this evaluation, these costs were calculated to estimate total operating costs for the "typical" trapper. However, there is a large

*Reprinted from R. F. McLean, Economic value of the resource, chap. 5 in Tanana Basin Area Plan for State Lands (ADNR, Fairbanks, AK, 1985).

measure of variability among trappers as to the type and degree of participation in trapping. For instance, some trappers derive a significant portion of their income from trapping while others primarily trap for recreational benefits. In addition, most individuals do not exert equal trapping pressure on all furbearer species. For instance, based on trapper responses to the 1982-83 ADF&G Trapper Survey, only 6% of all TBAP Area trappers trapped for beaver. Consequently, the estimates of the average units of gear per trapper were calculated as an average for all trappers. Again using beaver as an example, the results of the 1982-83 ADF&G Trapper Survey allowed us to calculate that the average number of beaver traps set per trapper for those who actually trapped for beaver was 10.8. However, weighted for the number of trappers who did not trap for beaver, the average number of beaver traps set per trapper for the "typical" TBAP trapper was 0.62.

The final step in calculating total operating costs for trapping in the TBAP area was to breakdown expenditures separately for each mode of transportation used by trappers. These subtotals were then summed on a weighted basis relative to the percent of trappers using each respective mode. The distribution of trapping effort by transportation mode was estimated from the 1982-83 ADF&G Trappers Survey and were calculated as follows:

Mode	Percent of Total Trappers Using This Mode
Airplane/Walking	1.5
Airplane/Dog Team	3.0
Airplane/Snowmachine	4.5
Vehicle/Walking	6.1
Vehicle/Dog Team	1.5
Vehicle/Snowmachine	53.0
Snowmachine Only	27.3
Dog Team Only	1.5
Walking Only	1.5

Capital Costs

Various combinations of an airplane, snowmachine, dog team, highway vehicle, and walking are generally used to reach a trapline and to run the line. Each different mode, and combination of modes have different costs associated with them. The amortized cost of owning a piece of equipment is only one of the capital expenses of trapping. There is also the cost of other miscellaneous items such as dog harnesses and gas cans. The total cost of these items must also be prorated over their expected life-cycle to calculate the cost of the equipment per year.

Since a particular piece of equipment is generally also used for activities unrelated to trapping, only 40% of the yearly cost of a plane, and 60% of the cost of a snowmachine and dog team was attributed to trapping. Since less than 1% of the use of a motor vehicle can be attributed to trapping, no annual capital costs were calculated. However, vehicle operating costs were calculated and are discussed in the next section.

The assumptions which were made to calculate the capital costs of owning equipment used in trapping are broken down in Table A-3.

Travel Costs

A trapper's operating costs include both the roundtrip costs of getting to and from the start of the trapline and the costs of actually running the trapline. Although the automobile/snowmachine and snowmachine only modes are the most common forms of transportation in the TBAP area, all possible combinations of airplane, automobile, snowmachine, dog team, and foot travel are utilized by trappers.

In order to calculate the travel costs it was first necessary to estimate the average roundtrip distance to the start of the trapline and the average length of the trapline. These estimates were calculated based on the pooled Fairbanks Area/Rural TBAP area responses to the 1982-83 Trapper Survey (Table A-8, A-9, and A-10).

Secondly, it was necessary to estimate the average number of times a trapper checks his traps during the 16 week trapping season. Based on assumptions provided by Herb Melchior (ADF&G Statewide Furbearer Biologist) and a review of the 1982-83 ADF&G Trapper Survey, this analysis assumes that the average non-aircraft trapper checks his line 1.5 times a week or 24 times a season. Trappers who utilized aircraft to travel to their traplines were assumed to average one trip per week or 16 times a season.

The final assumptions which were included in this analysis of travel costs were the actual operating expenditures per mile (or hour) for aircraft, vehicles and snowmachines. It was assumed that most aircraft trappers use a Super Cub class airplane which consumes approximately 6 gallons of gas per hour. Most vehicle trappers utilize four-wheel drive vehicles which were assumed to have an operating cost of $0.40/mile. Snowmachine trappers typically utilize small, lightweight snowmachines which have a rated mileage of 30 to 40 miles per gallon. However, under actual field conditions (deep snow, sled loaded with equipment, spare fuel, etc.) it is assumed that the typical snowmachine only averages 15 miles per gallon.

The assumptions which were made to estimate travel costs per trapper are summarized in Table A-4.

Other Operating Costs of Trapping

In addition to the capital and operating costs of transportation equipment used in trapping, trappers must also purchase a variety of traps, stretcher boards, rifle, knife, ax, and other miscellaneous equipment.

The assumptions used to calculate the average cost per year for this equipment are presented in Table A-5. As initially indicated, these assumptions represent the average amount of equipment used by the "typical" trapper and have been adjusted to validly reflect the inclusion of trappers who did not participate in all forms of trapping.

Summary of Operating Expenses

The total cost per trapper per year was determined by adding together (a) transportation equipment costs, (b) travel costs, and (c) other operating costs. These costs are summarized in Table A-6.

III. NET BENEFITS TO TRAPPING

The gross revenue from trapping in the Tanana Basin during the 1980-1981 season was $1,130,286. Net revenue, or producer surplus was $424,238.

IV. POTENTIAL BENEFITS

Major opportunities exist for substantially increasing the economic benefits of trapping in the TBAP area. Based on the comparison of the current total Statewide fur export with the historic 1910-1983 trend, it is evident that the 1980-81 statewide export was substantially below the State's average sustained fur export (Figure A-1). Unfortunately, similar historic records for the Tanana Basin are no longer available. It is reasonable, however, to assume that fur exports derived from the Tanana Basin have followed a similar pattern to that of the State as a whole. Although several factors are undoubtedly responsible for the marked post-World War II decline in fur export production, the rapid expansion of a cash economy and employment opportunities based on large government capital project expenditures during this period appears to be one of the most significant.

Notwithstanding this apparent decline in the level of fur trapping, ADF&G biologists have concluded that there is no apparent physical evidence to indicate that the habitat's carrying capacity or the abundance of furbearers in the Tanana Basin is significantly different from historic levels. Therefore, it is reasonable to believe that the potential furbearer harvest in the TBAP area could once again approximate the average historic level.

In addition, the economic benefit of trapping in the TBAP area could be increased with the inclusion of in-State secondary fur processing and fur garment manufacture. Currently, most fur pelts are exported "raw" out-of-State.

Although it is extremely risky to attempt to project potential economic benefits for a new industry without, at a minimum , a preliminary market assessment and a good understanding of the anticipated inter-relationship of the proposed industry with other trade sectors in Alaska, it is possible to make a gross estimate of the potential economic benefits. These estimates, therefore, should be viewed as speculative and thus significant only as an indicator of the order of magnitude of the potential benefits.

Several assumptions were made prior to calculating the potential economic benefit of trapping in the TBAP Area. These assumptions were:

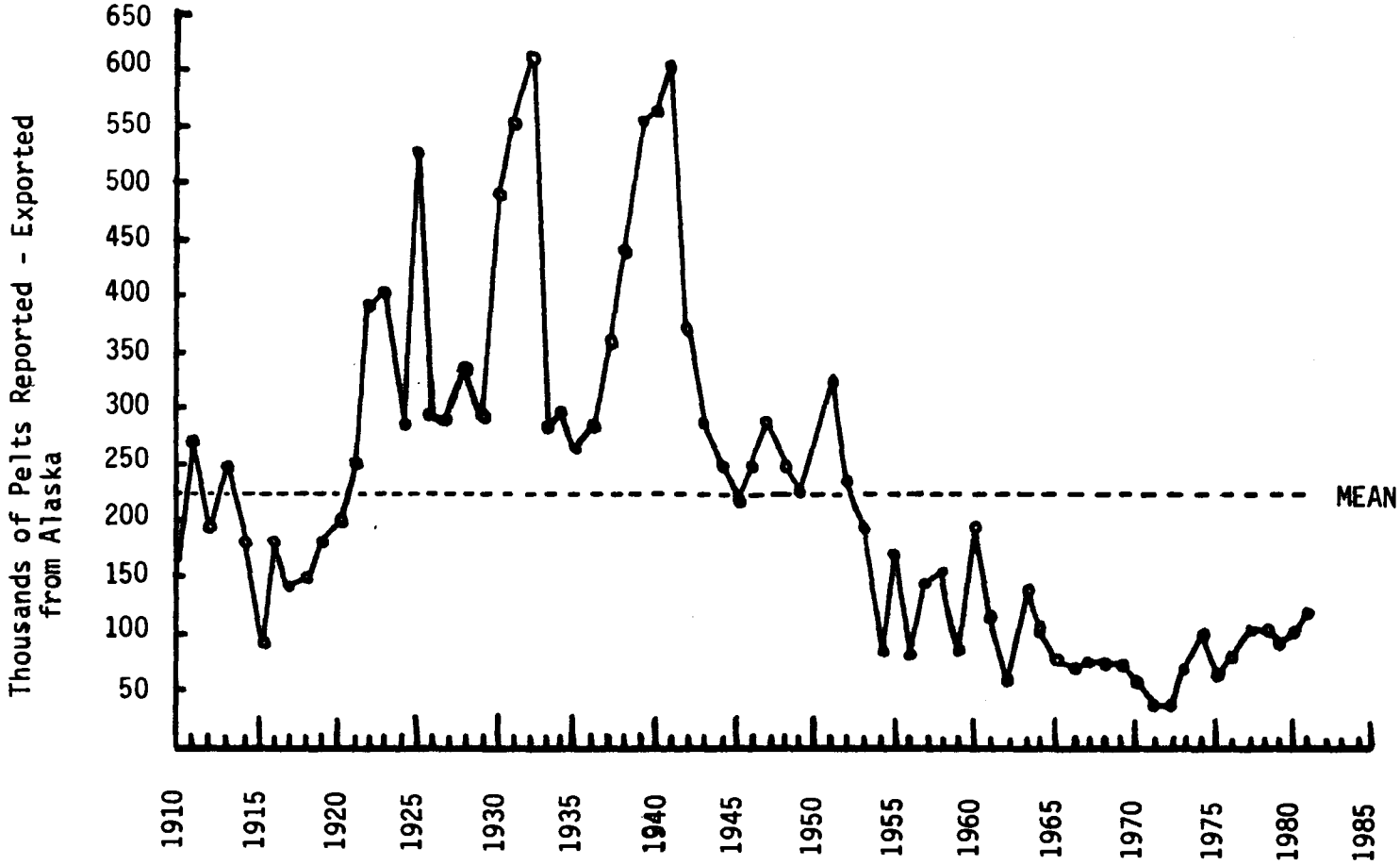

FIGURE A-1. Alaska Fur Export Statistics, in thousands of Pelts, 1910 to 1981.

1) An expansion of the domestic and international fur market sufficient to support the expansion of the annual TBAP fur harvest up to the average historic level (approx. 200% increase over current levels).
2) Continued matching of fur supply with demand so as to maintain current fur prices.
3) The inclusion of in-State fur processing and fur garment manufacturing industries are conservatively estimated to add 100% of "value-added" to the "raw" fur trapping values.
4) The use of a gross income multiplier of 1.74 for the expanded fur trapping industry and 1.72 for the potential secondary fur industries. These multipliers were calculated by Logsdon, et al, 1977, for the fishing and manufacturing industries, respectively, and were chosen, in the absence of more refined estimates, as most representative of the trapping industries.

Based on these assumptions, the estimated potential gross economic value of trapping in the TBAP Area is 7.6 million dollars.

Potential Fur Harvest Gross Revenue	2.2 Million
Gross Secondary Economic Effect	1.6 Million
Sub-total	3.8 Million
Secondary Fur Processing & Manufacture - Gross Revenue	2.2 Million
Gross Secondary Economic Effect	1.6 Million
Sub-total	3.8 Million
TOTAL	7.6 Million

TABLE A-1. Summary of Current Gross Revenues from Trapping in the TBAP Area.

Species	1980-81 Fur Harvest (#'s) 1)	% of Raw Furs Exported	Price of Exported Furs 2)	Gross Revenues From Exported Furs	% of Raw Furs Locally Processed	Price for Furs Locally Processed	Gross Revenues From Furs Locally Processed	Gross Revenues for Exported and Locally Processed Furs
Beaver	1,796	100%	$ 43.00	77,228	0	0	0	77,228
Fox	2,021	95%	90.00	172,796	5%	180.00	18,189	190,985
Marten	10,998	95%	38.00	397,028	5%	100.00	54,900	451,928
Mink	1,813	99%	49.00	87,949	1%	100.00	1,800	89,749
Muskrat	11,883	95%	4.00	45,155	5%	8.00	4,753	49,908
Lynx	707	99%	235.00	164,484	1%	500.00	3,500	167,984
Otter	51	97%	44.00	2,177	3%	88.00	135	2,312
Wolf	200	0	0	0	100%	300.00	0	60,000
Wolverine	134	0	0	0	100%	300.00	0	40,200
TOTAL								$1,130,286

1) Alaska Department of Fish and Game. The 1980-81 harvest was estimated by adjusting the reported fur export upwards by 40% to account for unreported harvests. See text for explanation.

2) Appendix TabTe A-2.

TABLE A-2. Average Price per Pelt for Exported and Locally Processed Furs, TBAP Area.

Species	% of Furs Sold at Given Price 1)	Price per Pelt 2)
Beaver		
Exported	100%	$ 43.00
Fox		
Exported	95%	90.00
Locally Processed	5%	180.00
Marten		
Exported	95%	38.00
Locally Processed	5%	100.00
Mink		
Exported	99%	49.00
Locally Processed	1%	100.00
Muskrat		
Exported	95%	4.00
Locally Processed	5%	8.00
Lynx		
Exported	99%	235.00
Locally Processed	1%	500.00
Otter		
Exported	97%	44.00
Locally Processed	3%	88.00
Wolf		
Locally Processed	100%	300.00
Wolverine		
Locally Processed	100%	300.00

1) Alaska Department of Fish and Game. See text for estimation methodology.

2) "The Alaska Trapper and Dog Mushing News," February, 1982, Page 19. Locally processed price was estimated based on ADF&G conversations with local trappers and fur garment manufactures.

TABLE A-3. Total Costs Associated with Owning, Operating and Maintaining Equipment for Trapping in the TBAP Area, 1978

Mode	Major Equipment Cost	Life Cycle	Prorated Cost/Year	Other Misc. Gear	Life Cycle	Prorated Cost/Year	Annual Maint. Cost	Total Yearly Cost	% Attrib. to Trapping	Total Cost/Year Attrib. to Trapping
Airplane	$25,000	20	$1,250	0	0	0	$2,100[2]	$3,350	40%	$1,340.00
Snowmachine	2,500[3]	5[3]	500	$150	10	$ 15	35	550	60%	330.00
Dog Team	750[4]	5	150	500	5	100	0	250	60%	150.00
Automobile[1]										

Source: Alaska Department of Fish and Game and conversations with local trappers.

[1]The cost of automobile ownership is not calculated the same way as snowmachine, airplane and dogs since the percentage of times per year that the vehicle is used for trapping versus other uses is so small. The automobile costs are calculated on the next table at 40¢/mile.

[2]Other costs for airplanes include (a) $750/year for an overhaul and other general maintenance (b) $350/year for engine rebuilding ($7,000 for rebuilding once during the 20 year life of the plane) (c) $1,000/year insurance.

[3]The cost and life of a trappers snowmachine is different than the calculations used to determine snowmachine cost to a hunter or recreational user. The cost to a trapper is slightly more ($2,500 rather than $2,000) and the machine lasts only 5 years rather than 10.

[4]Average team has 10 dogs, each of which cost approximately $75.00.

TABLE A-4. Annual Travel Costs Per Trapper Associated with Getting to and Running a Trapline, by Mode of Transportation in the TBAP Area, 1981.

	TRAVEL COSTS FROM RESIDENCE TO TRAPLINE						TRAVEL COST TO RUN TRAPLINE				TOTAL COST
Mode	Miles/Hours Traveled to Start of Trapline (Roundtrip)[1]	Cost/Mile or Hour	Total Cost to get to Starting Pt. of Line	# Times/ Season Expend. is Incurred	Total Cost/ Year to get to Trapline	Average Trapline Length (Miles) (Roundtrip)	Cost/Mile	Total Transportation Cost to Run Trapline	# Times/ Season Expend. is Incurred	Total Cost/ Year for Trans. to Run Line	Total Transport Cost/Year Run Line
Airplane & Foot	1.5 hrs.	10.20/hr.[2]	15.30	16[4]	244.80	0	---	---	---	---	$ 244.80
Airplane & Dog Team	1.0 hrs.	10.20/hr.[2]	10.20	16[4]	163.20	65	---	---	---	864.00[6]	1,027.20
Airplane & Snow-machine	1.5 hrs.	10.20/hr [2]	15.30	16[4]	244.80	30	0.10/mile	3.00[3]	16[4]	48.00	292.80
Passenger Vehicle & Foot	23 miles	.40/mile	9.20	24	220.80	5	---	---	---	---	220.80
Passenger Vehicle & Dog Team	60 miles	.40/mile	24.00	24	576.00	60	---	---	---	864.00[6]	1,440.00
Passenger Vehicle & Snow-machine	63 miles	.40/mile	25.20	24	604.00	63	0.10/mile	6.30[3]	24	151.20	756.00
Dog Team only	---	---	---	---	---	35	---	---	---	864.00[6]	864.00
Snowmachine only	---	---	---	---	---	41	0.10/mile	4.10[3]	24	98.40	98.40
Foot only	---	---	---	---	---	4	---	---	---	---	0

Source: Alaska Department of Fish and Game and local trappers.

(continued)

TABLE A-4 (continued).

Footnotes:

[1] ADF&G 1982-83 Trapper Survey. Unpublished. Fairbanks.

[2] 1 hour flying times uses up 6 gallons of gas. 6 gallons at $1.70/gallon equals $10.20/hour.

[3] Assumes 15 mile/gal. gas @ $1.50 gal. = $0.10/mile.

[4] Trappers that use airplanes fly their line once a week or 16 times each season, and then spend 2 days running the line.

[5] Average of 1.5 trips a week over a 16 week season equals 24 trips a season.

[6] Trappers using dog teams do not expend a certain amount of money for fuel on each trip they take. They do however, have to feed their dogs. Each dog costs approximately $12 per month. 10 dogs @ $12/month = $120/month x 12 months/year = $1440/year. However, only 60% of the yearly cost of dogs is attributable to trapping since the dogs are used for other activities as well. 60% of $1440 = $864/year.

BLE A-5. Annual Miscellaneous Equipment Costs for Trapping in the TBAP Area.

Equipment	Cost of Equipment	Average # of Items Owned	Life of Equipment	Total Cost/ Year of Equipment	% of Yearly Cost Attributable to Trapping	Total Cost/ Year for Equipment
Mink/ Marten Traps	$ 35.09/doz.[1]	50.33[2]	5 yrs.	$ 29.43	100%	$ 29.43
Fox Traps	41.45/doz.[1]	20.29[2]	5 yrs.	14.02	100%	14.02
Otter Traps	83.84/doz.[1]	0.29[2]	5 yrs.	0.41	100%	0.41
Lynx Traps	57.25/doz.[1]	27.23[2]	5 yrs.	25.98	100%	25.98
Beaver Traps	103.95.doz.[1]	0.78[2]	5 yrs.	1.35	100%	1.35
olverine Traps	103.95/doz.[1]	5.03[2]	5 yrs.	8.71	100%	8.71
Wolf Traps	59.95/ea. [1]	5.03[2]	5 yrs.	60.31	100%	60.31
Misc. Traps	65.00/doz.	14.41	5 yrs.	15.61	100%	15.61
Stretcher Boards for Beaver	7.50 ea.[3]	½ doz.	5 yrs.	9.00	100%	9.00
Stretcher Boards for Fox	19.25/doz.[1]	1 doz.	10 yrs.	1.95	100%	1.95
Stretcher Boards for Muskrat	12.95/doz.[1]	1 doz.	10 yrs.	5.18	100%	5.18
Stretcher Boards for Mink & Marten	10.00/doz.[1]	2 doz.	10 yrs.	2.00	100%	2.00

(continued)

TABLE A-5 continued.

Equipment	Cost of Equipment	Average # of Items Owned	Life of Equipment	Total Cost/ Year of Equipment	% of Yearly Cost Attributable to Trapping	Total Cost/ Year for Equipment
Stretcher Boards for Lynx	50.00/doz.[1]	½ doz.	10 yrs.	2.50	100%	2.50
Stretcher Boards for Wolf	20.00/bd.[3]	2 bds.	10 yrs.	4.00	100%	4.00
22 Rifle or Pistol	125.00/ea.[3]	1/ea.	10 yrs.	12.50	75%	9.38
Knives, Ax & Saws	60.00[3]	---	10 yrs.	6.00	25%	1.50
Other Misc. Gear	75.00	---	10 yrs.	7.50	100%	7.50
Bailing Wire	15.00/roll	1 roll	0	15.00	100%	15.00
Lures & Scents	---	---	---	30.00[3]	100%	30.00
TOTAL						$243.83

1 Average prices from The Trapper, Vol. 8, No. 11, July 1983.

2 Based on the average number of traps set per trapper, increased by 25% to reflect spare and replacement traps, as reported in the 1982-83 ADF&G Trapper Survey.

3 Estimated by the Alaska Department of Fish and Game based on conversations with local trappers.

TABLE A-6. Total Annual Capital and Operating Expenditures for Trapping in the TBAP Area.

Mode	Cost of Owning Operating & Maintaining Equipment to Get to Trapline (Table A-3)	Cost of Owning Operating & Maintaining Equipment to Run Trapline (Table A-3)	Travel Cost/ Trapper to Run Trapline (Table A-4)	Other Equip. Costs/Trapper/ Year (Table A-5)	Total Cost/ Trapper/Year	% Trappers This Mode	Total Trappers Using This Mode[1]	Total Trapping Costs
Airplane & Foot	1,340.00	0	244.80	243.83	1,828.63	1.5%	9	16,458
Airplane & Dog Team	1,340.00	150.00	1,027.20	243.83	2,761.03	3.0%	18	49,699
Airplane & Snow-machine	1,340.00	330.00	292.80	243.83	2,206.63	4.5%	27	59,579
Passenger Vehicle & Foot	0	0	220.00	243.83	463.83	6.1%	37	17,162
Passenger Vehicle & Dog Team	0	150.00	1,440.00	243.83	1,833.83	1.5%	9	16,504
Passenger Vehicle & Snowmachine	0	330.00	756.00	243.83	1,329.83	53%	318	422,886
Dog Team Only	0	150.00	864.00	243.83	1,257.83	1.5%	9	11,320
Snowmachine Only	0	330.00	98.40	243.83	672.23	27.3%	164	110,246
Foot Only	0	0	0	243.83	243.83	1.5%	9	2,194
TOTAL								706,048

[1] The Alaska Department of Fish and Game has estimated that there are approximately 600 trappers in the Game Management Units 12 and 20.

TABLE A-7. Current Net Producer Benefits from Trapping in the TBAP Area.

	Gross Revenues All Trappers	Operating Costs to All Trappers	Net Revenues or Producer Benefits to All Trappers
1980-81	1,130,286	706,048	424,238

Source: Tables discussed in previous sections of this appendix.

TABLE A-8. 1982-83 ADF&G Trapper Survey, Summary of the Fairbanks Sub-unit Responses, TBAP Area.

Mode	# Trappers Respond.	% of Total Respondents	Round-trip Dist. to Start of Line[2]	R.T. Trap Line Length	Average Number of Sets per Trapper							Average # Years Trapped
					Lynx	Marten	Fox	Otter	Wolf/Wolver.	Beaver	Other	
Airplane & Foot	1	3.0	110	0	0	0	0	0	0	6	0	2
Airplane & Dog Team	0	0	---	---	---	---	---	---	---	---	---	---
Airplane & Snow-Machine	1	3.0	100	30	15	40	2	0	0	15	0	16
Passenger Vehicle & Foot	3	9.1	27	6	9	11	22	0	0	0	17	13
Passenger Vehicle & Dog Team	1	3.0	60	60	16	0	6	0	0	0	10	8
Passenger Vehicle & Snowmachine	18	54.5	74	29	14	40	14	0	3	1	4	7
Foot Only	1	3.0	0	4	1	3	18	0	0	0	3	14
Dog Team Only	1	3.0	0	35	10	0	30	0	0	0	10	10
Snowmachine Only	7	21.2	0	43	24	48	13	1	5	0	4	11
TOTAL[1]	33	100.0	50.9	29	15	34	14	0.2	3	1	5	9

[1] Averages weighted by the percent composition for each mode of transportation.
[2] Estimate based on respondents address and reported trapping area.

TABLE A-9. 1982-83 ADF&G Trapper Survey, Summary of the Rural Sub-unit Responses, TBAP Area.

Mode	# Trappers Respond.	% of Total Respondents	Round-trip Dist. to Start of Line[2]	R.T. Trap Line Length	Average Number of Sets per Trapper							Average # Years Trapped
					Lynx	Marten	Fox	Otter	Wolf/Wolver.	Beaver	Other	
Airplane & Foot	0	0	---	---	---	---	---	---	---	---	---	---
Airplane & Dog Team	2	6.0	75	65	16	128	0	3	0	0	0	7
Airplane & Snow-Machine	2	6.0	100	30	12	25	6	0	20	0	2	9
Passenger Vehicle & Foot	1	3.0	10	3	4	12	0	0	0	0	0	1
Passenger Vehicle & Dog Team	0	0	---	---	---	---	---	---	---	---	---	---
Passenger Vehicle & Snowmachine	17	52.0	51	99	35	41	26	0	22	0	28	15
Foot Only	0	0	---	---	---	---	---	---	---	---	---	---
Dog Team Only	0	0	---	---	---	---	---	---	---	---	---	---
Snowmachine Only	11	33.0	0	40	27	44	12	0	7	0	8	18
TOTAL[1]	33	100.0	37	70	29	45	18	0.2	15	0	17	15

[1] Averages weighted by the percent composition for each mode of transportation.
[2] Estimate based on respondents address and reported trapping area.

TABLE A-10. 1982-83 ADF&G Trapper Survey, Summary of the Combined Fairbanks and Rural Sub-unit Responses, TBAP Area.

Mode	# Trappers Respond.	% of Total Respondents	Round-trip Dist. to Start of Line[2]	R.T. Trap Line Length	Average Number of Sets per Trapper							Average # Years Trapped
					Lynx	Marten	Fox	Otter	Wolf/Wolver.	Beaver	Other	
Airplane & Foot	1	1.5	110	0	0	0	0	0	0	0	6	2
Airplane & Dog Team	2	3.0	75	65	16	128	0	3	0	0	0	7
Airplane & Snow-Machine	3	4.5	100	30	13	30	5	0	13	0	6	11
Passenger Vehicle & Foot	4	6.1	23	5	8	12	17	0	0	0	13	10
Passenger Vehicle & Dog Team	1	1.5	60	60	16	0	6	0	0	0	10	8
Passenger Vehicle & Snowmachine	35	53.0	63	63	24	41	20	0	12	1	16	11
Foot Only	1	1.5	0	4	1	3	18	0	0	0	3	14
Dog Team Only	1	1.5	0	35	10	0	30	0	0	0	10	10
Snowmachine Only	18	27.3	0	41	26	46	13	0.5	4	0	6	15
TOTAL[1]	66	100.0	44	50	22	40	16	0.23	8	0.62	12	12

[1] Averages weighted by the percent composition for each mode of transportation.
[2] Estimate based on respondents address and reported trapping area.

I. INTRODUCTION

A. Definition

Nonconsumptive uses of fish and wildlife are those wildlife-oriented human activities that do not involve the removal or intended removal of animals from their natural habitats. Examples of nonconsumptive uses are wildlife viewing, photography, and scientific study.

The term "nonconsumptive" is widely used to categorize an important group of human activities involving wildlife resources. It should not be confused with the distinctions made between "game" and "nongame," which are terms used in legal designations for kinds of wildlife, because nonconsumptive use activities may involve species that are hunted and fished by other people or at other times.

Use of the term "nonconsumptive" is not, however, meant to imply that these activities have no effects on wildlife resources. In fact, a considerable body of literature has developed concerning the effects of such activities on wildlife populations (Boyle and Samson 1983).

A variety of classifications of nonconsumptive use have been suggested. More (1979) quotes Langenau's four levels of appreciative use: 1) active or passive use of the animal to view, photograph, or study; 2) secondary benefits derived from seeing the animal while engaged in other outdoor recreation; 3) intellectual benefits from reading, thinking, and talking about the animal; and 4) option demand - the value of the animal to nonusers who may wish to "use" the animal in the future.

Although this chapter will focus on the uses described in 1) and 2) above, it is important to recognize that studies of American attitudes toward wildlife have included the "existence" value of wildlife, "just knowing that wildlife were alive and well," Kellert (1980) wrote. Schweitzer (1980) defined ecological value as "perceptions that wildlife and fish are important for other than market or social reasons which includes belief in both protection of individual species and 'ecological integrity'."

B. Purposes of this Chapter

Managers of fish, wildlife, and land are increasingly aware of a growing constituency of nonconsumptive users. For both Alaska and the nation as a whole, data from the 1980 National Survey of Fishing, Hunting and Wildlife-Associated Recreation (USFWS 1982) showed that although many of the same people were involved in both

nonconsumptive and consumptive uses, nonconsumptive users considerably outnumbered consumptive users. Consumptive uses in this survey were sport and, apparently, subsistence hunting and fishing; commercial activities like trapping and commercial fishing were excluded.

Although nonconsumptive fish and wildlife uses support large business sectors with significant economic consequences for Alaska, no attempt has yet been made to estimate the total dollar value of these uses. The theoretical and practical difficulties of quantifying dollar values for nonconsumptive fish and wildlife uses are, however, beyond the scope of this chapter. Instead, indicators of demand are presented, some of them from statewide and regional surveys and others from site-specific use data (e.g., visitors to Denali National Park). In effect, this chapter provides an assessment of existing information and indicates the need for future data collection and analysis of nonconsumptive uses of fish and wildlife in Alaska.

For natural resource policy in general, evidence of substantial nonconsumptive wildlife use means that natural environments have economic value as habitat for birds and other observable fauna that probably has been underestimated. This chapter therefore presents information on nonconsumptive uses of fish and wildlife in Alaska in order that the demand for this use can be more readily assessed and included in the evaluation of alternative uses of lands and water. This report, however, is by no means a complete compendium of the information available on nonconsumptive uses, especially in the regional sections. It nevertheless provides relevant indicators of the level of demand and suggests information sources for additional data.

C. Perspectives on the Site-specific Information

The regional sections describe specific sites where wildlife viewing is an important human use. User data for those areas are provided when available. Again, the information presented is an indication of the types of data that are available.

In addition to the data limitations, there are several other considerations regarding the site-specific information. Alaska has vast undeveloped acreage, but its overall productivity per acre for wildlife populations is low relative to more temperate areas. Wildlife viewing is often only a part of a spectrum of interests drawing visitors to these particular areas. The areas that are rich in observable wildlife have especially rich environments and/or support temporary congregations of species during certain life-cycle stages. Examples of such areas are annual caribou or waterfowl migration corridors or stopover sites and feeding areas (e.g., streams where bears congregate to feed on spawning salmon or areas where whales feed on herring). The fish and wildlife that congregate in areas during one season or

life-cycle stage may depend on other habitats or on a much larger area during other portions of their life cycle.

There are relatively few places where observable fish and wildlife can be guaranteed for visitors who will spend a short period of time in the area. These "guaranteed" sites thus become critically important to tour operators who advertise wildlife viewing.

Certain viewing experiences are particularly prized. Perhaps first among these, especially for visitors to Alaska, is the opportunity to see brown bears. Places where this opportunity can reliably be obtained are relatively few. The best known of them (Denali National Park, McNeil River, Brooks River in Katmai National Park) are heavily used to the point where visitor limitations are in place or contemplated (see description of these areas in the regional sections).

Other particularly prized viewing opportunities, especially for tourists, involve seabird rookeries (puffins are in vogue), high-density Bald Eagle populations, whales and other marine mammals, Dall sheep, mountain goats, moose, and migrating caribou. Wolves might be popular if they could more reliably be observed.

On the other hand, observable wildlife populations are not a guarantee of visitor use. Access considerations, scenic qualities, and the mosquito density also affect human use levels. Many of the national wildlife refuges (NWR) in northern and western Alaska draw exceedingly few nonconsumptive wildlife users. This is true even of the Yukon Delta NWR, famous for waterfowl nesting populations.

The carrying capacity of fish and wildlife viewing areas is an important consideration in nonconsumptive use. Carrying capacity has two aspects. One relates to the number of visitors the fish and wildlife can tolerate. The other relates to the number of visitors that can be tolerated without seriously diminishing the quality of the experience for each visitor. Certain viewing situations and visiting modes allow for a relatively high number of visitors. For example, medium size cruise vessels visit bird and sea mammal rookeries with relatively little disturbance to either the animals or people. Other situations allow for a very limited number of visitors. For example, the Department of Fish and Game (ADF&G) issues permits for a maximum of 10 visitors per day at McNeil River, where one can watch brown bears feeding on salmon.

Carrying capacity concerns are not a focus of this chapter, but they are important to patterns of visitor use. The annual data for well-known fish and wildlife nonconsumptive use areas show steadily increasing numbers of visitors. Because these places do not have unlimited carrying capacity, visitors are eventually displaced, either through management policy or by their own

choice. They may then seek wildlife areas that are less well known or accessilbe and perhaps have less abundant wildlife. For example, visitor limits at McNeil River and crowding at Brooks River in Katmai National Park may cause people to look for other areas where brown bear can be seen feeding on salmon.

II. DATA TYPES AND LIMITATIONS

The conceptual and empirical problems encountered in identifying and quantifying nonconsumptive uses of fish and wildlife in Alaska are substantial enough to diminish the quantity and quality of data available. However, elimination of nonconsumptive uses from consideration in the economic volume on the basis of data deficiencies would result in seriously undervaluing Alaska's fish and wildlife resources. It was therefore decided to forge ahead despite the inherent problems and gather available data to provide at least an indication of the extent of nonconsumptive use in the state.

Data were obtained from a wide variety of sources and presented largely as they were received without trying to convert use data into dollars or to make data collected by different methods comparable. Because few data collection efforts have focused on nonconsumptive use of fish and wildlife as a unique factor, the data presented in this chapter sometimes have only an indirect relationship to the subject at hand. An example is data showing total recreational visitor-days for a site where nonconsumptive uses of fish and wildlife are known to occur. The reader should be aware that the intent of presenting such data was not to suggest that all those visitor-days should be ascribed to nonconsumptive wildlife use but to show trends in areas known to have nonconsumptive uses. These data are the best available for the specified area. Readers are largely left to draw their own conclusions about the relevance of the data presented.

Part of the problem involved with measuring levels of nonconsumptive fish and wildlife use is that, unlike other wildlife uses, nonconsumptive use usually has no visible "product." Similarly, no licenses are required, and special equipment is usually not needed. Thus the features used to measure other kinds of wildlife use -- harvest or licenses and product sales - are absent or impossible to directly relate to nonconsumptive use of fish and wildlife.

The lack of a consistent definition of nonconsumptive wildlife use is such a large problem that data on nonconsumptive use almost become artifacts of the definitions and procedures used to collect them. The USFWS 1980 National Survey of Fishing, Hunting and Wildlife Associated Recreation recognized that the term "nonconsumptive wildlife use" could mean different things to different people. The survey dealt with that problem by using two key criteria: 1) whether involvement with wildlife was the primary purpose of the activity or secondary to some other purpose and 2) whether the activity was residential (in the immediate vicinity of the home) or nonresidential (more than one mile from home).

The two criteria resulted in four combinations: primary and secondary residential and primary and secondary nonresidential (USFWS 1982). In the survey, a respondent could be counted as both a consumptive and a nonconsumptive user. The results showed that 60% more people could be counted as nonconsumptive users than as consumptive users (286,500 versus 180,500) using the broadest definition of all types of nonconsumptive use. Using one of the narrower definitions, "primary nonresidential" use, nonconsumptive users were 44% as large as the number of people counted as consumptive users (79,000 versus 180,500, see table 3).

It is interesting to contrast the USFWS results with information collected in Alaska by the U.S. Forest Service on recreational visitors in national forests. The Forest Service Recreational Information Management System (RIM) contains information on recreational visitor-days (RVDs). Norman R. Howse, acting director of recreation for the Forest Service's Alaska Region, stated that "nature study (wildlife, birds, fish)" is the RIM category that best approximates the definition of nonconsumptive wildlife use, adding that "while other activities may include elements of nonconsumptive use, we have no standard method for sorting out what portions of, say, tour boat, ship, and ferry activities . . . is really wildlife viewing" (Howse 1986). The RIM system shows 1985 totals for national forests in Alaska of 26,400 RVDs in the "nature study" category. This compares to 568,600 RVDs for consumptive activities (sportfishing, hunting, etc.), a number over 21 times larger than the number of nonconsumptive wildlife RVDs (USDA: FS 1986). The Forest Service's unit of measurement is recreational visitor-days, whereas the USFWS survey measures individuals who participated in an activity one or more times during a year. Still, the differences in units of measurement seem inadequate to account for such a large-scale discrepancy between the two data sets in the relationships they show between consumptive and nonconsumptive wildlife activities. It appears that fundamental differences in definitions and methods of collecting data account for these major differences in study results.

To some extent, the concern of natural resource managers for collecting data on consumptive activities may create a bias against reporting nonconsumptive activities. For example, the Forest Service RIM handbook instructs staff how to report recreational visits that involve a variety of activities:

> People may participate in more than one activity in a given instance; for example, walking (hiking) and hunting at the same time. Record the activity which best represents the primary experience sought by the visitor. When the primary experience may not be readily apparent, record the activity which has the most management and/or resource impact (USFS RIM Handbook).

It may be that many visits recorded by resource managers as sportfishing trips were multipurpose trips in which sportfishing played only

a minor part and was not even engaged in by some members of the party. In other cases, the dominant motive for the trip may indeed have been sportfishing. Data from the Kenai National Wildlife Refuge (see table 38) indicates that a majority of sport- fishing trips about which data were collected involved a combination of activities. A survey of anglers conducted by the ADF&G in 1983 reported that the most important attributes of a quality angling experience are 1) uncrowded environment, 2) wilderness setting, and 3) catching lots of fish (quoted in Bright 1985).

Again, to some extent, the problem is simply one of trying to divide up a whole, real-life experience into separate, quantifiable components. And, as one of the less easily identified components, experiencing wildlife can easily miss being identified.

Nonconsumptive use and recreational data from the Southeast, Southcentral, and Interior regions tend to include a lot of information about local residents. Data from the Southwest, Western, and Arctic regions tend to omit information about local users or to define all use by local people as consumptive. This is particularly true regarding Native people and may have a lot to do with the salience of subsistence as a concept and as a reality. It may reflect cultural biases of data collectors or of the people about whom data are being collected. Yet wildlife, including species such as the raven that are not used in any practical way, figures more importantly in traditional Native cultures than it does in western cultures. Terry Haynes of the ADF&G's Division of Subsistence commented that he is "uneasy about the statements alluding to the lack of nonconsumptive uses of wildlife among Alaska Natives. Although it may be very difficult to measure the importance of wildlife for nonconsumptive uses among rural residents, I would argue that many rural residents find satisfaction in just knowing that critters are out there" (Haynes 1986).

The major part of the data presented in the regional sections of this chapter came from specially designated and protected areas, such as parks and wildlife refuges. These are by no means the only areas that have important fish and wildlife nonconsumptive use areas. Many more data simply are collected for these areas. On the other hand, data on human uses in the unprotected areas would be most useful because of the importance of this information for land management decisions.

The collection of site information for the regions is uneven for many reasons. Thoroughness from one area to another is dependent largely on the practices and perceptions of the management agencies and even of the individual staff members who responded to information requests. Indeed, the identification of a site as important for nonconsumptive wildlife uses is to a large extent a judgement call. No standard criteria are available showing how much wildlife and how many people should be present before an inference of nonconsumptive fish and wildlife use can be made, and the motives and features attracting people to a particular site are not always apparent.

Four general types of data about nonconsumptive users are included in this chapter:

- Economic data. Usually these are in the form of data on visitors' expenditure for trips. There are also some general economic data on the value of and employment in the Alaska visitor industry.

- Attitudinal data. These include the results of surveys evaluating people's general attitudes toward wildlife and of a few surveys concerning people's responses to specific sites.

- Demographic data about visitors and nonconsumptive users.

- Descriptive and quantitative user data for nonconsumptive use sites.

For the site-specific data it would have been desirable to provide documentation for all the human use data presented, showing how the data were collected and what definitions were used. Unfortunately, this was possible only for some of the data. The large number of sources and the short time available precluded an in-depth investigation of all data sources.

Finally, two major types of nonconsumptive wildlife uses were omitted from this chapter. Catch-and-release sportfishing, which may well be considered a nonconsumptive use, was omitted on the assumption that this can be dealt with more effectively in the sportfishing chapter. The commercial use of photos, films, publications, and art dealing with fish and wildlife was omitted simply for lack of time, although these have economic significance and enable people to enjoy fish and wildlife at a distance.

Despite the uneven quality of available data it is abundantly evident that nonconsumptive wildlife uses have substantial and growing economic importance. Land and wildlife managers may find managing for nonconsumptive uses at least as complex as managing for consumptive uses. A primary requirement for management is information about use levels, but visitor data that are being collected tend not to focus on this form of use.

For example, data may be collected showing that a number of people kayaked a fjord system, traveled a waterway via tour ship, or canoed a river. If detailed information is collected, we may learn that the visitors engaged in the recreational activity of canoeing or caught 300 trout. What is not learned is the importance of wildlife-viewing opportunities in drawing people to the area. We may also miss learning that within the larger waterway specific sites are frequented because certain wildlife species can be observed there.

It would be helpful if agencies already engaged in collecting visitor information were to reorient their efforts sufficiently to capture data on nonconsumptive wildlife use. An example of an information-gathering

effort where reorientation could be helpful is the area planning process for state lands led by the ADNR. Currently, a wildlife element is usually prepared by the ADF&G and a recreation element by the Division of Parks and Outdoor Recreation. However, nonconsumptive wildlife uses are generally not included in either set of information.

For another example, the U.S. Forest Service's recreational information management system (RIM) includes certain qualitative and quantitative data about recreational use of national forests. However, some significant nonconsumptive use is not included, such as data on cruise ship and ferry passengers and many other waterborne users of the Chugach and Tongass national forests. Inasmuch as the Chugach encompasses most of Prince William Sound and the Tongass encompasses most of the archipelago and fjords of Southeast Alaska, a great deal of use goes uncounted.

Within the ADF&G, information gathering that targets on consumptive uses may also miss the nonconsumptive component. Examples are sport fish and hunting surveys, which currently do not obtain data about the importance of nonconsumptive uses of nontarget species.

In addition to information gaps that result from the orientations of data collection, inconsistencies mark the data collected by different agencies. The Alaska Division of Parks and Outdoor Recreation multiplies visitors observed at a site by a known turnover rate for that site to arrive at a total number of visitor-days. In contrast, the U.S. Forest Service, observing four visitors staying three hours each at a site, would combine the visits of the four people into a single (12-hour) visitor-day. Both approaches have merit, but their inconsistencies limit the comparative use of the resulting data.

Better interagency coordination could perhaps reorient existing data collection efforts to emphasize a consistent reporting framework and to obtain data more relevant to the management of wildlife habitat. One step toward that goal would be to develop and adopt consistent working definitions that would begin to result in more reliable trend information.

III. STATEWIDE SURVEYS OF NONCONSUMPTIVE FISH AND WILDLIFE USERS

A. Alaska Residents and Nonresident Visitors Considered Separately

All recent statewide surveys of nonconsumptive fish and wildlife users have studied either the Alaska resident population or the nonresident visitor population, but not both together. Nonresident tourist visitors have been studied primarily to determine the economic impacts of their expenditures in Alaska. Survey questions relating to nonconsumptive fish and wildlife uses were intended to assess the importance of fish and wildlife in attracting tourists to Alaska and to estimate the extent to which

visitors' expectations were fulfilled. Alaska residents were surveyed to learn about their wildlife-oriented activities, the importance of wildlife as a component of their environment, and their knowledge of and attitudes toward wildlife.

The available information indicates differences between the Alaska resident and Alaska visitor populations in demographic characteristics and in orientations toward wildlife. For both populations, however, the presence of fish and wildlife emerges as an important reason for being in Alaska.

One obvious demographic difference between the two groups is age. In 1984, the median age of the Alaska resident population was 27.5 years, somewhat younger than the United States median age of 31.1 years (ADL 1985). In contrast, those visiting Alaska in 1985 for strictly vacation/pleasure purposes had a median age of 54 years. The population of Alaska tourists is drawn largely from older age groups. According to surveys of the United States population, these age groups are less interested in wildlife-related pursuits than are younger Americans. The opportunity to view wildlife in its natural habitat is nevertheless an important factor in their decision to visit Alaska.

Surveys of Alaska residents show a high rate of participation in both consumptive and nonconsumptive fish-and-wildlife-related activities. Alaskans also have a distinctive attitudinal profile favoring wildlife, including a high level of knowledge and a highly ecological orientation toward fish and wildlife.

In contrast to the statewide survey data, the visitor data for specific sites presented in the regional sections of this report usually do not distinguish between Alaskan and nonresident visitors.

In addition to surveys described in this section, a new source of information about Alaska and the general United States population will become available with the publication of the report of the President's Commission on Americans Outdoors. The commission was appointed in August 1985 to make a nationwide review of existing trends, policies, programs, and opportunities related to outdoor recreation in America. After taking testimony and comments from the public and government recreational managers, the commission will issue a report with their recommendation to President Reagan in December 1986.

Terry O'Sullivan, recreation planner for the U.S. Bureau of Land Management, put the commission in historical context:

> This is the first effort to assess recreation opportunities and the people's desires for recreation since the Outdoor Recreation Review Commission was established in 1960 to perform a similar evaluation. The work of that Commission

set the tone for recreation in America for the next 25 years. Their recommendations led to legislation that created the Land and Water Conservation Act, the Wilderness Act, the National Wild and Scenic Rivers Act, and the National Trails Act (O'Sullivan, pers. comm.).

B. Surveys of Alaska Residents

This section presents information from four statewide surveys of Alaska residents:

1. The Kellert Study, based on a survey conducted in 1978, examined attitudes toward and knowledge about wildlife and wildlife habitats. It shows a distinct Alaskan attitudinal pattern, differing significantly from United States averages.

2. The 1980 National Survey of Fishing, Hunting, and Wildlife Associated Recreation examined participation rates for Alaska and the United States in consumptive and nonconsumptive fish and wildlife-oriented recreation.

3. The Alaska Public Survey, conducted in 1979, was an intensive examination of outdoor recreational patterns, environmental preferences for outdoor recreation, and residents' responses to forest management policies.

4. The 1970 Alaska Outdoor Recreation Plan, based on a survey conducted during 1966, 1967, and 1968, examined outdoor recreational activities.

    1. Kellert Study. The Kellert Study of American knowledge of and attitudes and behaviors toward wildlife and natural habitats was funded by the U.S. Fish and Wildlife Service. Several papers analyze the data collected in an interview survey, which was conducted in September and October of 1978 using a carefully selected random sample of residents of the 48 contiguous states and Alaska. The data were analyzed on the basis of a number of demographic characteristics - age, sex, race, education, income, population of residence, region, religious participation, and occupation.

        Region of residence emerged as an extremely sensitive differentiator of public perception and understanding of animals. The authors separated the contiguous United States into five regions and treated Alaska as a sixth region. Alaska residents appeared to have a uniquely positive orientation toward wildlife. For example, on the scale ranking knowledge of wildlife, Alaskans had unusually high scores, ranking only behind respondents with a graduate education (18 years or more of education) among all demographic groups.

Respondents were ranked on nine attitude scales, shown below:

Attitudes Toward Animals

Naturalistic: Primary interest and affection for wildlife and the outdoors.

Ecologistic: Primary concern for the environment as a system, for interrelationships between wildlife species and natural habitats.

Humanistic: Primary interest and strong affection for individual animals, principally pets.

Moralistic: Primary concern for the right and wrong treatment of animals, with strong opposition to exploitation or cruelty towards animals.

Scientistic: Primary interest in the physical attributes and biological functioning of animals.

Aesthetic: Primary interest in the artistic and symbolic characteristics of animals (not included in the report of survey results).

Utilitarian: Primary concern for the practical and material value of animals or the animal's habitat.

Dominionistic: Primary interest in the mastery and control of animals, typically in sporting situations.

Negativistic: Primary orientation an active avoidance of animals due to indifference, dislike, or fear (Kellert 1980).

Thirty United States demographic categories were identified on the basis of education, sex, age, income, region of residence and occupation. Alaskans were ranked with other demographic groups in terms of their scores on the attitude scales. Compared to the other groups, Alaskans ranked near the top of the scale for these attitudes: naturalistic, ecologistic, scientistic, and dominionistic. They ranked near the bottom on the other four attitudes: humanistic, moralistic, utilitarian, and negativistic.

Attitude Scale	Ranking of Alaskans
Naturalistic	2nd highest - after persons with graduate education
Ecologistic	2nd - after persons with graduate education

Humanistic	28th
Moralistic	29th
Scientistic	6th
Utilitarian	27th
Dominionistic	3rd
Negativistic	30th

The author commented on the unusual Alaskan attitudal profile and on Alaskans' far greater than average willingness to forgo economic development to protect wildlife habitat. Kellert (1980) summaries:

> Very significant regional differences were also found on the knowledge of animals scale. Alaskans had, by far, the highest scores, ranking only behind respondents with a graduate education among all demographic groups. Residents of the Rocky Mountain states also had high knowledge scores, above those of any other region of the country and even the college educated as a group. Interestingly, the Western states, as a whole, had knowledge scores substantially above those of any Eastern region. The Northeastern states had the lowest knowledge scores.
>
> Despite a similar pattern of interest and knowledge of wildlife among Alaska and the Pacific Coast residents, they differed considerably in their degree of emotional attachment to animals, particularly pets. Whereas Alaskans had among the lowest humanistic scores of any group (lower scores occurring only among those over 75 years old and farmers), Pacific Coast residents, in contrast, had among the highest on this scale. On the other hand, the south, despite many differences from Alaska, was similarly characterized by low scores on this scale.
>
> Major and important regional differences were also found in concern for the protection of wildlife and natural habitats. The views of Alaskans were, again, the most outstanding and atypical. In general, residents from this state expressed a far greater willingness than any other region to foresake a variety of human benefits in order to protect wildlife and natural ecosystems -- a tendency reflected in both exceptionally low utilitarian and extremely high ecologist scores (indeed, the most outstanding scores of any demographic group on these scales). This protectionist sentiment was also reflected on a number of specific habitat preservation questions concerning wetlands, forestry, park and wilderness natural resource development.

The protectionist concern of Alaskans, however, was primarily restricted to wildlife and natural habitat issues, and largely unrelated to animal cruelty and rights considerations or opposition to the consumptive use of animals. This was clearly reflected in very low moralistic and high dominionistic scores (on the moralistic scale, lower scores than any demographic group except those residing in areas of less than 500 population). Alaskans hunted, trapped, and supported these activities to a far greater extent than in any other area of the country.

The pattern of very low utilitarian, moralistic and quite high ecologistic and dominionistic scores was unusual and only partially duplicated by two other groups in the study -- National Trappers Association members and, to a lesser extent, residents of the Rocky Mountain states. These three groups appeared to possess the unusual capability of separating a strong appreciation and protectionist concern for wildlife and natural habitats from worries about animal cruelty and the right of humans to exert dominance and mastery over the natural environment.

Figure 1 compares Alaskans with residents of other regions in terms of their scores on a set of questions involving trade-offs between wildlife habitat and natural resource development. Interestingly, in assessing attitudes toward predator animals, Alaskans also ranked at the top of the positive scale, above the 26 other demographic groups rated on that scale. This included a strongly positive attitude toward the wolf (71% of Alaskans had a favorable attitude compared to 41% of the general public) (Kellert 1979).

Among the limitations of this survey is the small sample size, which was only 3,107 for the United States. Even though an oversampling was conducted of both Alaska and the Rocky Mountain states, the sample size for Alaska was quite small.

2. 1980 National Survey of Fishing, Hunting, and Wildlife Associated Recreation. The U.S. Fish and Wildlife Service (USFWS) has conducted a national survey of fishing and hunting every five years since 1955. The 1980 survey was the first to also gather information about those who observe, photograph, or feed wildlife.

The survey was conducted for the USFWS by the U.S. Bureau of the Census in two phases: initial screening interviews, conducted by telephone when possible and in person when necessary, which obtained information about all household

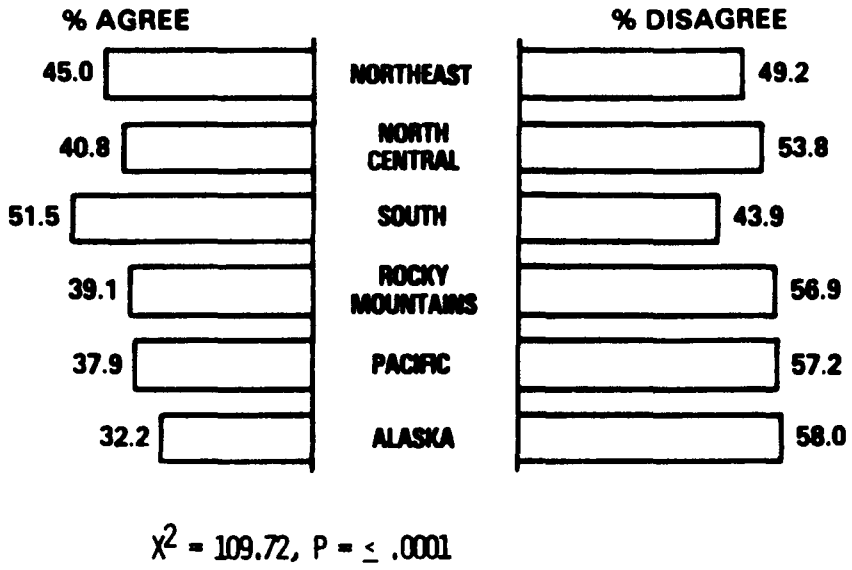

Figure 1. Natural resources development opinions, by region (Kellert 1980).

Response to a set of questions involving specific tradeoffs between development and wildlife: "Natural resources must be developed even if the loss of wilderness results in much smaller wildlife populations."

members age six and older; and follow-up detailed in-person interviews of a subsample of those initially screened. In Alaska, 2,200 households were identified for screening, and 1,480 screening interviews were completed. A total of 780 hunters and fishers were later interviewed in person. It appears that the nonconsumptive use information for Alaska came from initial screening interviews only. The small sample size for Alaska could have led to underrepresenting rural communities. Discussing the reliability of the survey, the authors say that the cumulative nonresponse rate for Alaska was 24.5%. The rate of undercoverage (failure to represent all units with the sample) was 35% as compared to the 1980 decennial census. For the United States as a whole the rate of undercoverage was only 12.8%. It is also possible that cross-cultural communications problems and cultural biases could affect the reliability of results for Alaska.

The survey sample size was designed to provide statistically reliable results for U.S. Bureau of the Census geographic regions, and each respondent was assigned a weight factor proportionate to the national and regional population represented. These weights were used to project all data in the reports to estimates of the national and regional populations. This was a household survey; the target population for the Alaska portion of the survey was Alaska residents.

The survey generated considerably more information than was published. The complete public use data file is available on magnetic tape from the Bureau of the Census.

Several categories of nonconsumptive activities are reported, including "residential" activities. This refers to activities carried out within one mile of one's residence. This category has the largest number of participants and, at least on a national basis, most frequently involves bird watching around the home. Activities were also divided into primary and secondary, depending on whether nonconsumptive uses of wildlife were the primary or secondary purpose of the activity. Probably the most directed activities, and those most likely to involve major expenditures by participants, are found under the combined category called "primary nonresidential." This category involves trips or outings of at least one mile from home for the primary purpose of observing, photographing, or feeding wildlife. Trips to zoos and hunting and fishing trips are not included.

The Alaska population age six years and older had a participation rate of 23% in "primary nonresidential" nonconsumptive wildlife activities. This compares to United States participation rate for persons age 16 and older of 17%

(table 1). More detail on Alaskan nonconsumptive users appears in table 3.

A majority of Alaska residents who were nonconsumptive fish and wildlife users also participated in consumptive activities. Of the total 286,500 estimated nonconsumptive users (84% of the Alaska population age 6 and older) only an estimated 42.5% did not fish or hunt. The remainder both hunted and fished (18.4% of total), hunted only (2.8%), or fished only (36.3%). Note that these figures are for the 164,600 nonconsumptive users who were also involved in consumptive uses. The total number of all hunters and fishermen was 180,500 (table 2).

3. Alaska Public Survey. The Alaska Public Survey, conducted in 1979, was an interagency effort involving several state and federal agencies (U.S. Forest Service, Bureau of Land Management, National Park Service, Alaska State Division of Parks). Portions of the study were conducted by the University of Alaska Institute of Social and Economic Research and by the University of Washington College of Forest Resources. The project leader was Roger N. Clark of the U.S. Forest Service Northwest Forest and Range Experiment Station.

   The survey focused on Alaska residents. A random sample of 2,888 households in Southeast, Southcentral, and Interior Alaska was interviewed in 1979. Several versions of the interview were used, resulting in more than 1,000 variables. The intended result was a large database that could be used by different agencies and researchers for a number of purposes. The survey could also serve as a baseline for future research. Timing of the survey near the 1980 census was intended to enhance its usefulness.

   Objectives of the study included assessing 1) coastal recreational patterns and preferences, 2) other types of outdoor recreation, 3) subsistence activities as contributions to both livelihood and recreational enjoyment, and 4) responses to national forest policies. Several reports have been written using the survey but by no means exhausting the possibilities of the data. Project leader Roger N. Clark invites potential users to contact him or National Park sociologist Darryll Johnson to make further use of the database. Clark says he would like to see more use made of the database and is prepared to produce data runs on request (Clark, pers. comm.). Clark can be contacted at USDA Forest Service, Wildlife Recreation Research, 4507 University Way NE, Seattle, WA 98105, phone (206) 442-7817 (FTS 399-7817). Darryll Johnson, Regional Sociologist for the National Park Service, can be contacted at (206) 442-4176 (FTS 399-4176).

Table 1. Participation in Wildlife-Related Activities, Alaska Compared to U.S.

	Alaska Residents Age 6 Years & Older[a]		All U.S Residents Age 16 Years & Older[a]	
	Number	% of pop.	Number	% of pop.
Total population	341,100	100	169,942,000	100
Hunting or fishing participants	180,500	53	45,884,340	27
Nonconsumptive participants	286,500	84	93,249,000	55
Nonconsumptive participants, primary nonresidential	79,000	23	28,822,000	17

Source: USFWS 1982.

a Note difference in age categories, Alaska and U.S. data.

Table 2. Participation in Hunting and Fishing by Alaska Residents

	Age 6 - 15		Age 16 & Older		Age 6 & Older[a]	
	Number	% of pop.	Number	% of pop.	Number	% of pop.
Total population	67,200	100	273,900	100	341,100	100
Hunted	6,100	9	60,500	22	66,600	20
Fished	31,900	47	139,100	51	171,000	50
Hunted or fished	32,600	48	147,900	54	180,500	53

Source: USFWS 1982.

a This age category combines the previous two age groups.

Table 3. Activities by Alaska Residents

	Resident	Total Alaska Population in Age Group	Percent of Population Participating
Total Alaska resident sportsmen[a]	180,500	341,100	52.9
16 years old and older	147,900	273,900	54.0
6-15 years old	32,600	67,200	48.5
Resident fishermen (16 years old and older)	139,100	273,900	50.8
Fresh water	120,600	273,900	44.0
Salt water	60,200	273,900	22.0
Resident hunters (16 years old and older)	60,500	273,900	22.1
Big game	49,900	273,900	18.2
Small game	34,000	273,900	12.4
Migratory birds	22,400	273,900	8.2
Other animals	4,400	273,900	1.6
Total nonconsumptive participants (6 years old and older)	286,500	341,100	84.0
Primary	150,800	341,100	44.2
Nonresidential[b]	79,000	341,000	23.2
Residential[b]	113,800	341,100	33.4
Secondary	281,900	341,100	82.6
Nonresidential[b]	235,300	341,100	69.0
Residential[b]	241,600	341,100	70.8

Source: USFWS 1982.

a Sportsmen: all who hunted or fished.

b Residential and nonresidential refers to activities engaged in within 1 mi of the person's home ("residential") or beyond 1 mi from home ("nonresidential").

Data were collected from only 375 households in the Interior Region, as compared with 1,258 in Southcentral Alaska and 1,255 in Southeast Alaska. Data for two of the regions are reported in Summary Findings from the Alaska Public Survey: a Summary of Response from Southeast and Southcentral Alaska (Clark and Johnson 1981). Two other publications deal exclusively with the Southeast Region: Residents and Resources: Findings of the Alaska Public Survey on the Importance of Natural Resources to the Quality of Life in Southeast Alaska (Alves 1980) and Responses from the Alaska Public Survey: an Overview and Statistical Abstract for the Tongass National Forest, Ketchikan Ranger District (McGowan 1985).

The questions in the survey that most directly target the subject of wildlife viewing were in the section on saltwater activities. People were asked: "Do you have one favorite place for overnight trips along the coast"? They were asked to identify the location, describe the frequency and timing of visitation, party size, and travel times. They were also asked: "What makes that place your favorite"? This question was used to classify 17 suggested characteristics as very important, important, not very important, or not at all important. One of the characteristics they were asked to classify in terms of importance was "good opportunity to view wildlife or birds." For Southcentral residents this proved to be by far the most important feature of their favorite places, receiving an important or very important rating from 96% of respondents. For Southeast residents wildlife-viewing opportunities were the most important for 74% of the respondents, placing it among the top five most important features (table 4).

When asked how often they had visited their favorite place in the last 12 months, Southeast residents responded with a surprisingly high average of 15.4 day trips and 5.8 overnight trips. Southcentral residents had visited their favorite place an average of 11.6 day trips and 4.6 overnight trips.

The next set of questions asked respondents about "a list of possible changes to your favorite place." They were asked whether these items would make their favorite place less attractive, more attractive, or make no difference, and would they stop going to the place. Responses to these questions are shown in table 5.

In an analysis of the Alaska Public Survey data for Southeast Alaska, Alves (1980) comments that "a recreationalist's perception of change at a favored spot will, of course, depend on his values which in turn condition what he looks for in a favored spot and what he does there." Alves found that "those who most value a place's natural features (and

Table 4. Qualities at Favorite Place Rated Important or Very Important and Most Important[a] (Question B-27) by Alaska Residents

	(Percentage of Respondents)			
	Southeast		Southcentral	
	%	(N)	%	(N)
Quality				
Good plane access	28	(479)	36	(379)
Good boat access, moorage	75	(489)	58	(379)
Road access	18	(461)	84	(379)
Available campground	29	(465)	58	(375)
Cabins available	31	(460)	26	(375)
Good starting point to go inland	36	(479)	39	(375)
Good saltwater fishing	72	(486)	82	(379)
Good clamming or crabbing	54	(482)	56	(377)
Good beachcombing, hiking, walking	75	(489)	84	(379)
Good opportuntity to view wildlife/birds	74	(489)	96	(379)
Good hunting	44	(462)	24	(375)
Good swimming or scuba diving	25	(463)	16	(379)
Exploring abandoned buildings or mines	21	(476)	28	(378)
Undisturbed natural area	79	(485)	79	(376)
Scenery	87	(489)	89	(379)
Good place to get away from others	70	(489)	83	(379)
Other	72	(106)	77	(118)

Source: Clark and Johnson 1981.

a Data calculated on the basis of Version 2 respondents who engaged in recreation activities around salt water (see B-1) on overnight trips and who indicated they had a favorite place for such trips.

Table 5. Attractiveness[a] and Responses of Alaska Residents to Possible Changes at Favorite Place (Questions B-29, B-30 and B-31)

Region	(Percentage of Respondents) Southeast %	(N)	Southcentral %	(N)
Possible change and response				
New logging	(471)		(367)	
Less attractive	77		67	
No difference	21		29	
More attractive	2		4	
Have you noted any? (yes)	20	(89)	6	(22)
Would stop going? (yes)	41	(193)	21	(80)
Clear-cuts	(465)		(365)	
Less attractive	80		77	
No difference	18		22	
More attractive	2		1	
Have you noted any? (yes)	14	(64)	7	(24)
Would stop going? (yes)	37	(176)	21	(79)
Log storage	(465)		(370)	
Less attractive	76		54	
No difference	24		43	
More attractive	0		3	
Have you noted any? (yes)	10	(48)	6	(24)
Would stop going? (yes)	34	(162)	12	(45)
Mine tailings	(442)		(365)	
Less attractive	77		69	
No difference	20		28	
More attractive	3		3	
Have you noted any? (yes)	13	(59)	2	(9)
Would stop going? (yes)	32	(153)	23	(87)
Off-shore oil drilling	(464)		(377)	
Less attractive	72		55	
No difference	28		41	
More attractive	0		4	
Have you noted any? (yes)	7	(30)	21	(79)
Would stop going? (yes)	41	(195)	24	(88)

(continued)

Table 5 (continued).

Region	(Percentage of Respondents) Southeast %	(N)	Southcentral %	(N)
Commercial fishing	(464)		(378)	
Less attractive	22		19	
No difference	68		58	
More attractive	11		23	
Have you noted any? (yes)	40	(183)	47	(174)
Would stop going? (yes)	11	(54)	8	(29)
Shipping traffic	(454)		(376)	
Less attractive	43		35	
No difference	54		49	
More attractive	3		17	
Have you noted any? (yes)	21	(94)	25	(94)
Would stop going? (yes)	16	(76)	13	(49)
Airplanes, helicopters	(461)		(378)	
Less attractive	45		34	
No difference	53		60	
More attractive	2		6	
Have you noted any? (yes)	36	(164)	33	(121)
Would stop going? (yes)	16	(74)	10	(37)
New houses, buildings	(455)		(376)	
Less attractive	30		56	
No difference	17		32	
More attractive	2		11	
Have you noted any? (yes)	14	(62)	31	(114)
Would stop going? (yes)	43	(200)	22	(82)
New roads	(452)		(369)	
Less attractive	77		44	
No difference	15		27	
More attractive	8		29	
Have you noted any? (yes)	9	(42)	19	(71)
Would stop going? (yes)	35	(165)	14	(51)
More recreationists	(462)		(367)	
Less attractive	73		70	
No difference	22		21	
More attractive	5		9	

Table 5 (continued).

Region	(Percentage of Respondents) Southeast %	(N)	Southcentral %	(N)
Have you noted any? (yes)	40	(180)	52	(193)
Would stop going? (yes)	33	(155)	33	(123)
Other	(79)		(80)	
Less attractive	64		52	
No difference	9		0	
More attractive	27		48	
Have you noted any? (yes)	6	(27)	6	(15)
Would stop going? (yes)	6	(29)	11	(42)

Source: Clark and Johnson 1981.

a Data calculated on the basis of Version 2 respondents who engaged in recreation activities around salt water (see B-1) on overnight trips and who indicated a favorite place. Numbers in parentheses represent the number of cases upon which percentages are based.

the sense of isolation they enjoy there) are more sensitive to change than those who place a high value on ease of access and site improvements."

A fair proportion of Alaska residents had, within the last 12 months, visited one of the Alaska national parks noted for wildlife, although there was no indication of whether wildlife or other features prompted these visits (table 6).

The Clark and Johnson report is particularly useful because it presents the survey data not only for the regions but for subareas and for some communities within those regions. Part of one table is presented on the next page to show the level of subregional data (table 7). Table 7 shows that sample sizes are quite small for some communities. Copies of the Clark and Johnson publication can be obtained from Mr. Clark at the address given earlier.

4. Alaska Outdoor Recreation Plans. Statewide outdoor recreation planning for Alaska resulted in published plans in 1970 and 1981. The federal Land and Water Conservation Fund act of 1965 required a Statewide Comprehensive Outdoor Recreation Plan (SCORP) as a condition of receiving federal matching funds for outdoor recreation projects. The 1981 plan was done in part to fulfill the SCORP requirement.

For its assessment of residents, the 1981 plan (Alaska Division of Parks 1981) used the 1979 Alaska Public Survey described in the preceding pages. The 1970 plan used a survey conducted by the Parks and Recreation Section of the Alaska Division of Lands in 1966-1967. The survey sample was biased by selecting from utility and telephone lists, thus omitting nonsubscribers, and included no Southwest and few Northwest residents. For those two areas, an additional sample, avoiding the utilities list bias, was interviewed in the summer of 1968.

In terms of the categories of recreational activities, by far the most important category identified in the 1970 plan was "trail-related activities." Eighty-seven percent of the total population (age 12 and older) participated in such activities, with average annual participation at 67 days per capita. Within this major category of activities, 12 "subactivities" were identified. Of these, "walking for pleasure" was the most popular, with 72% of all Alaskans (age 12 and older) participating. The next most popular (and perhaps the nearest equivalent in the data for nonconsumptive wildlife use) was "nature study," with 35% of the total population participating and an average annual participation per capita of more than eight days. Participation in nature study varied considerably by region (table 8).

Table 6. Alaska Residents Who Visited National Parks in the Last 12 Months (Percentages)

Park	Southeast	Southcentral
Denali	3	24
Glacier Bay	13	5
Katmai	1	2

Source: Clark and Johnson 1981.

Table 7. Attractiveness and Responses of Alaska Residents to Possible Environmental Changes at Their Favorite Place, Percentage of Respondents

	Southeast Region												South Central Region							
	F.S. Management Area				Communities											Communities				
	All Respondents	Ketchikan	Stikine	Chatham	All Other	Juneau	Ketchikan	Sitka	Medium Non Native	Native	Small Subsistence	Logging Camp	All Respondents	Chugach Nat'l Forest (Coastal)	OCS #60 (Coastal)	Anchorage	Kenai	Prince William Sdn.	S.C. Mainland	Kodiak Is.	Kenai Peninsula (Coastal)
New logging	(471)*	(118)	(53)	(288)	(12)	(228)	(105)	(50)	(51)	(12)	(15)	(10)	(367)	(46)	(166)	(261)	(24)	(5)	(65)	(12)	(253)
Less attractive	77	62	74	84	81	86	63	78	70	92	80	50	67	48	69	70	82	100	46	82	73
No difference	21	36	26	14	19	12	37	22	30	0	20	25	29	35	31	25	14	0	54	19	27
More attractive	2	2	0	2	0	2	0	0	0	9	0	25	4	17	1	5	4	0	0	0	0
Have you noticed any? (yes)	20	23	22	18	8	22	26	5	22	10	7	0	6	11	5	8	0	25	0	9	3
Would stop going? (yes)	41	26	36	47	34	47	24	45	30	74	60	25	21	26	17	27	37	25	14	38	21
Clear-cuts	(465)	(112)	(53)	(288)	(12)	(228)	(99)	(50)	(51)	(12)	(15)	(10)	(365)	(46)	(166)	(257)	(25)	(5)	(65)	(12)	(249)
Less attractive	80	65	74	87	100	86	67	89	73	100	87	50	77	75	78	77	96	100	65	91	81
No difference	18	27	26	13	0	14	27	11	28	0	13	25	22	17	22	21	4	0	35	9	20
More attractive	2	8	0	0	0	0	6	0	0	0	0	25	1	9	0	2	0	0	0	0	0
Have you noticed any? (yes)	14	20	19	12	0	11	23	14	17	10	7	0	7	18	2	8	0	25	5	0	5
Would stop going? (yes)	37	24	38	42	36	40	21	45	34	65	60	25	21	11	23	20	50	25	14	38	24
Log storage	(465)	(112)	(53)	(286)	(13)	(224)	(99)	(53)	(52)	(12)	(15)	(10)	(370)	(50)	(167)	(257)	(26)	(5)	(69)	(13)	(250)
Less attractive	76	80	64	77	73	75	79	84	57	78	87	100	54	52	54	52	84	100	45	83	78
No difference	24	20	36	23	27	25	21	16	41	22	13	0	43	40	46	46	16	0	55	9	23
More attractive	0	0	0	0	0	0	0	0	0	0	0	0	3	8	0	3	0	0	0	9	0
Have you noticed any? (yes)	10	17	15	9	0	9	13	10	13	10	14	0	6	23	4	6	0	0	10	9	3
Would stop going? (yes)	34	25	35	38	19	35	21	45	24	60	53	75	12	11	12	12	24	25	4	23	12
Have you noticed any?	(456)	(105)	(54)	(284)	(12)	(216)	(93)	(59)	(54)	(10)	(14)	(10)	(371)	(50)	(164)	(261)	(23)	(5)	(69)	(13)	(249)
Have you stopped going?	(476)	(115)	(54)	(293)	(13)	(228)	(102)	(56)	(53)	(12)	(15)	(10)	(374)	(50)	(166)	(261)	(26)	(5)	(68)	(14)	(250)

Source: Clark and Johnson 1981.

* ( ) indicates number of respondents to questions (answers to questions B-29, B-30 and B-31).

Note: The number of respondents were slightly different for the questions "Have noticed..." verus "Would stop" categories and are listed below:

Table 8. Nature Study - Alaska Resident Participation

Region	Percentage Total Population Participation	Average Annual Participation Days Per Capita	Estimated Participation On a Peak Seasonal Day
Southeastern	50	21.5	11,800
Southcentral	32	5.7	9,900
Southwestern	34	10.3	3,700
Interior	30	5.3	3,400
Northwestern	21	4.6	800
Statewide	35	8.5	

Source: ADNR 1970.

Possibly there were cultural biases in the way respondents viewed this question, so that urban residents and those with more formal education were more likely to identify their activities as nature study. In any case, the report provides this analysis of the data:

> Socioeconomic characteristics of demand for this activity include the following: women participate in this activity more often than men (39% versus 31%); urban participants predominate roughly two to one over rural participants, with the frequency of participation showing approximately the same ratio; and nature study participation appears to have a correlation with more years of education, in that, for example, about half of the Alaskans with 16 or more years of education participate in nature study, compared with only 5% of the group with four or less years of education (ADNR 1970).

5. Limitations of the data. All the statewide data on the nonconsumptive uses of wildlife by Alaska residents were obtained before 1981. Alaska's high population turnover rate and high growth rates during the 1970's and early 1980's suggest the possibility of rapid changes in attitudes and behaviors. On the other hand, the Kellert survey showed a distinctive Alaskan attitudinal profile favoring wildlife and habitats. Aspects of the Alaska Public Survey that addressed reasons why people move to or stay in Alaska suggest there is a self-selection process operating such that people who move to and stay in Alaska favor wilderness and wildlife habitats. Discussing the Southeast Alaska data from the Alaska Public Survey, Alves (1980) said that perhaps the most important findings are the following:

   - The importance of the region's natural resource base in providing an attrative setting in which to live and recreate. We found that, for many, the importance attached to and satisfaction derived from the region's environmental setting overshadowed the economic opportunities that the natural resource base provided.

   - The strong attachment of residents to the region. Southeasterners live in the region longer, are more satisfied with community life there, and are more likely to mention other places in their present region and residence as good places to live than are the residents of Southcentral and Interior Alaska we interviewed.

He commented that, "because of their strong ties to the region, they are likely to persevere through considerable economic

inconvenience, such as might accompany a major change in the region's economy, before they would move elsewhere. Many expressed an interest in pursuing another line of work if necessary to remain in the region" (Alves 1980).

Of the four Alaska resident surveys described, the oldest and least reliable is the 1970 Alaska Outdoor Recreation Plan. Moreover, the data never focuses specifically on nonconsumptive wildlife uses, the nearest proxy being "nature study" trail-related activities.

The Kellert study, the USFWS National Survey of Fishing, Hunting, and Wildlife Associated Recreation, and the Alaska Public Survey all were carefully constructed surveys conducted by interviews between 1978 and 1980. The Alaska Public Survey has the limitation of surveying only residents of the Southeast, Southcentral, and Interior regions of Alaska. The Interior information, based on a smaller sample, has yet to be published except in a highly summarized form in the 1981 Alaska Outdoor Recreation Plan. However, the data are available for use on request. The surveys inevitably suffer from some problems with sampling procedures, nonresponse rates, etc. Sample sizes were small for the USFWS survey and especially for the Kellert survey. Moreover, surveys about attitudes and about nonconsumptive uses of wildlife may run an even greater risk in Alaska than elsewhere of introducing biases through cross-cultural communication problems and differences in perception. These three studies nevertheless appear worthy of attention and use as indicative of Alaskans' interest in fish and wildlife and involvement in nonconsumptive uses.

C. Surveys of Nonresident Tourists

This section contains information from the following sources:

- Observations on Alaska tourism by noted author and professor, Roderick Nash
- Four studies done for the Alaska Division of Tourism in 1980, 1983, and 1985. They assess studies of tourists' attitudes toward wildlife, among other things, and provide estimates of the economic importance of the Alaska visitor industry.
- A 1979 Alaska cruise ship passenger survey that looked at demographic and interests/reactions of one sector of the tourist industry.

1. Roderick Nash. Author of Wilderness and the American Mind, Nash wrote a paper for the Alaska in Perspective series (Nash 1981). He reviewed the history of Alaska tourism from the time of John Muir, the foremost American nature writer of his time. Muir, with "blazing pen," almost single-handedly

transformed the Alaskan wilderness from a liability to an asset so far as tourism was concerned.

Nash writes:

> Considering the way the wild calls tourists to Alaska, it may be useful to think of the territory and then the State as an exporter of wilderness. Other societies, which have exhausted that quality in their own cultures and landscapes are wilderness importers. Tourism is the economic mechanism for the exchange. . . . The traded commodity is experience. The importers consume it on the premises, and they pay handsomely for the privilege. That caribou beside Wonder Lake is worth far more on the hoof and in the view finders of Mount McKinley National Park visitors than converted to meat and hide products. In addition to travelers there is a large armchair clientele for Alaska's wilderness. People who stay at home consume Alaska in the form of motion pictures, television specials, coffee-table books and illustrated articles. Again, wilderness is the marketable commodity.

A footnote says, "In this connection it is significant that economists have estimated that an adult male lion in Kenya's Amboseli National Park generates $515,000 in tourist revenue over the course of its lifetime."

Describing aspects of wilderness, Nash writes:

> WILDLIFE: "Wilderness," etymologically, is wild-deerness, and the prospect of seeing (or shooting or photographing) freely-roaming wild animals constitutes a potent draw of tourists. Wild animals, especially the wolf and the grizzly, symbolize wild Alaska and distinguish it from the nation's other states where wolves are on the edge of extinction. Sighting a grizzly is the highlight of mainland Alaska's foremost tourist attraction (in terms of numbers): the shuttle bus tour of Mt. McKinley National Park. Whale sightings are similarly keys to the success of a tour of Glacier Bay National Monument.

Nash noted a new trend in the Alaska tourism of the 1970's; he saw it oriented to a much greater extent than before to actual contact with wilderness. As evidence, he cites increases in annual backcountry user statistics for Denali and Glacier Bay national parks.

Certainly wilderness and wildlife are declining rapidly around the world. If Alaska wilderness and wildlife persist they will become an ever more scarce and valued attraction for nonresident visitors.

2. Surveys conducted for the Alaska Division of Tourism. Several studies for the Alaska Division of Tourism provide estimates of the volume of nonresident tourism and of in-state employment dependent on tourism. The studies also indicate features in Alaska that are important in drawing tourists to the state. Among those features are opportunities to view wildlife.

   a. Alaska Visitor Statistics Program; patterns, opinions, and planning, summer season, 1985. This study was conducted for the Division of Tourism (ADCED 1986) and pertains to summer-season-only visitors (June through September 1985). Comparable data for the entire year of 1985 will be available late in 1986. Part of a four-phase research project called the Alaska Visitor Statistics Program, this study was based on a visitor opinion survey designed to assess visitors' use of and satisfaction with major components of their Alaska trip. Visitors entering the state were counted by obtaining passenger counts from airline and ship carriers and U.S. Customs. A random arrival survey done by personal interviews obtained information about a scientifically selected sample of 2,699 arriving visitors. Two to three months after the interview a visitor opinion survey packet was mailed to every other random arrival survey respondent volunteering their name - 95% of all visitors approached. Methods including a small monetary incentive of $1 to $10 resulted in an unusually high response rate of 81.7%, with usable responses totaling 1,031, or 74.7% of all surveys mailed out. Reliability for various aspects of the visitor opinion survey was high. Survey respondents were asked to rate, in each region visited, the services or activities they used or participated in. This rating exercise was fairly complex, and not all respondents noted every item used. However, a by-product of this rating was a relative measure of use patterns among regions. Use percentages, then, are the percentage of each region's visitors that rated each item.

      Of particular interest for our purposes are the questions asked about visitors' activities. Among summer season activities, "wildlife watching" was the activity with by far the highest level of participation in every region. Wildlife watching received use ratings by 31% of Southeast, 35% of Southcentral, and 30% of Interior visitors. Denali National Park visitors rated

wildlife viewing most often, with 52% rating it. Of Southwest visitors, who are often in good viewing environments at remote camps, 44% rated wildife viewing. Bird-watching - perhaps most often of a casual variety - was the second most popular activity, rated by 25% in Southeast and 22% in Southcentral (table 9).

Satisfaction ratings were made on a scale of 1 (poor) to 7 excellent). Satisfaction with both wildlife and bird-watching activities was rated high, at 6.2, for the Southwest Region, lower, at 5.6, for the Southeast Region (table 9).

These statistics are for almost all nonresident summer visitors, including those traveling for business. Only seasonal workers and international air carrier passengers are omitted. Elsewhere in the report visitors are categorized into four types 1) vacation/pleasure, 2) visit friends and relatives, 3) pleasure and business combined, and 4) business only), but activity use and satisfaction data are not presented by visitor type. It should be noted that passengers arriving by international air carrier are being sampled and that information will become available later.

Survey data about attractions visited showed that Alaska's major natural attractions are the basic products around which the state's visitor industry is built. Statistical analysis showed that attractions and activities have the heaviest influence on overall visitor satisfaction. The report concludes that "how those key natural attractions are managed and how they are experienced have critical implications to Alaska's success in the visitor market."

Five of the top six Alaska attractions are natural attractions. In order, they are Portage Glacier, the Inside Passage, Mendenhall Glacier, Glacier Bay, and Denali Park (see table 10 for more complete data). The report also presents data on visits to Alaska attractions by the four categories of visitors (vacation/pleasure, business, etc.), but that information will not be presented here.

b. Alaska visitor arrivals, summer season 1985. This is another part of the Alaska Visitors Statistics Program, again pertaining only to June through September visitors. Statistics for the entire year of 1985 will be available in the fall of 1986. (A third portion of the visitor statistic's program, a visitor expenditure study, will be available in late 1986).

Table 9. Use[a] and Satisfaction[a] Ratings of Visitor Activities, Summer Season 1985

Activities	Southeast		Southcentral		Interior		Southwest		Denali Park	
	Use	Satis-faction	Use	Satis-faction	Use	Satis-faction	Use	Satis-faction	Use	Satis-faction
Downhill skiing	1	---	0	---	0	---	0	---	---	---
Cross country skiing	0	---	0	---	0	---	---	---	---	---
Snowmobiling	0	---	0	---	0	---	---	---	---	---
Dogsledding	0	---	0	---	0	---	---	---	0	---
Canoeing/kayaking	2	6.1	2	6.5	0	4.5	---	---	0	---
Rafting	6	6.1	2	6.1	3	6.4	13	6.1	7	6.3
Hunting	0	---	0	---	1	---	8	---	0	---
Fishing	14	6.3	28	6.1	12	6.1	32	6.3	3	5.0
Wildlife viewing	31	5.6	35	5.9	30	5.7	44	6.2	52	6.1
Birdwatching	25	5.6	22	5.6	15	5.3	26	6.2	30	5.8
Hiking	18	5.9	24	6.3	18	6.2	23	5.8	27	6.3

Source: ADCED 1986.

--- means insufficient data.

a Survey respondents were asked to rate, in each region visited, the activities in which they participated. A by-product of the rating process was a relative measure of use. Percentages are the percentage of each region's visitors that rated each item.

b Satisfaction ratings are on a 1 (poor) to 7 (excellent) rating scale.

Table 10. Attractions Visited in Alaska

Attraction	Number of Visitors To Attraction	Percent of Visitors Visting Attraction
Total Visitors	431,200	100.0%
Portage Glacier	209,300	48.5
Inside Passage	206,800	48.0
Mendenhall Glacier	196,500	45.6
Glacier Bay	156,400	36.2
Ketchikan Totems	147,100	34.1
Denali/McKinley	144,200	33.4
Trans-Alaska Pipeline	136,700	31.7
Sitka Russian Church/Dancers	131,100	30.4
University of Alaska Museum	130,600	30.3
Skagway Historic District	125,600	29.2
Anchorage Museum	119,900	27.8
Alaskaland	96,600	22.4
Gold Panning	81,400	18.9
Chugach State Park	80,600	18.7
Prince William Sound	76,100	17.6
Valdez Pipeline Terminal	73,300	17.0
Lake Hood Air Harbor	62,200	14.4
Misty Fjords	59,700	13.9
University of Alaska Geophysical Institute & Musk Ox Farm	56,400	13.1
Resurrection Bay	56,000	13.0
Chena River Trips	55,400	12.8
St. Nicholas Russian Orthodox Church & Native Spirit House	53,800	12.5
Matanuska Glacier	50,600	11.7
Kenai Nat'l Wildlife Refuge	49,500	11.5
Tracy Arm	48,300	11.2
Potter Point Game Refuge	46,100	10.7
Kachemak Bay	35,600	8.3
Chilkat Bald Eagles	27,700	6.4
Kenai Fjords Nat'l Monument	27,700	6.4
Hatcher Pass Recreation Area	26,600	6.2
Chena Hot Springs	22,400	5.2
Alaska Transportation Museum	21,200	4.9
Prudhoe Bay Oilfields	13,600	3.2
Brooks Range	12,900	3.0
Kotzebue - Eskimo Culture	11,500	2.7
Independence Mine	11,100	2.6
Nome - Gold Rush History	9,700	2.2
Crow Creek Mine	9,100	2.1
Katmai	8,400	1.7
Farthest N. Point in North America	6,300	1.5
Kodiak Nat'l Wildlife Refuge	4,600	1.1
Baranof Museum	2,500	0.6
Pribilofs	600	0.1
Ft. Abercrombie, Aleutian Islands, Gates of the Arctic (each)	400	0.1

Source: ADCED 1986.

The 1985 visitor arrivals study was designed to determine the number of Alaska visitors in total and by trip purpose, entry mode, and place of origin. None of the questions asked in this survey pertained to wildlfie or any near approximation, and the information is therefore relevant for our purposes only to the extent that it provides information about the demographic characteristics of Alaska visitors.

During the 1985 summer season, 473,373 people arrived in Alaska as visitors. Of these, 272,600, or 61%, listed their main trip purpose as vacation or pleasure, 17% came to visit friends and relatives, 8% came for a combination of business and pleasure, and the remainder came for business purposes or seasonal work.

For all Alaska visitors, arrival modes were air, 54%; cruise ship, 31%; highway personal vehicles, 10%; and marine highway, 5%. Forty-one percent of all summer season visitors were traveling on a package tour. Three percent intended to buy in-state travel products after arrival in Alaska.

For the vacation/pleasure group of visitors, arrival modes were air, 31%; cruise ship, 49%; highway vehicle, 13%; marine highway, 7%. Nearly two-thirds (63%) were on a package trip, and 34% said they were completely on their own.

Commenting on marketing implications of the demographic finds, the authors write:

> Though greatly expanded in the past decade, the Alaska Vacation/Pleasure market . . . still appears somewhat limited in demographics and travel mode preference, perhaps a reflection of past marketing emphasis.
>
> The vacation/pleasure market is concentrated in the 55 and older age group (61%), is heavily retired (46%), tends to use the cruise mode (49%), and is often from the West (52%). Age varies little by region or origin, indicating similar demographic types are drawn across a large geographic area.
>
> Future Alaska visitor market expansion may depend on broadening the current Vacation/Pleasure market base as well as on increasing penetration into existing high volume markets.

It is interesting to compare Alaska vacation/pleasure travelers with demographic statistics for the United

Table 11. Numbers (Thousands) and (in Parentheses) Percentages of Americans 16 Years Old or Older Who Participated in Nonconsumptive Wildlife-Oriented Activities in 1980

Type of Activity	Relation of Activities to Home of Participant		
	Nonresidential	Residential	Nonresidential or Residential[a]
Primary	28,822 (17.0)	79,670 (46.9)	83,173 (48.9)
Secondary	73,773[b] (43.4)	80,475 (47.4)	88,805[b] (52.3)
Primary or secondary[b]	79,079 (46.5)	89,153 (52.5)	93,249 (54.9)

Source: Shaw and Mangun 1984.

b These values differ slightly from those in the National Report (USDI 1982), which did not include shopping trips or traveling to work in the secondary nonresidential category.

Table 12. Nonconsumptive Use Data from the 1980 National Survey of Fishing, Hunting, and Wildlife Associated Recreation. Data are for the United States Population

	Participants in Nonconsumptive Uses										
	Total U.S. Population 16 Years Old[a]		Total Nonconsumptive Users[b]			Primary Nonresidential			Primary Residential[a]		
Age Years	Number	Percentage of U.S. Population	Number	Percentage of U.S. Population	Percentage of Sub-population	Number	Percentage of U.S. Population	Percentage of Sub-population	Number	Percentage of U.S. Population	Percentage of Sub-population
16-17	8,612	5.1	3,931	45.7	4.2	1,383	16.1	4.8	3,229	37.5	4.1
18-24	28,546	16.8	14,354	50.3	15.4	5,960	20.9	20.7	10,967	38.4	13.8
25-34	37,742	22.2	23,789	63.0	25.5	9,236	24.5	32.0	20,154	53.4	25.3
35-44	26,117	15.4	15,335	58.7	16.5	4,796	18.4	16.6	13,172	50.4	16.5
45-54	22,555	13.3	11,908	52.8	12.8	3,340	14.8	11.6	10,575	46.9	13.3
55-64	21,723	12.8	11,370	52.3	12.2	2,482	11.4	8.6	10,663	49.1	13.4
-64	24,648	14.5	11,551	46.9	12.4	1,625	6.6	5.6	10,909	44.3	13.7
Data unavailable[c]	---	---	1,012	1.1	---	---	---	---	---	---	---
Total or average	169,942	100.0	93,250	54.9	100.0	28,822	17.0	100.0	79,669	46.9	100.0

Source: Shaw and Mangun 1984.

a Data from National Report (USDI 1982).

b Data from Public Use File.

c Data from the public use file contains the category = data unavailable. These missing data reflect certain sociodemographic variables that were deleted from the file by the Bureau of the Census to ensure anonymity of the respondents. Other data in this table come from the National Report (USDI 1982) and has no "data unavailable" category.

Table 13. Nonconsumptive Use Data from the 1980 National Survey of Fishing, Hunting and Wildlife Associated Recreation. Data are for the United States Population

	Participants in Nonconsumptive Uses										
	Total U.S. Population 16 Years Old[a]		Total Nonconsumptive Users[b]			Primary Nonresidential			Primary Residential[a]		
Years of Education	Number	Percentage of U.S. Population	Number	Percentage of U.S. Population	Percentage of Sub-population	Number	Percentage of U.S. Population	Percentage of Sub-population	Number	Percentage of U.S. Population	Percentage of Sub-population
Precollege											
0	1,452	0.9	0	0.0	0.0	0.0	0.0	0.0	344	23.7	0.4
1-7	12,453	7.3	3,761	30.2	4.0	865	6.9	3.0	3,823	30.7	4.8
8	11,401	6.7	3,908	34.3	4.2	756	6.6	2.6	3,801	33.3	4.8
9-11	28,555	16.8	11,656	40.8	12.5	3,543	12.4	12.3	11,672	40.9	14.7
12	62,538	36.8	33,618	53.8	36.1	10,580	16.9	36.7	29,455	47.1	37.0
College											
1-3	26,250	15.4	18,996	72.4	20.4	6,100	23.2	21.2	14,437	55.0	18.1
4	13,936	8.2	9,699	71.0	10.4	3,359	24.1	11.7	7,856	56.4	9.9
5	13,359	7.9	10,363	77.6	11.1	3,588	26.9	12.4	8,281	62.0	10.4
6	---	---	1,247	---	1.3	---	---	---	---	---	---
Total	169,944	100.0	93,248	54.9	100.0	28,822	17.0	100.0	79,670	46.9	100.0

Source: Shaw and Mangun 1984.

--- means no data were available.

a Data from National Report (USDI 1982).

b Data from Public Use File.

Table 14. Nonconsumptive Use Data from the 1980 National Survey of Fishing, Hunting and Wildlife Associated Recreation. Data are for the United States Population

	Participants in Nonconsumptive Uses										
	Total U.S. Population 16 Years Old[a]		Total Nonconsumptive Users[b]			Primary Nonresidential			Primary Residential[a]		
Income	Number	Percentage of U.S. Population	Number	Percentage of U.S. Population	Percentage of Sub-population	Number	Percentage of U.S. Population	Percentage of Sub-population	Number	Percentage of U.S. Population	Percentage of Sub-population
5,000	12,997	7.6	5,258	40.4	5.6	1,495	11.5	5.2	4,644	35.7	5.8
5,000-9,999	22,976	13.5	9,966	43.6	10.7	2,327	10.2	8.1	9,067	39.6	11.4
10,000-14,999	21,210	12.5	11,153	52.6	12.0	3,802	17.9	13.2	9,688	45.7	12.2
15,000-19,999	19,310	11.4	11,175	57.9	12.0	3,447	17.9	12.0	9,497	49.2	11.9
20,000-24,999	21,966	12.9	14,432	65.7	15.5	4,999	22.8	17.3	12,412	56.5	15.6
25,000-29,999	16,379	9.6	10,066	61.5	10.8	3,572	21.8	12.4	8,641	52.8	10.8
30,000-39,000	13,764	8.1	9,776	71.0	10.5	3,278	23.8	11.4	8,145	59.2	10.2
40,000-49,999	5,664	3.3	3,452	61.0	3.7	1,034	18.3	3.6	2,924	51.6	3.7
50,000	5,854	3.4	3,735	63.8	4.0	1,171	20.0	4.1	3,014	51.3	3.8
Not reported	29,923	17.6	14,236	---	15.3	3,697	---	12.8	11,637	---	14.6
Total	169,943	100.0	93,249	54.9	100.0	28,822	17.0	100.0	79,669	46.9	100.0

Source: Shaw and Mangun 1984.

--- means no data were available.

a Data from National Report (USDI 1982).

b Data from Public Use File.

Table 15. Nonconsumptive Use Data from the 1980 National Survey of Fishing, Hunting and Wildlife Associated Recreation. Data are for the United States Population

Geographic Division	Total U.S. Population 16 Years Old[a] Number	Total U.S. Population 16 Years Old[a] Percentage of U.S. Population	Participants in Nonconsumptive Uses: Primary Nonresidential[a] Number	Primary Nonresidential[a] Percentage of U.S. Population	Primary Nonresidential[a] Percentage of Sub-population	Primary Residential[a] Number	Primary Residential[a] Percentage of U.S. Population	Primary Residential[a] Percentage of Sub-population
New England	9,362	5.5	1,657	17.7	5.7	4,952	52.9	6.2
Middle Atlantic	27,867	16.4	4,111	14.8	14.3	11,872	42.6	14.9
North Central								
East	30,791	7.5	6,099	19.8	21.2	17,936	58.3	22.5
West	12,774	18.1	3,000	23.5	10.4	6,783	53.1	8.5
South Atlantic	28,066	16.5	3,739	13.3	13.0	11,270	40.2	14.1
South Central								
East	10,792	6.4	1,173	10.9	4.1	4,117	38.2	5.2
West	17,550	10.3	1,842	10.5	6.4	6,837	39.0	8.6
Mountain	8,415	5.0	2,125	25.2	7.4	4,133	49.1	5.2
Pacific	24,326	14.3	5,076	20.0	17.6	11,770	48.4	14.8
Total	169,943	100.0	28,822	17.0	100.0	79,670	46.9	100.0

Source: Shaw and Mangun 1984.

a Data from National Report (USDI 1982).

Table 16. Total Nonresident Visitors by Type, October 1982-September 1983

Visitor Type	Numbers
Pleasure only	377,540
Most pleasure, some business	33,825
Half business/ half pleasure	33,196
Mostly business/ some pleasure	78,598
Business only	122,801
Total	645,960

Source: ADC 1984.

States population involved in nonconsumptive wildlife recreation, as shown in the 1980 National Survey of Fishing, Hunting, and Wildlife Associated Recreation. Nonconsumptive wildlife recreationalists in that study were likely to be younger, with participation rates higher for the 18-to-44 age group than for older groups. Geographically, participation was highest among people from the Pacific, mountain, and northcentral states. More years of education and, to a lesser extent, higher incomes were associated with higher particpation rates (see tables 11 through 15). Perhaps this is an indicator of where there is room for growth in the Alaska tourism market, although the responsibilities of that age group may impede Alaska vacations for many in this group. Nevertheless, they contribute to the growth in the new trend of tourism of which Roderick Nash speaks, a tourism oriented toward more actual contact with wilderness or minimally developed land. The authors of the 1985 Alaska visitors study also comment on the importance of the "visit friends and relatives" group, which they separated from the "vacation/pleasure" group. People in that category amounted to 17% of the 1985 summer visitors and as a group were more likely to buy in-state travel packages. A review of in-state travel products listed in the Alaska Travel Planner shows that they are heavily oriented toward wildlife viewing.

c. Alaska Traveler Survey and Visitor Industry Analysis 1983. The 1983 study prepared for the Division of Tourism by the Alaska Department of Labor (ADC 1984) has the most complete information in terms of total visitors for an entire year and estimates of employment in the visitor industry. Based on a visitor survey conducted as visitors left the state during the 12-month period October 1982 through September 1983, the study found the following (table 16):

- A total of 645,960 visited Alaska during the year.
- Of these, 64% identified the purpose of their trip as "pleasure only" or "mostly pleasure."
- Another 17% were on "half business" or "mostly business" trips that involved some pleasure time.

Part of the 1983 study was a survey of firms conducting business in Alaska. The survey was designed to assess the economic impact of visitor expenditures on the Alaska economy. It sampled both resident and non-resident visitors, distinguishing between the two types of visitors in its findings:

- Nonresident visitors (of all types) to Alaska spent $960 million on their trips, of which an estimated $550 million remained in Alaska.

- Including sales to nonresident and resident visitors, the visitor industry is Alaska's fourth largest private sector industry.

- An average of approximately 9,000 jobs are the direct result of nonresident visitor expenditures. An additional 7,000 jobs directly resulted from resident Alaskan visitors traveling from their homes to another part of the state. This total of 16,000 visitor - related jobs makes the visitor industry Alaska's fourth largest private sector employer.

Table 17 shows the relative rank of all those firms defined by the study as the visitor industry (including resident and nonresident visitors compared to other economic sectors, based on the number of jobs they provide). Employment associated with those visitor industry firms has been subtracted from their usual industry categories, primarily the retail trade, transportation, and services industries. Table 18 shows 1982 employment and wages in the visitor industry by census division.

The visitor data portion of the study addresses nonresident visitors only, and most of its statistics are based on survey respondents rather than on the total number of visitors. Visitors were asked what they most enjoyed seeing or doing on their Alaska trip. The most frequently mentioned item was "scenery/sightseeing," with one-third of all visitors giving that as their first or second choice. "Visiting family and/or friends" was second, and "mountains/Denali" was third, a favorite of 16.2% of "pleasure only" visitors. Wildlife was first or second choice of 5.4% of "pleasure only" visitors and 4.0% of "mostly pleasure" visitors, with a 4.6% rating for visitors of all types.

The "most enjoyed" ratings received by Denali and Glacier Bay national parks can perhaps be attributed partly to the wildlife observable there. "Pleasure only" visitors gave Denali a 16.2% rating and Glacier Bay an 11.8% rating as their most enjoyed experience.

Data on places visited in Alaska showed that almost a third of "pleasure only" visitors visited Denali:

Table 17. Total Employment in Alaska by Industry 1982 Annual Average

Industry	Employment
Services	30,960
Retail trade	21,411
Construction	16,779
Visitor industry	16,164
Transportation	15,647
Manufacturing	12,599
F.I.R.E*	9,057
Mining	8,976
Wholesale trade	7,205
Miscellaneous	2,007
Total private industry	140,805
Government	59,171
Total	199,976

Source: ADC 1984.

* Finance, insurance, and real estate.

Note: Employment for nonagricultural wage and salary employees subject to Alaska Unemployment insurance; excludes self-employed and unpaid family workers. Industry employment is adjusted to exclude those jobs directly attributed to resident and nonresident visitor expenditures. Visitor industry is defined by the direct impact of resident and nonresident visitor expenditure as a percentage of total sales.

Total 18. Average Employment and Total Wages in Visitor-Affected* Industries in Alaska by Census Division, 1982

Census Division		
Aleutian Islands	218	4,276,704
Anchorage	22,423	368,473,503
Angoon	17	235,102
Barrow-North Slope	500	19,444,585
Bethel	474	7,285,663
Bristol Bay Borough	90	1,374,814
Bristol Bay	258	4,080,812
Cordova-McCarthy	211	2,913,387
Fairbanks	4,548	75,823,228
Haines	149	1,749,758
Juneau	2,057	32,285,365
Kenai-Cook Inlet	1,394	17,993,040
Ketchikan	1,245	21,159,193
Kobuk	258	4,961,556
Kodiak	641	9,731,709
Kuskokwim	65	992,713
Matanuska-Susitna	917	12,249,721
Nome	450	8,230,250
Outer Ketchikan	48	565,479
Prince of Wales	81	840,635
Seward	198	2,076,485
Sitka	622	9,929,046
Skagway-Yakutat	283	3,245,283
Southeast Fairbanks	201	2,269,518
Upper Yukon	49	938,578
Valdez, Chitna-Whittier	316	3,826,987
Wade Hampton	196	2,722,571
Wrangell-Petersburg	426	6,430,391

Source: ADC 1984.

* Visitor-affected employment and wages include that associated with expenditures of local residents.

Note: These Census Division figures were tabulated at a different time than statewide figures appearing elsewhere in this report. Due to corrections and updates to the statewide file, these figures will be slightly different.

Visited Denali: 31.9% of "pleasure only" visitors, 16.3% of "mostly pleasure" visitors, 18.7% of all visitors.

Visited Katmai: 0.7% "pleasure only" visitors, 0.9% of "mostly pleasure" visitors, 0.4% of all visitors.

Visited other parks: 13.8% of "pleasure only" visitors, 13.3% of "mostly pleasure" visitors, 8.7% of all visitors.

Distribution of total nights spent in Alaska by region and in parks and wilderness is shown in table 19. It should be noted that the percentage distribution of total nights spent by region is only a general indicator of the relative economic impact of visitors for the affected region because of several factors. First of all, many visitors stayed in areas or communities not specifically identified on the survey. These areas were included in the "other" category. In addition, most visitors who spent a majority of their time in Alaska on cruise ships did not indicate having spent their nights in a particular community. Although cruise ship visitors generally do not leave money behind in the form of hotel receipts, they do spend a significant amount of money in the communities. Table 19 tends to underestimate the relative importance of visitors to Southeast Alaska based upon the "nights spent in Alaska" measure because of the undercounting of these cruise ship visitors.

Distribution of nights by type of accomodation showed that "camping/RV" accounted for 19.4% of "pleasure only" visitor nights, 20.6% of "mostly pleasure" visitor nights and 15.1% of all visitor nights.

The 1985 visitor arrivals study was designed to determine the number of Alaska visitors in total and by trip purpose, entry mode, and place of origin. None of the questions asked in this survey pertained to wildlife or any near approximation, and the information is therefore relevant for our purposes only to the extent that it provides information about the demographic characteristics of Alaska visitors.

During the 1985 summer season, 473,373 people arrived in Alaska as visitors. Of these, 272,600, or 61%, listed their main trip purpose as vacation or pleasure, 17% came to visit friends and relatives, 8% came for a combination of business and pleasure, and the remainder came for business purposes or seasonal work.

Table 19. Percentage Distribution of Total Nights Spent in Each Region* by Type of Visitor Party in Alaska

Location	Pleasure Only	Mostly Pleasure Some Business	Half Business Half Pleasure	Mostly Business Some Pleasure	Business Only	Total
Southeast	13.8	10.7	10.0	12.3	19.3	14.1
Southcentral	41.0	44.8	48.9	38.5	23.6	39.7
Southeast	4.8	7.3	2.2	1.7	1.9	2.1
Interior/north	13.3	10.4	11.1	12.2	8.8	11.6
Yukon	3.1	1.3	0.1	0.3	0.0	1.5
Denali	5.8	6.2	4.7	1.9	0.2	3.6
Other parks	1.7	0.7	0.3	0.4	0.1	0.9
Wilderness	3.2	4.3	3.4	2.6	2.1	3.0
Other	13.5	14.2	19.3	30.0	43.8	23.4
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: ADC 1984.

* The regions identified include the following cities and areas: Southeast - Haines, Juneau, Ketchikan, Sitka, Skagway, Southcentral - Anchorage, Homer, Kenai, Prince William Sound, Seward, Southwest - Katmai, Kodiak, Interior/North-Barrow, Fairbanks, Kotzebue, Nome, Yukon-Whitehorse, Yukon Territory, Denali, other parks, wilderness, and Other - areas other than those specificially provided on the survey form.

For all Alaska visitors, arrival modes were air, 54%; cruise ship, 31%; highway personal vehicles, 10%; and marine highway, 5%. Forty-one percent of all summer season visitors were traveling on a package tour. Three percent intended to buy in-state travel products after arrival in Alaska.

For the vacation/pleasure group of visitors, arrival modes were air, 31%; cruise ship, 49%; highway vehicle, 13%; marine highway, 7%. Nearly two-thirds (63%) were on a package trip, and 34% said they were completely on their own.

> Though greatly expanded in the past decade, the Alaska vacation/pleasure market . . . still appears somewhat limited in demographics and travel mode preference, perhaps a reflection of past marketing emphasis.
>
> The vacation/pleasure market is concentrated in the 55 and older age group (61%), is heavily retired (46%), tends to use the cruise mode (49%), and is often from the West (42%). Age varies little by region or origin, indicating similar demographic types are drawn across a large geographic area.
>
> Future Alaska visitor market expansion may depend on broadening the current Vacation/Pleasure market base as well as on increasing penetration into existing high volume markets.

It is interesting to compare Alaska vacation/pleasure travelers with demographic statistics for the United States population involved in nonconsumptive wildlife recreation, as shown in the 1980 National Survey of Fishing, Hunting, and Wildlife Associated Recreation. Nonconsumptive wildlife recreationalists in that study were likely to be younger, with participation rates higher for the 18-to-44 age group than for older groups. Geographically, participation was highest among people from the Pacific, mountain, and northcentral states. More years of education and, to a lesser extent, higher incomes were associated with higher participation rates (see tables 11 through 15). Perhaps this is an indicator of where there is room for growth in the Alaska tourism market, although the responsibilities of that age group may impede Alaska vacations for many in this group. Nevertheless, they contribute to the growth in the new trend of tourism of which Roderick Nash speaks, a tourism oriented toward more actual contact with wilderness or minimally developed land. The authors of

showed that 27% of cruise visitor entries intended to exit by another travel mode.

The objectives of the 1979 study (Koth 1980) were to "identify passengers' responses to aspects of the general southeast Alaska setting and the ship-board experience in terms of both pre-trip expectations and post-trip impressions, to determine critical elements of the Alaskan cruise experience and misconceptions about it."

Of the 121 cruises scheduled for that season, 15 were chosen as representative, and all passengers on those cruises were asked to complete a questionnaire. A response rate of 68% was obtained.

Passengers' ages averaged 56.8 years old. Asked for their two major reasons for taking a cruise to Southeast Alaska, 54.1% responded "see Alaska Inner Passage scenery," but only 3.2% responded "wilderness, last frontier." Asked about their preference for types of outdoor recreational settings, 88.5% responded either with "well developed areas with good facilities, easy access" or "somewhat developed areas with some facilities, paved access." Only 3% preferred "completely undeveloped wilderness, no roads."

The data provide mixed messages about the importance of wildlife. Asked "when you were thinking about taking this trip to Alaska, how important did each of the following seem to you"?, 60.3% responded that seeing wildlife was very important and 35% said it was somewhat important. This made wildlife a close second to the most important item, "general scenery." However, when asked the open-ended question "what was your favorite natural attraction in southeast Alaska"?, only 1.6% mentioned wildlife. Asked about factors that were different in Alaska from what they expected, 5.6% responded that they expected to see more wildlife.

Table 20 shows passengers' sightings of animals relative to pretrip expectations. The figures represent animal sightings for all phases of the trip to Alaska in addition to the cruise (some passengers went to Denali National Park, for example). Sightings of animals ranged from a high of 70% for eagles to 20% for bears. Only 33.1% reported themselves satisfied with wildlife sightings on the cruise portion of their trip.

Reasons for satisfaction/dissatisfaction with Southeast Alaska wildlife sightings are shown in table 21.

Passengers were asked about their degree of satisfaction with visits to various towns and to Glacier Bay. Concerning Glacier Bay, 56.7% reported seeing seals there, and 60% of

the 1985 Alaska visitors study also comment on the importance of the "visit friends and relatives" group, which they separated from the "vacation/pleasure" group. People in that category amounted to 17% of the 1985 summer visitors and as a group were more likely to buy in-state travel packages. A review of in-state travel products listed in the Alaska Travel Planner shows that they are heavily oriented toward wildlife viewing.

d. 1980 Alaska tourism study. The Alaska Division of Tourism contracted a study of Alaska's image as a travel destination. Done in 1980 by GMA Research Corp, the study was an update of an earlier 1976 study. The results appear in the Alaska Outdoor Recreation Plan 1981 (ADNR 1981). Three target populations were interviewed:

1. People known to travel, but who had not been to Alaska

2. People who had recently visited Alaska

3. Travel agents, who may be influencing both of these groups by their ideas and recommendations

These three populations were asked how much they liked to do each of 16 vacation activities and to rate Alaska on how well they think Alaska delivers on each of these activities. Respondents used a scale of 1 to 5 to rate how important an activity was to them and how well they perceived Alaska providing that activity. The mean averages were converted to a 0-100% scale.

Traveling people who had not been to Alaska rated seeing wildlife in its natural habitat at a 73% level of importance to them as a vacation activity and saw Alaska as providing that activity at an 88% level. For people who had recently visited Alaska, viewing wildlife rated 87% in importance, and Alaska was rated at 85% for providing that activity. Travel agents rated wildlife's importance at 66% and Alaska at 92% for providing wildlife experiences.

3. 1979 Alaska cruise ship passenger survey. The National Park Service and U.S. Forest Service cooperated on a survey of cruise ship passengers in Southeast Alaska during the 1979 sailing season. The survey is discussed in this statewide overview section rather than in the regional section because this group of visitors is often involved in an itinerary that takes them by bus or plane to Southcentral or Interior Alaska before they leave Alaska. The 1985 Alaska visitor study

Table 20. Cruise Ship Passengers' Sightings of Animals in Alaska Relative to PreTrip Expectations

Animal	Percentage Saw Aninal	Missing Cases	Percentage Saw Fewer Than Expected (2)	Percentage Saw as Many As Expected (3)	Percentage Saw More Than Expected (4)	Mean Response	N
Eagles	70.0	285	35.2	32.9	31.9	2.97	1,791
Seals	63.8	256	53.8	28.4	17.7	2.64	1,652
Whales	45.2	296	65.2	25.5	9.3	2.44	1,151
Dolphins	33.6	329	68.0	24.3	7.7	2.40	844
Mountain goat	31.4	402	45.0	34.2	20.8	2.76	766
Bears	20.0	323	57.5	26.2	16.3	2.59	503

Source: Koth 1980.

Note: The table figures represent animal sightings for all phases of the trip to Alaska, in addition to the cruise (e.g., the interior, Denali National Park where applicable).

Table 21. Cruise Ship Passengers' Reasons for Satisfaction/Dissatisfaction with Wildlife Sightings in Southeast Alaska

Reason	Absolute Frequency	Percentage
Little, no wildlife seen; want to see more	751	50.7
Limitations of being on ship[a]	157	10.6
Did not sight particular species	137	9.3
Sighting is a matter of luck, cannot control	73	4.9
Never see enough wildlife	60	4.1
Satisfied, much wildlife seen	45	3.0
Weather influenced sightings	37	2.5
Seasonal variation influenced sightings	31	2.1
Not enough time	30	2.0
Wildlife not important	29	2.0
Other	130	8.8
Total	1,480	100.0

Source: Koth 1980.

a This category includes "too far from wildlife" (45) and "did not go to undeveloped areas" (35).

those who saw them rated them as "very impressive." Whales were seen by 23.8%; 65.9% of those who saw whales rate them "very impressive." Rating their Glacier Bay experience compared to expectations, only 2.1% said they expected more wildlife.

A consultant who has studied Alaska tourism commented that the cruise ship market is less a market for seeing Alaska and more a market for cruising. Southeast Alaska is a relatively desirable cruise route because the protected inland waterways make for calmer seas and more frequent views of scenery than many other cruise routes (McDowell, pers. comm.).

Koth, Field, and Clark (1980), in a paper analyzing the cruise ship experience for its implications for onboard natural history interpretation, note that during the early northbound part of the sailing interest and enthusiasm for the new environment is high. "However, as the clientele travel through the areas of interest, they possess or accumulate little actual experience with the outside environment." Clark and Lucas (1978) compare this encapsulated travel to an "isolation booth experience." The novelty wears off after several days, interest abates dramatically, turning to port visits and ship-board social life. On the return trip, social interests predominate. "The information gathering behavior is evident in the earlier stages of the cruise. Certain attractions and species sightings are viewed as compulsory upon boarding. Upon completion or accomplishment of this 'task,' however, the social goals predominate."

It might be added that dramatic wildlife photos are used heavily in cruise ship and other Alaska tourism publicity, but wildlife sightings from a large cruise ship are likely to be distant and infrequent.

IV. SOUTHWEST REGION

A. Overview

The Southwest Region has areas where nonconsumptive uses of fish and wildlife are at or near carrying capacity (McNeil River, Round Island, parts of Katmai National Park) and other areas with perhaps comparable fish and wildlife values that currently draw very few nonconsumptive users. Alaska Peninsula areas are in the latter group; brief descriptions of three national wildlife refuges on the peninsula are included because the information was readily available. Also, these areas are likely to receive increasing use because many of their characteristics are similar to areas currently receiving considerable use. Differences in accessibility would appear to be one reason for these contrasts. However, visitors frequent some places that are expensive or

difficult to reach, like the Pribilofs and Round Island. A boom in sportfishing in the Bristol Bay drainages has drawn with it some people whose interests are largely in wildlife viewing and experiencing wilderness.

The available information sources tend to categorize local residents as consumptive users (mainly subsistence users from outside the region - usually from Southcentral Alaska or from out of state) as recreational consumers or nonconsumptive users. Thus, little information exists about nonconsumptive fish and wildlife uses by locals. Exceptions are the Walrus Islands and the Kodiak Island area.

B. Kodiak National Wildlife Refugre

1. Area Description. The Kodiak NWR encompasses 1,865,000 acres, including the southwestern two-thirds of Kodiak Island, Uganik Island, and a small part of Afognak Island. The refuge was established in 1941 to preserve the habitat of brown bear and other wildlife. It is known worldwide for the Kodiak brown bears, the world's largest carnivores (USFWS 1985a). Other fish and wildlife attracting visitors include eagles, red fox, river otter, beaver, deer, mountain goats, swans, other waterfowl, salmon, and marine mammals. Although consumptive uses draw more people to the area, nonconsumptive wildlife uses are significant and growing (Kodiak NWR 1986).

2. Jurisdiction and management plans. The refuge is managed by the USFWS. A comprehensive conservation plan, environmental impact statement, and wilderness review was published in 1985.

3. Access, proximity to communities, and facilities. Access is by charter aircraft from Kodiak or by boat. The refuge has nine public use cabins available by lottery. Official trails and campgrounds have not been established. A visitors' center is located off the refuge near Kodiak.

4. Human use. Visitor data for uses classified as nonconsumptive are provided in table 22. Counts of visits and activity hours follow the standard procedure for national wildlife refuges: one person engaging in several activities can be counted as more than one "visit," but double-counting is eliminated in the "activity hours" counts. Approximately one-third of the visitors to Kodiak NWR are counted for a second activity, including consumptive activities such as hunting. For the "photography" category, only relatively serious photographers are counted; counts for both visits and hours largely exclude people for whom photography is a component of other activities. Many photographers use the cabins, and a fairly accurate estimate of cabin users is available from the permit system. Counts of day users and

Table 22. Nonconsumptive Uses of the Kodiak NWR Number of Visits and Activity Hours, 1983-85

	1983	1984	1985
Visitor Center (off refuge)			
Visits	1,331	2,217	6,707
Activity hours	1,066	1,329	3,353
Environmental education (off refuge)			
Visits	216	307	826
Activity hours	26	179	1,209
Camping			
Visits	85	45	20
Activity hours	2,800	900	200
Hiking			
Visits	732	872	907
Activity hours	3,238	3,673	4,328
Photography			
Visits	195	225	316
Activity hours	1,880	1,550	2,092

Source: Kodiak NWR 1986.

tent campers are estimates based in part on overflights of the refuge. Overall, the refuge staff estimates the accuracy of visitor and activity hour data at ± 30% (Menke, pers. comm.). Most photography, wildlife viewing, and sightseeing occur July through September (Kodiak NWR 1986).

Use of the recreation cabins for photography, sightseeing, and wildlife observation has been increasing for several years (Menke, pers. comm.). In the summer of 1985, the visitor center was open on weekends for the first time and offered a regular schedule of wildlife films. The films proved popular, attracting nearly 1,500 visitors that year. Over 800 students and teachers from local schools were involved in outdoor classroom activities (off the refuge) during 1985. These activities were conducted by the refuge staff in cooperation with village teachers (Kodiak NWR 1986).

The cabin sites at North Frazer Lake, Red Lake, and in the upper Kaluk Lake area are particularly good places to photograph brown bear. Three other cabins at Uganik Island, Uganik Lake, and Veikoda Bay are described as good for general wildlife photography, including bears (USFWS 1986a). Primary use of the O'Malley cabin is by photographers during July and August, when bears are feeding on spawning salmon. The refuge receives numerous requests for information from people who want to photograh bears. Some big game guides are now taking clients whose primary interest is in photography (Menke, pers. comm.).

The Division of Tourism estimates that 4,600 nonresidents visited the refuge during the summer (June through September) of 1985 (ADCED 1986a).

C. Shuyak Island

1. Area description. A new state park was established in 1984 on the northeast part of Shuyak Island, which is north of Afognak Island in the Kodiak Island group. HB 605 in the 1986 Alaska legislature would also establish a state game refuge on part of the island. The highly scenic island is about 50 mi^2 in size, has numerous small islets along the north shore, and supports a dense population of brown bears (Collinsworth 1984). There are several sea lion haulouts, numerous sea otters in the bays, and seabird rookeries along the northeast coast. Beavers are numerous and show little fear of visitors. Sitka black-tail deer (introduced) find the island excellent wintering range. Humpback and killer whales are sometimes sighted nearby. Wildlife viewing is a primary draw for visitors to the island. (Unless otherwise referenced, information in this description is from Nankervis, pers. comm.).

2. Jurisdiction and management plans. The northeast portion of the island is under the jurisdiction of the ADNR, Division of Parks and Outdoor Recreation. An agency review draft plan exists for the park. The remainder of the island is evidently state land administered by the ADNR (Kodiak Island Borough 1986).

3. Access, proximity to communities, and facilities. Access is by charter aircraft or by boat. It is an 18-hour boat trip and about 50 air miles from Kodiak. It is about 80 air miles from Homer. The Division of Parks and Outdoor Recreation has built two cabins on the island.

4. Human use. There are no data available on numbers of visitors to Shuyak Island or Park. Most nonconsumptive visits to Shuyak Island occur May through August. Kayakers often go to the island specifically to see the wildlife. Two commercial operators bring kayak trips to the island, one operating out of Kodiak and one out of Anchorage. In the summer of 1985, there were six commercial kayak trips to the island, bringing an average of 10 people per trip. Most of the growth in tourism to Shuyak will likely base out of Homer.

   The Kodiak Island Borough supported establishment of both a state park and state game refuge on the island (Kodiak Island Borough 1986).

D. Other Kodiak Area Sites

Most of the following sites in the Kodiak Island area appeared on a list entitled "nonconsumptive use sites" in a fish and wildlife resource inventory of the Cook Inlet-Kodiak areas (ADF&G 1976). Minimal information was available for these sites. Additional sites were identified by a staff person from the Alaska Division of Parks and Outdoor Recreation in Kodiak. Minimal information was available regarding public use of these sites.

- Cape Chiniak: a site on the Kodiak road system where sea lions can be seen May through September (ADF&G 1976)

- Road system, Kodiak to Long Island: Porpoises and whales can be seen here May through September. Deer can be seen on south slopes and beaches between January and March (ibid.). Bird watching occurs along the road (Nankervis, pers. comm.).

- Fossil Beach: at the southern end of the Kodiak area road system. The Audubon Society does a whale watch here in April and late fall (Nankervis, pers. comm.).

- Fort Abercrombie State Historical Park: has excellent tide pools and some seabirds. The area is accessible from the

Kodiak road system. Audubon Society groups, school children, and children from summer camps operated by Native organizations come to study the tide pools and birds (ibid.).

- Buskin State Recreation Area: Located on the Buskin River and accessible from the Kodiak road system, this is part of the state parks system. Although primarily used for sportfising, a secondary use is watching Bald Eagle (ibid.).

- Pasagshak State Recreation Area: This recreation area is located at the end of the Kodiak road system. Although primarily used for sportfishing, a secondary use is watching Bald Eagle (ibid.).

- Tugidak Island: Located 150 mi southwest of Kodiak. Access is by charter aircraft and boat. Seals may be observed pupping in May and June (ADF&G 1976).

- Ugak Bay (Women's Bay): Access is by air charter or boat. Seals can be seen November through March (ibid.).

- Marmot Island. East of Afognak Island, Marmot Island is accessible by air charter or boat. The state ferry passes this island, and sea lions may be observed June through August (ibid.).

The following areas are on Afognak Island. The source for this information is an ADF&G publication dated 1976, which is prior to the occurrance of logging on the island. Nakervis (pers. comm.) reports that local people go to Afognak less since areas have been clear-cut.

- Raspberry Straits (Waskanareska Bay): Access is by boat or air charter. Elk is an observable species May through August (ADF&G 1976).

- Portage Lake: Access is by boat or air charter. Brown bear may be seen during July and August (ibid.).

- Tonki Cape: Access is by boat or air charter. Elk and deer may be seen May through September (ibid.).

E. McNeil River State Game Sanctuary

1. Area description. The congregation of brown bears fishing salmon at McNeil River falls has been ranked by many experienced naturalists and photographers as one of the best wildlife-viewing opportunities available in the world today. As many as 70 bears regularly utilize the falls from July through early August. More significant than the sheer number of bears is the array of natural bear behavior and

interactions that can be safely witnessed at close range (Sellers 1986).

Species of secondary interest are Bald Eagle, spawning salmon, and red fox. The McNeil River Sanctuary is located between the southwest corner of Kamishak Bay in Cook Inlet and the northern edge of Katmai National Park.

2. Jurisdiction and management plans. The sanctuary is one of the state special areas established by the legislature and managed by the ADF&G. The ADF&G has an in-house plan for managing the area that recognizes observation of brown bears as the priority human use and that limits conflicting activities (ADF&G n.d.).

3. Access, proximity to communities, and facilities. Access is primarily by light plane. McNeil River is 200 air miles southwest of Anchorage and 110 air miles southwest of Homer. With the exception of introducing minimal campground improvements, the wilderness character of the area has been maintained. An ADF&G employee is stationed at the sanctuary to minimize conflicts between visitor activities and the bears.

4. Human use. To prevent disturbance to the bears, only 10 visitors per day are permitted between July 1 and August 25. From August 26 to July 1, the number of permits is unlimited. Permits are drawn by lottery from application received. In the past two years, more than 1,800 permit applications have been received (Sellers 1986).

   In 1985, there were 216 visitors to the refugre, for a total of 816 visitor-days. The visitor season lasted from June 19 through August 25 (ADF&G 1986a).

   Interest from both amateur and professional photographers is high. Formerly, the visitor group was dominated by professional photographers, but under the lottery system this is no longer true. Some professionals have suggested a class of "professional photographer" permits (Smith 1979).

   In 1979, the ADF&G did a survey to evaluate visitor attitudes, motivation, expenditures, and the importance of McNeil River for attracting nonresident visitors to Alaska. Questionnaires were completed by 25 people at the NcNeil River campground. Another 71 questionnaires were mailed to guest book signers; 46 of these were completed and returned, for a total of 71 responses. The survey (Smith 1979) shows results separately for the two sample groups and for residents and nonresidents. The sample group data are combined here for the sake of brevity.

When asked how they had heard about McNeil River, 50% of nonresidents listed magazine articles or photo captions in various publications. Another 13% had learned about it from television, which is an indication of the level of national publicity the area has received.

The main reasons why respondents visited McNeil River are shown in table 23. They were also asked the portion of their vacation time spent in Alaska and what percentage of the time in Alaska was spent at McNeil River (table 24) and what they would have done if they had not received a permit. Among the nonresidents, 39% indicated they would not have come to Alaska, and another 16% would have shortened their visit to Alaska.

Information on expenditures directly or primarily related to the McNeil River visit was collected only from the campground sample. They reflect both in-state and out-of-state expenses (table 25).

The department was interested in the question of funding for the sanctuary, pointing out that sanctuary operations are 100% hunter-financed. Almost all the visitors responded that the state should charge a fee for the privilege of visiting (table 26).

Smith commented that both residents and nonresidents were split 50:50 between hunters and nonhunters. None of the nonresidents and only two of the residents were anti-hunting.

F. Katmai National Park and Preserve

1. Area Description. Katmai National Park and Preserve encompasses approximately 4 million acres of public land at the head of the Alaska Peninsula. The upper 63 mi of the Alaganak River, which starts within the park, has been designated a wild river. The park was initially established to preserve the features associated with the explosion of Mt. Katmai. Although the volcanic ash has now cooled and no fumaroles remain steaming, the Valley of Ten Thousand Smokes remains the major scenic attraction. Fish and wildlife are the other principal attraction of the park, and it was to protect wildlife habitat that the park and preserve were expanded in 1978 and 1980. Katmai National Park is a sanctuary for the largest protected population of Alaska brown bears. Concentrations of the bears along streams during the annual salmon-spawning runs provide excellent opportunities for visitors to observe and photograph the bears in their natural environment. Secondary wildlife species attracting visitors include moose, fox, wolf, lynx, beaver, river otter, caribou, and waterfowl (NPS 1986).

Table 23. Main Reason for Visiting McNeil River

	Percentage of Residents (n=59)	Percentage of Nonresidents (n=53)
To view bears	36	25
Wilderness experience	15	13
Nature study	12	15
Amateur photo	20	28
Professional photo	14	15
Guiding	1	2
Other	2	2

Source: Smith 1979.

Note: Many people listed more than one reason.

Number in ( ) = no. of replies.

Table 24. Distribution of Vacation Time of Visitors to McNeil River

	Percentage of Vacation Spent in Alaska		Percentage of Vacation Spent at McNeil River	
	Res. (n=18)	Nonres. (n=29)	Res. (n=26)	Nonres. (n=31)
Less than 50%	0	7	61	80
50%	11	7	12	10
More than 50%	89	86	27	10

Source: Smith 1979.

Numbers in ( ) = no. of replies.

Table 25. Expenditures ($) Directly or Primarily for Visit to McNeil Campground (Sample Only)

	Residents (n=11)	Nonresidents (n=12)
Film	80.18	390.80
Food	44.55	74.17
Hotels	3.18	55.42
Air travel	11.45	516.09
Air taxi	191.91	179.30
Guides	---	---
Other	14.27	490.08
Total	347.82	1,602.58

Source: Smith 1979.

--- means no data were available.

Numbers in ( ) = no. of replies.

Table 26. Should Fees be Charged for Visiting the Sanctuary?

	Residents (n=35)	Nonresidents (n=32)
Application fee	3	9
Visitor fee	23	28
Both fees	60	63
Neither	14	---

Source: Smith 1979.

--- means no data were available.

Number in ( ) = no. of replies.

(Unless otherwise referenced, all information in this description is from the park plan [NPS 1985e].)

2. Jurisdiction and management plans. The park, preserve, and Alaganak Wild River are administered by the National Park Service. A revised draft management plan was published in December 1985 (NPS 1985).

3. Access, proximity to communities, and facilities. Transportation within the region is principally by air, with King Salmon serving as the local center. There is daily scheduled service between King Salmon and Anchorage, 290 mi to the northeast. An estimated 4,000 to 6,000 people annually enter the park by aircraft, but the majority of the approximately 25,000 visitors use a 10-mi road from King Salmon into the western end of the park.

   Four lodges and two camp-style lodges, with a total capacity of 100, serve visitors; the largest is Brooks Camp, with a capacity of 60. There is also a developed campground and a visitors center at Brooks Camp, trails, special facilities for wildlife viewing, and a road into the Valley of Ten Thousand Smokes.

4. Human use. Visitor data for the last three years are shown in table 27. The NPS reports that overnight use of the concession lodges and the campground has accelerated over the past 10 years, with an average annual increase of 175 to 200 visitors, respectively. The increase in the recorded use of the backcountry has subsided somewhat to an increase of 111 visits per year. The NPS estimates that "if the rate of increase during the past 10 years continues, total overnight use may reach 20,000-25,000 by the year 2000, including 6,250 overnight stays at concession lodges, 6,300 stays at the campground, and 3,600 stays in the backcountry. Overnight lodge use will be limited by capacity, and limits will be placed on future development by the National Park Service" (NPS 1985e).

   The park plan recognizes that NPS visitor figures underestimate the level of visitor use:

   > Due to the size of Katmai and the number of access and use points, monitoring total use is difficult. In particular, the Bay of Islands is known to be popular for overnight and day use. Use of the Nonvianuk and Alagnak rivers has not been regularly monitored, nor has the apparently accelerating use of dispersed backcountry and coastal areas by fly-in sport fishermen.

Table 27. Recorded Visitation of Katmai National Park and Preserve, 1983-85

Year	Total Visits	Total Overnight Stays
1983	14,105	4,024
1984	20,329	8,173
1985	25,340	5,054

Source: NPS 1986.

The park plan recognizes that NPS visitor figures underestimate the level of visitor use.

Brooks Camp is the major visitor use area in the park. The entire Brooks Camp complex, especially the river and lakeshores, provides a critical feeding area for brown bear during the summer and fall. The park managers find that the increasing number of people and the seasonal concentrations of bears presents a potentially dangerous conflict. They are concerned about both the potential for a tragic incident and for impact on the bear population if visitor use is allowed to increase. They are, therefore, considering a phased relocation of all Brooks Camp facilities to reduce the number and frequency of bear/human encounters, but they will defer a final decision on this proposal until the results of current studies on bear/human interactions in the Brooks Camp area have been completed. To alleviate current congestion, the Park Service will initiate a reservation system for the Brooks Camp campground. A development concept plan will be prepared to address the need for, location, and size of an overflow camping area, a new visitor center, and an elevated boardwalk to and across the Brooks River.

G. Wood-Tikchik State Park

1. Area description. The Wood-Tikchik State Park is the largest in the Alaska state parks system, a 1.4 million acre wilderness of mountains, forests, tundra, lakes, and rivers. It is named for a system of long, interconnected lakes that are important spawning and rearing grounds for Bristol Bay sockeye. Wildlife common to the area include moose, black and brown bears (especially along the Tikchik River), caribou, beaver, furbearers, eagles, and migratory waterfowl species (Simmerman 1983). Sportfishing and hunting are the most popular recreational activities in the park. Photography, wildlife observation, kayaking, and canoeing are gaining in popularity (ADNR n.d.).

2. Jurisdiction, management plans. The Wood-Tikchik State Park is administered by the ADNR, Division of Parks and Outdoor Recreation. An unfinished draft plan is being prepared by the Division of Parks and the Wood-Tikchik State Park Management Council.

3. Access, proximity to communities, and facilities. Access is by air or riverboat. The nearest communities are Dillingham and Aleknagnik. The Division of Parks and Outdoor Recreation has no facilities in the park, but there are five commercial sportfishing lodges in the park.

4. Human use. Concerning human use for recreational activities, the draft plan referred to above provides the following:

> Trends. No figures are available directly measuring recreational trends in Wood-Tikchik State Park.

Although it is generally agreed that the park is witnessing annual increases in visitation, this conclusion must be reached indirectly through a number of other measures.

A small but significant recreation/tourism industry has developed in the Bristol Bay region. Many are small seasonal businesses serving visiting sport fishermen and hunters. Others are year-round operations which serve specific needs of visitors. Air taxis, fishing guides, hunting guides, lodges, grocery and liquor stores, outfitters, restaurants, bars, and hotels all receive income from recreationists. A 1983 study found that one-third of the region's service industry can be attributed to recreational activities and that recreational businesses are growing at a faster rate than other services.

The park plan mentions that although regulations exist requiring permits for commercial operations in the park, they have gone largely unenforced; an anticipated move to enforce these regulations will provide more data on commercial users. The 1986 Alaska legislature is considering HB 440, which would provide funds for a Bristol Bay regional recreation plan. A study of commercial recreation being conducted for the Bristol Bay Coastal Resources Service Area includes the Wood-Tikchik area., The study will be available in mid May 1986 (Isaacs, pers. comm.). For more information on this study and on HB 440, see section H., Bristol Bay Area Recreation Studies.

H. Bristol Bay Area Recreation Studies

1. House Bill 440. The Bristol Bay Cooperative Management Plan, initiated in 1981, became two separate plans, a State of Alaska Bristol Bay Area Plan and a federal Bristol Bay Regional Management Plan. Both of these plans recognized the need for additional planning for recreational management of the region (Herrmann 1986a). Little information about area recreation was produced by the state planning process for Bristol Bay (Trasky, pers. comm.). In response to this recognized need, HB 440 was introduced in the 1986 Alaska legislature by the House Resources Committee. The bill provides for a recreational management plan to be adopted by the commissioner of natural resources. The plan would become a part of the Bristol Bay Area Plan (CSHB 440). It would be initiated in the summer of 1986 and printed by June 31, 1988 (ibid.). According to an analysis of HB 440 (Herrmann n.d.), the Institute of Social and Economic Research estimates that the economic value of recreational hunting, fishing and nonconsumptive uses of fish and wildlife resources in the region at between $20 and $40 million per year. Testifying

in favor of HB 440 before the House Resources Standing Committee (House Resources Standing Committee 1986), Alice Ruby of the Bristol Bay Coastal Resources Service Area Board commented:

> It is an understatement that in the last eight to ten years Bristol Bay has experienced what can only be described as an explosive and alarming increase in commercial, private, and public recreation use of the region's rivers and lakes. It is not surprising given the abundance of fish and wildlife and spectacular scenery and wilderness qualities which offer some of the finest opportunities for outdoor recreation in the state. If gone uncontrolled, this rapid increase in recreational use would not only adversely affect traditional subsistence use and important habitat, but the high quality of recreation and wilderness experiences.
>
> Unfortunately, we are no longer looking at the potential for conflict between resource users, but the conflicts are already being experienced. Very little documentation exists on the actual efforts and intensity of recreational use, much less securing the region's enforcement activities. The recreation industry is estimated to generate in excess of $50 million annually in Bristol Bay alone.

Other people testifying in favor of HB 440 at the March 21, 1986, hearing included representatives of Native village corporations and of the Bristol Bay Native Association, a member of a Bristol Bay fish and game advisory committee, several lodge operators, and a long-time area sportfishing guide. The forms of recreation discussed in testimony were all based on fish, wildlife, and scenery, with sportfishing as the largest component (House Resources Standing Committee 1986).

2. Bristol Bay Coastal Zone Resources Service Area Study. Because of the rapidly accelerating use of the Nushagak River drainage by recreationists and virtual lack of information on the intensity and location of this use, the Bristol Bay CSRA Board received a $30,000 special appropriation to do a study on commercial recreational use of the Nushagak/Mulchatna river drainages. Due to funding limitations, the study is focusing on the Nushagak/Mulchatna river drainages. Phase I of the study has been completed and resulted in a directory of commercial service providers - lodges, guides, and air taxis - that operate in the study area. A total of 128 commercial operators were found to operate within the study area. Phase II of the study involves a survey of the three

broad categories (lodges, guides, and air taxis) of recreational service providers. Information is being collected about location, timing, and other use characteristics for sportfishing, hunting, and recreational rafters, as well as information on the types and costs of services provided. Two questions ask about scenic/wildlife viewing. A total of 71 surveys have been completed, representing 55% of the recreational businesses operating in the study area. Fifty-two of the surveys were done by personal interview. Questionnaires were mailed to operators not available for interview (Herrmann 1985b).

Bristol Bay has four major recreational areas: The Bristol Bay side of the Alaska Peninsula; the Lake Clark and Lake Iliamna area; the Togiak area; and the Nushagak/Mulchatna area. The latter, including the Wood-Tikchik lakes, constitutes the study area (Isaacs, pers. comm.).

Preliminary data from the guide and lodge surveys only (the air taxi data had not yet been compiled) are shown in table 28. Twenty guides and 25 lodge operators were surveyed. The preliminary data presented in the table are for actual survey responses only and have not been expanded to the entire population of guides and lodges.

I. Becharof National Refuge

1. Area description. Becharof NWR encompasses 1.2 million acres on the Alaska Peninsula. Katmai National Park bounds it on the northwest and the Alaska Peninsula NWR bounds it on the southwest. Becharof Lake is the refuge's largest feature. The lake drainages contain a variety of landscapes and habitats, including important spring and fall staging and migration habitat for waterfowl and shorebirds. Thirty-five species of mammals inhabit the range, including brown bear, moose, caribou, wolf, and wolverine. Harbor seals, sea lions, fur seals, and sea otters use the Pacific coastline of the refuge. (All of the information in this description comes from the plan [USFWS 1985b].)

2. Jurisdiction and management plans. The refuge is managed by the USFWS. A comprehensive management plan, environmental impact statement, and wilderness review was published in April of 1985. There are 102,640 acres of Native land selections and 16,576 acres of state land within the refuge.

3. Access, proximity to communities, and facilities. People from outside the region generally arive by air. King Salmon, 10 mi north of the refuge, has daily scheduled air service from Anchorage 295 mi to the northeast. No facilities have been developed on the refuge.

Table 28. Number of Recreational Businesses Operating, Clients, and Employees by Month, in the Nushagak/Mulchatna and Wood-Tikchik Areas

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
No. businesses operating:													
Guides	1	2	3	2	5	11	15	15	12	7	1	1	
Lodges	0	1	1	1	14	25	25	24	24	13	0	1	
No. clients													
Guides	0	0	4	0	10	202	131	86	93	24	18	24	597
Lodges	0	0	0	0	119	813	1,102	1,064	1,032	124	0	0	4,254
*No. employees													
Guides	2	4	4	10	23	55	50	36	41	28	2	2	
Lodges	8	8	11	14	89	230	219	221	217	80	8	8	

Source: Isaacs, pers. comm.

The information above represents entire businesses. The guides reported that about 24.5% of their gross income came from activities and operations in the study area. For lodge operators, 50.8% was from the study area.

* Unclear whether owners and their families were included in employee counts.

4. Human use. Public use of the refuge is primarily for subsistence, fishing, and general hunting. The park plan provides public use figures by activity for the 12-month period from June 1981 through may 1982. A total of 4,983 visitor-days were recorded during the period. Wildlife viewing/photography accounted for 735 of those days.

   Addressing public use management, the plan advises that forms of recreation disruptive to wildlife will generally not be permitted.

   The plan comments that residents of the region are not enthusiastic about increased recreational use of the refuge, but they are more accepting of nonconsumptive uses than of hunting and fishing by people from outside the local area.

   The park planners say that drainages such as the King Salmon River and Big Creek contain wildlife concentrations and are particularly sensitive to disturbance. These areas have high recreational potential and are therefore possible sites for user/resource conflicts.

J. Alaska Peninsula National Wildlife Refuge

This refuge encompasses 3.5 million acres along the Pacific coast side of the Alaska Peninsula from Becharof NWR to the end of the peninsula. It has a varied landscape including wetlands, tundra, fjords, volcanos and sea cliffs. Although little nonconsumptive wildlife use presently occurs, there are areas with high potential for such uses:

- The Black Lake/Chignik Lake area: harbors one of the most dense concentrations of brown bears in North America
- Ugashik Lakes: key feeding habitat for brown bears
- Dog Salmon River: one of the most important moose concentrations on the peninsula, also large numbers of salmon, brown bear, and caribou
- Mother Goose Lake: area provides key habitat for brown bear and moose
- Meshik River: the upper reaches support large moose and brown bear concentrations

Human use patterns are similar to the Becharof and Izembek NWRs. All but a small minority of current use consists of subsistence, sportfishing, and general hunting. From September 1982 through August 1983 a total of 9,727 nonconsumptive use "activity hours" are shown for the refuge. Of these, 1,468 were for "wildlife viewing/photography." Ron Thuma of the USFWS comments that many

of the nonconsumptive uses recorded as camping, boating, etc., also involved nonconsumptive wildlife uses (Thuma, pers. comm.). (Unless otherwise referenced, information in this description is from the Alaska Peninsula NWR [USFWS 1985b].)

K. Izembek National Wildlife Refugre and State Game Refuge

1. Area description. The Izembek NWR and State Game Refuge encompasses tundra, lakes, wetlands, and mountains on the southwestern tip of the Alaska Peninsula. The area is 650 air miles southwest of Anchorage. The community of Cold Bay is adjacent to the refuges. The refuges' wetlands and lagoons are used extensively by thousands of shorebirds, geese, and ducks, particularly emperor geese and brant, during fall migration. Izembek Lagoon, near Cold Bay, is within the State Game Refuge and is the area most used by migrating waterfowl. Caribou, brown bears, salmon, river otters, and wolves occur on the refuge. Sea otters, sea lions, and harbor seals are found on the Bering Sea coast. Left Hand and Right Hand valleys are noted for their scenic qualities and are key habitat for caribou and brown bear. (Unless otherwise referenced, all information in this description is from the Izembek NWR plan [USFWS 1985c].)

2. Jurisdiction and management plans. The State Game Refuge is managed by the ADF&G. The NWR is managed by the USFWS. A comprehensive plan, EIS, and wilderness review was published in 1985.

3. Human use. Most human use is for hunting and fishing. The visitor data provided in the park plan are for September 1982 through August 1983 and are in terms of "activity hours." A total of 30,102 activity hours were shown for the time period, of which only 610 were for wildlife viewing/photography. However, Ron Thuma of the USFWS suggests that this underestimates the nonconsumptive wildlfie use by campers, etc. He also reports that residents of Cold Bay frequently drive to Izembek Lagoon to view the waterfowl and migrating caribou (Thuma, pers. comm.). The ADF&G does not collect user data for the Izembek State Game Refuge.

L. Walrus Islands State Game Sanctuary

1. Area description. The Walrus Islands State Sanctuary includes four small islands - Round, Summit, High, and Crooked islands - west of the Nushagak Peninsula in Bristol Bay that serve as walrus haulouts. Round Island is one of the few locations in the United States where walrus can regularly be seen today, making it important not only for walrus viewing and photography but also for scientific study (Taggert 1982).

The islands also serve as rookeries for seabirds, many of which can only be seen only at sea or when they come ashore to nest. Visitor interest in seabirds is almost as high as in walrus (Taylor, pers. comm.). Fifty-two bird species have been counted on the islands. Other species to be observed are red fox on the islands and grey whale, which feed in the area during spring migration (Quinlan et al. 1983).

2. Jurisdiction and management plans. The sanctuary was established in 1960 and is administered by the ADF&G from its Dillingham office. Regulations were established to prohibit hunting and trapping in the sanctuary and to restrict access to Round Island (the major haulout) and the waters within .5 mi (A.S. 16.20.00 and 5 AAC 81.300). The department has a management plan, circa 1982, for the sanctuary.

3. Access, proximity to communities, and facilities. Round Island is about 30 mi from Togiak and 80 mi from Dillingham. Access is difficult because of the lack of good boat or aircraft landing sites and the unpredictable and often severe weather. Seaplane landings require ideal wind and sea conditions. Boat access is somewhat safer and more reliable. Since 1984, one commercial operator has provided transportation to the island via a small (24 ft) boat from Togiak (Taylor, pers. comm.).

   As a matter of policy, no visitor facilities are established or planned for the islands.

4. Human use. Because of the increase in visitor use in the past 12 years and because it became necessary to distinguish nonconsumptive users from unauthorized users, a permit system (5 AAC 81.300) for access to Round Island was adopted by the Board of Game in the 1975-1976 season. The permit was modified in 1982 to require that visitors notify department personnel on Round Island just prior to the visitors' arrival. The current permit system allows unlimited visitors but restricts their activities. The major concern for the walrus is that visitor activities could stampede them into the water, causing possible injury or death to pups (Taggert 1982).

   The sanctuary has an international reputation, and in the past most visitors have been nonresidents, with the exception of commercial fishermen who, frequently visit the islands via fishing boat. The commercial operator out of Togiak is now bringing a number of local residents, as well as people from other parts of Alaska, other states, and Europe.

   Almost all human use is during late spring and summer, when walrus are on the islands. Arrival of walrus on the islands is affected by the timing and movements of the pack ice in

Bristol Bay. In years in which pack ice leaves later than usual or extends further south than usual, the walrus remain with the ice and are not common on the islands until later in summer (ADF&G 1985b).

Because many visitors are commercial fishermen and fish-processing crews, the timing of herring and salmon fishing seasons and closures are an important determinant of the period of use.

M. Aleutian/Pribilof Subregion

1. Attu Island. Attu is at the extreme western end of the Aleutian Islands chain and is part of the Alaska Maritime National Wildlife Refuge. It is of special interest to birders because of the number of Asiatic as well as American birds to be seen. Arctic fox, sea otter, and whales are also seen. Military roads provide access to various parts of the island (Quinlan 1983).

   The following areas were identified as nonconsumptive use areas by ADF&G personnel. Minimal information is available about the use of these Sites.

   - Cape Seniavin: located 160 mi southwest of King Salmon on the Alaska Peninsula is a walrus haulout and a place where seabirds are viewed, June through August (ADF&G 1976)

   - Cape Newenham and Cape Pierce: located approximately 110 mi northwest of Dillingham in the Togiak National Wildlife Refuge, are visited by a few people each year for the purpose of viewing seabirds and walrus. Walrus have reestablished an historical haulout here. Access by boat or plane is expensive, but there have been a few visitors each year whose interests are scientific or wildlife photography and viewing. Refuge managers accommodate these visitors each year whose interests are scientific or wildlife photography and viewing. Refuge managers accomodate these visitors but are concerned with preventing disturbance, particularly of the walrus haulout (Fisher, pers. comm.). Cape Newenham and surrounding waters are also a state game refuge.

   - Ilnik-Wildman Lake: located 100 mi southwest of King Salmon, provides opportunities to see caribou calving in June (ADF&G 1976)

2. Pribilof Islands. The Pribilof Islands in the Bering Sea are known worldwide as a nesting area for about 2.5 million seabirds (Simmerman 1983) and as the rookery area for 75-80% of the world's population of northern fur seals (ADF&G 1985).

Large numbers of reindeer graze on the islands. Arctic foxes can be seen on land, and Pacific walruses, sea otters, dolphins, and whales swim offshore (Simmerman 1983). The largest number of seabirds (about 2,250,000) nest on St. George Island. Well over a thousand people per year visit the islands to see the birds and wildlife (Alaska Maritime NWR, pers. comm.).

a. Jurisdiction and Management Plans. The seabird cliffs on St. Paul and St. George and all of nearby tiny Walrus and Otter islands are in the Alaska Maritime National Wildlife Refuge, administered by the USFWS. Planning for the maritime refuge is underway. The rest of the land is managed by St. George and St. Paul community councils and Tanadgusix and Tanaq Native corporations (Simmerman 1983). Information about council and corporation plans was not requested.

b. Access, proximity and facilities. Reeve Aleutian Airways has scheduled flights to the airport at St. Paul. From there, charter flights land at a smaller airstrip at St. George. Weather frequently affects flight schedules. Hotel accommodations are available in the villages. There is a relatively extensive road system on the islands.

c. Human use. All visits to St. Paul Island and the fur seals are arranged through Exploration Holidays and Cruises Inc. or through the Tanadgusix and Tanaq village corporations. Visitors arrive on a package tour, which includes air fare, a bus tour of the island and hotel lodging (Simmerman 1983). The USFWS staff estimates that 1,000 people per year come on the Exploration Holidays tour and an additional four or five special birding groups (consisting of 10 to 20 people each) arrive annually. Visitors to St. George Island make arrangements with Tanaq Village Corporation, which arranges for a charter flight from St. Paul, a tour of the island, and lodging. Tanaq hosted 40 visitors in 1984, 60 in 1985, and expects 70 to 80 visitors in 1986 (Coburn, pers. comm.). A Lindblad Explorer cruise ship brough about 150 people to the islands on a single visit in 1985 and is scheduled to return in 1986 (Alaska Maritime NWR, pers. comm.).

V. SOUTHCENTRAL REGION

A. Overview

Compared to other regions of the state, the Southcentral Region appears to have the largest amount of nonconsumptive wildlife use

by both residents and nonresident tourists. This of course results from its having the largest population of Alaska residents and receiving the largest numbers of tourists. Available data show particularly intensive use on the Kenai Peninsula and in Chugach State Park. Parts of the Susitna Valley and Prince William Sound may receive equally intensive use, but equivalent data are not available for those areas.

Several sites are reported to receive regular use for educational purposes. These are Potter Marsh, Palmer Hay Flats, and Gull Island and Peterson Bay in the Kachemak Bay area.

B. Susitna Area Plan

The Alaska Department of Natural Resources (ADNR) has completed a comprehen- sive land use plan for the Susitna area, including an area plan, a Recreation Element (ADNR 1984c) and a Fish and Wildlife Resources Element (ADF&G 1984).

1. Recreation Element. The Recreation Element provides areawide estimates of the participation in and value of a number of outdoor recreational activities, such as hiking, cross-country skiing, and snowmobiling. The use estimates were derived from a recreation study conducted in 1979 by the U.S. Department of Agriculture, Soil Conservation Service (SCS), and the ADNR, Division of Parks and Outdoor Recreation (DPOR). Using the participation rates provided by DPOR from its statewide outdoor recreation survey (actually, the Alaska Public Survey described in section III. B. of the statewide portion of the chapter), SCS prepared a demand assessment and economic evaluation of seven common recreational activities. The results for the Susitna planning area are shown in tables 29 and 30. The recreation plan narrative notes that by limiting the evaluation to only seven activities the total recreational use and value attributable to the region could not be derived from the analysis.

   Although the study provides indicators of the volume and value of outdoor recreation in the Susitna area, none of the specified recreational activities refers to nonconsumptive wildlife use. The importance of nonconsumptive uses of wildlife in recreation must be inferred from other data. Parts of the Alaska Public Survey not incorporated in the Susitna recreation element, for example, clearly indicate the importance Southcentral Alaska residents attach to encountering wildlife in their outdoor recreational environment. When these residents were asked to rate a list of 17 possible qualities of their favorite outdoor recreation place, opportunities to view wildlife received the highest number of "important" or "very important" responses (Clark and Johnson 1981). of this chapter). In that instance, the

Table 29. Existing and Projected Recreational Demand in the Susitna Planning Area, Excluding Willow Subbasin

Activity	Existing Recreational Demand[a] User-day Demand			Projected Recreational Demand for the Year 2000[a] User-day Demand		
	Parks Hwy Sector	Glenn Hwy Sector	Total	Parks Hwy Sector	Glenn Hwy Sector	Total
Kayaking/canoeing	36,112	34,412	70,524	55,216	59,021	114,237
Cross-country skiing	30,257	69,328	99,585	52,820	135,540	188,360
Snowmobiling	29,602	65,739	95,341	52,652	132,101	184,753
Hiking	37,644	37,069	74,713	58,550	64,935	123,485
Picnicking	174,233	202,754	376,987	277,089	348,748	625,837
RV camping	75,305	44,759	120,064	110,715	71,235	181,950
Tent camping	56,238	51,133	107,371	84,543	86,359	170,902

Source: ADNR 1984c.

a Includes demand for recreation by residents and nonresidents based on per capita participation rates.

Table 30. Existing Recreational Value in the Susitna Planning Area, Excluding Willow Subbasin (1982 Dollars)

Activity	Recreational Value to Residents			Recreational Value to Nonresidents			Total Annual Value	Total Present Value[a]
	Parks Hwy Sector	Glenn Hwy Sector	Total	Parks Hwy Sector	Glenn Hwy Sector	Total		
Kayaking/canoeing	1,034,050	648,570	1,682,620	73,504	70,035	143,539	1,826,159	18,106,000
Cross-country skiing	400,310	496,990	897,300	59,373	136,099	195,472	1,092,772	10,834,600
Snowmobiling	1,112,874	1,845,488	2,958,362	73,003	162,044	235,047	3,193,409	31,662,000
Hiking	362,600	226,180	588,780	62,900	61,925	124,825	713,605	7,075,300
Picnicking	2,087,560	1,608,580	3,696,140	1,412,043	1,643,180	3,055,223	6,751,363	66,938,500
RV camping	460,850	216,090	676,940	2,915,931	1,733,150	4,649,081	5,326,021	52,806,500
Tent camping	529,610	307,930	837,540	328,462	298,616	627,078	1,464,618	14,521,400

Source: ADNR 1984c.

a Based on 50-year evaluation period, 10% discount rate.

question referred to coastal recreation, whereas the Susitna area is inland, but it would be unreasonable to assume that appreciation of wildlife is limited to coastal habitats.

2. Sites described in the Fish and Wildlife Resources Element and the Recreation Element. The Recreation Element recommends a number of areas for inclusion in the state park system or for other forms of protection from developments detrimental to recreational uses. These recommendations are generally limited to state-owned land. Neither nonconsumptive wildlife use nor current levels of general recreational use is described for the recommended areas. The Fish and Wildlife Resources Element of the Susitna Area Plan also recommends that, for a number of areas, fish and wildlife habitat and harvesting areas for consumptive uses be protected. Most often, high levels of sportfishing use and substantial populations of mammals are mentioned for these areas. Although it would seem that nonconsumptive uses of wildlife are important in some of the areas described in these two publications, in only two cases is information on nonconsumptive use provided.

   Despite the lack of appropriate information it may be useful to list some of the areas described in the two elements. Proposals before the 1986 legislature for protection of some of these areas are noted.

   Areas that have been identified as "especially suited for nonconsumptive uses of wildlife resources" in the Fish and Wildlife Resources Element are listed below:

   a. Bird Island (Western Lake Louise). This area supports the northernmost known colony of double-crested commorants in North America and the largest known herring gull colony in the interior part of Southcentral Alaska. This bird viewing area is used mostly by local residents (Bader, pers. comm.).

   b. Sheep Mountain Closed Area. This area provides habitat for the only sheep population visible from the road system in the Susitna and Nelchina basin. Several lodges along the Glenn Highway have based their businesses on the visibility of Dall sheep and provide telescopes and rooms with a view of the animals. Bus tours highlight sheep viewing and photography at Sheep Mountain. Local residents and a portion of the tourism trade support maintaining the area in public ownership, and the Board of Game has kept the area closed to sheep and goat hunting for more than 12 years to increase viewing opportunities. This area has regional significance as a tourist attraction for bus tours and also for highway travelers in private vehicles, of which

an estimated 50-75% will slow or stop their vehicles to look for sheep (ibid.).

Other relevant areas recommended in either the Fish and Wildlife Resources Element or the Recreation Element or both:

c. Deshka River, including Kroto and Moose creeks. This is an area that supports large numbers of salmon, trout, and grayling and high concentrations of moose. Fish and wildlife values and public use of the resources are some of the highest in the planning area. (HB 93, concerning State Recreational Rivers in the 1986 legislature, proposes Kroto and Moose creeks as a state recreational river.) The area is used for camping, fishing, hunting, and photography; nonconsumptive float trips are numerous (ibid.).

d. Lake Creek, from Chelatna Lake to the Yentna River. This section of Lake Creek ranks as one of the top five streams in the Susitna planning area in terms of fish and wildlife production, including 2,000 moose in and around the corridor, as well as black and brown bear populations. It is a popular float trip. (HB 93 would include Lake Creek among six proposed state recreational rivers.) Some float trips occur here (ibid.).

e. Talachulitna River. This river ranks among the top five streams in the planning area for fish and wildlife production. A trophy rainbow trout fishery is managed for catch-and-release fishing. Large salmon runs and an estimated 2,500 moose use the corridor. (HB 93 would include the Talachulitna as a state recreational river.) This is a popular recreational river, used for float trips, photography, camping, hunting, and fishing (ibid.).

f. Alexander Creek, from the Susitna River to and including Alexander Lake. Alexander Creek also ranks among the top five in fish and wildlife production. Salmon, trout, grayling, moose, black and brown bear, and furbearers occur in the area. The creek affords opportunity for a good float trip; the lower 25 mi are accessible by powerboat. (HB 93 would include Alexander Creek.) This is a popular recreation area for float trips, camping, and photography, as well as for hunting and fishing (ibid.).

g. Jim-Swan lakes. These lakes are described as having potential for a recreational area, game refuge, and multiple use area. (HB 324 in the 1986 legislature would establish a Jim-Swan Lakes Recreation Area.) This

is a popular area for family outings and has many summer visitors who canoe and view on the lake. The area has extensive habitat and wildlife.

h. Matanuska Valley Moose Range. This range is already protected by a Matanuska-Susitna Borough ordinance; the recommendation is to expand the area. The moose population is estimated at 1,500-2,500. The range is used for much recreation involving ATVs and berry picking and to a lesser extent for horseback riding, hiking, and camping. Hunting activities, however, predominate (ibid.).

i. Lake Louise area. This area encompasses the remainder of Lake Louise (part was included in a. above) and the Canoe Lakes, a small system of lakes near the junction of Lake Louise Road and the Glenn Highway. The Recreation Element states that they should be managed for recreational and wildlife values. Three state recreational areas have been proposed in the Lake Louise vicinity: Tazlina Lake, Susitna Lake/Tyrone River, and South Lake Louise. There are lots of recreational activities in this area, including boating, canoeing, and camping (ibid.).

j. Cheltana Lake. In Sunflower Basin, this is one of the few large lakes remaining in public ownership in the Susitna valley. The south end of the lake is the beginning for the Lake Creek float trip. The area is described as having fine visual quality and wildlife values. Some camping occurs around the lake (ibid.).

k. Rock's Lakes, Chambers Lakes, and Swan Nesting Lakes. These lakes are in the Susitna lowlands west of the Parks Highway and south of Petersville Road. It is recommended that they be managed for wildlife habitat values and wilderness recreational values. This area is being developed as a result of state land disposals, so an increasing amount of mixed recreational activity occurs here (ibid.).

l. Prairie Creek, from its headwaters at Stephan Lake to its confluence with the Talkeetna River. Because of its high density of spawning king salmon, this creek attracts the highest concentration of brown bears during July and August of any known location in the Susitna planning area. An estimated 40 bears are attracted from as far away as 100 km. Prairie Creek is fairly remote but is accessible by boat and float plane. The creek is floated for photographic and fishing trips (ibid.).

m. Nelchina Public Use Area. This area is the most important habitat of the 25,000-strong Nelchina Caribou Herd. An estimated 5,000 to 6,000 moose inhabit the area. Dall sheep and black and brown bears are also seen. It is a large area where a great deal of hiking and lesser amounts of cross-country skiing and snowmobiling occur as well as some photography trips (ibid.).

n. Peters Hills-Peters Creek area. This area contains diverse wildlife species, including 3,000 to 5,000 moose, black and brown bears, wolves, and other furbearers. Camping and alot of winter sports occur here (ibid.).

o. Montana Creek. The Montana Creek area contains diverse wildlife species, including large numbers of moose, black and brown bears, and salmon and rainbow trout. Some camping occurs here (ibid.).

p. Chunilna Creek (Clear Creek). This creek is one of the more productive fish and wildlife systems in the planning area. Wildlife species in the area include moose, black and brown bears, and furbearers. Some camping occurs here (ibid.).

q. Peters Creek. Peters Creek is an important fish and wildlife production area with road access and offering a good float trip. Species include moose, bear, salmon, trout, and grayling. Due to new subdivisions in the area, there is significant general recreation, including ATV use, snowmobiling, cross-country skiing, and camping (ibid.).

r. Susitna River corridor. This corridor constitutes one of the most important fish production areas in Southcentral Alaska and one of the most important river systems for moose production in Southcentral Alaska. This is a boat transportation corridor, used for many recreational purposes including camping (ibid.).

C. Chugach State Park

1. Area description. Chugach State Park, established in 1970, is one of America's largest state parks, with 495,000 acres. It is immediately east of Anchorage, with Turnagain Arm as its southern border. It includes coastal spruce forests, mixed deciduous-coniferous forests, subalpine shrublands, alpine tundra, and glaciers. It is an important wilderness recreational area for the residents of and visitors to the Anchorage area; 280,000 people live within a 40-mi radius of

the park. Opportunities for wildlife viewing attract much visitor use and are included in the five primary purposes of the park mentioned in the legislation that created this park.

(All information on this description is from Garry 1986 or ADNR 1986b).

Moose and Dall sheep are the primary species that attract human observers. Secondary species are black and brown bears, mountain goat, Belukha whales along Turnagain Arm, anadromous fish, raptors, and waterfowl. The park is closed to hunting from May 1 until the day after Labor Day, so use of wildlife during the summer is necessarily nonconsumptive. Setting aside some specific areas for wildlife viewing has been discussed but not implemented. Eklutna Lake and Eagle River valley offer good opportunities to see Dall sheep and moose.

2. Jurisdiction and management plan. The park is under the jurisdiction of the Alaska Department of Natural Resources, Division of Parks and Outdoor Recreation. There is a Chugach State Park Master Plan dated February 1980 and a Chugach State Park Trail Plan dated January 1986. The latter indicates that wildlife viewing is an important use along some of the trails.

3. Access, proximity to communities, and facilities. As mentioned above, the park is immediately adjacent to Anchorage. It is bounded on the south by the Seward Highway, and the Glenn Highway largely follows its northwestern boundary.

   An extensive trail system (498 mi in 1985, with 204 mi more proposed) provides access within the park. Certain areas and trails are open to ATVs and snowmobiles, and some trails are particularly designed for cross country skiers. Other trails are designed with particular user groups in mind (e.g., dog mushers or horseback riders). Parking lots, three public campgrounds, and a visitor center with a natural history interpretive program, are maintained by the park service.

4. Human use. The Alaska Division of Parks and Outdoor Recreation estimates that Chugach Park receives over one million visits annually. The biggest user group are local residents. Use of the park by residents has risen dramatically since its establishment in 1970, many times faster than the general population growth of the area. Out-of-state visitors are also discovering the park, which is easily accessed by visitors to the Anchorage area with limited time. The Division of Tourism estimates that 80,500 nonresidents visited the park during the summer (June through September) of 1985 (ADCED 1986a).

Table 31. Chugach State Park Visitor Count, 1983-85

Area	1983	1984	1985**	Total
Seward Highway (turnouts)	115,188	226,438	86,326	427,953
Mirror Lake	186,666	136,271	64,831	387,768
Glen Alps	145,262	153,975	48,678	349,915
Eklutna Lake	105,258	125,495	60,883	291,636
McHugh Creek	108,401	112,915	59,547	280,863
Prospect Heights	48,187	66,741	51,364	166,292
Eagle River Visitor Center	28,200*	32,320*	39,586*	
All areas	979,077	1,231,273	1,075,866	3,286,216

Source: Garry 1986.

* Actual count.

** In 1985, the method for calculating the visit count was changed, giving the appearance of a lower visit count. The actual car count was higher in 1985 than in 1984.

It is estimated that 50% of the visitors pursue nonconsumptive uses of fish and wildlife as part of their park experience (Garry 1986). Visitor counts for major areas are shown in table 31. Visitors counts for specific campgrounds and trails are available from the park administration. In the last five years, 1,470 people have attended interpretive programs at the Eagle River Visitor Center about the fish and wildlife of the park.

Eight commercial operators had permits in 1985 for guided trips in the park, all involving nonconsumptive uses, although not necessarily of fish and wildlife.

Visitor use of Chugach State Park is year-round, with cross-country skiers, dog mushers, snowshoers, and snowmobilers being important winter users.

Most developed day use and overnight camping facilities in the park receive excessive visitor use during good weather in the summer, often exceeding by 200% the designed capacity of the facility (ibid.).

D. Potter Point State Game Refuge

1. Area description. The refuge comprises 2,300 acres, including the 564-acre Potter Marsh. It is located along the shore of Turnagain Arm 10 mi from downtown Anchorage. House Bill 186, under consideration by the 1986 Alaska Legislature, would add approximately 6.6 mi^2 to the refuge between Pt. Campbell and Pt. Woronzof and rename it the Anchorage Coastal Wildlife Refuge.

   The area hosts migrating and nesting waterfowl and other birds. Over 100 species migrate through the area in April, May, and June. Among these are migrating trumpeter and whistling swans, geese, diving and dabbling ducks, shorebirds, marsh hawks, Bald Eagle, and arctic terns. During the summer, the nesting population of lesser Canada geese is the largest drawing card for visitors. Small mammals are less readily observed, with muskrats being the most frequently seen. Salmon may be observed spawning in Rabbit Creek.

2. Jurisdiction and management plans. The Potter Point State Game Refuge was established in 1971 and is managed by the ADF&G. There is an Operational Management Plan dated June 1985 (ADF&G 1985c) and a Resource Inventory dated 1981 (ADF&G 1981b).

3. Access, proximity to communities, and facilities. The refuge is located between the Old and New Seward highways 10 mi from

downtown Anchorage. The refuge has two paved turnouts, a boardwalk along the edge of the marsh, and a viewing area.

4. Human use. Human use of the area is greatest during the spring waterfowl migrations and summer nesting season. A 1981 survey by the ADF&G (Meyer 1982) revealed that the refuge received an average of 4,622 visitor-days per week during the summer. In addition to systematic visitor counts, interviews with 3,577 people produced information about groups visiting the area. Potter Marsh was the primary destination for 76% of the groups in spring and 66% in summer. Seventy percent of the groups interviewed were there to view the wildlife and scenery or watch birds through binoculars. Photography was recorded to be part of the experience of 16% of the groups contacted.

   Ninety-two percent of the user groups were from Anchorage. More tourists were present during the summer and comprised 22% of user groups during that period. According to the management plan, the refuge is also an educational resource for Anchorage area schools. Waterfowl and small game hunting are allowed in the refuge during the fall.

   The Division of Tourism estimates that 46,100 nonresidents visited the Potter Point refuge in the summer (June through September) (ADCED 1986a).

E. Kenai National Wildlife Refuge

1. Area description. The Kenai National Wildlife Refuge (NWR), consisting of 1,970,000 acres, covers a large part of the western Kenai Peninsula. The refuge is rich in wildlife and receives a high degree of human use, both consumptive and nonconsumptive, by both Alaska residents and nonresidents. The refuge staff reports:

   > The Kenai National Wildlife Refuge is utilized by 140 species of wildlife including Dall sheep, moose, brown and black bears, wolf, coyote, mountain goat, wolverine, beaver, mink, trumpeter swan, Bald Eagle, four species of Pacific salmon, several species of waterfowl, small game, and numerous migratory birds. Its location in southcentral Alaska places the refuge in close proximity to Alaska's major population centers, road systems, and annual tourist influx. While Kenai has long been known as an outstanding hunting area for big game, non-consumptive use of the Kenai's resources has always exceeded consumptive use (Kenai NWR 1986).

   This general description of the refuge will be followed by descriptions, including visitor statistics when available, of

specific areas within the Kenai NWR that receive high levels of nonconsumptive wildlife use.

2. Jurisdiction and management plans. The Kenai National Moose Range was established in 1941 and enlarged and renamed in 1980 by ANILCA. It is under the jurisdiction of the USFWS. A combined comprehensive conservation plan, environmental impact statement, and wilderness review was published in January, 1985 (USFWS 1985d). A Kenai wilderness management plan is under development. Pursuant to ANCSA, 65,513 acres of land have been conveyed to Native corporations, and another 15,375 acres may be conveyed, along with large amounts of subsurface rights. As on all Alaska NWRs, oil and gas leasing is allowed; oil and gas developments have occurred in the Kenai NWR (ibid.).

3. Access, proximity to communities, and facilities. The refuge is located within a few hours drive of Anchorage on the Kenai Peninsula road system and is close to the towns of Kenai, Soldotna, and Seward. Facilities include 18 picnic sites, 7 campgrounds, 10 boat ramps, a visitors' center in Soldotna, interpretive displays, and more than 200 mi of marked trails (Simmerman 1983). Numerous commercial facilities for visitors are located near the refuge.

4. Human use. Annual visitor numbers reached 788,977 in 1985 (table 32). User types were not distinguished in these data, but information for 1973-1975 shows use categories that include "environmental education" and "wildlife/wildland nonconsumptive," the latter being by far the largest of nine use categories (see table 33).

   A 1969 study entitled Values of Wildlife and Related Recreation on the Kenai National Moose Range (Steinhoff 1969) showed that visitors rated wildlife observation and wildlife research as the first and second most important values of the range (table 34). In terms of actual uses, the category "wildlife observation, photography" ranked fifth for these visitors (table 35).

   During 1984 and 1985, there were 32 outfitter/guide special use permits for the Kenai NWR.

   Among the 1984 permits were five for fly-in tent camps and six for Swan Lake/Swanson River Canoe Routes. A larger number of permits were for sportfishing guides, who often provide nonconsumptive opportunities to enjoy game even though their primary activity is angling (Kenai NWR 1986). The Commercial Visitor Directory for the Kenai NWR shows 9 companies offering "lake/ocean touring," 9 offering "backpacking/back country canoe guide service," 13 offering "river float trips," 7 offering "photography guide service,"

Table 32. Reported Visitation of Kenai NWR,* 1981-85

1981	668,500
1982	684,500
1983	700,715
1984	717,715
1985	788,977

Source: Kenai NWR 1986.

* Visitation figures include incidental visitation occurring along the Sterling Highway. Data not available for individual activities, or between consumptive and nonconsumptive users. The majority of visitor use is estimated to be primarily nonconsumptive. There are, however, no current refugewide data available on visitor profiles.

Table 33. Reported Kenai National Moose Range Public Use Data, 1973-75

	1973		1974		1975	
	Visits	Act. Hrs	Visits	Act. Hrs	Visit	Act. Hrs
Interpretation	1,240	620	1,600	800	2,400	1,100
Environmental education	2,200	28,400	800	4,700	800	2,600
Hunting - resident game	23,500	615,500	30,700	215,600	15,000	150,000
Hunting - migratory birds	2,300	17,400	1,500	12,200	1,800	12,000
Fishing	45,300	603,400	71,400	436,400	49,800	536,700
Other consumptive activity	1,050	8,400	500	1,300	1,600	3,400
Trapping	10,000	90,000	8,000	30,000	7,000	21,000
Wildlife/wildland - nonconsumptive	68,500	1,120,400	166,000	6,679,000	141,000	2,250,000
Recreation - nonwildlife/wildland	47,100	3,504,000	10,300	180,900	5,500	110,900
Total activity visits	201,190		271,000		224,900	
Total visits	140,300		156,300		102,000	

% Distribution of Activity	
Swanson River Rec. Area	30%
Skilak Loop Rec. Area	55%
Tustumena Lake Rec. Area	10%
Mystery Creek Road	2%
All others	3%

Source: USDI 1975.

Note: Due to changes in sampling techniques, statistical validity may vary from year to year.

Table 34. Rating (Percentages) of Educational Factors as "Highest Uses" of Kenai National Moose Range

Use	Users			
	Residents	Nonres.	Public	Managers
Wildlife observation	75[a]	71	72	100
Wildlife research	67	54	76	88

Source: Steinhoff 1969.

a Percentage rating the use as a "highest use" of the range.

Table 35. Allocation of Values to Recreational Uses of Kenai National Moose Range

Group of Uses	Percentage of 1968 Uses
Fishing	22
Hunting	18
Camping and picnicking	15
Relaxation and driving	14
Wildlife observation, photography	12
Berrying	4
Hiking, horse use	4
Water sports	4
Canoeing	3
Winter sports	2

Source: Steinhoff 1969.

Note: This distribution does not correspond closely to that reported by the range staff for 1968, which showed 92% of the "visitor use days" in the first three categories. Sixty-seven percent of the use was allocated to camping and picnicking alone. The discrepancies are due partly to differences in method and partly to differences in interpretation. In this report, camping is categorized as a use only if it was an end in itself, not merely for convenience or inexpensive living while pursuing another use such as salmon fishing. Neither this study, range reports, nor any other studies have effectively considered allocation of use and purpose among the family members of the visiting unit. The father may come primarily to fish, the mother to relax, one child to camp, and another to swim. A similar, more precise allocation could be made of the multiple objectives and uses by each individual in the family.

1 offering "sightseeing tours," and 3 offering "winter backcountry guide service." Many companies offered several services and were therefore listed more than once.

Some detailed nonconsumptive wildlife use information is available for two specific areas within the Kenai NWR:

a. Swan Lake/Swanson River National Recreation Trails. Located in the northeastern part of the Kenai NWR, this canoe and portage system was declared a national recreation trail in the early 1980's. It is an important location for observing wildlife in a wilderness setting. A visitor survey conducted in mid 1970 revealed wildlife and wildland viewing as a primary drawing point of the area. The nonmotorized access into the area has allowed species to flourish that would otherwise have been harvested. Moose, waterfowl, loons, eagles, and bears are common and provide highly sought after wildlife viewing opportunities (Kenai NWR 1986).

   In 1985, 4,250 visitors used the area, for a total of 26,000 visitor days. Ten percent of the visitors were from other states, and 3% were from foreign countries (table 36). Data on visitor activities show that 59% participated in wildlife viewing, 50% in bird-watching, and 48% in nature photography (table 37). A majority of visitors combined nongame activities with sportfishing (table 38). Ninety-five percent of visitor use occurred in June, July, August, and September.

   The NWR staff reports that several studies, and visitors impact monitoring programs have been conducted within the area:

   Although use is primarily nonconsumptive, the overall numbers of persons utilizing the area caused a certain amount of wildlife disturbance and associated campsite, trail, and lake shore disturbance. While the resource damage and wildlife disturbance is at an acceptable level, we have developed advisory and regulatory programs to reduce visitor associated impacts (i.e., no camping zones near an eagle nest, minimum impact camping education, group size limitation, no campfire advisories, and increased back country patrol) (ibid.).

b. Skilak Lake Special Management Area. Located in the center of the Kenai NWR east of Sterling, this is a popular area for both consumptive and nonconsumptive uses, receiving an estimated 35% of the entire refuge use. The NWR staff expects the area to grow in importance as a nonconsumptive visitor opportunity because both refuge and state regulations are

Table 36. Recorded Visitor Use of Swan Lake/Swanson River National Recreational Trails

Year	Total Individuals	Visitor Use Days	
A.			
1979	2,200	11,000	
1980	3,189	15,945	
1981	4,620	24,100	
1982	6,824	34,120	
1983	6,036	30,180	
1984	4,125	20,500	(lower figure possibly due to weather)
1985	4,150	26,000	
B. Use by Specific Rate Within Swan Lake/Swanson River Trails			
	Swan Lake route west	50.2%	
	Swan Lake route east	28.2%	
	Swanson River route	21.6%	
	Vistor residency		
	Kenai Peninsula	26%	
	Anchorage, AK	49%	
	Other AK	6%	
	Lower 48	10%	
	Foreign	3%	

Source: Kenai NWR 1986.

Table 37. Percentage Participation and Preference for Recreational Activities on the Kenai NWR Canoe System

Activity	% Participation	% Most Preferred Activity
Fishing	78	30
Canoeing	100	47
Wildlife viewing	59	6
Bird-watching	50	7
Nature photography	48	4
Berry picking	15	0
Swimming	14	0
Big game hunting	7	3
Camping	5	0
Other (small game and waterfowl hunting, wild-flower identification, etc.)	9	3
		100
		(346)

Source: Kenai NWR 1986.

Table 38. Percentage Distribution of Activity Types on the Kenai NWR Canoe System

Activity Type	Percentage
Nongame only	18
Anglers only	14
Anglers and hunters	1
Nongame and anglers	59
Nongame and hunters	2
Nongame, anglers, and hunters	6
	100
	(401)

Sources: Kenai NWR 1986.

Note: Nongame means nonconsumptive users, including wildlife users.

emphasizing the wildlife-viewing opportunities through regulatory changes, habitat management, visitor facilities, and visitor interpretive facilities. Several species of wildlife, including moose, wolf, snowshoe hare, beaver, otter, mink, and black bear, are expected to become less wary, more abundant, and available for nonconsumptive uses. Wildlife and wildland viewing has been the dominant use of this area in the past, and predominance of these activities is expected to increase in the future. The area includes a variety of refuge landscapes, lakes, rivers, and diverse habitats (Kenai NWR 1986).

Plans for the area include a cooperative Wildlife Management Plan for Skilak Loop Special Management Area draft and a Visitor Facility and Interpretive Plan for Skilak Special Management Area, presently under development by Land Design North.

Seven campgrounds and several waysides and parking areas encourage visitor use. Plans are underway to redesign several facilities within the area to respond to increased visitor use and to encourage a more compatible nonconsumptive use of the area.

Visitor statistics collected do not distinguish between consumptive and nonconsumptive users. The following figures include estimated visitation associated with travelers on the Sterling Highway who stop to photograph and watch wildlife.

Year	Total Recorded Visits
1982	239,411
1983	245,156
1984	251,040
1985	257,064

Approximately 15 special use permits were given to outfitter guides to facilitate visitor use of the area during 1982-1985. Although one permit holder specialized exclusively in wildlife tours, several operators featured sightseeing and wildlife observation. Most included both nonconsumptive and consumptive activities, 99% of which is angling (frequently catch-and-release fishing). The two primary features of a guided trip to the refuge are fishing coupled with wildlife and wildland observation.

Other areas within the Kenai NWR have been noted by USFWS and ADPOR personnel. Despite a lake of

quantitative measures of human use, these areas are recognized nonconsumptive fish and wildlife use areas.

c. Tustumena-Skilak benchlands. Lying between Tustumena and Skilak lakes and consisting of mountain and glacier formations, this area has Dall sheep and mountain goat ranges, brown bear habitat, and timberline moose ranges. It is encompassed by the Andrew Simons Research Natural Area (USFWS 1985d).

d. Chickaloon estuary and watershed. This is the major waterfowl and shorebird migratory staging area on the Kenai Peninsula and the only pristine watershed that is seasonally accessible by road on the peninsula (USFWS 1985d).

e. Kenai River Bald Eagle wintering areas. About 400 Bald Eagles are present every winter along the Kenai River, above and below Skilak Lake, and in the Fox River valley. Cooper Landing, just east of the NWR in the Chugach National Forest, is an especially important eagle wintering area (USFWS 1985d; Millington, pers. comm.). In mid winter, several hundred eagles feeding along stretches of the river can easily be observed from the Sterling Highway. The upper Kenai River has recently been made a drift-boat-only area for sportfishing. This area affords visitors an outstanding place to observe salmon, beaver, moose, and eagles (Kenai NWR 1986).

f. Watson Lake. Located at about mile 75 on the Sterling Highway, Watson Lake is a stopover spot for trumpeter swans in the fall (Millington, pers. comm.).

g. Russian River falls. This falls on the lower Russian River, on the boundary between the Kenai NWR and Chugach National Forest, affords visitors an excellent opportunity to photograph leaping salmon. Access is via a 2-mi trail (Kenai NWR 1986).

h. Headquarters area. The Kenai NWR headquarters near the Sterling Highway in the vicinity of Soldotna has a visitors' center and nature trail. Several miles of trails combined with recent wildlife harvest closures make this area a good place to observe moose and woodland bird species (ibid.).

F. Alaska State Parks on the Kenai Peninsula

The Alaska Division of Parks and Outdoor Recreation, Kenai Area Office, provided visitor statistics for state parks and recreation areas on the Kenai Peninsula (ADNR 1986c). Parks said to have "a

Table 39. Visitor-days Recorded at Kenai Peninsula Campgrounds and Kachemak Bay State Park, 1985

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	1985 Total
Captain Cook Rec. Area	4,968	1,929	4,914	1,584	10,833	10,680	24,120	24,882	20,288	27,969	8,064	1,848	135,070
Caines Head Rec. Area	---	---	---	---	3,858	3,936	11,007	6,427	10,454	---	---	---	33,658
Kachemak Bay State Park	---	---	---	---	1,890	9,983	4,682	3,563	3,556	---	---	---	23,674
All Kenai Penin. State Parks*	44,298	11,160	20,970	137,780	242,334	222,862	253,225	137,092	90,825	147,410	18,486	13,543	1,322,099

Source: ADNR 1986c.

--- means no data were available.

* Total campground and Kachemak Bay park counts represent only areas and months for which counts were taken. Many areas were not counted during winter months, and some, including the wilderness portion of Kachmak Bay Park, were never counted.

high value for nonconsumptive uses" were the Captain Cook State Recreation Area, Caines Head State Recreation Area, and Kachemak Bay State Park, including the Kachemak Bay Wilderness Area.

Table 39 provides visitor numbers for the above areas and total visitor numbers for state campgrounds on the Kenai Peninsula. The counts represent visitor-days and are only for areas and months in which counts were actually taken. Annual totals for areas and peninsulawide totals underrepresent actual use because counts were not taken every month for some campgrounds, and a few campgrounds and the Kachemak Bay Wilderness Area were never counted. The numbers for Kachemak Bay State Park do not include the wilderness area of the park and are for May through September only. Most Kachemak Bay park visitor counts come from the Glacier Spit campground area, Halibut Cove lagoon, and the Leisure Lake trail. A boat or plane observed in the Kachemak Bay State Park area is counted as three visitors. For campgrounds on the road system, vehicles are counted as three visitors. Average weekend and weekday counts are obtained and multiplied by days in the month, with an adjustment for turnover rate, since not all visitors stay for whole days. Three visitors in one day, each staging for only a few hours, count as three visitor-days (Reed, pers. comm).

A brief description of the nonconsumptive areas identified by the State Division of Parks and Outdoor Recreation follows. The exact portion of use for these areas, described in table 39, that can be attributed specifically to nonconsumptive use of fish and wildlife is uncertain, but nonconsumptive use of the indicated species is known (unless otherwise referenced, all information is from ADNR 1981).

1. Captain Cook State Recreation Area. The Swanson River flows through this 3,620-acre recreational area on the northeast shore of Cook Inlet on the North Kenai Road. Eagles, beavers, moose, and bears are often seen, as well as swans and Belukha whales in season.

2. Caines Head Recreation Area. Located on the shores of Resurrection Bay 7 mi south of Seward, this 5,960-acre recreational area is accessible by boat or trail from Seward. It is a good place to view puffins on the mainland cliffs, seabird rookeries on the islands, and mountain goats on the coastal cliffs. Killer whales, sea otters, sea lions, and other marine mammals can be seen offshore (Millington, pers. comm.).

   Tour boats from Seward specializing in wildlife viewing capitalize on the wildlife in this area. Tour boats touring the Caines Head coast and continuing on to the Kenai Fjords carried 65,000 passengers in 1985 (Eliason, pers. comm.). Their tour season lasts from mid May to December (Oldow, pers. comm.).

3. Katchemak Bay State Park and Wilderness:

a. Area description. This 328,300-acre park extends from the south shore of Kachemak Bay across the Kenai Mountains to the Gulf of Alaska coast. The scenic fishing and wildlife viewing opportunities are the primary attractions of the park and its coastline, although hunting, particularly for moose and mountain goat, occurs in the area. People primarily look for moose, mountain goat, raptors, whales, sea and land otters, seabirds, waterfowl, shorebirds, and intertidal invertebrates. (Information in this description is from ADNR 1986.)

b. Jurisdiction and management plans. The park is under the jurisdiction of the ADNR, Division of Parks and Outdoor Recreation.

c. Access, proximity to communities, and facilities. The park is accessible by boat or charter plane, usually originating from Homer. The nearest towns are Homer and Seldovia. Facilities are limited to one campground and several trails. The Division of Parks reports that the greatest demand for new development in the park is for trail and trail-related facilities.

d. Human use. Human use data are available only for the nonwilderness part of the park (table 39).

G. Kenai Fjords National Park

1. Area description. The Kenai Fjords National Park encompasses a coastal mountain system on the southeastern side of the Kenai Peninsula. The park includes the Harding Icefield in the Kenai Mountains and a fjord system with a rich marine environment on the Gulf of Alaska. Because the park is near the highway system in relatively populous Southcentral Alaska, it is one of the most accessible and visited parks in Alaska. (Unless otherwise referenced, the information in this description came from the National Park Service Kenai Fjords General Management Plan [NPS 1984a]).

According to the park plan, wildlife is the primary resource of Kenai Fjords National Park. Land and marine mammals and seabirds are abundant. Land mammals include mountain goat and black bear. Less abundant are moose, Dall sheep, brown bear, wolf, wolverine, and coyote.

The marine waters of Kenai Fjords support 23 species of marine mammals, including that include whales, porpoises,

dolphins, sea lions, sea otters, and harbor seals. Concentrations of sea lions are found on islands off the coast of the park, including the Pye and Chiswell islands groups, the southern point of Nuka Island, and on three islands in nearby Resurrection Bay outside the park. Harbor seals are common in the waters of the fjords and can often be seen in large numbers on icebergs in front of the tidewater glaciers. Killer, humpback, minke, sei, and grey whales can also be seen. Grey whales migrate through the area between April 15 and June 1 (Oldow, pers. comm.).

Numerous seabird rookeries can be seen from the water. An estimated 175,000 seabirds of 18 species nest along the fjords and islands; tufted and horned puffins and black-legged kittiwakes are the most numerous.

Other birds in the park include the peregrine falcon, Bald Eagles, ptarmigan, and grouse (NPS 1984a).

One tour boat operator reports that since the establishment of the park, wildlife numbers have increased and become more visible from the water. Black bears and mountain goats with newborn kids are often seen (Oldow, pers. comm.).

2. Jurisdiction and management plans. Kenai Fjords is a new park, established as a national monument in 1978 and gaining national park status in 1980.

The park includes approximately 530,000 acres of federal land. Nuka Island and a strip of nearby mainland are owned by the State of Alaska. Approximately 77,450 acres within the park boundary are expected to be conveyed to Native corporations. These lands comprise much of the peninsulas and the shoreline of the park.

Some of the offshore islands, including the Pye and Chiswell group, are part of the Alaska Maritime National Wildlife Refuge.

A general management plan for the Kenai Fjords National Park was adopted in June 1984. Management planning for the Alaska Maritime National Wildlife Refuge is still in the early stages (see section J on the Alaska Maritime NWR).

3. Access, proximity to communities, and facilities. The northeast border of the park is a few miles from the town of Seward. The Exit Glacier area of the park is accessible via an 8-mi gravel road beginning near the town. Seward is 130 road miles from Anchorage via the Seward Highway. There is scheduled air service between Anchorage and Seward. The Alaska state ferry system connects Seward, Kodiak, Seldovia, Homer, Valdez, and Cordova, and provides opportunities to

view the coastline of the park. Flights into the park, including landings on the Harding icefield, can be chartered from nearby communities (NPS 1984a).

The coastal areas are accessible by private or charter boats from Seward or Homer. Although bays offer sheltered waters within the fjords, reaching these areas requires passage of one or more headlands subject to often severe Gulf of Alaska weather. Pleasure-boating is thus generally limited to large craft (ibid.).

The Park Service has constructed a visitor contact station and some trails in the Exit Glacier area and has improved road access to the area. Additional trails, a campground, and interpretive displays are planned for the Exit Glacier area. A visitor center has been constructed in Seward. One public use cabin has been constructed in the fjord portion of the park and another is planned (NPS 1986).

4. Human use. Visitor use of the park is rapidly expanding, and the biggest increase is in charter boats taking people to see wildlife. Park data for the 1982 and 1983 season indicate the following (ibid.):

   - 5,500 people visited the park visitor center in Seward during its first year of operation in 1982; 12,294 people visited in 1983.
   - 1,440 people aboard private recreational boats visited the fjords in the summer of 1983; another 4,000 sport fishermen in boats fished along the coast in boats in the same year.
   - An estimated 387 people went ashore in the fjord portion of the park in 1983 compared to 160 in 1982.
   - An estimated 1,289 people visited the park on charter boats and flightseeing trips in 1983 compared to 732 people in 1982.

   Use data from the NPS Alaska Region Office show a 48% increase between 1983 and 1985, excluding tour boat visitors, and a phenomenal increase in tour boat visits (table 40).

   Scheduled commercial boat tours of the fjords began in the summer of 1982 with about five tours. In 1983, there was one or more scheduled trips each weekend and an occasional mid week trip, all departing from Seward. In 1985, the two tour operators specializing in wildlife-viewing trips took 65,000 visitors on day-long cruises to the area. The vessels used ranged from 45 to 75 ft. The companies plan to expand their operations for 1986 (ibid.).

Table 40. Recorded Human Use of Kenai Fjords National Park, 1983-85

	1983	1984	1985
Backcountry users	451	561	1,430
Charter air and boat	1,294	3,248	6,756
Other	22,408	27,148	28,052
Total visitors (excluding boat visitors)	24,408	30,957	36,238
Tour boat visitors	---	---	65,000

Source: Eliason, pers. comm.

--- means no data were available.

The tour boats operate from May 17 to December 15 and are experiencing substantial early and late season business, even though the seabirds leave by mid September and do not return until mid May. Grey whale migrations through the area may prompt service as early as May 1 in the future (Oldow, pers. comm.).

The park plan reports that a guide service conducts kayak and backpack trips into the fjords.

H. Alaska Maritime National Wildlife Refuge

1. Area description. The Alaska Maritime National Wildlife Refuge consists of 2,400 islands, rocks, reefs, spires, and headlands in coastal Alaska, including much of the Aleutian Islands. It is divided into five management units. Islands in the Gulf of Alaska Management Unit fall within the Southcentral Region: Tuxedni Refuge in Cook Inlet; the Barren Islands at the mouth of Cook Inlet; Gull Island in Kachemak Bay; the Pye and Chiswell islands group off the coast of the Kenai Fjords National Park; and Middleton Island. (The information in this section comes from Alaska Maritime NWRs [1986], unless otherwise referenced.)

   Of the maritime refuges in Southcentral Alaska, the most visited for wildlife viewing are Gull Island in Kachemak Bay near Homer and the Pye and Chiswell islands groups, all of which receive substantial visitor use.

2. Jurisdiction and management plans. These islands are in the Gulf of Alaska Management Unit of the Alaska Maritime National Wildlife Refuge. Work has been initiated on a management plan. The Alaska Maritime NWR Planning Team may be contacted at the U.S. Fish and Wildlife Service, 1011 E. Tudor Road, Anchorage, Alaska 99503.

3. Access, proximity to communities, and facilities. Access is by boat to all these islands. Shore visits are not encouraged because human activity is considered to be disruptive to bird nesting and marine mammal when they are hauled out. There is one public use cabin in the Tuxedni Refuge (Simmerman 1983). Gull Island is readily accessible by boat from Homer, and the Chiswell and Pye islands group are most easily visited by boat from Seward. The Barren Islands and Middleton Island are in remote locations subject to severe Gulf of Alaska weather and are rarely visited.

4. Human use. Gull Island is one of the most visited and viewed seabird rookeries in Alaska, with several charter companies offering boat tours to the island between March 15 and December 15. The NWR management staff reports that visitors

to Gull Island are a problem only if people get on the island or fly low overhead and that viewing from boats poses no problems.

The Pye-Chiswell islands group receive substantial visitation by tour boats offering wildlife viewing between May 17 and December 15.

Chisik Island, near Tuxedni Bay, attracts visitors. It has one of the largest seabird colonies in Cook Inlet (Yanagawa, pers. comm.).

I. Kenai Peninsula Wildlife-Viewing Areas - Areas Not in Kenai NWR or Alaska State Park

The following is a list of areas on the Kenai Peninsula that are known to be important for wildlife viewing. These areas are in addition to those included in the narratives on Kenai area Alaska state parks and the Kenai NWR. Due to lack of information, only a brief description is provided for each area. With a few exceptions, no human use statistics were obtained. Natural resource management personnel from the ADF&G, the Alaska Division of Parks, and the U.S. Forest Service indicated that these areas receive significant nonconsumptive use.

1. Portage Glacier. On the Seward Highway at the end of Turnagain Arm, the Portage Glacier is located in the Chugach National Forest. The U.S. Forest Service maintains a visitor center there that is open from Memorial Day to Labor Day.

   The Division of Tourism estimated that Portage Glacier was the most visited attraction in Alaska by nonresident visitors during the summer of 1985. From June through September an estimated 209,300 nonresidents visited this site (ADCED 1986a).

   Wildlife viewing is a secondary attraction of this site. Spawning salmon can be observed from a stand over William Creek. Beaver dams, ducks, and shorebirds can be seen from the road and mountain goats can be seen on surrounding cliffs. Naturalists guide "iceworm hunts" on the glaciers. Moose can often be seen in winter (Quinlan et al. 1983).

2. 20-Mile River. Access to the Twenty-mile River is at mile 83 on the Seward Highway; however, the river is navigable only with shallow draft river or air boats. People watch Bald Eagles from May through September (ADF&G 1976).

3. Resurrection Pass Trail. People hike this trail partially to view moose, Dall sheep, caribou, bear, and small game,

primarily from May to October. The trail is located within the Chugach National Forest (ADF&G 1976).

4. Cooper Landing - Dall sheep viewing area. Dall sheep and mountain goats can be seen on cliffs near the Seward Highway in Cooper Landing. No sheep or goat hunting is allowed. There is a highway pullout and sign for viewers. Sheep are most visible April through June and September through December. This area is in Chugach National Forest (Millington, pers. comm.).

5. Cooper Landing - Russian River. People hike the 3-or 4-mi trail from the campground at Russian River to reach a weir for red salmon. A fish ladder helps salmon up the falls. The trail is located in the Chugach National Forest (Millington, pers. comm.).

6. Cooper Mountain. Mountain goats and Dall sheep may be seen in May and June, south of upper Russian Lake trail. Chugach National Forest (ADF&G 1976).

7. Round Top Mountain. This area is north of Sportman's Lodge on the Sterling Highway. Dall sheep may be seen in May and June (ADF&G 1976).

8. Ptarmigan Creek. People are known to stop at about mile 21 on the Seward Highway to view sockeye salmon spawning from August to September. This creek is located within Chugach National Forest (Hom, pers. comm.).

9. Victor Creek. A 3-or 4-mi trail from Mile 20 of the Seward Highway an heads to an area where mountain goats can be viewed on the ridges, especially in the spring. The trail is located within the Chugach National Forest (Hom, pers. comm.).

10. Seward Highway to Mile 18. Moose may be viewed in winter from the highway. The area is in Chugach National Forest (Hom, pers. comm.).

11. Lost Lake Trail. The Lost Lake Trail is located at Mile 5 of the Seward Highway. Black bear can be observed from May through June. The trail is in the Chugach National Forest (ADF&G 1976).

12. Devil's Creek Trail. The Devil's Creek Trail is located at Mile 39 on the Seward Highway. A Dall sheep lick is located 8 mi up trail and provides a Dall sheep viewing location. The trail is located in the Chugach National Forest (ADF&G 1976).

13. Moose River. The Moose River is located a half mile from the Sterling Highway and provides a spring staging area for trumpeter swans and some waterfowl for viewing (Millington, pers. comm.).

14. Tern Lake. At the intersection of the Seward and Sterling highways in the Chugach National Forest, nesting arctic terns, northern pintails, American wigeons, loons, yellowlegs, sandpipers, magpies, and sparrows are easily viewed during spring and summer. Moose frequent the area, and mountain goats and Dall sheep are often visible on nearby mountains. A campground is located behind the lake (Quinlan et al. 1983).

15. Kasilof River flats. The estuary and flats along the lower 5 mi of the Kasilof River is a spring staging area for snow geese, sandhill cranes, and other waterfowl and in fall staging areas for Canadian geese and sandhill cranes. The area is mostly state lands without any special jurisdiction (Millington, pers. comm.).

16. Kenai River flats. Large numbers of people visit the Kenai River flats to watch snow geese, Canada geese, sandhill cranes, and ducks in the spring. Caribou are visible from April to November. The ADF&G counted 77,678 people in April 1985 and 14,050 in May 1985. Waterfowl are seen in fewer numbers in the fall. Belukha whales are seen spring and summer (Millington, pers. comm.).

    Except for the lower 5 mi, the Kenai River water column is in the Kenai River Special Management Area administered by the Alaska Division of Parks (Millington, pers. comm.). The lower 5 mi of the river are not in any special management area.

17. Kenai Airport area. The Kenai Lowlands Caribou Herd, consisting of 50 or 60 animals, can be seen near the road in the vicinity of the Kenai airport. Many visitors drive to see this accessable herd (Kuwada, pers. comm.).

18. Anchor River/Fritz Creek Critical Habitat Area. This is a new state special area created by the legislature to protect winter moose habitat on the Kenai Peninsula a few miles north of Homer. It is managed by the ADF&G. The area is also habitat for black and brown bears and Bald Eagles who feed on salmon spawning in the Anchor River, and it is a travel corridor for many species of big game, furbearers, and small mammals. The proposal for the area submitted by the Kenai Peninsula Critical Habitat Task Force (1984) listed wildlife viewing and photography among the recreational uses of the area. A long list of Kenai Peninsula governments,

Southcentral regional, and statewide organizations supported HB 289, which created the critical habitat area (ADF&G).

19. Fox River Flats Critical Habitat Area. Created by the legislature to protect waterfowl habitat, the area is located where the Fox River drains into the upper end of Kachemak Bay.

20. Homer Spit. Located at Homer, the longest naturally formed gravel spit in the world forms a protective breakwater that shelters many waterbirds during the winter. Common and Steller's eiders nest and overwinter on the spit. Ducks, loons, grebes, and sandpipers are common in winter. During spring and fall migrations, surfbirds, turnstones, phalaropes, and other shore and water birds are in the area. Ravens, crows, and Bald Eagles are common year-round but especially in winter. Harbor seals, sea otters, and porpoises may be seen near shore (Quinlan et al. 1983).

21. Homer Airport area. Beluga Slough and Mud Bay (or Coal Bay), near the airport at the base of Homer Spit, support concentrations of waterfowl and wintering moose. There is a proposal to transfer 300 to 400 acres to the ADF&G, which would manage it as a wildlife viewing area (Holdermann, pers. comm.).

22. Kachemak Bay Critical Habitat Area and environs. The waters of Kachemak Bay, including the many bays on the south side, are a critical habitat area, established by the legislature and under the management jurisdiction of the ADF&G.

    In Kachemak Bay, Gull Island, across the bay from Homer, is a popular destination for commercial and private trips to view the seabird rookeries. Gull Island is part of the Alaska Maritime NWR and is under the jurisdiction of the U.S. Fish and Wildlife Service.

    Kachemak Bay is rich in marine mammals and birds, fish and shellfish. Numerous charterboats operating from Homer take people on sportfishing trips, but wildlife viewing is a selling factor for all (Montgomery, pers. comm.; Holdermann, pers. comm.).

    A tour boat company specializing in wildlife-viewing trips took 5,000 people to see Gull Island seabirds and other marine wildlife in 1986. A privately operated ferry service from Halibut Cove goes by the rookery daily, making wildlife viewing an important part of the trip (Montgomery, pers. comm.). There are also several wilderness lodges on the south side of Kachemak Bay.

There is a growing interest in kayaking in Kachemak Bay, a form of recreation particularly suited to fish and wildlife viewing. Several companies offer guided kayak trips or kayak lessons.

The China Poot Bay Society has a center for marine research and education in Peterson Bay on the south shore of Kachemak Bay adjacent to Kachemak Bay State Park. This is a growing operation, which expects 1,600 to 1,900 people to use the facility in 1986. Thirty schools use the facility, with class levels ranging from fourth grade to postgraduate, including courses for teachers. The 28-ft tidal variation provides interesting tide-pool areas. A hatchery in the bay to which sockeye salmon return provides a place for students to watch salmon spawning. Some terrestrial wildlife is studied as well. The season for this facility used to be Memorial Day to Labor Day but has lengthened to March 15 to December 15 (Montgomery, pers. comm.).

A Homer tour boat company working with the China Poot Bay Society transports people to Peterson Bay for classes and also offers day trips to Peterson Bay for a coastal studies natural history tour. The tour boat company's season has lengthened with winter birding trips and school groups (Montgomery, pers. comm.).

The Division of Tourism estimates that 35,600 nonresidents visited Katchemak Bay during the summer (June through September) of 1985 (ADCED 1986a).

J. Other Southcentral Wildlife Viewing Areas North of Anchorage

1. Palmer Hay Flats State Game Refuge. This refuge was created by the legislature in 1975 around the area where Palmer Slough drains into the head of Knik Arm. It was expanded in 1985 to include wetlands in the Spring Creek area and along the mouths of the Matanuska and Knik rivers (ADF&G n.d.). Access is via the Parks and Glenn highways. The latter transects the refuge. Migratory waterfowl as well as shorebirds, passerines, and raptors use this area as a stopover during April and May on their northward migrations and again during the fall on their way south. Some ducks remain to nest on the flats. The area is also a major calving and wintering ground for the moose of Matanuska Valley (Clausen 1985).

Many Southcentral residents and tourists travel to the area to view wildlife, especially birds (ibid.). School classes and birding groups visit the area (Clausen, pers. comm.). Viewing of migratory waterfowl has been increasing rapidly in recent years. As access improves, public demands for

interpretive and viewing facilities as exemplified at Potter Marsh Refuge can be expected (ADF&G 1986).

A draft management plan for the refuge will be available for public review in June of 1986.

2. Hatcher Pass. Proposed as a state public use area in S.B. 334 before the 1986 Alaska legislature. Located on Hatcher Pass Road between Wasilla and Willow. Parka and ground squirrels, marmots, ptarmigan, moose, June - August. State land managed by the Department of Natural Resources. A Hatcher Pass Management Plan is in progress (ADF&G 1976, ADNR 1986). The Division of Tourism estimates thtat 26,600 nonresidents visited Hatcher Pass during the summer (June through September) of 1985 (ADCED 1986a).

K. Prince William Sound and Copper River Delta

The volume of passenger traffic on the train to Whittier and the number of charter and scheduled cruises advertised for Prince William Sound suggest that the sound is a highly important recreation area for people from Anchorage, other parts of Alaska, and outside the state. However, very little information is available from land management agencies regarding human use of Prince William Sound. Information on nonconsumptive wildlife uses may be available from private individuals and commercial operators. Unfortunately, the time available for this study did not permit extensive collection of information from such sources. A cooperative planning effort for Prince William Sound led by the ADNR was initiated in 1985. It will include recreation and wildlife elements, and will undoubtedly result in an improvement in available information.

Although some sites noted for wildlife viewing will be mentioned here, little detail and no human use data are provided. Indicators of volume of visitors coming into the area are followed by a discussion of land management agencies important for the Prince William Sound and Copper River area. A short list of nonconsumptive wildlife use sites is also presented.

1. Visitors to the area. Passengers arriving in Whittier via the shuttle train increased from a total of 38,700 in 1976 to 147,000 in 1985 (see table 41). An estimated 90 to 95% of them come for recreation purposes. Twenty-five cruise ships called at Whittier in 1985, and 40 calls are scheduled for 1986 (Walkinshaw 1986).

The Valdez Visitor Center estimates that 80,000 tourists per year visit Valdez. Large cruise ships are schedulted to make 25 stops in Valdez in the summer of 1986. Columbia Glacier is the most popular destination for large cruise ships and

Table 41. Passengers To and From Whittier on the Alaska Railroad, 1970-85

Fiscal Year	Passengers	Vehicles	Total Riders Passengers and Vehicle Drivers
1970	7,471	---	---
1971	17,864	---	---
1972	27,683	---	---
1973	19,928	---	---
1974	29,232	---	---
1975	22,512	---	---
1976	22,563	16,139	38,702
1977	50,114	12,672	62,786
1978	58,427	14,229	72,656
1979	68,691	16,039	84,730
1980	71,131	16,226	87,357
1981	75,519	17,879	93,398
1982	77,664	17,784	95,449
1983	98,224	19,516	117,740
1984	100,186	19,670	119,856
1985	125,566	21,992	147,558

Source: Walkinshaw 1986.

--- means no data were available.

smaller tour boats departing from Valdez. Wildlife is advertised as an important part of all trips. Bald Eagles, seabirds, sea otters, and whales are commonly seen (Markley, pers. comm).

The Division of Tourism estimates that 76,100 nonresidents visited Prince William Sound and 56,000 visited Resurrection Bay during the summer (June through September) of 1985 (ADCED 1986a).

The "Official Vacation Planner" published by the Alaska Department of Commerce and Economic Development, Division of Tourism (1986), in its Prince William Sound and Valdez listings shows 27 charter and scheduled cruise operations for the sound. The listings provide little indication of the volume of passengers these operations can handle, although when vessel sizes were mentioned they were most commonly in the 45-65-ft class. All of these brief ads mention sightseeing, and many mention photography. Thirteen mention fishing. Nine mention wildlife or natural history; two of these offer university credit.

Another three companies offered guided kayak or motorized raft trips, and one of these companies also offered university credit. Several companies offered boat rentals, and one company rented inflatable rafts.

2. Land management agencies. Most of the area is in the Chugach National Forest, which extends from the eastern boundary of the Kenai NWR through Prince William Sound and the Copper-Bering rivers areas to Cape Suckling. The State of Alaska owns the tidelands but otherwise owns little land on the coast. It does own a sizable piece in the Richardson Highway area east of Valdez. Native corporations are important landowners in the coastal area between Valdez and Cordova and in the southeast corner of the sound.

   The Prince William Sound Area Plan, which ADNR is undertaking with the assistance of other state agencies, will cover the area from approximately Whittier to Cape Suckling.

   Thirteen marine parks in Prince William Sound are administered by the Alaska Division of Parks. SB 390, which is before the 1986, legislature, would create 31 new marine parks in the sound. Most of these are important as boat anchorages by may also have scenic and wildlife values. Existing and proposed marine parks are listed in table 42.

   There are no national parks or national wildlife refuges in the area except for a couple of small islands that are part of the Alaska Maritime NWR in the Gulf of Alaska. The most important of these is Kayak Island (near Cape St. Elias).

The state legislature has established a Critical Habitat Area on the lower Copper River delta, for the protection of fish and wildlife, especially waterfowl and shorebirds. It is managed by the ADF&G.

The Chugach National Forest has published a Land and Resource Management Plan (1984) and a Final Environmental Impact Statement (1984). These plans contain little information about existing recreation or nonconsumptive wildlife uses. Elements of the management plan's description of the existing management situation with regard to recreation are summarized below (USFWS 1984):

- The recreation program includes developed and dispersed recreation.
- Because of access and the abundance of wildlife and fish, most recreational use occurs on a relatively small part of the forest located on the Kenai Peninsula.
- Water-oriented use and tourism in Prince William Sound is an important element in the dispersed recreation spectrum.
- The maximum supply for dispersed recreation greatly exeeds the potential demand.
- The potential demand for developed recreation is projected to increase almost twice as rapidly as for dispersed recreation.
- Current management direction of nonrecreational functions in Prince William Sound and the Copper River area is essentially optimum for dispersed recreation.

There are currently no formally designated wilderness areas in the Chugach Forest, but ANILCA specifies wilderness study of a large portion of the Chugach. Regarding wildlife habitat, the management plan comments as follows:

> In accordance with ANILCA, the Copper River delta is being managed with primary emphasis on fish and wildlife management. The need for strong guidelines for any activities on the delta is mentioned.
>
> Wildlife habitats in Prince William Sound have not been greatly affected by management activities. The majority of the wildlife in Prince William Sound requires old-growth timber or alpine habitat.
>
> With the high recreation use occurring in the sound and the dependence of many species on undisturbed habitat,

future management activities will have to be carefully coordinated to avoid excessive loss of habitat.

The plan shows expected annual outputs, and dollar values, for a number of forest "goods and services," including recreation. Information on recreation for the five forest management units in the Prince William Sound and Copper River area is shown in tables 42,43, and 44.

3. Identified wildlife-viewing sites. The limited list following could doubtless be greatly expanded by consulting more people acquainted with the area. Although statistics on use levels were not available, these areas were identified by natural resources management personnel and, in two cases, by a local visitors bureau staff person, as places where significant nonconsumptive use occurs.

   - Kittiwake rookery near Whittier: Said to be a major rookery (Wiles, pers. comm.)

   - Ptarmigan Drop in Thompson Pass: A popular roadside viewing area on the Richardson Highway; willow ptarmigan, especially during the spring; proposed for a state park in the Copper River Area plan; presently state land managed by the ADNR (ADNR 1986)

   - Robe Lake: In the city limits of Valdez; a popular area for viewing waterfowl (Markley, pers. comm.)

   - Columbia Glacier: North of Valdez Arm; the most popular cruise destination out of Valdez; eagles, sea otter, marine mammals, including whales (Markley, pers. comm.)

   - Port Nellie Juan: Said to be a major rookery (Wiles, pers. comm.)

   - Latouche Island: Marine park site (ibid.).

   - Port Etches: On Hinchinbrook Island (ibid.). A marine park is proposed for part of this area.

   - Goat Mountain: Mile 45, Copper River Highway out of Cordova. Mountain goats, May through September (ADF&G 1976)

   - Copper River Delta: Copper River Delta Critical Habitat Management Area is administered by ADF&G. It contains some of the most important waterfowl habitat in the state and has an international reputation. Access is by air or float charter from Cordova or the limited road network (Quinlan et al. 1983).

Table 42. Alaska Division of Parks Marine Park System in Prince William Sound

Existing Parks (Alaska Div. of Parks 1984, unless otherwise referenced)

Surprise Cove - 15 mi east of Whittier. Mountain goats on nearby peaks. Porpoises.

Zeigler Cove - 14 mi east of Whittier on the west side of Port Wells.

Bettles Bay - 20 mi from Whittier on shore of Port Wells. Plentiful wildlife: black bears, sea lions, geese, waterfowl, whales, seals.

South Esther Island - 20 mi east of Whittier, confluence of Wells Passage and Port Wells. Sea lion haulouts on nearby islands. Seals and sea otters. Seabird colonies.

Horseshoe Bay - Southwestern Prince William Sound. Wildlife.

Sawmill Bay - 14 mi southwest of Valdez.

Shoup Bay - 7 mi west of Valdez on the north shore of Port Valdez. Shoup Glacier at head of bay. Mountain goats, marine mammals, ducks. Wildlife and scenery viewing and fishing are the primary reasons for visits to the bay. Some commercial tours to the area (Alaska Division of Tourism 1986).

In SB390, 1986 Alaska Legislature Proposed Parks

Drier Bay	Decision Point	Cascade Creek
Boswell Bay	Bettles Bay (addition)	Bettles Islands
S.W. Latouche I.	Kayak I.	S. Elrington I.
Siwash Bay	Shoestring Cove	Sawmill Bay
Princeton Creek	Port Nellie Juan	Port Fidalgo
Port Chalmers	Perry I.	Outside Bay
Marsha Bay	Main Bay	Long Bay
Granite Cove	Golden Creek	Goat Harbor
Garden Cove	Falls Bay	Entry Cove
Eagle Bay	Disk I.	Canoe Passage
Hummer Bay		

Table 43. Chugach National Forest, Prince William Sound, and Copper River Management Area Expected 1986-90 Average Annual Outputs of Recreation and Dollar Values

Forest Management Area	Outputs in Thousands of Recreational Vistor-days			Value in Thousands of 1978 Dollars		
	Developed	Dispersed	Wilderness	Developed	Dispersed	Wilderness
Nellie Juan	0	6	9	0	18	90
College Fjord	3	39	25	9	117	250
Gravina	1	17	0	3	51	0
Big Islands	5	25	0	15	75	0
Copper River	5	41	0	15	123	0
Total	14	128	34	42	384	340

Source: USDA: Forest Service 1984.

Table 44. Expected Recreational Outputs Projected to the Year 2030 in Thousands of Recreational Visitor-days

Forest Management Area	Year - 1985			Years 2021-2030		
	Developed	Dispersed	Wilderness	Developed	Dispersed	Wilderness
Nellie Juan	0	5	7	4	17	27
College Fjord	2	31	20	13	114	74
Gravina	1	13	0	6	50	0
Big Island	4	19	0	23	73	0
Copper River	4	32	0	23	120	0
Total	11	100	27	69	274	110

Source: USDA: Forest Service 1984.

Note: The Forest Service treats 12 hours of visitor use, or overnight use, as one "recreational visitor day (RVD)." Three visitors for four hours each would equal one RVD.

Wildlife viewing areas known to be used include the following (ibid.):

- Mudflats of Hartney Bay at Whitshed Road in Orca Inlet. Thousands to millions of shorebirds are visible late April and May.
- Mile 5.7 of the Copper River Highway at Eyak River Bridge. Trumpeter swans are visible in spring and fall until freeze-up.
- Mile 10.7 of Copper River Highway at turnout with wildlife sign. Arctic terns, Canada geese, trumpeter swans, ducks, and beaver are visible from April to October.
- Mile 11.5 of Copper River Highway, Scott Glacier plains. Brown bear are often visible August to September.
- Mile 15 of Copper River Highway. Silver salmon may be seen spawning in stream from September to October.
- Mile 16.9 of Copper River Highway, Alaganik Slough. Loons, mergansers, geese, trumpeter swans, jaegers, gulls, Arctic gerns, owls, eagles, shorebirds, seals, brown bear, and moose may be seen from April to September.
- Mile 27.5 of Copper River Highway, Long Island. Trumpeter swan broods, waterfowl, and eagles may be seen from May to September.
- Martin Islands. Kittiwakes, murres, puffins, cormorants, and oystercatchers may be seen from May to August.
- Wingham Island. Kittiwakes, murres, puffins, and three species of cormorants may be seen from May to August.
- Cape St. Elias: Kayak Island; Steller sea lions may be seen year-round; Kayak Island is part of the Alaska Maritime NWR (Quinlan et al. 1983)

L. Lake Clark National Park and Preserve

1. Area description. The Lake Clark area on the west side of Cook Inlet was established as a national park in 1980. The western portion of the park is in the Southwest Region. The park and preserve boundaries contain some 3,655,000 acres, including most of the rugged and glaciated Chigmit Mountains, three active volcanos, and parts of three national wild

rivers: Mulchatna, Chilikadrotna and Tilikakila. Headwaters of several rivers draining into Bristol Bay are within the park and preserve. (The information in this description comes from the National Park Service Lake Clark General Management Plan [NPS 1984b] unless otherwise referenced.)

Large mammals within the park and preserve include moose, caribou (the Mulchatna Herd on the west side of the park), black bear, brown bear, (mainly along the Cook Inlet coast and along interior salmon streams), fox, lynx, and beaver. Wolf populations are depressed because of hunting and trapping pressure (NPS 1984). Migrating waterfowl are numerous, but the park plan reports that there is only a preliminary understanding of the nesting species, numbers, densities, and population trends. The Lake Clark area represents the southwestern extension of Dall sheep range. Seals and other sea mammals can be seen along the Cook Inlet coast.

Not all wildlife use is nonconsumptive. Sportfishing and subsistence taking of fish and wildlife are allowed in the park, and general hunting is also allowed in the preserve.

2. Jurisdiction and management plans. Lake Clark is under the jurisdiction of the National Park Service. Within the park are substantial Native land selections by Bristol Bay and Cook Inlet villages and Cook Inlet Region, Inc., some of which have been conveyed. Selections are particularly significant in the Cook Inlet area north and south of Tuxedni Bay and in the southeastern corner of the preserve. Nearly three-fourths of the shoreline of Lake Clark is in nonpublic ownership, including non-Native small tracts. As in other national parks, the Park Service has authority to enter into cooperative management agreements with the state and private landowners and to acquire private lands with the consent of the landowner.

A general management plan and environmental assessment was published in mid 1984. The plan contains a schedule of studies that, if funded, will be completed in the next one or two years:

- Backcountry use plan, 1985-1986
- Beaver-human interaction study, 1984-1986
- Visitor use pattern study, 1984-1988
- Large mammal studies, 1984-1987
- Raptor survey 1984-1987

3. Access, proximity to communities, and facilities. Existing visitor access to the Lake Clark region is by air. South-central Alaska, including Anchorage and Kenai Peninsula communities, is the departure point of most tourist travel to the park. Lake Clark is an hour's flight from Anchorage, and several companies provide daily commercial service from Anchorage to the airport at Illiamna. The state maintains an airfield at Nondalton, and two private airstrips serve lodges at Port Alsworth on Lake Clark. Numerous private and charter planes fly into the area, landing on lakes, gravel bars, etc. As many as 60 planes have been counted at one time on the beaches near major air corridors. A new road will link Illiamna with the village of Nondalton, located at the south end of Lake Clark. There are no roads in the park.

4. Jurisdiction and land management. The park headquarters is located in Anchorage. The park plan contains little provision for federal development, relying on the private sector to provide visitor use accomodations and facilities. There are currently 11 lodges on private lands within the park and preserve boundaries and two outside the boundaries. The average lodge can house 10 people at one time. The park plan indicates expected increases in these facilities and mentions plans by the Nondalton Native Corporation for real estate development at Keyes Point and possibly at Portage Bay.

5. Human use. The park plan estimates that there were 16,000 visitors to the park and preserve in 1983. Of these, 12,600 visitors "represents the tourist count," the others being mainly subsistence users and landowners. Visitor statistics (see table 45) for 1983-1985 show total and "backcountry" visits.

   Human uses of the park include subsistence, sportfishing, and general hunting (allowed only in the preserve), river running, backcountry hiking and camping, and photography.

VI. INTERIOR REGION

A. Overview

The Interior Region has areas that receive extremely heavy nonconsumptive wildlife use, such as Denali National Park and Creamers Field, and others that receive almost no such use despite the presence of substantial wildlife. All the National Wildlife Refuges in the region except Tetlin NWR are in the latter category. The Tanana basin is heavily used for recreational purposes but information was not readily available regarding nonconsumptive wildlife use in the area. The importance to

Table 45. Visitor Statistics for Lake Clark National Park and Preserve, 1983-85

Visits	1983	1984	1985
Total visits	17,575	17,282	18,360
Back country visits	8,016	1,232	2,332

Source: Eliason, pers. comm.

Note: One person visiting for several days is counted as one visit. If he or she returns on another occasion, two visits are counted.

Fairbanks area residents of nonconsumptive wildlife uses is indicated by their initiative and support regarding Creamers Field. Little information is presently available for the Copper Basin. An area planning process led by ADNR may change that, but to date these kinds of area plans have produced little information that focuses directly on nonconsumptive wildlife uses. Rapid growth in recreational uses is predicted for the massive Wrangell-St. Elias National Park.

B. Tanana Basin Area Plan - Recreation Element

The Tanana Basin Area Plan (ADNR 1984d) is one of a series of large area planning efforts undertaken by state agencies led by the Alaska Department of Natural Resources (ADNR). As part of the planning effort a number of "elements" were produced, including a Recreation Element (ADNR 1983) and a Fish and Wildlife Element. A review of portions of the two studies together - the 295 recreation sites, which are listed and ranked in importance in the Recreation Element, and the significant wildlife areas identified in the Wildlife Element - could very possibly result in the identification of sites where recreational use of fish and wildlife is important. That kind of a detailed review is outside the scope of this study. Instead, the discussion here will focus on relevant aspects of the Recreation Element. Usage in the Recreation Element excluded hunting and fishing from the definition of recreation. (Unless otherwise referenced, all information in this description is from the Tanana Basin Area Plan, Recreation Element [ADNR 1983]).

The Tanana basin area stretches from the Canadian border on the east to the Yukon River on the northwest. It includes Fairbanks and the most populated area of Alaska's interior. The planning area includes all state selected, tentatively approved and patented land within the Tanana basin exclusive of those areas which have had area plans completed or which do not have state inholdings. A large proportion of basin land is held by the State of Alaska.

1. Current and projected demands for outdoor recreation. Because information on use levels for particular recreation sites was not available, demand for general recreation was calculated for the basin as a whole based on the results of a statistical survey done in 1979 by the Alaska Division of Parks and Outdoor Recreation (actually, the Alaska Public Survey) as reported in the Alaska Outdoor Recreation Plan (ADNR 1981a). That survey generated information about the average number of "occasions" each adult participated in certain recreational activities. The assumption was made that recreational patterns of children were the same as those of adults. (For more discussion of the Alaska Public Survey see section III.B., Surveys of Residents, in this chapter).

"Occasions" were translated into user days per year by multiplying them by an average length of 1.2 days. The length estimate came from a Bureau of Land Management survey conducted in the Denali Highway area in 1979, which determined 1.2 days to be the average length for recreational trips in the area. The authors recognize that this may overestimate the time spent by residents, but they justify it on the basis that the data on "occasions" omits recreation time spent in the basin by Alaskans from other parts of the state. Nevertheless, the resulting estimate of total user-days is consistently referred to as an estimate for basin residents (ibid.).

An estimate of the average number of days spent by out-of-state visitors in general recreation on state land was derived from the results of a study done by Louis Berger and Associates on tourism in the Tanana basin (Louis Berger and Associates 1982). The Berger estimate was reduced to the estimated amount of time spent by tourists on state land. There was no mention of reducing the Alaska resident recreation time estimate for the basin as a whole to the time spent on state lands.

The resulting estimates for outdoor recreation in the Tanana basin are shown in table 46.

Fish and wildlife viewing was not one of the recreational activities identified as a component of the recreation estimate for residents, although it is probably an aspect of some of the activities that were identified. Presumably compatible activities were cross-country skiing (accounting for 720,000 user-days) and three other activities, tent camping, hiking with a pack, and kayak/canoeing (together accounting for 1,094,400 user-days). Two of the most popular identified activities, snowmobiling and motorcycle/other ORV, are perhaps incompatible with fish and wildlife viewing unless used as transportation to reach locations where fish and wildlife can be seen.

A population of 105,000 was projected for the basin for the year 2,000. Multiplied by 71.6 user-days per person (the current estimate), this resulted in a projection of 7.5 million user-days by residents in the basin in the year 2,000. Tourism was projected to increase 680% by the year 2,000, resulting in a total of 2,154,000 user-days on state lands in the basin by that year. The rate of tourism increase was projected from the increase shown between 1973 and 1980 in the Berger (1982) study.

Data from the Alaska Public Survey was used that showed that enjoyment of "recreational opportunities" was the second most frequently given reason why Interior residents came to live

Table 46. Tanana Basin General Recreation User-Days Per Year for 1980

	Total Occasions	Total User-Days	Total User-Days on State Land	Total User-Days in Basin
Residents*	59.70	71.64	---	4,298,400
Tourists	---	---	258,500	776,500

Source: ADNR 1983

--- means no data were available.

* Based on a 1980 population for the basin estimated at 60,000. Residents are described in the tabular material and in the text as Tanana basin residents.

in the Tanana basin, and why they stay. (It should be noted that in that particular set of questions the Alaska Public Survey treated hunting and fishing as part of recreation.) Participation was particularly high in trail-related activities.

2. Cost-benefit analysis. A cost-benefit analysis of managing state land for recreation was conducted as part of a study of the economic value of managing state land for six different resources: settlement, fish and wildlife, forestry, agriculture, mineral development, and general recreation. Each of the resources was examined separately first. Combinations due to multiple use were to be discussed in a separate paper. Data were unavailable for some parts of this analysis. Current income from residents' recreational activities was estimated from their expenditures on recreational equipment. Income from tourists was calculated by multiplying an average daily expenditure of $40.37 by tourists (from Louis Berger and Associates 1982) by the number of tourist days spent on state land. The results for 1980 were $17 million for residents and $10 million for tourists/nonresidents.

3. Identification and ranking of recreational sites. A capability map was developed for recreational areas in the basin. This involved identifying specific areas with significant recreational values and then attaching a relative value (high, medium or low) to those sites. The four kinds of sites identified were trails, waterways, small sites, and large areas. One of the uses considered for the latter was wildlife viewing. The recreational map and accompanying narrative, developed by Nat Goodhue ADNR, Division of Parks, was based on the following informational sources:

   - The Tanana Basin Land Use Atlas, published as part of the Tanana basin area planning process in 1982; includes an inventory of backcountry areas, trails, waterways, and sites currently used for various recreational activities, including wildlife viewing
   - Alaska Division of Parks Public Interest Land identification, classification, request files
   - Consultation with state park personnel
   - Interviews with local residents

   Estimates of the relative value of the sites were based on four criteria: intensity of existing use, location relative to population centers, irreplaceable nature, and economic value for tourism. A summary of the 295 identified sites and their relative value is included in the Recreation Element.

The map showing the location of these sites, together with background information about the various recreational values and uses of the sites, is on file at the ADNR in Fairbanks. Although a review of that material is beyond the scope of this chapter, the list, map, and background material together may provide information about important wildlife-viewing sites.

The final part of the Recreation Element consists of recommendations for the designations of various sites as state or other kinds of public recreation areas, sites, trails, and waterways.

C. Copper River Basin Area Plan and Kuskokwim Area Plan

Two more area planning efforts led by the ADNR are underway for the Interior Region.

1. Copper River Basin Area Plan. Information is not yet available for this area plan. Al Carson, Habitat Biologist with the ADF&G, Division of Habitat, is working on the Wildlife Element. Pete Martin, ADNR, Division of Parks, Anchorage, is working on the Recreation Element.

2. Kuskokwim Area Plan. This area includes the Kuskokwim River drainages upriver from Aniak. It is bounded on the south by the Bristol Bay planning area, on the west by the Yukon Delta and Innoko national wildlife refuges, and on the east by Denali Park and the Susitna planning area (see map 1). The State of Alaska is the largest landholder in the area, with 16.9 million acres, followed by the federal government, with 4.9 million acres; the remaining 1.5 million acres are in private and Native corporation ownership. There are about 1,800 year-round residents in the planning area (ADNR n.d.). Matt Robus, Habitat Biologist, ADF&G, Division of Habitat, Fairbanks, is working on the Wildlife Element. The draft plan is scheduled to be ready for public review in the fall of 1986.

   The Kuskokwim planning area is one of the least used areas in the state for fish and wildlife viewing, birdwatching, photography, and other nonconsumptive uses (Talbot, pers. comm.). Although most human uses are for sport or subsistence hunting and fishing, the Native village residents also appreciate seeing wildlife. The only nonconsumptive users are one or two parties a year floating various tributaries of the Kuskokwim: the Holitna, Big, Stony, and Aniak rivers and the South Fork of the Kuskokwim (ibid.). The Aniak River trip is run by a commercial operator and is largely for sportfishing. There is one lodge in Sleetmut receiving 10 to 100 people a year, primarily sport fishermen.

The greatest potential for nonconsumptive wildlfie uses in the area is on the northwest slope of the Alaska Range on the west side of Lake Clark and Denali National Parks (ibid.). Unlike the river area, this is open country where one can hike around and see wildlife, including Dall sheep, moose, and buffalo (ibid.).

D. Denali National Park and Preserve

1. Area description. Denali National Park, established in 1917 and expanded in 1980 by ANILCA, is the oldest national park in Alaska. It contains the highest mountain on the North American continent and the largest continously protected ecosystem in the world. It has gained international recognition through its designation as a biosphere reserve under the Man and Biosphere program of the United Nations. As a long established park with relatively easy access, strategically located between Anchorage and Fairbanks, it draws a large number of visitors. (Unless otherwise referenced, all information in this description is from the 1985 Denali Draft Plan [NPS 1985c] or from the National Park Service's April 1986 response to a questionnaire.)

Although the mountain is a primary objective of many visitors, it is visible only some 30 to 35% of the time. Wildlife-viewing opportunities are a more reliable attraction; virtually 100% of all park visitors see at least one of the four primary large Alaska wildlife species (brown bear, Dall sheep, caribou, moose); approximately 92% see all four species. Important secondary species for wildlife viewers are wolf, lynx, fox, arctic ground squirrel, red squirrel, golden eagle, sandhill crane, and jaegers.

An economic impact study of the national park system in Alaska (Rich and Tussing 1983) said that wildlife populations were seen as vital to the attractions of the parks, and particularly of Denali.

The 1980 expansion added 3,756,000 acres on the south side of the McKinley massif, encompassing considerably different landscape features and resource values. The entire park and preserve now totals six million acres.

In general, the wildlife to the south of the Alaska Range is less abundant and less visible than the wildlife along the park road corridor to the north. The existing park road follows a broad tundra valley and traces portions of a traditional caribou migration route. The topography facilitates viewing of large mammals at great distances. Most areas to the south of the range are not expansive and open and thus do not afford a comparable viewing experience.

2. Jurisdiction and management plans. The park is under the jurisdiction of the NPS, which published a revised draft "general management plan, land protection plan and wilderness suitability review" in December of 1985. In addition, the Resources Management Plan, a separate, more detailed document, is updated annually.

3. Access, proximity to communities, and facilities. Visitors arrive via private vehicle, tour bus, railroad, or aircraft. The completion of the George Parks Highway in 1972 caused a sudden increase in visitor traffic because of the ease of access it provided between Anchorage or Fairbanks and the park.

   Currently, almost all visitor facilities are confined to the 88.5-mi park road corridor and near the park entrance along the George Parks Highway. The park service has operated seven campgrounds but is closing three of them as part of its program to reduce vehicle traffic. Overnight accomodations are provided outside the boundary by privately operated lodges and a concessioner-operated hotel. Two private lodges are located near the end of the park road in Kantishna, and there is a roadhouse in Kantishna. Several additional commercial operations near the park entrance provide lodging, camping, and associated visitor services.

   An NPS shuttle bus system operates during the peak visitor use season, serving the two functions of providing visitors an opportunity to see the park and providing access into the park's interior for backcountry users. In addition, the concessioner offers wildlife tours along the park road, and the three lodges in Kantishna provide transportation from the park entrance to their facilities. Visitor travel along the road corridor is by necessity controlled, and only those with camping permits or special use permits are allowed access in private vehicles. Even with the transportation systems and other controls to minimize wildlife disturbance, traffic volume along the road doubled between 1971 and 1979. Traffic control plans are discussed further under the Human Use heading.

4. Human use. Visitor use has grown remarkably since the establishment of the park. Table 47 shows total recreation visits, 1922 to 1985. Recorded use in 1985 was almost five times the 1972 level. Visitation is highly seasonal, with 93% of the total annual use occurring during the months of June, July, August, and September (table 48). Based on current trends, it is expected that visitors will increase by another 250,000 people between 1984 and 1994. Backcountry use (by permit) in the park totaled 29,625 in 1983, 26,722 in 1984, and 26,029 in 1985 (Eliason, pers. comm.).

Table 47. Annual Visitation, 1922-85

Year	Total Recreation Visits
1922	7
1932	400
1942	5
1952	7,300
1962	16,600
1972	88,615
1973	137,418
1974	161,427
1975	160,600
1976	157,612
1977	170,031
1978	222,993
1979	251,105
1980	216,341
1981	256,593
1982	321,868
1983	346,082
1984	394,426
1985	436,545

Source: 1922-84 from NPS, 1985 data from Eliason, pers. comm.

Table 48. Seasonal Use Patterns, 1980

Month	Total Recreation Visits
January	198
February	146
March	401
April	633
May	12,791
June	27,623
July	61,963
August	73,791
September	36,250
October	1,564
November	828
December	153
Total	216,341

Source: NPS 1985c.

Recent statistics for overnight stays and for passengers on the wildlife tour bus and park-operated shuttle bus are shown in table 49.

Sport and subsistence hunting and fishing are not allowed within the original park boundaries. Because the use figures cited above are almost all from within the old park boundaries, they are for nonconsumptive uses.

One of the park administration's major concerns is that visitor use is affecting wildlife behavior and diminishing the unique wildlife-viewing opportunities along the park road. A study completed in 1984 by the NPS showed that heavy traffic along the park road is causing moose and bear to avoid the area, although traffic increases have not had a significant effect on overall populations in the area. If the present rate of increase in park visitation continues (a 144% increase in the decade ending in 1984), new solutions are needed.

The solution presented in the park plan is to expand recreational opportunities on the south side of Denali and to modify traffic on the north-side road. The southern expansion of Denali National Park to the boundary of adjoining Denali State Park has created an opportunity for development to draw visitors into the area.

In 1972, the year the George Parks Highway opened, a mandatory public transportation system was instituted in the park, and only visitors with overnight or other special use permits were allowed to drive their cars beyond Savage River. By 1981, the level of bus and permitted private vehicle traffic had increased to the point where the need for new controls was recognized. Private vehicles are seen to cause the greatest amount of avoidance behavior on the part of wildlife because their occupants can stop at will and approach the animals on foot. The 1985 general management plan, therefore, outlined a traffic plan under which bus traffic would be kept within 15% of 1984 levels and private vehicle traffic would be reduced by 45%. Professional photographer permits will also be managed to reduce the use of private vehicles. After monitoring the effects, tour and shuttle bus traffic would be allowed to increase to a level that does not unacceptably affect wildlife behavior. It is anticipated that if private vehicle traffic can be reduced by 45%, bus traffic can be increased by 20% while still achieving an overall decrease in total traffic of 17%. As a result of these actions, up to 24,000 additional visitors per year could be accommodated on the park road with less disturbance to wildlife.

Table 49. Denali National Park Visitor Statistics, 1983-85

Year	Backcountry Users	Pack-Operated Shuttle Bus Trips	Concessioner Wildlife Tour Bus Trips Trips/Visitors	Overnight Stays	Total Visitors
1983	29,625	64,679*	39,187*	122,834	346,082
1984	26,722	2,829/ 72,541	1,416/ 54,709	129,467	395,099
1985	26,209	3,157/ 77,388	1,534/ 49,903	125,013	436,545

Source: NPS 1985c.

* Not available.

Based on past trends, the proposed 20% increase in bus service will not be enough to accomodate all of the demand; however, visitors who cannot be accomodated on the north side of the park can be accomodated on the south side once the proposal for south side development is implemented.

E. Wrangell-St. Elias National Park and Preserve

1. Area description. The Wrangell-St. Elias National Park and Preserve is the national park system's largest unit and in conjunction with the adjacent Kluane National Park in Canada constitutes the largest parkland in North America. The United Nations has recognized the unique value of this area, designating the United States and Canadian parks as a world heritage site. The Wrangell-St. Elias Park encompasses two high and glaciated ranges, including Mt. St. Elias at 18,000 ft., separated by the Chitina River basin. The park is bounded on the west by the Copper River. Parts of the park extend into the Southcentral and Southeast regions. Because road access and the majority of public use occurs in portions of the park lying within the Interior Region, it is treated here as part of the Interior Region. (All information in this description is from the Wrangell-St. Elias National Park/Preserve revised draft plan, NPS 1985h).

A vast and diverse environment provides habitat for a variety of wildlife, including a Dall sheep population estimated at between 12,000 and 16,000. Herds in the Wrangell Mountains constitute one of the greatest concentrations of wild sheep in North America. The largest numbers are found in compact herds in the alpine and subalpine uplands north of the Chitina River. Numerous mineral licks in the park attract sheep.

Migratory caribou herds range into the north and west side of the Wrangell Mountains, where there are several calving areas. There are populations of mountain goats in the Chugach Mountains and near Icy Bay, where they are often seen near the water. Black and brown bears concentrate in the spring along the Copper River between Copper Center and lower Tonsina and in the summer near Long Lake in the Chitina valley and along coastal salmon streams. Moose inhabit lowland areas and small herds of introduced bison are found in the upper Chitina valley and near the Copper River between the Dadina and Kotsina rivers. Wolves occur throughout most of the park; wolverines, lynx, martin, and other furbearers are found at lower elevations. Sea lions concentrate off the Sitkagi Bluffs adjacent to the Malaspina Glacier; a high density of harbor seals occurs in Icy Bay; whales migrate along the coast. Bird life in the park includes a large number of trumpeter swan nesting areas an important one being

the mouth of the Bremner River. Bald and golden eagles occur, with nesting concentrations along the Chitina River. Waterfowl nest in lowland rivers and lakes, and seabirds are found in coastal areas. The Gulf of Alaska coast is a major flyway for migratory waterfowl.

2. Jurisdiction and management plans. The park and preserve are administered by the National Park Service, which published a revised draft "general management plan, land protection plan and wilderness suitability review" dated December 1985.

3. Access, proximity to communities, and facilities. The park is less than 200 road miles from Anchorage and about 250 road miles from Fairbanks. Most park users arrive by car from those two cities or from Valdez. The Glenn and Richardson highways border the northeastern part of the park. Two rough unpaved roads penetrate the park: the 43-mi road from Slana to Nabesna in the north and the 61-mi road from Chitina to the Kennicott River in the Chitina valley. Access to the interior of the park is possible by charter aircraft (there are airstrips in backcountry regions). NPS visitor services are limited. There is a visitor center at park headquarters on the Richardson Highway near Copper Center and year-round range stations at Slana, Chitina, and Yakutat. Outside the park boundaries there are campgrounds along the road system. There are some privately operated lodges on private lands within the park.

4. Human use. Historical visitor use data are not available for the park/preserve. From NPS monthly use reports, the park service estimates that about 14,900 people visited the park in 1982, about 18,800 in 1983, and about 22,220 in 1984. Many of these visits involve fishing and hunting; sport and subsistence fishing plus subsistence hunting and trapping are allowed in the park, and in the preserve sport hunting is also allowed. The park service reports that "nonconsumptive uses such as expedition mountaineering, backpacking, photography, cross-country skiing, rafting/kayaking and sightseeing are only occasionally participated in by park/preserve users, but the proportion of these uses is increasing annually."

   Campgrounds on the highway system adjacent to the park show heavy and increasing use. The Liberty Falls Campground near Chitina in 1975 had approximately 5,500 visits. In 1982, it had approximately 24,500 visits.

   Approximately 50 commercial outfitters were licensed to operate in the park during the 1983 visitor season. Some of these were big game guides. Others offer activities such as sportfishing, backpacking, sightseeing, pack trips, mountaineering, river running and photography trips.

The park service comments that both Kluane Park in Canada and Wrangell-St. Elias have the potential to attract numbers similar to Denali, depending on the type of visitor facilities that are provided. Anchorage and Fairbanks residents are expected to be an important source of visitors to the area. Projections using data on Kluane Park's backcountry visitor growth rate yielded estimates of future growth of Wrangell-St. Elias users ranging form 48,200 to 67,000 by 1995. However, the park plan states:

The long-term potential visitation trend at Wrangell-St. Elias is probably more like Denali's. Wrangell-St. Elias has road access and the potential to attract visitors at a level similar to Denali. It is close to the major population centers of the region, is on the main tourist route from the Alaska Highway to Anchorage, and has an abundance of outstanding natural features that attract tourists and residents of Alaska.

F. Yukon-Charley Rivers National Preserve

1. Area description. The Yukon-Charley Rivers National Preserve encompasses the entire 1.1 million acre Charley River drainage, a complete and largely undisturbed watershed, and a portion of the upper Yukon River valley. The preserve extends westward from the United States-Canadian border and encompasses approximately 2,527,000 acres, of which about 2,113,000 acres are federal land. The area has geological and potential archeological significance as one of the few locations in the world where almost the entire span of the earth's geologic history is recorded in an uninterrupted sequence of fossil-bearing rocks, and where unglaciated valleys may contain information about early human populations. It contains high mountains, lakes, valleys, and healthy populations of Dall sheep, caribou, moose, and grizzly, and one of the largest breeding populations of the endangered peregrin falcon in North America. (All information in this description is from the Yukon-Charlie Plan [NPS 1983].)

2. Jurisdiction and management plans. The preserve is under the jurisdiction of the NPS, which published a general management plan, environmental assessment, land protection plan, Charley Wild River Management Plan, and wilderness suitability review in September of 1983. There are over 400,000 acres of private land in the park, most of it held by the Doyon Native Regional Corporation.

3. Access, proximity to communities, and facilities. The preserve is 161 road miles from Fairbanks. The Steese Highway terminates at Circle, about 14 river miles north of

the preserve. The Taylor Highway terminates in Eagle, about 12 river miles south of the preserve boundary. Unlike most NPS areas in Alaska, the Charley River basin will remain accessible by helicopters under written permit. Other access is by private fixed-wing aircraft, boats, and, in winter, snowmobiles and dog sleds. Projected use levels do not warrant construction of trails or campgrounds by the NPS. A park service headquarters office is outside the preserve in Eagle, and there is a visitor contact facility at Circle.

4. Human use. The formal collection of data regarding public use of the preserve was not initiated until January 1982. Data gathered in 1982 are summarized in table 50.

G. Gates of the Arctic National Park and Preserve

1. Area description. The park plan describes Gates of the Arctic as "a maze of glaciated valleys and gaunt, rugged mountains covered with boreal forest and arctic tundra vegetation, cut by wild rivers, and inhabited by far-ranging populations of caribou, Dall sheep, wolves and brown bears (barren-ground grizzlies)." Congress has recognized a special value of the park and preserve to be its wild and undeveloped character and the opportunities it affords for solitude and wilderness travel and adventure. (Unless otherwise referenced, all information in this description is taken from the park revised draft plan, 1985).

2. Jurisdiction and management plans. The park is administered by the National Park Service. The Gates of the Arctic revised draft general management plan, land protection plan, and wilderness suitability review was published in December 1985. A final plan is anticipated to be approved in 1986 (NPS 1986).

3. Access, proximity to communities, and facilities. Primary access to the region is by air. Regularly scheduled flights are available from Fairbanks to Allakaket, Bettles and Anaktuvuk Pass from Kotzebue to Ambler, Shungnak, and Kobuk. The Dalton Highway is a new major source of access to the region. Built as a service road for the trans-Alaska pipeline, it was first opened to the public from the Yukon River crossing to the North SLope Borough boundary in 1981. The highway passes near the eastern end of the park, and although most traffic is still industrial, some recreational travel has developed. The park service maintains a field office and visitor services at Coldfoot and Bettles. It has no public facilities in the park. Facilities are planned at Anaktunvik Pass, and the NPS maintains seasonal camps at three locations in the park (Haynes 1986).

Table 50. Yukon-Charley Rivers Preserve, Public Use Report, 1982

Month	Visits		Backcountry Overnight Stays	
	Recreation	Subsistence	Recreation	Subsistence
January	12	19	0	530
February	6	19	4	530
March	17	27	8	536
April	30	30	50	534
May	41	29	51	536
June	115	40	163	980
July	141	90	315	995
August	127	39	268	995
September	118	34	242	980
October	50	19	60	530
November	25	19	0	530
December	15	19	0	530
Totals	697	384	1,161	8,206

Source: NPS 1983.

4. Human use. The results of a questionnaires distributed to visitors in 1984 (56 respondents) showed that 98% had participated in photography, 91% in wildlife viewing, 66% in fishing and 20% in mountaineering.

   Yearly recreational visitation for 1983 and 1984 averaged about 2,500 visits. The average group size during 1981-1983 was 5.3 people per group, and the average number of groups was about 470 per year. Trips averaged 10.1 days in length. Approximately 64% of recreational visitation occurs during July and August. Other human users of the park, not counted here, are primarily subsistence users from nearby villages.

H. Alaska State Parks in the Interior Region

1. Chena River Recreation Area. This 254,000-acre state recreation area located 26 mi east of Fairbanks is a popular recreation area for Fairbanks residents. Access is via the Chena Hot Springs Road off the Steese Highway. There are several campgrounds along the road, four trail systems (at least 80 mi total) and four public use cabins (Smarski 1986) and lodging is available at Chena Hot Springs and Angel Creek. Along the rivers, one can see spawning salmon and nesting waterfowl. In season, beaver, muskrats, Bald Eagle, and waterbirds are found in the area. Moose, black bear, red fox, porcupine, squirrel, grouse, great horned owl, and other wildlife occur in the forests. In the alpine area, reachable via Granite Tors Trail, one can see pikas, marmots, and various birds (Quinlan et al. 1983).

   Viewing of fish and wildlife is one of the major draws of the area. There are excellent opportunities to observe moose from the road, particularly the large numbers of dows and calves that use the area during the summer. The high populations of beaver also provide excellent viewing opportunities from the road and river (Smarksi 1985).

   Most visitors are Alaska residents, with up to 20% nonresidents during the summer. From June to mid September, 20,000 to 30,000 visitors enter the area each month (ibid.)

2. Denali State Park. A 324,000-acre park located adjacent to the new southern portion of Denali National Park, this area is undoubtedly important for nonconsumptive wildlife uses. No information was received in time for publication.

I. Creamers Field Migratory Waterfowl Refuge

1. Area description. This 1,776 acre tract on the outskirts of Fairbanks is noted for the thousands of migratory waterfowl

and other birds that stop there during the spring migrations, mid April through mid May. The return of the waterfowl to Creamer's Field is a significant event to the people of Fairbanks looking for signs of spring. Migrating birds include geese, ducks, sandhill cranes, shorebirds, raptors (including peregrine falcons), and passerines. Besides migrants, the area has 20 resident species and 55 breeders. Along the wildlife conservation trails observers frequently see moose, fox, and hares, as well as birds (ADF&G 1981a).

The area was cleared and cultivated from the early 1900s to the 1960s as part of a dairy operation. The presence of grain and the early melting caused by agricultural practices attracted migrant birds. When the dairy land was to be sold in 1968 a public campaign in Fairbanks raised part of the funds to purchase the area; the State and federal governments provided the rest. Measures are still taken to accelerate snowmelt in spring, and feed is sometime spread on the east field with volunteer help (Sheilds 1982).

2. Jurisdiction and management plans. The refuge is managed by the ADF&G as one of the legislatively designated special areas. The department has a management plan for the refuge dated 1981.

3. Access, proximity to communities, and facilities. Creamers Field is in Fairbanks adjacent to the ADF&G Fairbanks office. A nature trail, an interpretive brochure, and two viewing platforms encourage conservation (ADF&G 1981a).

4. Human use. The area is heavily used by local residents, including large numbers of school children on field trips. Arctic Audubon and Fairbanks Bird Club members act as guides on most of these trips.

   In 1983, random counts of bird-watchers were made during a 10-day period at the peak of migrant waterfowl activity. An estimated 11,604 people visited Creamers Field during this particular period. This is typical of the spring season (Bruce 1986). During the rest of the year, a visitor sign-in box at the start of the nature trail gives a rough tally of how many people use the trail. Regular users tend not to sign in, and the sheets are sometimes missing, so counts from this source are below actual use levels (table 51).

   The season of use for wildlife watching begins at the end of February, when a few early users watch early birds. Heaviest use is from mid April through mid June.

Table 51. Creamer's Field Waterfowl Refuge Tally of Nature Trail Visitor Sign-in Sheets, 1981-85

	1981	1982	1983	1984	1985*
Alaska	479	788	989	782	342
Local	(426)	(659)	(923)	(711)	(301)
Nonlocal	(53)	(29)	(66)	(71)	(41)
Other states	466	346	654	514	273
Foreign	88	37	84	83	24
Total	1,033	1,171	1,727	1,379	639

Source: Bruce 1986.

* In 1985, poor trail maintenance and yellow jackets discouraged visitors.

J. Minto Flats

1. Area description. Minto flats is a wetlands impoundment at the north edge of the Tanana River valley. The area is most used for consumptive purposes, but nonconsumptive use draws some people as a primary purpose and is a secondary benefit to consumptive users. The large waterfowl population includes trumpeter swans. Mammals include moose, black bear, beaver, river otter, muskrat, and other furbearers. (All information in this description is from ADF&G 1986c.)

2. Jurisdiction and management plans. Most of the land in the area belongs to the State of Alaska, with many small private land holdings, Native selections, and some BLM land. The Tanana Basin Area Plan recommends the Minto flats area as a state wildlife refuge. Legislative proposals are being drafted.

3. Access and facilities. Access is by boat along the Tanana River. One can travel by road to Minto or Murphy Dome and from there by boat. There are no facilities.

4. Human use. No data are available on human use.

K. Bureau of Land Management Lands in the Interior Region

1. Area plans. BLM lands administered by the Fairbanks District Office are divided into three major planning areas. The Arctic Resource Planning Area falls partly within our defined Interior Region, but because the areas of interest are along the arctic coast that planning area will be described in the Arctic Region narratives.

   The Central Yukon Planning Area is within the Interior Region. It consists of 9,487,000 acres of BLM land boarded on the south by 64° latitude, on the north by 68° latitude, on the west by the Nulato Hills, and on the east by the trans-alaska pipeline corridor.

   The Central Yukon Resources Management Plan was completed by the BLM in 1986. The BLM Fairbanks office reports that nonconsumptive uses of wildlife in this area are minimal, largely because of its remoteness. Access is by light aircraft, riverboat, snowmobile, or dog team (Carufel 1986).

   Areas the BLM considered critical for wildlife include a caribou calving area in the Ray Mountains and another area northeast of Galena.

   The following six areas that have been designated research natural areas:

- Box River
- Redlands Lake
- Arms Lake
- Ishtalitna Creek
- McQuestion Creek
- Spooky Valley

2. National wild rivers. TheBLM administers a number of national wild rivers. Among those in the Interior Region, information from the BLM indicates that the Gulkana and Delta rivers are scenic and good places to view wildlife, such as moose, bear, eagles, Dall sheep, caribou, beaver, and waterfowl (BLM 1985 and BLM pamphlet).

   The Gulkana River, including the main stream and the Middle Fork, which is located about 200 road mi east of Anchorage, encompasses 114,680 acres, with 181 mi of designated wild river. It flows into the Copper River.

   The Delta River begins close to the headwaters of the Gulkana River in the Tangle Lakes area but flows into the Tanana River. The management area contains about 37,000 acres, including the Tangle Lakes (BLM 1983). The Tangle Lakes area was identified in the Tanana Basin Plan Recreation Element as having high recreational use and value (ADNR 1983). Access to the Tangle Lakes area is via the Denali Highway.

   Public uses of these two rivers and river corridors are reported to include wildlife viewing, hunting, and fishing.

   No user data are available, but management concerns and plans for various campgrounds and access routes the BLM maintains in the areas suggest that recreational use, including sportfishing, is heavy (BLM 1985a,1985c).

3. White Mountains National Recreation Area. This area offers good opportunities for viewing wildlife typical of spruce-hardwood forest, muskeg, and alpine tundra; moose, brown and black bear, Dall sheep, caribou, lynx, fox, wolf, and wolverine occur. In June and July, alpine-nesting shorebirds and passerines frequent the area.

   Located about 34 mi from Fairbanks on the Elliott Highway, the area can also be accessed via U.S. Creek Road off the Steese Highway.

   The BLM maintains a 21-mi summer trail and a 23.5-mi winter trail, both joining at the end at Beaver Creek National Wild River, where there is a public use cabin.

No user data are available for the White Mountains area. This area was identified as important for recreation in the Tanana Basin Area Plan Recreation Element (ADNR 1983).

4. Pinnell Mountain National Recreation Trail. A hiking trail in alpine tundra is accessible from the Steese Highway spring through fall. Alpine tundra wildlife are easily observed along the trail and at Eagle Summit near one of the trailheads. Ptarmigan, Lapland longspur, water pipit, horned lark, lesser plover, gyrfalcon, and other birds frequent the area. Pikas, marmots, caribou, wolves, red foxes, and singing voles occur (Quinlan et al. 1983). No use data are available. This area was identified as important for recreation in the Tanana Basin Area Plan Recreation Element (ADNR 1983).

5. Denali Scenic Highway. The 135-mi Denali Highway passes through some exceptionally scenic and largely wilderness country. It is a gravel-surfaced road, which slows traffic, and is used almost solely for recreational purposes. The area supports diverse wildlife populations. The BLM manages 100 mi of the road corridor, including 1 mi on each side of the road (a total of 128,000 acres) as a Special Recreation Management Area. Among public uses of the area are wildlife viewing, hunting, and fishing (ADNR 1985b). Opportunities for wildlife viewing are an important attraction of the area (Shryer, pers. comm.). (Unless otherwise referenced all information, in this description is from the ADNR Recreation Action Plan for Denali Scenic Highway).

   Long-range management goals for the area include developing self-guided natural history interpretive programs. Jeff Shryer, of BLM's Glennallen office, has proposed developing some special wildlife-viewing facilities (ibid.). The area has about 17 developed trails and several boat access facilities on the rivers.

   The BLM collects visitor data for the Special Recreation Management Area. The 1984 show camping (visits," or 236,280 "visitor-hours." The data also show ORV travel (500 visits, 4,000 visitor-hours), nonmotorized travel (300 visits, 2,400 visitor-hours), fishing, hunting, "other land based," boat, "other water based," and snow and ice based. Although the highway is not plowed in the winter, the snow-and ice-based category showed 500 visitors and 4,000 visitor-hours.

6. BLM campgrounds and recreation areas. The BLM maintains a number of campground, trail, and recreation areas in Alaska. Those in the Interior Region for which fish and wildlife use was identified as an "activity" include the following:

   ° Eagle Recreation Area - Mile 162 Taylor Highway

- American Creek Wayside - Mile 154 Taylor Highway
- Brushkana Campground - Mile 105 Denali Highway
- Paxson Lake Campground - Mile 175 Richardson Highway
- Liberty Falls Campground - Mile 25 Edgerton Highway

No use data are available for these areas.

L. Tetlin National Wildlife Refuge

1. Area description. The Tetlin NWR is located in east-central Alaska and encompasses much of the Tetlin-Northway lowlands, an important waterfowl breeding and resting area. The Canadian border is its eastern boundary, the Wrangell-St. Elias National Park borders it on the south. The Alaska Highway forms the northern boundary, and the refuge is the first opportunity for people travelling into Alaska via the highway to observe Alaska's scenery and wildlife. The highway provides many opportunities for photography and wildlife observation. The primary attraction is the abundant waterfowl and waterbird populations. There are also many passerine birds. Because the area is primarily forested, observation of big game is difficult but not unusual. (Unless otherwise referenced, all information is from refuge manager David Stearns' response to a questionnaire, 1986).

2. Jurisdiction and management plans. The U.S. Fish and Wildlife Service administers the refuge and published a Tetlin National Wildlife Refuge draft Comprehensive Conservation Plan, EIS, and wilderness review in July 1985 (USFWS 1985e).

3. Access, proximity to communities, and facilities. The Alaska Highway borders the refuge. The village of Northway is within the northern part of the refuge. A visitor center is planned for construction during 1987 and will be located on the highway near the Canadian border. Two state campgrounds exist along the highway.

4. Human use. Wildlife observation and photography are the highest recorded nonconsumptive uses of the refuge. Levels of nonconsumptive use are high because of highway travelers. During 1985, over 160,000 people traversed the northern boundary on the Alaska Highway (NPS 1985).

   During the period from September 1982 through August 1983, a total of 10,280 local and nonlocal public use visits were recorded for the refuge. This included 3,675 visits for wildlife viewing/photography, 60 visits for environmental

education, and 4,060 visits for camping (method of collecting or estimating these data not provided) (NPS 1985). Data for January-December 1984-1985 visits are as follows for nonconsumptive uses:

	1984	1985
Wildlife viewing/photography	16,845	24,615
Camping/picnicing	6,255	10,530

Again, the method of collecting or estimating these data was not provided (Sterns 1986).

N. Other National Wildlife Refuges in the Interior Region

The following national wildlife refuges are also located within the Interior Region:

- Yukon Flats NWR
- Innoko NWR
- Koyukuk NWR
- Nowitna NWR
- Kanuti NWR

These national wildlife refuges are managed by the USFWS. Management personnel report exceedingly little nonconsumptive use of these refuges. Almost all uses are hunting, trapping, and fishing, mostly subsistence. One site near the Nowitna NWR but outside the refuge was mentioned possibly as possibly having some nonconsumptive visitors. This site is the Melozitna River, where a new little lodge has been established near a hot springs. Abundant black bear, moose, and a few brown bears are found in that area. Sportfishing for grayling is the area's primary draw (Lons, pers. comm.).

VII. WESTERN REGION

A. Overview

The Western Region receives a negligible amount of nonconsumptive wildlife use. The Yukon Delta National Wildlife Refuge encompasses most of this region. The remainder of the area will be addressed by the Kuskokwim Area Planning Effort led by the ADNR. Half of the Kuskokwim planning area is in the Interior Region and it is described in that section.

B. Yukon Delta NWR

1. Area description. Yukon Delta National Wildlife Refuge is the largest of the national wildlife refuges in Alaska, covering the entire Yukon-Kuskokwim delta area and Nunivak Island. It includes both forks of the scenic Andreafsky River, a designated Wild River. Rivers, lakes, sloughs and ponds dominate the delta landscape. The delta is known for its importance as a breeding ground for waterfowl, shorebirds and other waterbirds, which arrive from nearly every state and province in North America and from all continents bordering the Pacific Ocean. The most notable of these migrants are the brant, geese and swans. An estimated 100 million shore and waterbirds representing over 50 species use the Delta for nesting and migration stopovers. Dense concentrations of kittiwakes, murres, and lesser numbers of puffins, auklets, guillemots and cormorants are found in seabird rookeries along the rocky shores of Cape Romanzoff and Nunivak and Nelson islands. Large mammals such as black and brown bears, caribou, and moose are found primarily along the highlands and in the forests along the rivers. Nunivak Island has a population of about 500 muskox (USFWS n.d.). A variety of marine mammals can be seen along the coast.

2. Jurisdiction and management plans. Large amounts of land in the refuge have been selected by native corporations (USFWS n.d.). The refuge is managed by the USFWS, which is preparing the first draft of a formal management plan, due for review in the fall of 1986 (Perry, pers. comm.). Native residents of the area generally are not eager to encourage recreational visits to the area, and the USFWS is concerned about visitors disrupting nesting areas. A few birdwatchers and people interested in seeing muskox do visit the area, but no data has been collected about these users (Perry, pers. comm.).

3. Human use. A small amount of nonconsumptive use has occurred in the northeastern part of the refuge on the two forks of the Andreafsky River, and in the southeast part of the refuge where the Kisaralik River flows through the Kilbuck Mountains. To date, most use of the Andreafsky River has been be Bethel residents who float that river. Brown bear and moose can be seen in the area. Raft trips on the Kisaralik have drawn people from Bethel, Anchorage and probably from outside the state. A few guided trips have been conducted there. Wildlife may not be a primary attraction for the area, although there are numerous raptor birds in the area, including golden eagles, peregrine falcons and acipiters. Brown bear are also present. The river has been featured in recent publications describing river rafting trips in Alaska (Patton, pers. comm.).

VIII. ARCTIC REGION

A. Overview

The Arctic Region receives little nonconsumptive wildlife use despite some excellent opportunities for wildlife viewing, including the opportunities to see caribou migrations. The Noatak National Preserve, with approximately 2,500 recreational visitors per year, is a relatively high use area for this region. Remoteness, expense of travel, and short summer seasons are factors reducing human use.

Open valley landscapes with little tall vegetation to block views offer excellent wildlife-viewing opportunities in areas such as the Arctic National Wildlife Refuge. At the same time, the open character the country, the tendency of human travel to be concentrated along the rivers, and visitors' desire for solitude lead some management personnel to express concern about the possibility of large numbers of visitors.

B. Arctic National Wildlife Refuge

1. Area description. The Arctic National Wildlife Refuge provides the ecological transition from the Arctic coastal plain through the rugged Brooks Range and southward into the rolling uplands of rivers draining into the Yukon. The refuge includes the Sheenjek National Wild River. Scenery and wildlife are the area's major attractions for nonconsumptive users. The Porcupine Caribou Herd is the primary wildlife species attracting nonconsumptive users to the area. Also important are brown bear, wolf, and Dall sheep. (All information in this description is from the USFWS [1976].)

2. Jurisdiction and management plans. The USFWS administers the refuge. Work has begun on a comprehensive conservation plan and a draft plan is scheduled to be available for public review early in 1987.

3. Access, proximity to communities, and facilities. Access is by light aircraft. Most commercial guides utilize scheduled air service to Kaktovik and charter flights into the refuge from there. A lesser number of visitors charter from Ft. Yukon or directly from Fairbanks. Fairbanks is over 250 mi from central points in the refuge. Within the refuge, there are no airstrips other than gravel bars, etc., and no facilities exist or are planned.

4. Human use. Little information has been collected about nonconsumptive use of the refuge. Nonconsumptive visits have been estimated at 300-400 per year, with an average stay of

13.4 days. A study conducted in 1979 showed that 30% of nonhunter visitors to the refuge are residents of Alaska. Permits are issued annually for commercially operators.

The USFWS reports that although the Arctic NWR contains vast acreage with minimal visitation, the possibilities for overcrowding exist because of the treeless and open terrain of most of the area and the attitudes of the majority of visitors. Most nonconsumptive visitors are seeking a minimum of aircraft sightings and encounters with other people.

C. Noatak National Preserve

1. Area description. The Noatak National Preserve encompasses over 250 mi of the Noatak River watershed in the western Brooks Range. It is the largest mountain-ringed river basin in America that is still virtually unaffected by human activities. Its scientific importance for research as a base against which to detect environmental changes in the future has been internationally recognized by its designation as a biosphere reserve in the United Nations' Man and the Biosphere program. The preserve is located in a transition zone between northern coniferous forests and tundra biomes. It contains most types of arctic habitat as well as one of the finest arrays of flora and fauna anywhere in the arctic. Wildlife is an important resource of the preserve. Thirty-seven mammal species are found in the Noatak valley and include caribou, moose, Dall sheep, brown bear, wolf, fox, lynx, marten, beaver, and muskrat. The caribou are part of the Western Arctic Herd, which ranges over the entire region and is the largest caribou herd in Alaska. As fall approaches, the caribou migrate eastward toward Anaktuvuk Pass and begin to cross the Noatak River in late August. The greatest number are moving through the area from mid September to early October. Thus, late season human visitors have the opportunity to see something increasingly rare in the world, the migration of a large animal herd. (Unless otherwise referenced, all information in this description is from the Noatak National Preserve Revised Draft Plan [NPS 1985g].)

2. Jurisdiction and management plans. The preserve was established in 1980. It is administered by the NPS, which published a revised draft general management plan, land protection plan, and wilderness suitability review in December 1985. An approved plan is anticipated in 1986 (NPS 1986).

3. Access, proximity to communities, and facilities. The preserve is 350 mi northwest of Fairbanks and 16 mi northeast of Kotzebue or Bettles, and from there access into the

preserve is by charter aircraft or by riverboat from Kotzebue, by riverboat (Quinlan et al. 1983). The only facilities in the preserve are two seasonal ranger stations maintained in tent camps along the river.

4. Human use. Present recreational use is estimated to be about 2,000 to 2,500 people per year. Sportfishing, river floating, and hunting are the most common recreational uses. A relatively small amount of photography and backpacking also takes place. There are 25 commercial operators providing air charter and guiding services in the preserve.

   Questions are already arising about limiting visitor uses in some areas. Although at present these areas can hardly be considered congested at any single time, visitor uses over the entire summer season are more than intermittent, and with the continued expansion of the tourism industry the potential exists for overuse of some areas in the preserve, especially because most use is along the river.

   Scientific uses of the preserve are being pursued and are beginning to provide important base line and background information against which future environmental changes within or outside the preserve may be compared.

D. Other National Parks, National Wildlife Refuges, and Federal Areas in the Arctic Region

1. Kobuk Valley National Park. This 1,726,550-acre park is located immediately south of the Noatak National Preserve and has similar wildlife and other natural values, including spring and fall migrations of the Western Arctic Caribou Herd. The area is used by local residents for subsistence and for transportation via the Kobuk River. Nonlocal recreational users are estimated at only 25 to 75 per year, most of whom float the Kobuk River (NPS 1985f).

2. Selawik National Wildlife Refuge. Located immediately south of the Kobuk Valley National Park, much of the area is lowland tundra. Wildlife includes large moose aggregations in the fall, caribou migrations in spring and fall, and nesting ducks, geese, and swans in summer. Nonconsumptive users of the refuge are estimated to average 23 per year for 1983 through 1985. Most of these were in May, June, and July (USFWS 1986c).

3. Cape Krusenstern National Monument. Located a short distance north of Kotzebue near the Noatak National Preserve, the monument is comprised of 657,807 acres of land and water. Much of the area is coastal plain dotted with lagoons. The cape's bluffs and its series of 114 beach ridges show the

changing shorelines of the Chuckchi Sea and are important for their archeological record of prehistoric human uses. Wildlife include caribou (the Western Arctic Herd), brown bear, muskoxen, moose, Dall sheep, wolf, fox, weasel, and wolverine. Marine mammals along the coast include ringed and bearded seal, sea lion, Pacific walrus, and several species of whales. The monument is a resting place for some migrating waterfowl and a nesting place for others. Recreational visitors from outside the region are estimated at 50 people per year. One or two commercial recreational trips in the area are reported per year. The park service recognizes that the area is also used for recreation by local residents, commenting that "it is often hard to accurately distinguish when local residents are recreating or subsisting" (NPS 1985b).

4. Bering Land Bridge National Preserve. Located on the northern side of the Seward Peninsula, this preserve has dynamic coastal barrier beaches with interior lagoons and a full representation of the variety of tundra communities from sea level to 3,500 ft. The broad river mouths, coasts, estuaries, and lagoons provide waterfowl nesting habitat as well as staging areas for fall migrations of shorebirds. Some 112 migratory bird species have been recorded, many of them Asian forms rarely seen in North America. Large mammals in the preserve include moose, bears, wolf, and muskoxen. Commercial reindeer herds are grazed in the preserve.

   Most human use of the preserve is for subsistence. Recreational visits for 1985 are estimated at 380, and total visitor-days are estimated at 790. Almost all of this (370 visits and 740 visitor-days) involved visits to Serpentine Hot Springs, which is probably the most frequently visited site on the Seward Peninsula that is not accessible by road. The hot springs are in a scenic valley that is important habitat for raptors such as gyrfalcons and rough-legged hawks. It is accessible by aircraft, and there is a public use cabin. People go to the hot springs year-round for a variety of reasons, including bathing, healing, spiritual revitalization, hunting, trapping, and hiking. Most visitors are from Kotzebue and Nome (NPS 1985a).

E. U.S. Bureau of Land Management Area

1. Arctic Resource Area. This area is north of 68° and west of the trans-Alaska pipeline. It contains 30 million acres of USBLM-administered lands. There are several areas within the Arctic Resource Area that attract nonconsumptive users. (Unless otherwise referenced, information in these descriptions is from Bruce 1986).

- The Colville River: Viewing wildlife and fishing are primary attractions. Wildlife of interest to visitors include peregrine falcons, gyrfalcons, rough-legged hawks, caribou, moose, and brown bear.

- Sagavanirktok River: Viewing wildlife and fish are primary attractions, including peregrine falcons, caribou, and brown bear.

- Teshekpuk Lake Area: A system of large lakes in this wet tundra area is used in summer by Canada, white-fronted geese, and Pacific black brant. The area also has ducks, shorebirds, owls, and gulls. Caribou, arctic fox, and lemmings occur in the area. Access is by charter flight Barrow or Prudhoe Bay (Quinlan et al. 1983).

No data have been collected on nonconsumptive use. Permits are required for commercial users, and so far only one has been issued for a nonconsumptive visitor operation for the 1986 season.

F. Other Arctic and Western Region Viewing Sites

These areas were mentioned in A Guide to Wildlife Viewing in Alaska (Quinlan et al. 1983). No user data are available. (All information is from Quinlan et al. 1983.)

1. Prudhoe Bay Area. Hotels are available, as well as guided tours of the oilfield and coastal areas. Wildlife that can be seen on these tours include caribou, arctic fox, loons, swans, geese, ducks (including king eiders, which can be seen from the road), shorebirds, snowy owls, ptarmigan, and other birds. The Division of Tourism estimates that 13,500 nonresident visitors saw this area during the summer (June through September) of 1985 (ADCED 1986a).

2. Gambell-St. Lawrence Island. This is a birding hotspot because of the variety of unusual birds that occur there. Limited lodging is available by prior arrangement with the Village Council. Guided bird tours visit the island.

IX. SOUTHEAST REGION

A. Overview

The Alaska Public Survey (Clark and Johnson 1981) showed that the existence of a wilderness environment for recreational pursuits is high on the list of reason why Southeast Alaska residents moved to or remain in the region. Summarizing the results of that survey,

Alves (1980) found that, compared to other Alaskans, Southeast residents had a stronger attachment to the region where they lived and attached a higher level of importance to the region's natural resource base in providing an attractive setting in which to live and recreate. The survey showed that opportunities for wildlife viewing were an important aspect of residents' favorite recreational areas. A description of the Alaska Public Survey, including responses for Southeast residents, appears in section III.B. of this chapter.

The visitor industry (including both Alaska resident and nonresident visitors) has become the second largest employer in the Southeast Region (USDA: FS 1986b). A study of 1985 summer season nonresident visitors to Alaska (including vacation, business, and other types of visitors) found that of 11 possible outdoor recreational activities listed, the one in which the largest percentage of visitors had participated was "wildlife-watching" (31%), followed by "birdwatching" (25%). However, satisfaction with their wildlife watching experiences in Southeast Alaska rated only 5.6 on a scale of 7 (ADCED 1986). Fifty-four percent of all out-of-state visitors to the region arrive via cruise ship. A 1979 study of cruise ship visitors is described in section III.C. of this chapter.

This section summarizes results of a study of tourism in the Southeast Region. Information on nonconsumptive fish and wildlife use at specific areas is also presented in this section; however, only limited visitor data are available for wildlife-viewing sites in the region.

Most of the land in the region is part of the Tongass National Forest, administered by the U.S. Forest Service.

B. Patterns of Tourism in Southeast Alaska

Patterns of Tourism in Southeast Alaska (Bright 1985) examines volume and growth rates of the Southeast Alaska tourism industry as a whole and of elements of that industry, presents information about the importance of tourism in the Southeast economy, and estimates the amount of money spent on promoting tourism in the region. The objective of the study was the assessment of the economic impact of ANILCA wilderness designations. The study also reports the results of an interview survey of full-time tourism operators in Southeast Alaska regarding the importance of wilderness (designated and undesignated) to their operations and the results of an analysis of the content of advertisements in national magazines and newspapers in the 10-year span, 1974 to 1984.

The study does not focus on wildlife as an attraction for the tourism industry. However, wildlife is to some extent implicit in

wilderness. The content analysis of Alaska tourism advertising (Morck 1984) quoted in Bright's study indicates that an image emphasizing Alaska as a last frontier, "with abundant wildlife and natural grandeur," has been dominant on the marketing scene since 1974. In the survey of tourism operators conducted by Bright, the 72 operators surveyed described the top five "attractions" their clients were seeking. In order of frequency given, these were scenery (58), wilderness (28), wildlife (27), fishing (26), and solitude (19).

1. Regional tourism volume and trends. Bright estimates that the Southeast Region hosted an estimated 205,000 visitors in 1983, an estimated 70% increase over 1975 (ibid.). This estimate was based on visitor use data from cruise ships, airplanes, and the state ferry system and is lower than the 250,000 visitors estimated by the Alaska Department of Labor (ADL) in its 1983 study for the Alaska Division of Tourism. The greatest increase is in cruise ship passengers, which have increased 115% since 1975. Table 52 shows increases in cruise ship, airline and ferry passengers between 1974 and 1983. Ferry system usage increased by 33%, and airline, passengers boarding planes at Juneau increased by 51%. Bright does not comment on what proportion of these last two sets of travelers should be considered tourists. Forest Service figures of use from the RIM (recreational information management) data system suggest an increase in recreational visitor-days (RVDs) during 1975-1983 of approximately 100% on the Tongass as a whole, with 1,366 RVDs in 1975 and 2,797 in 1983. Nonresident private yacht visits to the region were estimated at 300 to 350 per year in 1984.

2. Economic importance of the visitor industry in Southeast Alaska. Economic analyses by the ADL are presented, which show that the visitor industry (defined as out-of-state visitors and Alaska visitors and including people visiting for business reasons) provided sales of $37 million in the Southeast region for the one year period fall 1982 to fall 1983. The employment data provided in the Bright study has been updated and made more complete by the U.S. Forest Service for its 706(b) report to Congress on the Tongass National Forest (USDA: FS 1986b). That report shows that by 1984 the visitor industry had become the second largest employer in Southeast Alaska, outranking timber and fisheries. The updated employment data from the Forest Service is shown in table 53.

3. Increase in "adventure tours." Bright notes an increase in "adventure tours" that specialize in getting the visitors out into the country. Most of these are no longer than one or two days. These include raft and canoe trips. The trend is also reflected in the increase in smaller, explorer-class tour vessels. This trend provides opportunities for local

Table 52. Southeast Alaska Cruise Ship, Airline, and Ferry Passengers, 1975-83

Year	Cruise Ship	Airline	Ferry	Total
1975	46,279	110,660	230,000	386,939
1976	58,180	122,790	225,000	405,970
1977	74,870	131,474	180,000	386,344
1978	63,702	142,961	220,000	426,663
1979	70,895	153,500	245,000	469,395
1980	86,815	155,699	270,000	512,514
1981	83,566	156,257	285,000	524,823
1982	87,358	150,871	290,000	528,229
1983	99,706	167,302	306,000	573,008

Source: Bright 1985.

Table 53. Employment in the Top Four Southeast Alaska Industries, 1980-84

Industry	1980	1981	1982	1983	1984
Government	11,189	11,486	12,777	12,096	12,490
Commercial fishing/processing	3,545	3,317	3,365	3,153	2,750
Timber	3,072	2,557	2,461	2,119	1,813
Visitor	2,366	2,522	2,755	2,961	3,126

Source: USDA: FS 1986b. Data derived from a bargraph.

Southeast Alaska entrepreneurs to enter the tourism industry by offering adventure tours.

4. Tourism promotion. Approximately $30 million was spent marketing the Alaskan "image" in 1984. This figure includes $7 million from the Division of Tourism, $1 million from the Marketing Council (contributions from the private sector), and $22 million spent by the private sector promoting their own operations. It is estimated that at least $10 million was spent promoting the Inside Passage of Southeast Alaska. This last estimate was obtained from John Farnum and Eric McDowell, two Juneau consultants who have worked extensively with the tourism industry. McDowell said, "The single, most highly promoted attraction in all of Alaska is the Inside Passage" (Bright 1985).

5. Importance of tourism for protecting wilderness qualities. The Bright study found that tourism operators are dependent on the natural, unmodified landscape in Southeast Alaska. "Demand for the unmodified landscape is high, and development activities, including access, cabins and lodges have the potential of destroying the very resource upon which many of these firms are based." He quotes consultant Eric McDowell: "If you think the Forest Service can preserve the scenic quality of Southeast Alaska by simply protecting Wilderness areas and logging the rest of it, the industry is in trouble."

6. Survey of tourism operators. For his survey of tourism operators, Bright operationaly defined tourism as traveling for recreation that involves commercial transportation activities, a definition that does not separate residents and nonresidents. More specifically, he seems to have targeted the kind of local tour operators listed in the Official Vacation Planner put out by the Alaska Division of Tourism, in the pages entitled "What to Do - Local Attractions." He estimated that the number of such full-time operators in 1984 was about 115, 60-70% of whom were personally interviewed for the survey.

   The study found that with the exception of Misty Fjords, wilderness designations had little influence on actual area use patterns but had significantly influenced promotional patterns. Seventy-three percent of the operators felt that wilderness designations had a positive effect on their business. Of these, half responded that the designations were primarily of promotional benefit; the other half gave "protection of the resource" reasons for their positive response. Bright quotes one operator who summarized the general response, saying "Wilderness designations are insurance that the wilderness resource will remain intact. . . . it allows me to invest funds into the development of trips

in these areas." The 72 operators who were surveyed list the top five attractions for their clients. In order of frequency given, these were scenery (58 respondents), wilderness (28), wildlife (27), fishing (26), and solitude (19). The operators also described kinds of locations and activities they would avoid. The single most frequently mentioned activity avoided by operators was timber - related operations. The second most frequently mentioned were areas heavily used by people. Some of the operators did not see the need to avoid activities such as timber harvesting because these activities were not found along their normal operating routes.

7. Use of specific wilderness areas. Trends in recreational use of a number of specific areas were based on information Bright collected from a variety of sources, including Southeast Stevedoring (for cruise ship use), interviews with air taxi and vessel charter operators, guiding companies, and land management agencies. For the 1974-1984 period period, these trends were estimated as follows:

Misty Fjords:

- This area experienced an overall increase of 400-500%. The majority of visitors are nonresidents.
- Scenic flights increased from 250-300 in 1979 to 6,500-7,000 in 1984.
- Tour vessels did not use the area in the 1975-1978 period. By 1984, tour vessel traffic included six small vessels (650-690 capacity) making a total of 16 scheduled trips.
- Private recreational vessels owned by residents increased their visits to the area by 60-80% while nonresident-owned vessels increased visits by 100-120%.
- Kayak and canoe traffic increased by 100%.

Russell Fjord:

- This area experienced an overall increase of 100% during the period 1980-1985.
- The number of scenic overflights stayed about the same.
- Tour vessels did not use the area in the 1975-1982 period. In 1984, one large vessel (850) capacity) scheduled 17 trips; two vessels with a capacity of 525 each scheduled 4 trips; and one small tour vessel (under

100-ton class) made trips on a demand basis to the mouth of the fjord.

° Wilderness guiding in the area was not recorded in the 1975-1979 period. In 1984, there were five or six kayak/hiking trips involving 8-12 persons per trip.

Tracy Arm/Fords Terror:

° This area experienced an overall increase of 90-100% during the period.

° Tour vessels using the area in 1984 were three ships in the over 100-ton class and three ships in the under 100-ton class.

° Resident and nonresident boating increased 15 to 20% between 1982 and 1984.

West Chichagof/Yakobi Island:

° Kayaking is the major form of travel. Kayaking has increased an estimated 6-8% annually.

Stikine/LeConte:

° Use of the Stikine has increased approximately 400% since the mid 1970's, but this increase is for freight and tourism combined. LeConte Bay area use has increased at about 15% per year.

Tebenkof Bay:

° Kayak and canoe recreation has increased.

Admiralty Island:

° This area has experienced a gradual increase. A "hot spot" has developed: the Pack Creek area, where brown bears can be seen feeding on salmon. Most use is by small vessels, aircraft, and kayaks, but "explorer"-class vessels, are beginning to frequent the area and offload passengers.

South Baranof:

° Increase is only moderate because of difficult access.

User conflicts were noted for Misty Fjords. Some commercial operators and resident recreational visitors reported that the level of use, including scenic overflights, is

detrimental to their enjoyment of the area. Bright forsees the potential for user conflicts in the Russell Fjord area.

Two areas near Wrangell that are outside the Stikine-Leconte Wilderness were reported to have increasing recreational use. These were Anan Creek and the Harding River area. Visitation on Prince of Wales Island, another nonwilderness area, has continued to grow as the road system there expands. The Waterfall sportfishing lodge, hosting approximately 1,200 guests during the 1984 season, was another source of recreational visitor increase for the island, which was estimated at 100-150% overall for the 1976-1983 period.

The study contains two maps of Southeast Alaska, one showing 1975-76 tourism and recreational use patterns and the other showing 1983-1984 patterns, including high use areas, moderate use areas, areas showing greatest increase in use, and routes of large and small cruise ships.

C. Glacier Bay National Park and Preserve

1. Area description. Glacier Bay National Park was established in 1925 and enlarged in 1939 and again in 1980, so that it now encompasses 3,280,000 acres. For visitors to Alaska, it is the state's fourth most visited "attraction" (ADCED 1986a). Its primary source of interest is the dramatic landscape of the bay, with its numerous tidewater glaciers and changing landscape responding to the effects of rapid glacial retreat. Wildlife is a secondary but important attraction. The park service reports (NPS 1986):

> With increased national sensitivity to whale and other marine mammals there has been considerable interest in viewing of wildlife from tour boats and cruise ships. Wildlife watching, photography, etc. is also popular with river runners and backcountry users.
>
> Park personnel report that virtually 100% of all visitors see at least one or more of the primary wildlife species.
>
> Approximately: 64% see humpback whales
> 92% see harbor seals
> 67% see harbor porpoises
> 37% see black bear
> 82% see bald eagles (NPS 1986)

Primary species of interest besides those listed are mountain goat, moose, and seabirds. (Information in this description is from the Glacier Bay General Management Plan [NPS 1984c] unless otherwise referenced.)

Most of nonconsumptive wildlife human use in the park occurs in Glacier Bay itself, although substantial wildlife populations are found in other portions of the park, such as Dundas Bay on the Icy Strait coast, the approximately 100-mi stretch of the Gulf of Alaska coast, and the Alsek River near the northern boundary of the park.

Glacier Bay has long been known for its value in the study of glacial retreat and attendant plant succession and animal recolonization, and it receives substantial use as a natural laboratory for scientific research. The park plan lists numerous studies in progress as of the 1984 publishing date, including wildlife and visitor use studies. Many of these are being conducted by universities or other government agencies in cooperation with the NPS.

2. Jurisdiction and management plans. The park is under the jurisdiction of the NPS, which published a Glacier Bay National Park and Preserve General Management Plan in September of 1984.

3. Access, proximity and facilities. Bartlett Cove in Glacier Bay National Park is approximately 90 mi northwest of Juneau. Access is by plane or boat. The small community of Gustavus on the outskirts of the park has daily jet service from Juneau during the summer season. A road from the airport ends at Bartlett Cove in Glacier Bay, the site of the only developed facilities in the park. Bartlett Cove has a concessioner-operated lodge, a campground, dock, small boat harbor, and interpretive trails.

4. Human use. Cruise ship passengers constitute the largest group of Glacier Bay users, amounting to 112,783, or 86% of the total 130,943 recreational users of the park in 1985 (NPS 1986). The cruise ships using Glacier Bay increased to a peak of 139 in 1977. The following year saw a sudden decline in the number of humpback whales using the bay, and there were indications that the amount of vessel traffic and vessel noise were a factor. In 1981, the NPS issued regulations to control vessel use and traffic in the bay as a management tool to protect the whales. In 1981, only 89 cruise ships (two per day) were allowed to enter the bay between June 1 and August 31, and no more than 339 private vessels could enter the bay during the same period (a maximum of 21 per day). The number of commercial tour boats was limited to 1976 levels. Vessel traffic patterns and speeds were also regulated. Research is continuing on the effects of vessel traffic on humpback whales. The number of cruise ships entering the bay June through August 31 is still regulated but has been allowed to increase to 102 in 1985 and 1986. A total of 139 cruise ship visits are scheduled for the entire 1986 season (Case, pers. comm.).

Tour boats departing from Juneau visit Glacier Bay and the Glacier Bay Lodge concessioner operates both a daily tour boat and an overnight vessel. Both of these carry NPS interpreters, who spend much of their time imparting information about wildlife observed during the trips. Another concessioner offers kayak rentals and guided kayak trips in the bay. Kayakers now constitute more than 50% of all backcountry users. Six United States companies operate commercial rafting trips on the Alsek River at the northern end of the park. Commercial and private recreational users of the Alsek River totaled 270 in 1983, 395 in 1984, and 238 in 1985 (Case, pers. comm.).

An Alaska visitors opinion survey conducted in 1985 estimated that nonresident visitors to Glacier Bay totaled 156,400 for June through September of 1985 (ADCED 1986a). (Note that these figures are larger than NPS figures, tables 54 and 55).

The report comments (ADCED 1986a):

> Several natural attractions -- Denali/McKinley and Glacier Bay most conspicuously -- have controlled access and therefore controlled and limited commercial means for their enjoyment. These controls determine the travel products, accommodations, modes of access and often the costs associated with experiencing these attractions. These factors in turn can determine which market segments are likely to be users not only of those attractions but of travel products which include those attractions as part of the package. Public policy regarding the management of key natural attractions has significant impacts on the Alaska visitor industry.

One of the authors of the report commented that relatively few people visit Glacier Bay on their own as independent travelers (McDowell, pers. comm.).

Each year several high school and several university classes are conducted in Glacier Bay.

NPS statistics count visitors once for each visit. One visitor on a trip lasting several days is counted as one; if he/she returns for a second visit he/she is counted as two. Statistics in table 54 were obtained from the NPS Alaska Region office and differ somewhat from numbers in table 55 from the Glacier Bay management plan.

Almost all recreational and scientific use of the park takes place between May and October. The Glacier Bay lodge is open mid May through mid September.

Table 54. Glacier Bay Recreational Visitors, 1983-84

	1983	1984	1985
Cruise ship trips	96	99	134
Cruise ship passengers*	72,541	89,880	112,783
Backcountry overnight stays	3,581	4,456	5,078
Total overnight stays	58,090	59,275	41,380
Total visits	93,057	108,295	130,943

Source: NPS 1986; Eliason, pers. comm.

* Excludes ships' crews.

Table 55. Glacier Bay Annual Visitation, 1969-83

Year	Cruise Ship Passengers	Cruise Ships	Lodge Visitors	Lodge Overnight Stays	Charter/ Private Boaters[b]	Overnight Back-Country Users	Misc. Use With Cruise Ship Crews[c]	Misc. Use Without Cruise Ship Crews[b]	Total Without Cruise Ship Crews	Total With Cruise Ship Crews
1969	1,636[d]	---	2,120	---	1,090	105	1,349	---	---	6,300
1970	16,676[d]	---	1,599	---	496	85	10,884	---	---	29,740
1971	14,802[d]	---	1,461	---	400	118	8,927	---	---	25,708
1972	13,330[d]	---	2,895	---	955	186	7,309	---	---	24,675
1973	18,481[d]	43	3,174	---	952	296	13,058	---	---	35,961
1974	41,531[d]	57	3,212	---	644	452	2,049	---	---	47,888
1975	42,479	113	5,021	---	1,058	400	23,117	3,598	48,791	71,908
1976	46,488	115	6,747	9,983	941	510	30,064	3,594	54,671	84,735
1977	74,870	139	7,678	11,518	1,602	561	35,783	4,841	84,726	120,509
1978	64,022	124	11,756	17,634	2,096	600	30,926	4,022	78,626	109,552
1979	70,895	127	7,824	11,737	6,433	576	36,710	6,806	85,907	122,617
1980	81,115	137	7,410	11,114	2,128	651	39,050	4,847	91,521	130,571
1981	69,615	118	8,726	12,881	2,890[e]	803[f]	37,271	4,816	82,103	119,374
1982	74,808	105	6,738	9,650	3,568	1,276	45,096	5,941	86,390	131,486
1983	72,541	93	7,409	8,962	5,430	930	---	10,066	96,376	---

Source: NPS 1984c.

--- means no data were available.

a Includes all visitors to the lodge, not just overnight guests.

b Includes passengers on small charter tours.

c Miscellaneious users include day visitors, Glacier Bay Explorer passengers, charter fishing boat passengers, campers, commercial fishermen, scenic overflight passengers, day users, prospectors and miners, fuel patrons, U.S. and Canadian naval vessels, commercial film crews, contractors, and barge operators.

d Includes cruise ship crews.

e Reflects improved counting techniques on commercial fishing and charter boats.

f Includes Alsek River use (not included previously).

Additional discussion of Glacier Bay National Park appears in section III.B. in the description of the 1979 Alaska Cruise Ship Passenger Study.

D. Alaska Chilkat Bald Eagle Preserve and Haines State Forest

1. Area description. The Alaska Chilkat Bald Eagle Preserve was established by the legislature in 1982. It consists of 49,000 acres and encompasses the smaller, 4,800-acre Chilkat River state critical habitat area established in 1973. The preserve begins about 12 mi northwest of Haines along the route of the Haines Highway and is adjacent to the village of Klukwan. It includes major portions of the Chilkat River drainages as well as portions of the Klehini, Tsirku, and Chilkoot river drainages and is more than 30 mi long and up to 3 mi wide. (All information is from the Alaska Chilkat Bald Eagle Preserve Management Plan [ADNR 1985a] unless otherwise referenced.).

   The most spectacular fish and wildlife resources area of the preserve is known as the Bald Eagle Council Grounds. Here warm water upwellings at the confluence of the Tsirku River fan and the Chilkat River support a late fall chum salmon run, which in turn supports the concentration of eagles that occurs between November and February. This is the largest concentration of Bald Eagles in the world; up to 3,500 eagles converge on the area (Quinlan et al. 1983).

   Within the preserve are also found Bald Eagle and trumpeter swan nesting areas, as well as black and brown bears, moose, lynx, marten, wolfe, and wolverine. The Chilkat and Klehini river valleys provide a major waterfowl migration route to and from the interior of Alaska and Canada.

   Mountain goat viewing is common near Chilkoot Lake. The goats are within the Haines State Forest, but the viewing area is on BLM land, managed by ADPOR. Another popular area in the Haines State Forest where both local residents and tourists go to view wildlife is the "Glory Hole" at the upper end of Chilkoot Lake. Spawning salmon and bears can be seen there.

2. Jurisdiction and management plans. The preserve is under the jurisdiction of the Alaska Division of Parks and Outdoor Recreation but differs from other state parks in several respects. The ADF&G and USFWS have primary responsibility for eagles, salmon, and habitat management. The enabling legislation set up an advisory council, which includes several local members, to advise the state on management of the preserve and to be sensitive to local concerns and interests. An Alaska Chilkat Bald Eagle Preserve Management

Plan was published by the ADNR, Division of Parks, in September 1985. Numerous exclusions from the preserve include private, Native, Haines Borough, and University of Alaska lands.

The Haines State Forest is under the jurisdiction of the ADNR, Division of Forestry, which will publish a management plan for the forest in the spring of 1986.

3. Access, proximity to communities, and facilities. Access to the preserve is via the Haines Highway, which passes through the Council Grounds. The preserve begins about 12 mi from Haines, which is a port of call for the Alaska Marine Highway. The Haines Highway is one of two highway routes connecting Southeast Alaska with the Alaska Highway. To date, the preserve has no staffing or viewing facilities, such as highway pullouts, signs, and viewing platforms. The management plan comments that a safety problem occurs along the Haines Highway during periods of eagle concentrations as a result of people stopping to view wildlife but lacking viewing and stopping areas along the highway corridor.

4. Human use. Large numbers of people pass through the preserve as they travel the Haines Highway. It is difficult to know, especially in the absence of a monitoring program, how many of these find the eagle preserve an attraction. Tour buses stop so that passengers may view eagles and other wildlife. The Alaska Division of Tourism (ADCED 1986a) estimates that 27,700 nonresident tourists visited the preserve in 1985. ADPOR 1985 monthly visitor statistics for the preserve are shown in table 56. Because unusually cold weather in November of 1985 led to reduced eagle populations and fewer than usual visitors to view the eagles, fall 1984 figures are presented as well. Statistics for the summer months are derived from commercial river float trips and estimates of fishermen and hunters. Tour buses stopping along the highway are not counted. During the eagle gathering months, October through December, a percentage of people who cross the United States/Canadian border are counted as eagle preserve visitors (Kruger 1986).

Chip Waterbury (pers. comm.) of the Haines Visitors Bureau commented that tourists visit the preserve in the summer, when the number of eagles in the area is not remarkable. The number of people coming to see the late fall eagle concentration is relatively small and consists largely of Southeast Alaska residents.

Commercial tourist operations in the preserve include raft trips on the rivers. A permit system initiated by DPOR will provide information about numbers of clients involved in commercial operations beginning in 1986.

Table 56. Monthly Visitor Counts for Two Haines Area State Parks, 1985

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Eagle Preserve	678	846	474	433	410	5,264	7,134	7,129	7,134	3,500*	535	1,135
Fall 1984 Eagle Preserve visitors	---	---	---	---	---	---	---	---	8,900	6,789	7,814	1,135
Chilkat Park	48	48	58	56	2,198	5,620	5,728	6,642	7,066	3,100*	86	1,135

Source: ADNR 1985a.

--- means no data were available.

* Estimated to fill data gaps (Kruger, pers. comm.).

E. Chilkat State Park

1. Area description. This 6,000-acre park encompasses much of the Chilkat Peninsula, which extends southward into Lynn Canal, near Haines. The park has two separate parts, a northern portion established in 1970 and the portion on the southern tip of the peninsula established in 1975 (ADNR 1981b). It is a good place to see whales, seals, sea lions, and porpoises, which come in close to shore. Half of the park area is closed to hunting to allow for wildlife viewing and safety reasons. Wildlife in the park includes black and occasionally brown bears, moose, Bald Eagles, grouse, coyote, and wolverine (ibid.).

2. Jurisdiction and management plans. The park is under the jurisdiction of the Alaska Division of Parks and Outdoor Recreation. There is no written plan for managing the park.

3. Access, proximity, facilities. The park is 7 mi south of Haines on the Mud Bay Road. There are several miles of trails, a concrete boat launch and a small dock, spaces for 40 recreational vehicles, tent sites, and a picnic area (ibid.).

4. Human use. Chilkat State Park is used as a vacation point or as a stopover for travelers on the state ferry system (ibid.). Wildlife-viewing opportunities are one of the area's attractions (Quinlan et al. 1983).

   Table 56 shows total monthly visitors to the park in 1985 (ADNR 1985b). Counts actually represent numbers of visitor-days. For parks accessed by car, the Division of Parks method of estimating "visitors" involves counting the number of cars observed, multiplying that by three visitors per car, and dividing by the number of times counts were made. This results in an estimate of average number of visitors per day, which is multiplied by the number of days in the month and then by an average turnover rate for the park. Two visitors staying only half a day each would be counted as two visitors.

F. St. Lazaria Island and Sitka Sound

1. Area description. St. Lazaria Island in Sitka Sound has one of the largest seabird colonies in Southeast Alaska. Among the species nesting on the island are nearly half a million Leach's and fork-tailed storm-petrels, thousands of common and thick-billed murres, and smaller numbers of auklets, murrelets, puffins, cormorants, and oyster catchers (Quinlan et al. 1983). The birds begin arriving in late May; full populations are present mid June through August (Johnstone,

pers. comm.). The island is part of the Alaska Maritime National Wildlife Refuge and is an important destination for small tour boats and charter boats operating out of Sitka. Nearby Lowe Island is also visited as a good place to see seals and sea lions. Grey whales migrate past St. Lazaria in May, before the seabirds arrive. Humpback whales and a few minke whales can be seen at times in the sound. Sea otters can sometimes be seen in the outer sound between Goddard and Biorka islands. During bad weather, Nakwasina Passage and other bays provide tour destinations. Bear and deer can often be seen at the heads of bays, where river otter are common (Johnstone, pers. comm.).

2. Jurisdiction and management plans. St. Lazaria Island is administered by the U.S. Fish and Wildlife Service as part of the Alaska Maritime National Wildlife Refuge. Work has begun on a plan for the maritime refuge.

3. Access, proximity and facilities. St. Lazaria Island is about 15 mi west of Sitka and is reached by boat. Permits are required to land on the island, but the seabirds can easily be observed from a boat (Quinlan et al. 1983). Access to other areas of Sitka Sound is also primarily by boat. The only facilities in the sound are the commercial lodging, transportation, and other facilities in Sitka.

4. Human use. Approximately eight locally operated charter boats take visitors on wildlife/scenery trips and fishing trips in Sitka Sound (Johnstone, pers. comm.). Two 56-ft tour boats operate in the sound, one making daily scheduled trips and the other making trips when cruise ships are in port (Buyers, pers. comm.). Sitka residents use the sound for both consumptive and nonconsumptive forms of recreation.

G. Mendenhall Glacier

1. Area description. The Mendenhall Glacier near Juneau is the third most visited "attraction" in Alaska for visitors from outside the state (ADCED 1986a). Its primary interest is that it is a "drive-up" glacier. Wildlife is a secondary attraction. Mountain goats may be viewed on Mt. Bullard from spotting scopes at the visitors' center, and most of the mountain is closed to goat hunting to enhance viewing opportunities. Visitors see red salmon spawning in Steep Creek near the visitors center July through August and coho salmon later in the fall. Arctic terns, gulls, Bald Eagles, and forest birds occur along trails near the visitors center (Quinlan et al. 1983).

2. Jurisdiction and management plans. The Mendenhall Glacier area is part of Tongass National Forest, under the jurisdiction of the U.S. Forest Service.

3. Access, proximity, and facilities. The Mendenhall Glacier Visitors Center is located 13 mi north of Juneau by highway. The elaborate visitors center contains scopes for viewing mountain goats, interpretive displays, a facility for showing movies, and a restaurant. There are several excellent trails in the vicinity, including a glacier ecology interpretive trail, and a campground on the other side of Mendenhall Lake.

4. Human use. A visitor opinion survey of nonresident visitors to Alaska conducted for the Alaska Division of Tourism resulted in an estimate of 196,500 nonresident visitors to the Mendenhall Glacier during June through September 1985, making it the third most visited attraction in Alaska for that group of visitors in 1985; 45.6% of all visitors to Alaska and 76% of visitors to the Southeast Region visited the glacier. Sixty percent of these visitors were cruise ship passengers (ADCED 1986a). No data are available on the number of Juneau-resident visitors and visitors from other parts of Alaska, nor are there nonresident visitor data for the months of October through May. The Forest Service provided an estimate from its RIM data base of 600 recreational visitor-days of use of the glacier ecology trail in 1985 for the purpose of "nature study (wildlife, birds, fish)" (Howse 1986).

H. Mendenhall Wetlands State Game Refuge

1. Area description. This 3,600-acre refuge is located between downtown Juneau and the Juneau airport. It offers opportunities for viewing a variety of migrating birds, especially geese, ducks, swans, and shorebirds (Quinlan et al. 1983). Relatively few birds nest in the area, but the wetlands remain an important feeding station for nonbreeding birds over the summer, and a resident population of Canada geese winters in the area. Within the course of a year, the refuge shelters more than 140 species of birds (ADF&G n.d.).

2. Jurisdiction and management plans. The refuge is managed by the Alaska Department of Fish and Game.

3. Access, proximity and facilities. The refuge, which is in the immediate vicinity of Juneau, is bordered by the Egan Drive, and can also be accessed by the North Douglas Highway. There are two pullouts on the Egan Highway to facilitate viewing. One of these has an observation platform and interpretive signs (Quinlan et al. 1983).

4. Human use. Waterfowl hunting, hiking viewing and photography, boating, fishing, scientific and educational studies, and general sightseeing are popular uses of the refuge for both resident and visitors (ADF&G n.d.). Every year during Seaweek all fourth and seventh grade students in Juneau visit the setlands to observe wildlife. No visitor use statistics are available.

I. Admiralty Island National Monument

1. Area description. Admiralty Island is one of the larger islands in the Southeast Region. The National Monument encompasses most of the island, with the exception of lands in the vicinity of Angoon and on the northwest tip of the island. Admiralty Island is known for its brown bear and Bald Eagle populations. Other fish and wildlife of interest are deer, humpback whales, seals, sea lions, waterfowl, and salmon. Within the Monument, the areas of highest recreational interest are upper Seymour Canal, Pack Creek, Mitchell Bay, and the Admiralty Lakes areas. Pack Creek is described in another section because of the more extensive information available. The other three areas are described in this section. (All information in this description, unless otherwise referenced, is from the Admiralty Island National Monument/Wilderness Plan [USDA Forest Service 1983].).

2. Jurisdiction and management plans. The Admiralty Island National Monument is administered by the U.S. Forest Service, which has a management plan dated December 1983. The Kootznahoo Native Corporation of Angoon owns much of the shoreline of Kootznahoo Inlet, Favorite Bay, Kanalku Bay, and lower Mitchell Bay.

3. Access, proximity, and facilities. Angoon is the only community on the island. The Alaska Marine Highway ferry stops at Angoon, which is an access point for both the Mitchell Bay area and the Admiralty Lakes. The island is a short air charter or boat trip from Juneau, 15 mi to the north. There are a number of public use cabins and trails on the island, the most developed trail being the one that connects portions of the Admiralty Lakes canoe route.

4. Human use. Fish and wildlife viewing is an important draw for visitors:

> Viewing wildlife and fish is one of the most important expectations of visitors to Admiralty. Most visitors tend to engage in a mixture of activities that involves both consumptive and nonconsumptive modes. While consumptive users focus their energy on particular

species, a large part of their overall enjoyment comes from viewing and associating with the entire spectrum of marine and terrestrial fauna. On the other hand, "nonconsumptive" users usually have a fishing rod in their pack (Clough 1986).

Three important recreational use areas on Admiralty Island are described below. A fourth, Pack Creek, appears in a separate section.

5. Upper Seymour Canal. Small boats can reach this area from Juneau by using a hand-operated rail tram for portaging boats. An estimated 100 boats per year use this route. During the summer, an estimated two to five parties per day use the tram. Use is heavier during the fall hunting season. The Seymour Eagle Management Area, encompassing 11,000 acres of an island group in upper Seymour, contains over 100 Bald Eagle nest sites. Nesting studies here have provided eagle productivity data.

   Humpback whales can often be seen in the middle reaches of Seymour Canal. The whales feed on the Seymour Canal herring stock.

6. Admiralty lakes. The Admiralty Lakes area is the "recreational heart of the Monument/Wilderness." Visitor use of the Cross Admiralty Trail, a canoe and portage route, has doubled since the 1979 reconstruction of the trail system. Estimated Admiralty Lakes area use in 1983 averaged 30 people per day between July 4 and mid October. In this estimate of visitor use, each person spending any time in the area during a day was counted as one user. Facilities include seven public cabins, seven shelters, 10 trails totaling 16.5 mi and one commercial resort at Thayer Lake.

7. Mitchell Bay. This is an area of intricate waterways with interesting tidal action, islets, and inlets. Roughly 60 Bald Eagle nests have been found in the 25-mi^2 area. Much of the recreational use involves sportfishing.

J. Pack Creek on Admiralty Island

1. Area description. Pack Creek is a 5,799-acre area closed to brown bear hunting on the Seymour Canal shore of Admiralty Island. Admiralty is in a designated wilderness area, and the Pack Creek area itself was designated a research natural area in 1951. Game regulations prohibit brown bear hunting at Pack Creek and at nearby Windfall Harbor and Swan Cove. Human use of the area primarily consists of people coming to view and photograph the bears when they are feeding on salmon (Univ. Idaho 1982).

2. Jurisdiction and management plans. Pack Creek is part of Admiralty Island National Monument administered by the U.S. Forest Service. An Admiralty Island National Monument/Wilderness Plan was adopted in December 1983 and amended in August of 1985. The ADF&G also monitors the area and reviews management needs with the USFS.

3. Access, proximity to communities, facilities. Access is by air charter or boat, usually from Juneau. The area is 28 air miles south of Juneau but is considerably farther by boat. The only facilities in the area are an observation platform in a large tree and a trail to that observatory (Quinlan 1983, Univ. Idaho 1982).

4. Human use. The "research/natural" classification has been maintained in recognition of the opportunity for valuable bear research at Pack Creek (USDA: Forest Service 1983). Several wildlife movies have been made in the area.

   Increased visitor use of the area has led to management concerns and several studies of bear/human interactions. Although data on visitor use aquired through these studies are based on inconsistent observation periods from year to year, they do show an increase in visitors (table 57).

   Hundertmark (1985) reported that during the period July 11 to August 15, 1985, eight different tour operators made 14 trips to the area, accounting for 123 of the 160 documented visitors. The University of Idaho study provided more information on 1981 visitors: 43% were from Alaska, nearly all from Juneau. Five percent were from Europe and the remainder from the continental United States. The Idaho study collected demographic and economic information about visitors through a questionnaire administered at the site. Summarizing the data, the Idaho study (Univ. Idaho 1982) reports:

   > The typical Pack Creek visitor can best be described as relatively young, financially well-off and college-educated. Average age of the surveyed group was 36 years with the youngest being 18 and the oldest 69. Less than 20 percent of visitors were older than 50. A little over two-thirds (68 percent) of all visitors were male. ... Average income was in the 25,000 to 49,999 dollar category ... 61 percent had finished college ... 39 percent had completed some graduate work.

   According to the 1981 study, visitors came primarily as small groups of two to six people, with an average group size of four and the largest group consisting of eight people. Twenty percent were accompanied by professional guides. For most of the visitors, Pack Creek represented one of the

Table 57. Pack Creek, Admiralty Island, Alaska Visitor Use, 1979-85

Year	Observation Period	Number of Visitors	Source
1979	All summer (?)	101	Univ. Idaho 1982
1980	All summer (?)	106	Univ. Idaho 1982
1981	May 28 - Sept. 1 July 10 - Aug. 31	107 84	Univ. Idaho 1982 Warner 1984
1982	---	---	---
1983	July 10 - Aug. 31	108	Warner 1984
1984	July 10 - Aug. 26	116	Warner 1984
1985	July 11 - Aug. 15	160	Hundertmark 1985

--- means no data were available.

several stops in Alaska (37%) or one of several stops on Admiralty Island (25%). It was the only destination for 24% of the visitors. A variety of reasons were given for visiting Pack Creek (Univ. Idaho 1982).

Sixty percent of the visitors mentioned bears or bears and another reason. Bear viewing was the major reason for visiting (29 percent). The second major reason for visiting (18 percent) was to see Stan Price, a colorful, longtime resident of Pack Creek. Another 9 percent mentioned Prices in combination with photographing bears as a reason for visiting. Photography of bears was the major reason for visiting for 11 percent.

Although concern about visitor impacts on the bears is obvious from the number of studies being done and the Forest Service does not actively encourage people to visit the area (Hundermark 1985), the area plan (1983) indicates that no permit system is anticipated. Management objectives in the plan are, in the long-term, to "maintain the area's Wilderness qualities." By priority the objectives are as follows (USDA: Forest Service 1983):

a. Maintain the wildness in the bears. This long-term objective recognizes that present impacts must be reduced to help convert bears back to a "wild" state.

b. Minimize disturbance to the bears. The intent of this objective is to protect bears from poachers and human encroachment that would cause bears to leave or become aggressive.

c. Allow for the optimum number of visitors compatible with the long-term objectives of bear and wilderness values.

K. Forest Service Data for the Tongass National Forest

The only site-specific information the U.S. Forest Service provided was for the five sites described below and for areas within the Admiralty Island National Monument. The Forest Service provided information about total recreational visitor-days (RVDs) for ranger districts, wilderness areas, and national recreation trails. These are the smallest units for which the Forest Service regularly reports recreational visitor data. However, the data are collected in the field on a site-specific level. Special computer runs can be made to retrieve data at that level but were not available in time for this chapter. Site-specific data are far more useful than aggregated data for wildlife and habitat

managers. An explanation of the RIM system data was provided (Howse 1986):

> RIM is a Nation-wide database designed to provide information on the identification, location, size, condition, and use of each recreation site or area in the National Forest System. We have enclosed a copy of an exhibit from our RIM manual which defines the various activities we track on. On the basis of this activity list, it appears that activity code 61.2 Nature Study (wildlife, birds, fish) is the most appropriate for your analysis. While other activities may include elements of nonconsumptive use, we have no standard method for sorting out what portion of, say, tour boat, ship and ferry activities, (code 12.1) is really wildlife viewing. Thus code 61.2 appears to be the most unambiguous activity representing what we believe you are after.
>
> An RVD is the basic use reporting unit in the RIM System. It may consist of one (1) person for 12 hours, 12 persons for one (1) hour, or an equivalent combination of continous or intermittent recreation by individuals or groups. A word of caution on the use of the RVD numbers: with the exception of the Mendenhall Ecology Trail for which there are guided walks, virtually all of the use estimates are based on professional judgement rather than precise traffic counts and, thus, have the lowest reliability level.

Recognizing that the lack of a common definition makes objective measurement difficult, the Forest Service nevertheless attempts to quantify activities on the forest related to nonconsumptive recreation through the RIM system.

Because of difficulties with exact estimates of user-days, many agencies (NPS, ADF&G, e.g.) calculate any portion of use as one user-day. USFS RIM data, however, require knowledge of the number of hours of use to calculate visitor data. With the relatively imprecise "professional judgement" method of estimating use, it is unclear how USFS personnel arrive at the precise determination of hours necessary for accurate calculation of recreational use. In addition, the number of hours required to equal one RVD(12) tends to undervalue single-day use of sites in comparison to overnight use, especially at wilderness sites.

Tables 58, 59, and 60 show RIM data for nature study (wildlife, birds, fish) for the Forest Service ranger districts, wilderness areas, and national recreation trails in the Tongass National Forest. The use category for which data were provided is one of 61 categories in the RIM system and constitutes only a small fraction of total recreational visitor-days. Data from this category probably underrepresents the importance of a wildlife-rich environment to users who are recorded under other categories.

Table 58. FY 1985 Recreation Visitor-Days (RVDs) Reported for Activity Code 62.1 - Nature Study (Wildlife, Birds, Fish), by Ranger District

District	No. of RVDs
Petersburg	100
Wrangell	3,000
Sitka	3,200
Hoonah	4,400
Juneau	5,300
Admiralty Is. National Monument	4,300
Craig	300
Ketchikan	0
Thorne Bay	900
Misty Fiords National Monument	2,200

Source: Howse 1986.

Table 59. FY 1985 Recreation Visitor-Days (RVDs) Reported for Activity Code 62.1 - Nature Study (Wildlife, Birds, Fish), by National Recreation Trail

Trail Name	No. of RVDs
Deer Mountain-John Mountain	0
Mendenhall Glacier Ecology	600
Naha River	0
Petersburg Lake	0

Source: Howse 1986.

Table 60. FY 1985 Recreation Visitor-Days (RVDs) Reported for Activity Code 62.1 - Nature Study (Wildlife, Birds, Fish), by Wilderness Area

Wilderness	No. of RVDs
Admiralty Island	4,300
Endicott River	0
Coronation Island	200
Warren Island	100
Maurelle Island	0
Misty Fiords	2,000
Petersburg Creek-Duncan Salt Chuck	0
South Prince of Wales	0
Russell Fiord	300
Stikine-LeConte	1,300
South Baranof	1,000
Tebenkof	0
Tracy Arm-Fords Terror	0
West Chichagof-Yakobi	2,900

Source: Howse 1986.

The Forest Service has developed Community Opportunity Guides for a number of Southeast Alaska communities. The recreational sections of these guides show trails, sportfishing sites, cabins, and other facilities. Wildlife-and fish-viewing opportunities are mentioned for some sites.

The U.S. Forest Service has managerial authority for all five of the sites described below. The following are five areas within the Stikine Ranger District of the Tongass National Forest:

1. Anan Creek. Anan Creek in Bradfield Canal is an excellent place to observe black bear and some brown bear during the July-August salmon runs. A large pink salmon run attracts bears that can be watched feeding on fish. The Forest Service has constructed a bear observatory overlooking Anan Creek. There is a Forest Service public use cabin in Anan Bay and a 1-mi trail from there to the observatory. The area is 31 mi by water south of Wrangell. Primary access is by boat. Anan Bay is also accessible by charter aircraft. Black bear hunting is prohibited in the area.

   The primary attraction of the area is viewing wildlife. During 1985 approximately 185 visitor-days are estimated for the bear observatory. (All information is from the U.S. Forest Service [Howse 1986].)

2. Blind Slough trumpeter swan wintering area. Approximately 100 trumpeter swans (Quinlan et al. 1983) overwinter in a tidally influenced ice-free part of Blind Slough. This is one of the two most northern major wintering areas for trumpeter swans presently known. Visitors to the area may view migratory waterfowl in April and October (Quinlan et al. 1983). Black bears and Bald Eagles are frequently seen in the area.

   A small observatory, with educational signs, has been constructed, permitting sheltered viewing with a minimum of disturbance. The area is 16 mi south of Petersburg by road. Blind Slough is closed to hunting and motorized vehicles during the winter to minimize disturbance to the swans. Swan viewing occurs from mid October through March. Visitor data are not collected, but Petersburg Forest Service personnel estimate that 10 or more people use the observatory on a daily basis. (Information is from the U.S. Forest Service [Howse 1986] unless otherwise referenced.)

3. Falls Creek. Falls Creek, 9 mi south of Petersburg by road, has a fish ladder that enables spawning salmonids to bypass a falls to reach upstream spawning areas. The ladder is used by coho, pink, and chum salmon, trout, and Dolly Varden char. Although not a major fish producer, the area is important for its popularity and proximity to Petersburg. Fish ascending

the ladder can be watched from the road. Visitor data are not collected for the site, but Forest Service personnel report that it is not uncommon to find one or two cars parked at the site at any one time during the spring-through-fall season (ibid.).

4. LeConte Bay. LeConte Bay is a narrow, winding fjord with an active tidewater glacier at its head. Harbor seals are plentiful at the head of the bay and can be seen on the ice flows. This is a seal pupping area in May and June, and both pups and adults can be seen on icebergs. The area where seals can be seen on the ice is about 25 mi southeast of Petersburg. The primary use of the area is for viewing scenery and wildlife. Access for seal viewing is possible only by boat, as aircraft are unable to land in the area. No data are collected on human use of this area. Forest Service personnel in Petersburg report that some small cruise ships visit the area on a weekly basis during the summer; these ships usually carry 50 to 80 people (ibid.).

5. Stikine River Flats. The Stikine River tideflats provide one of the major resting and feeding areas for waterfowl in Southeast Alaska. Waterfowl are abundant during spring and fall migrations. One of the largest Bald Eagle concentrations in Southeast Alaska can be seen north of Farm Island in April. The Stikine flats are in the Stikine LeConte Wilderness Area. A management plan for the wilderness is awaiting final approval. Primary access is by boat and requires special tide conditions. The area is approximately 7 mi from Wrangell by boat and is several miles by boat from the end of the Mitkof highway system, which connects to Petersburg. The primary draw of the area is for consumptive uses of fish and wildlife, but significant bird-watching also occurs. No data on visitor use are available. (All information is from the U.S. Forest Service [Howse 1986].)

The following areas are in the Forest Service Ketchikan Ranger District:

6. Honker canoe route. This is a 33-mi cance route on lakes and streams stretching from Lake Bay to Thorne Bay on the eastern side of Prince of Wales Island. Wildlife viewing is an important part of the wilderness attraction of the area. Primary species are deer, black bear, Bald Eagle, and salmon. Secondary species are waterfowl, including swans, and river otter, mink, and beaver.

The Forest Service published a Honker Divide Unit Management Plan in 1985. Although the area is accessible to the road system, the Forest Service reports that the area is little used because it is remote and because access is difficult.

It is nevertheless considered to have high potential for nonconsumptive uses. The Forest Service recreational cabin at Honker lake received only 56 RVDs in 1985, in part because of a cabin-scheduling error. Expected usual number of RVDs for the cabin is 100.

7. Sarkar Lakes region. This lake area on the northeast side of Prince of Wales Island has high potential for fish and wildlife viewing. Wildlife species are the same as for the Honker area. Substantial salmon runs attract eagles and bears. A 1977 ADF&G study showed the region abounds with wildlife that is easily viewed from a canoe.

   The area can be reached by charter plane or via the road system. The Forest Service has a recreational cabin at Sarkar lake and is considering the area as a canoe route. The Sarkar Lake cabin registered 374 RVDs in 1985, and the Forest Service reports that 5%, or approximately 19 RVDs, have been assigned to the wildlife-viewing category. Season of use is April through October.

8. Major river and stream systems on Prince of Wales Island. Thorne River, Karta River, Sarkar Creek and lake systems (also mentioned above), Stanley, Eagle, Salmon Bay, Red Bay, Flicker, Buster, Shipley, Hatchery, Logjam, Shaheen, Naukati, Exchange, and Big creeks all have significant salmon runs and attract many Bald Eagles and black bear. The first three have the heaviest salmon runs and largest wildlife and fisheries diversity. Primary access is via the road system. Approximately 2,000 RVDs were recorded in 1985 for these rivers and streams. The Forest Service estimates that 5% of these, or 100 RVDs, were for nonconsumptive uses (apparently partly or entirely wildlife viewing).

9. Grindall Island sea lion Haulout. Grindall Island, off the Kasaan Peninsula on the east side of Prince of Wales Island, is one of the few known sea lion haulouts on the east coast of Prince of Wales Island. Viewing opportunities are secondary to other attractions of the area. Primary access is by boat. The area is about 12 mi from Ketchikan. A Forest Service cabin on Grindall Island registered 880 RVDs in 1985, but the Forest Service comments on the lack of estimates of other boat traffic and fly-over viewing. Most people visit from April through October, but the sea lions are believed to show up on the rocks in January and leave some time in May.

10. Sea Otter Sound. This area on the western side of Prince of Wales Island is heavily used by humpback whales and seals. There is a seal haulout on Clump Island in the middle of the sound. Wildlife viewing in the sound is usually secondary to boating and fishing.

Primary access is by boat. The Forest Service estimates 1,000 RVDs for local saltwater use in 1985, of which an estimated 3%, or 30 RVDs, were for wildlife viewing. The recreational season is April through October, but most whale-viewing opportunities are in July and August. There are no facilities in the area.

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Statewide Overview of Subsistence and Other Local Use

I. INTRODUCTION

This chapter discusses the local use of fish and wildlife resources and the importance this use plays in local and regional economies. This discussion of subsistence and other local use from an economic perspective does not analyze questions of allocation within a legal or political context. Fish and wildlife harvests have long been an important economic component to Alaskans. Alternative uses of land both directly and indirectly affect resource use. It is, therefore, important to examine the economic impacts of these effects in land use planning.

The subsistence-based, mixed economy operating in Alaska today is a complex combination of two very different economic systems, the traditional subsistence economy and the cash-and-market economy. The interplay between the cash and subsistence economies varies considerably among communities, subregions, and regions of the state. Within each of these subareas, components of subsistence and cash economies are influenced to differing degrees by the dynamic changes presently occurring in Alaska. Just as economic and resource development influence fish and wildlife ecological systems, they influence the human systems that have traditionally been part of and dependent on the Alaska ecosystem.

The economics of traditional hunting, fishing, and gathering societies are significantly different from those of cash-and-market oriented societies; the economic differences are rooted in cultural and social differences (Wolfe et al. 1984, Sahlins 1972, Lee 1981, Usher 1982, Feit 1983). Production of local natural resources is primarily for consumption within the harvesting household, kinship group, or community, rather than for sale in the marketplace (Sahlins 1972). Distribution of fish and wildlife harvests within the local group is conducted through noncommercial (nonmonetary) channels (Langdon and Worl 1981). Production and distribution of subsistence products are organized to provide for household and community security and for continued cultural existence rather than to maximize individual gain or greatest possible yield, given available labor and technology (Langdon and Worl 1981).

Another difference between subsistence and cash-and-market systems is in their relationship to changes in the natural world. Economic systems based on trade, manufacturing, and finance generally try to insulate themselves from the vagaries of the environment and the seasons, whereas a subsistence economy must synchronize its activities

with cyclic seasonal changes (Wolfe 1983, Wolfe et al. 1984). (See volume 2 of the Alaska Habitat Management Guide for the Southwest Region, Human Use of Fish and Wildlife, for a more detailed discussion of the characteristics of the subsistence economy and research findings on the relationship between subsistence and cash economies.)

Despite these differences, Alaska subsistence societies have successfully integrated their traditional systems with the cash-and-market-based economy introduced when Euro-Americans began settling Alaska (Van Stone 1960). Now, in most rural Alaska villages, a subsistence-based, mixed economy operates, in which cash and hunting and fishing activities have a shared importance. In mixed economies, cash serves two purposes: 1) it supplements the livelihood of the people, and 2) it provides the means for obtaining supplies and the modern implements for resource harvests (Wolfe 1983, Van Stone 1960).

To a large extent, fishing and hunting are important economic components of most local Alaska economies. The relative importance, however, varies among communities, with traditional subsistence and wage-labor, cash economies representing two ends of the spectrum. Not only are hunting and fishing activities variable economic elements of local economies, but they also have varying importance to the social, cultural, and familial structure of communities.

Although cash is a component of mixed economies, the monetary economic value of fish and wildlife harvests is difficult to quantify and compare with other uses of fish and wildlife (commercial fishing or furbearer harvesting, for instance) or to compare with competing uses of land and water, such as timber harvesting, mining, or oil production. The reason for this is that, as mentioned earlier, the primary goals of fish and wildlife users are not to convert harvests into cash in the marketplace but to provide food for home use and perpetuate the family and social group (ADF&G 1985). Also, conventional economic evaluation and analyses focus on the products of economic activities, while ignoring the activities themselves (in this case hunting and fishing). In the socioeconomic systems of many communities in Alaska, the activities themselves may be of equal if not greater value than the products (ibid.). It is also very important to note that products and activities may have economic value, even if the monetary value is not readily discernable or measurable. Many uses of fish and wildlife by Alaskans are primarily nonmarket, noncommercial activities that are part of their economic well-being despite their nonmonetary aspects.

Because the noncash aspects of local economies are so difficult to quantify and because the social and cultural aspects of traditional subsistence further complicate measurement, the importance of hunting and fishing activities in mixed economies is often underestimated. The problem, then, is to accurately portray the importance of resource use in terms useful to planners and resource managers.

Besides the differing natures of the two economic systems that make conventional economic analysis of traditional subsistence use difficult, there are more specific technical problems. For instance, the key statistics and indices of subsistence economies are not readily comparable to the conventional economic statistics collected by government agencies. Market analysts find that subsistence production makes very minimal contributions to the Gross National Product. Subsistence production is nonreportable and nontaxable income-in-kind. Also, labor statistics usually underestimate the extent of participation in subsistence occupations; by U.S. Bureau of Labor Statistics definitions, hunters and fishers are "unemployed" because they are not "wage earners." Hunters and fishers are not counted as part of the labor force because they are not actively seeking wage employment. (See appendix B in this volume for a discussion of Alaska rural labor markets and unemployment.) Agency data on the volume of production of resources, such as the commercial sales of furs and fish, do not account for furs and fish retained for personal uses. In addition, the efforts by the ADF&G to gather information about the amount of game and selected fish species harvested results in a consistent bias toward underestimation of actual harvest because of inadequate data collection methods and widespread nonreporting by residents (Usher, pers. comm.; Usher 1976, 1982; Usher et al. 1985) who may be unaware of the importance of harvest information for sound management of fish and wildlife populations.

II. RESOURCE HARVEST AND PRODUCTION QUANTITIES

An initial step in the process of analyzing the importance of natural resource use in local economies is the development of resource harvest data. One estimate of harvest is derived from individual investigations into the amount of natural resources used by households in particular communities. Such compilations have been done by the ADF&G, Division of Subsistence (see appendix B in this volume for a listing of Division of Subsistence research reports). Tables indicating pounds and harvest for some communities are presented in the Human Use sections of the Alaska Habitat Management Guide for each region. But these figures must be used cautiously because community fish and wildlife harvest levels may fluctuate widely over time as a result of a number of factors. The harvest totals collected by the Division of Subsistence have typically been gathered only for a year or two in each location. Therefore, data on harvest quantities serve primarily as rough guidelines of the magnitude of harvests in an area (ADF&G 1985).

If, in spite of the difficulties, accurate local harvest figures can be derived, attaching a monetary value to them presents other theoretical and technical problems. Replacement or substitution cost is one conventional economic method of ascertaining value (Usher 1976). Normally, it is defined as the price one would have to pay on the market to replace the item in use. But normal market items, such as pork, beef, or chicken, are imperfect substitutes for wild meat and fish. Wild food has been shown to be significantly higher in necessary proteins, fats, and nutrients and devoid of chemical additives; many harvesters of wild resources also report that they do not like domestic products (Usher 1976). Any economic evaluation of fish and wildlife harvests should take into account that wild food is nutritionally superior to many foods imported into the region (Wolfe et al. 1984). Accurate calculation of replacement costs, then, would take into account the social and health value of the resource to the people who harvest it and not simply the market-equivalent value of possible replacements.

One of the most significant shortcomings of economic analyses of community economies is that conventional analyses measure the value of products on the assumption that the final price or value of an item is a reflection of all of the costs and benefits of its production. However, relatively recent research on the economic impacts of pollution has led to the identification of market externalities that challenge this notion (see Ayres and Kneese 1969, Kneese 1971, and Davis and Kamien 1969 for early works on the subject). By definition, an externality is a benefit or cost that is imposed on others as a result of a particular activity but is not reflected in the final price of a production activity. External costs imposed on a large number of people are called social costs. Examples of externalities that are social costs are water pollution caused by a streamside factory or automobile exhaust affecting air quality. In contrast, externalities that are social benefits include education, research and development, and public transportation.

Conventional economic analysis does not consider that the process of production has value in itself. Economic value is linked exclusively to the final market value of products. But, as mentioned earlier, in many communities in Alaska, the activities of hunting and fishing (the process of production) may be of equal if not greater value than the products themselves.

In traditional subsistence communities, for example, where production is organized to provide for household and community security and continued cultural existence rather than to maximize individual gain or the greatest possible yield of resources (Langdon and Worl 1981), the social benefits of resource harvest, production, and exchange are primarily economic externalities. These "externalities" form the basis of the community social and productive structure.

Even though they have been recognized as influencing the value of products, market externalties are analytically difficult to assess (Clark 1976). For this reason, they are still generally ignored in economic evaluations. This can result in products from activities that have high external costs being overvalued or those from activities with high external benefits being undervalued, or both. Ignoring externalities means that nonmarket fish and hunting activities that support the community or family social structure will continually be undervalued in comparison to land uses directed at market development.

Therefore, to more fully evaluate for land use planning the value of fish and wildlife harvests and the traditional subsistence and mixed economies they support, an input-output type of economic analysis is needed that identifies the community structure and estimates the market price that would be required to replace all the products and services provided by this structure. Input-output analysis is widely used in natural resources planning as a means to assess the economic impacts of proposed actions. It is a systematic mathematical technique used to analyze the interdependence of the producing and consuming portions of, in this case, a community or subregional economy (Baumol 1961). This type of analysis would require extensive data as well as a detailed understanding of household and community production. Although still inadequate, because it would not consider cultural values, it would nevertheless be an improvement over the final harvest product replacement cost where alternative uses of land and water substantially impact fish and wildlife harvests and the local economies dependent on these harvests.

Replacement cost or substitution value methodologies (as developed by Usher [1976] and Wolfe and Andrews [1985]) are most appropriate for estimating the economic value of marginal impacts on resource harvests. For example, if salmon harvests in a particular area were reduced by 10% as a result of an offshore oilspill, the effected communities could be compensated for the loss calculated by using replacement cost methods. Use of this methodology is based on the assumption that harvests have not been reduced to a level that impacts the community social and economic structure.

In utilizing substitution value methods, one way to account for the health value is to multiply the price of domestic meat substitutes by a nutritional factor. Wolfe and Andrews (1985) calculate replacement costs for Yukon River salmon by multiplying the unit weight of the salmon by 1.29 (observing that salmon has 0.29 times more protein per unit weight than domesticated meat and poultry) before multiplying by the local retail price per pound of store-bought substitutes. For accurate replacement costs it is important to use prices currently posted in local stores. These vary widely among communities even within the same subregion.

Accurate evaluation of fish and wildlife harvests is becoming increasingly important in planning and other government decision-making. According to Usher (1976), by consistently undervaluing replacement costs of wild food, most early investigators seriously underestimated the contribution of traditional hunting, fishing, and gathering to the total regional economy. This, in turn, has led to conclusions that some communities are without a viable economic base (ibid.). This misperception, that the absence of a conventional western economic base means an absence of any kind of economic base, can lead to inappropriate policy decisions. One example is recent counterproductive welfare policies. Wolfe et al. (1984) report that, in order to qualify for aid from some federal and state welfare programs, applicants have been required to give up fishing permits or equipment. The policies thus create a long-term dependency on government, the opposite effect of their intended purpose. The situation is an example of how programs designed to deal with problems in one cultural or economic setting may not be appropriate for another.

Not all of the resource harvest is used for food. Hides, skins, and feathers may be used for clothing or adornment or ceremonial purposes. Although the value of nonfood uses is probably not as great as food uses of wild resources, they should not be ignored in evaluating the economic importance of harvests.

Another consideration in evaluating the economic importance of harvests is the cost of that harvest. Some investment is made in time and equipment to harvest fish and wildlife resources and should be subtracted from the value of the harvest (Usher 1976). This supports the view that it is not sufficient to simply provide adequate quantities of fish and wildlife. If animal population densities are so reduced or located in areas so remote from human users that the cost in time, fuel, or additional equipment becomes excessive, people may be effectively denied use of the resources.

Data on which estimates of production cost can be based have rarely been gathered. Because of differences in hunting practices and success rates among locations and over time, the data that do exist are useful only for the study area at a particular time and cannot be applied to other regions. As with information on harvest quantities, existing studies can only be used as rough guides (ibid.).

IV. ROLE OF SUBSISTENCE IN COMMUNITY AND REGIONAL ECONOMIES

A. Introduction

Noncommercial fishing and hunting figure prominently in the economy and social welfare of many Alaska communities. The harvest of fish and game for personal use is a relatively hidden

component of Alaska's economy, unmeasured in indices of economic production or social welfare. Although unmeasured, food and material from wild resource harvests are providing substantial economic and social benefits to the state. If wild foods were not produced annually in rural Alaska, they would have to be replaced by imported products at substantial economic and social costs to the state.

This section provides recent wild resource harvest estimates in Alaska and compares the level of harvest to levels of meat, fish, and poultry production and consumption in the United States as a whole. These comparisons demonstrate the significant contributions that fishing and hunting are currently making to the economic welfare of the state. The information also demonstrates the unique nature of Alaska's economy in comparison with the rest of the United States: in Alaska, many rural regions are supported by a mixed subsistence-cash economy.

Wild resource harvests contained in this section primarily have been gathered by the Division of Subsistence, Alaska Department of Fish and Game. The materials were originally summarized in Wolfe and Walker (1985). Table 1 lists the major sources of harvest information. These sources should be consulted for research methodologies.

B. Food Consumption Patterns: U.S. and Alaska

The important economic role played by subsistence and other local use of natural resources in Alaska can be understood by looking at food consumption patterns in the United States as a whole. On average, residents of the United States consume about 1,371 lb of food per person every year, depicted in figure 1 (U.S. Department of Commerce 1984). "Consumption" in this sense refers to the amount of food produced annually by the American and foreign food industries for United States domestic consumption (technically, "consumption" is the residual after exports, nonfood use, and ending stocks are subtracted from the sum of beginning stocks, domestic production, and imports). As shown in figure 1, Americans consume a varied inventory of food products, including dairy products, grains, vegetables, fruits, meat-fish-poultry products, potatoes-beans, sugar-corn sweeteners, and other fats and oils, totalling altogether 1,371 lb per person annually. The largest single item in the American diet is dairy food (339 lb per person). Meat, fish, and poultry together provide 255 lb in the American diet each year. The 255 lb of meat-fish-poultry will serve as a convenient national standard with which to assess the economic contribution of wild resource harvests in Alaska communities.

Table 1. Sampled Communities by Area and Source

Kenai Peninsula	
Kenai	Reed 1985
Seldovia	Reed 1985
Ninilchik	Reed 1985
Homer	Reed 1985
English Bay	Stanek 1985
Port Graham	Stanek 1985
North Cook Inlet	
Tyonek	Fall, Foster, and Stanek 1984
Yentna	Fall, Foster, and Stanek 1983
Southeast	
Haines	Mills, George, Kookesh, and Sumida 1984
Kluckwan	Mills, George, Kookesh, and Sumida 1984
Sitka	Gmelch and Gmelch 1984
Yakutat	Mills and Firman 1985
Tenakee Springs	Kookesh 1985
Angoon	George 1985
Klawock	Ellanna and Sherrod 1985
Copper Basin	
Cantwell	Stratton and Georgette 1984
Chickaloon	Stratton and Georgette 1984
Chistochina	Stratton and Georgette 1984
Chitina	Stratton and Georgette 1984
Copper Center	Stratton and Georgette 1984
E. Glenn Hwy.	Stratton and Georgette 1984
Gakona	Stratton and Georgette 1984
Glenallen	Stratton and Georgette 1984
Gulkana	Stratton and Georgette 1984
Kenny Lake	Stratton and Georgette 1984
Lake Louise	Stratton and Georgette 1984
Lower Tonsina	Stratton and Georgette 1984
Matsu Glacier	Stratton and Georgette 1984
McCarthy	Stratton and Georgette 1984
Mentasta	Stratton and Georgette 1984
Nabesna Road	Stratton and Georgette 1984
N. Wrangell Mts.	Stratton and Georgette 1984
Paxson-Sourdough	Stratton and Georgette 1984
Sheep Mt.	Stratton and Georgette 1984
Slana	Stratton and Georgette 1984
S. Wrangell Mts.	Stratton and Georgette 1984
Upper Tonsina	Stratton and Georgette 1984

(continued)

Table 1 (continued).

Kodiak Island	
Akhiok	Kodiak Area Native Association 1983
Karluk	Kodiak Area Native Association 1983
Kodiak City	Kodiak Area Native Association 1983
Larsen Bay	Kodiak Area Native Association 1983
Old Harbor	Kodiak Area Native Association 1983
Ouzinkie	Kodiak Area Native Association 1983
Port Lions	Kodiak Area Native Association 1983
Alaska Peninsula	
Naknek	Morris 1985b
South Naknek	Morris 1985b
King Salmon	Morris 1985b
Chignik Bay	Morris 1985b
Chignik Lake	Morris 1985b
Chignik Lagoon	Morris 1985b
Perryville	Morris 1985b
Ivanof Bay	Morris 1985b
Egegik	Morris 1985b
Southwest	
Nondalton	Behnke 1982, Morris 1985b
New Stuyahok	Wolfe et al. 1984
Dillingham	Schichnes and Chythook 1985
Iliamna	Morris 1985b
Kokhanok	Morris 1985b
Newhalen	Morris 1985b
Pedro Bay	Morris 1985b
Port Alsworth	Morris 1985b
Western	
Alakanuk	Wolfe 1981
Emmonak	Wolfe 1981
Kotlik	Wolfe 1981
Mt. Village	Wolfe 1981
Stebbins	Wolfe 1981
Quinhagak	Wolfe et al. 1984
Nunapitchuk	Andrews 1985
Russian Mission	Pete 1985
Scammon Bay	Fienup-Riordan 1983
Arctic	
Kivalina	Burch 1985
Gambell	Little and Robbins 1984

(continued)

Table 1 (continued).

Yukon-Koyukuk	
Allakaket-Alatna	Marcotte and Haynes 1984
Hughes	Marcotte and Haynes 1984
Bettles-Evans.	Marcotte and Haynes 1984
Huslia	Marcotte 1985
Stevens Village	Sumida 1986
Minto	Andrews 1985
Upper-Tanana	
Tanacross	Haynes 1984
Tok	Haynes 1984
Tetlin	Halpin 1985
Urban	
Anchorage	ADF&G 1985, Mills 1984
Fairbanks	ADF&G 1985, Mills 1984
Juneau	ADF&G 1985, Mills 1984
Matsu	ADF&G 1985, Mills 1984

The diet of rural Alaska often stands in marked contrast to the average American diet. Figures 2, 3, and 4 illustrate the amount of wild foods produced and consumed in a year in three rural Alaska communities in Southwest Alaska, Western Alaska, and northwest Alaska (Behnke 1982, Wolfe 1981, Burch 1985). Residents of Nondalton in southwest Alaska produce on average about 738 lb of wild foods per person each year (usable product). Unlike the average American, Nondalton residents consume large quantities of fish, primarily salmon (508 lb per person), but also grayling, whitefish, pike, trout, and Dolly Varden/char. Nondalton residents also consume substantial quantities of moose (85 lb), caribou (61 lb), and small game (31 lb), as well as smaller quantities of black and brown bears, waterfowl, and grouse (Behnke 1982).

Residents of Alakanuk in Western Alaska also produce and consume large quantities of wild foods each year, about 730 lb per person (fig. 3). Their diet is more varied than at Nondalton, containing bearded seal (42 lb), spotted and ringed seal (44 lb), and belukha whale (35 lb) in addition to fish and game. Certain fish species utilized are also different from those at Nondalton, including cisco, Alaska blackfish, cod, smelt, sheefish, lamprey, and burbot. As in Nondalton, salmon comprises the largest single resource consumed (198 lb per person) (Wolfe 1981).

Residents of Kivalina in northwest Alaska produce and consume even larger amounts of wild foods (968 lb per person per year) than Nondalton and Alakanuk. The largest single food item is caribou (302 lb), followed by char (189 lb), belukha (177 lb), and bowhead whale (136 lb). Like Alakanuk, other wild resources in the food inventory include bearded seal, ringed seal, moose, polar and brown bears, and waterfowl. In contrast to Nondalton and Alakanuk, salmon make only modest contributions to the family larder (22 lb) (Burch 1985). Of course, harvest levels of particular species vary from year to year in these three case communities; however, the overall volume of all resources harvested remains relatively stable between years, as has been documented by Wolfe (1979, 1981), Behnke (1982), and Burch (1985).

The examples of wild resource harvests of Nondalton, Alakanuk, and Kivalina illustrate that diets in some rural Alaska communities vary substantially from the American norm. They also demonstrate that wild food consumption in rural Alaska can be at levels two to three times the national average domestic meat-fish-poultry consumption. This high level of use of subsistence fish and game exists because many of the perishable items found in the United States diet are not sold in rural village stores, especially dairy products, fruits, vegetables, and potatoes, which collectively comprise 56% of the American diet (767 lb per person annually). The larger quantities of wild fish and game harvested in places

like Nondalton, Alakanuk, and Kivalina are substituting for the nutrients provided by dairy products, fruits, vegetables, and potatoes in the typical American diet. The primary food groups imported into rural Alaska are grains, sugars, and fats, which are less perishable.

Persons unfamiliar with rural Alaskan economies are often surprised at the high quantities of wild food products harvested each year, commonly between 700-800 lb per person. However, compared with the levels of production by the United States food industry (1,371 lb per person annually), wild resource harvest at 700-800 lb per person annually is understandable.

C. Wild Resource Harvests by Areas

Using the 255 lb of meat-fish-poultry consumed by the average American as a standard, figure 5 compares wild resource harvests across regions in Alaska. As shown in figure 5, most rural areas of the state are harvesting at least half or more of the national standard level of meat-fish-poultry consumption in the United States as a whole. Areas where lower wild harvests occur in Alaska include the large urban centers (fig. 6) and certain communities of the Kenai Peninsula (fig. 7). The lower per capita harvests in these areas are due to the market-based economic systems of the communities: resource harvests by families primarily follow a recreational pattern of use, that is, harvest activities represent periodic breaks from stable wage employment. Although highly valued for their recreational nature by community residents, fishing and hunting do not contribute much to the total food supply of the community.

For other areas of the state, the proportion of the food supply contributed by wild resource harvests is substantial. Per capita harvest levels in the road-connected areas of the Copper River basin (fig. 8) and upper Tanana River drainage (fig. 9) are commonly half or more of the national standard. The major species harvested are salmon, moose, and caribou. In some communities, game provides about as much as fish to the families' diet. As is discussed further below, the wage sector of the economies of the Copper basin and upper Tanana areas are not as stable or diversified as wage opportunities in Alaska's urban centers. Seasonal and part-time employment is the norm, and low household incomes are common (Fall and Stratton 1984, Haynes 1984). Fishing and hunting provides an important component to the domestic family's livelihood under these economic circumstances.

Resource harvest levels are at or somewhat exceeding the national standard meat-fish-poultry consumption level in communities of the Southeast archipelago (fig. 10), Kodiak Island (fig. 11), and the

Alaska Peninsula (fig. 12). In the communities of these areas, fish comprises the bulk of the wild resource harvest, although game harvests are often high in certain communities. Harvesting wild resources is conducted in association with seasonal commercial fisheries in these areas. Commonly, the earnings from commercial fishing are invested in equipment that is used for both commercial and personal use fish harvests. The economies of coastal fishing communities of Alaska commonly exhibit this unique combination of subsistence activities and market activities: high subsistence harvests contribute food for local family consumption and commercial fish harvests produce commodities for export sale.

The largest wild resource harvests occur within the Bristol Bay-Iliamna area (fig. 13), subarctic Interior (fig. 14), Yukon-Kuskokwim delta (fig. 14), and Arctic coastal area (fig. 10). As described earlier, annual wild resource harvests in the 700-800 lb per person range are common, two to three times the national standard meat-fish-poultry consumption level. Some communities produce in the 1,000 lb per capita range. These areas of the state are relatively remote from the urban centers.

In summary, wild resource harvests are a prominent part of the economy and social welfare of many areas in Alaska. Most rural areas in Alaska harvest wild resources at levels half or greater than the mean per capita use of meat, fish, and poultry in the United States, whereas, per capita use of wild resources in the large population centers of Anchorage, Fairbanks, Juneau, Palmer-Wasilla, and the northern Kenai Peninsula area is considerably less.

D. Mixed Subsistence-Cash Economies

Fishing and hunting for personal consumption provide a reliable economic base for many areas in Alaska. This type of regional economy has been termed a "mixed, subsistence-cash economy" (Wolfe 1979, Wolfe et al. 1984). It is this type of economy that makes Alaska unique among other states. In a mixed economy, wild resource production is augmented and supported by cash employment. As stated above, depending upon the area, employment may be in commercial fishing, public sector wage employment (schools, local government), capital construction, and other types of economic enterprises. A community or area is able to support itself by investing a portion of the monetary earnings into hunting, fishing, and other resource harvesting to produce a portion of the local food supply. Commonly this is the only viable economic strategy, because the cash sector of the local economy is of modest size or is insecure.

The socioeconomic systems of many Alaska communities commonly follow traditional cultural patterns distinctively different from cultural patterns of the Euro-American tradition. In these areas, high production and use of wild resouces results from a combination of harvest and wage activities at the domestic family level. Cash incomes are used by families to capitalize in fishing and hunting equipment. Productive labor is organized primarily by kinship and other traditional principles. Wild resources are widely shared along local nonmarket distribution networks. In this manner, the local economies are able to produce and distribute large amounts of wild food resources that rival on a per capita basis the productivity of the United States food industry.

Table 2 depicts community differences in monetary income levels in different areas of the state. The table provides the amount of taxable income reported on individual 1982 income tax returns, averaged by community. Taxable income represents an individual's monetary income after deductions. In the Anchorage area, for example, the average taxable income reported on the 1982 income tax returns from Fort Richardson was $12,135. Table 2 groups communities by area and provides the median community income for each area. In the Anchorage area, for example, Girdwood is the middle community, with a 1982 income of $22,709.

Based on median community incomes, a ranking of each area's monetary income is possible. Anchorage is number one ($22,709), Fairbanks number two ($22,698), and so forth, with Bristol Bay-Iliamna last ($8,892).

Reported taxable income is deceptive in one respect: it does not represent the real purchasing value of earned income because of statewide cost of living differentials. In more remote areas, store prices are commonly much higher than store prices in Anchorage or Fairbanks. Table 3 depicts the cost of food by area in Alaska communities, using the market basket price of food in Anchorage as an index of 100 (University of Alaska Cooperative Extension Service). It shows that food that costs $1.00 in Anchorage costs $1.85 in Hoonah, and $2.26 in Fort Yukon. Thus, the real purchasing power of earned income in many remote regions is about one-half of the value of money in Anchorage.

Table 2 provides estimates by area of the cost-of-living differentials based on the food price indice of table 3, and adjusts the area's median community income levels. For example, the Fairbanks area's median community income of $22,698 is adjusted down to $20,635 because food prices are 110% higher in Fairbanks in comparison with Anchorage.

Table 2. 1982 Average and Median Community Income Adjusted for Cost of Living Differential, Based on Average Taxable Income Reported on Income Tax Returns, Alaska Department of Revenue

Area	Community	1982 Average Taxable Income	Median Community Income	Food Index Cost of Living	Adjusted Median Community Income
Anchorage	Ft. Richardson	12,135	22,709	100%	22,709
	Elmendorf AFB	13,179			
	Mountain View	15,820			
	Chugiak	22,309			
	Girdwood	22,709			
	Anchorage	23,590			
	Eagle River	24,772			
	Indian Mountain CDP	25,688			
	Bird Creek	25,993			
Fairbanks	Eielson AFB	12,801	22,698	110%	20,635
	College	21,613			
	North Pole	22,197			
	Ester	22,698			
	Fairbanks	24,178			
	Clear AFB	31,467			
Juneau	Juneau	22,968	23,449	115%	20,386
	Douglas	23,444			
	Auke Bay	23,752			
Willow-Palmer	Willow	19,265	21,879	109%	20,072
	Sutton	19,408			
	Palmer	21,879			
	Wasilla	23,198			
	Big Lake	25,996			
Ketchikan	Ketchikan	21,693	21,693	114%	19,029
	Ward Cove	22,667			
Kenai Peninsula	English Bay	9,535	18,524	119%	15,556
	Port Graham	9,535			
	Seldovia	15,470			
	Whittier	15,864			
	Hope	16,475			
	Ninilchik	16,766			
	Anchor Point	16,849			
	Homer	17,295			
	Seward	18,524			

(continued)

Table 2 (continued).

	Clam Gulch	18,944			
	Moose Pass	19,732			
	Sterling	20,715			
	Kasilof	21,724			
	Soldotna	22,251			
	Cooper Landing	22,522			
	Kenai	23,405			
Copper Basin	Chitina	8,979	15,379	140%	10,985
	Slana	11,645			
	Tatitlek	13,504			
	Gakona	15,379			
	Copper Center	17,062			
	Cordova	19,296			
	Glenallen	20,054			
	Paxson-Sourdough	20,538			
	Valdez	27,587			
Upper Tanana-Parks Highway	Tetlin	4,443	15,334	110%	13,940
	Tanacross	6,898			
	Eagle	10,576			
	Central	11,656			
	Dot Lake	12,444			
	Northway	13,304			
	Manley Hot Springs	14,076			
	Chicken	14,618			
	Trapper Creek	15,334			
	Cantwell	15,365			
	McKinley Park	16,538			
	Circle	16,876			
	Talkeetna	16,929			
	Tok	18,334			
	Nenana	19,517			
	Delta Junction	20,673			
	Healy	28,907			
Alaska Peninsula-Aleutian Islands	Nikolski	7,171	17,532	155%	11,311
	Akutan	8,834			
	South Naknek	11,747			
	Perryville	12,688			
	Chignik Lake	12,688			
	Ivanof Bay	12,688			
	Atka	13,421			
	Port Heiden	15,830			
	King Cove	15,834			
	St. Paul	16,232			
	Chignik Bay	17,176			

(continued)

Table 2 (continued).

	Unalaska	17,532			
	Naknek	17,920			
	St. George	18,257			
	False Pass	18,972			
	Dutch Harbor	19,815			
	Cold Bay	20,784			
	Sand Point	22,960			
	Nelson Lagoon	23,924			
	Chignik Lagoon	23,937			
Southeast	Port Alexander	5,959	15,902	146%	10,892
	Hyder	6,927			
	Meyers Chuck	6,950			
	Elfin Cove	7,069			
	Point Baker	7,530			
	Hydaburg	10,297			
	Angoon	11,605			
	Klukwan	11,605			
	Tanakee Springs	12,129			
	Pelican	12,381			
	Metlakatla	13,060			
	Hoonah	13,172			
	Kake	15,902			
	Gustavus	16,484			
	Craig	17,002			
	Mt. Edgecumbe	17,289			
	Yakutat	17,402			
	Haines	17,463			
	Klawock	18,751			
	Petersburg	19,743			
	Skagway	19,809			
	Sitka	20,392			
	Thorne Bay	20,796			
	Kasaan	21,232			
	Wrangell	21,301			
North Cook Inlet	Tyonek	11,555	11,555	140%	8,254
	Upper Yentna	12,101			
Kodiak Island	Karluk	7,734	10,453	148%	7,063
	Ouzinkie	8,157			
	Old Harbor	9,234			
	Larsen Bay	10,453			
	Akhiok	12,112			
	Port Lions	17,556			
	Kodiak City	19,259			

(continued)

Table 2 (continued).

Arctic Coast	Brevig Mission	6,830	11,682	200%	5,841
	Wales	7,257			
	Koyuk	7,696			
	Golovin	7,822			
	Elim	8,175			
	Savoonga	8,693			
	Diomede	8,816			
	Koliganek	9,034			
	Teller	9,087			
	Gambell	9,488			
	Shishmaref	9,855			
	White Mountain	9,942			
	Shaktoolik	10,150			
	Kobuk	10,347			
	Selawick	10,635			
	St. Michael	10,709			
	Noatak	10,920			
	Noorvik	11,682			
	Buckland (Elephant P)	11,747			
	Kivalina	11,839			
	Shungnak	12,173			
	Kiana	12,302			
	Deering	12,781			
	Ambler	13,486			
	Unalakleet	14,511			
	Kotzebue	18,566			
	Anaktuvuk Pass	19,637			
	Nome	19,745			
	Nuiqsut	19,866			
	Point Lay	20,893			
	Wainright	21,719			
	Kaktovik	23,442			
	Atkasook/Tikikluk	24,871			
	Point Hope	25,907			
	Barrow	29,406			
	Ft. Wainwright	12,262			
Interior Subarctic	Venetie	5,387	9,389	200%	4,695
	Hughes	5,687			
	Koyukuk	5,694			
	Allakaket-Alatna	6,008			
	Stevens Village	6,555			
	Arctic Village	6,658			
	Nikolai	6,915			
	Chalkyitsik	7,253			
	Huslia	7,356			
	Minto	7,415			

(continued)

Table 2 (continued).

	Rampart	7,620			
	Beaver	7,856			
	Kaltag	8,070			
	Anvik	8,490			
	Stony River	9,389			
	Grayling	9,787			
	Holy Cross	10,853			
	Nulato	12,270			
	Pedro Bay	12,574			
	Shageluk	13,241			
	Lake Minchumina	13,528			
	Tanana	13,943			
	Fort Yukon	14,152			
	Ruby	16,397			
	McGrath	16,927			
	Bettles-Evansville	17,742			
	Port Alsworth	20,022			
	Galena	21,467			
	Takotna	22,285			
Yukon-Kuskokwim Delta	Chuathbaluk	5,109	8,892	200%	4,446
	Kipnuk	5,917			
	Newtok	6,097			
	Chefornak	6,596			
	Upper Kalskag	6,934			
	Tununak	6,942			
	Nunapitchuk	7,103			
	Kwethluk	7,117			
	Atmautluak	7,199			
	Goodnews Bay	7,531			
	Quinhagak	7,457			
	Nightmute	7,564			
	Akiak	7,606			
	Chevak	7,746			
	Pitkas Point	7,774			
	Toksook Bay	8,019			
	Kwigillingok	8,040			
	Pilot Station	8,233			
	Tuntutuliak	8,433			
	Tuluksak	8,612			
	Akiachak	8,782			
	Hooper Bay	8,856			
	Napakiak	8,892			
	Kasigluk	8,958			
	Eek	8,979			
	Kongiganak	9,009			
	Stebbins	9,183			

(continued)

Table 2 (continued).

	Mekoryuk	9,800			
	Napaskiak	9,822			
	Scammon Bay	9,827			
	Sleetmute	9,918			
	Red Devil	10,020			
	Kotlik	10,035			
	Lower Kalskag	10,290			
	Fortuna Ledge (Marsh)	10,427			
	Platinum	11,626			
	St. Marys	11,973			
	Alakanuk	12,195			
	Emmonak	12,975			
	Russian Mission	13,217			
	Mountain Village	13,362			
	Crooked Creek	14,450			
	Sheldon Point	15,032			
	Aniak	16,169			
	Bethel	18,796			
Bristol Bay-Iliamna	Portage Creek	4,559	8,644	200%	4,322
	New Stuyahok	5,882			
	Manokotak	6,435			
	Clark's Point	7,540			
	Togiak	7,579			
	Ekwok	7,837			
	Nondalton	8,560			
	Newhalen	8,644			
	Kokhanok	8,644			
	Levelock	9,413			
	Egegik	10,780			
	Aleknagik	12,118			
	Iliamna	13,453			
	Dillingham	16,213			
	Pilot Point	17,865			
	King Salmon	22,032			

Table 3. Cost of Food in Alaska: Consumer Price Index

Urban Areas	
Anchorage	100
Fairbanks	110
Juneau	115
Ketchikan	114
Palmer-Wasilla	109
North Kenai Peninsula	
Homer	127
Kenai-Soldotna	110
Southeast	
Hoonah	185
Petersburg	128
Sitka	114
Wrangell	119
Yakutat	182
Copper Basin-Prince William Sound	
Cordova	164
Glenallen	140
Valdez	122
Upper Tanana	
Delta Junction	138
Northway	163
Tok	145
Kodiak Island	
Kodiak City	135
Larsen Bay	160
Interior Subarctic	
Fort Yukon	226
McGrath	179
Tanana	248
Alaska Peninsula-Aleutian Islands	
Dutch Harbor	155
Birstol Bay-Iliamna	
Dillingham	172
King Salmon	209
Naknek	206
Yukon-Kuskokwim Delta	
Bethel	166

(continued)

Table 3 (continued).

Arctic Coast	
Barrow	195
Kaktovik	228
Kotzebue	176
Nome	181
Unalakleet	200

Source: These numbers represent the average of quarterly consumer price index information from June 1981 through December 1985 collected by the Cooperative Extension Service, Univ. Alaska and USDA. Based on the cost of food at home for a week. Anchorage is the base adjusted at 100.

The adjusted median community income in table 2 is a good indicator of the strength of the wage sectors of each area's economy. Remarkably, once incomes are adjusted to their true purchasing potential, some areas are shown to be extremely poor in terms of cash. In the Arctic, the median 1982 taxable income was only $5,841 per income tax return. In Interior Alaska communities, the median 1982 taxable income was only $4,695. The poorest areas in the state were the Yukon-Kuskokwim delta ($4,446) and Bristol Bay-Iliamna ($4,322).

Clearly, communities in these cash-poor areas could not possibly manage on such low earnings if it were not for the way that money is used. The low monetary incomes are invested into fishing and hunting activities, producing large quantities of wild foods which support the region's population. If it were not for the operation of these "mixed, subsistence-cash economic systems," many rural communities in most regions in Alaska would experience significant economic hardships. In fact, even the poorest Alaska communities with such economies do quite well in regards to food. The poorest families (in monetary terms) in rural Alaska eat better than the richest families in the continental United States. The mixture of wild resource harvest, nonmarket distribution systems, and cash is the economic backbone of Alaska's rural regions.

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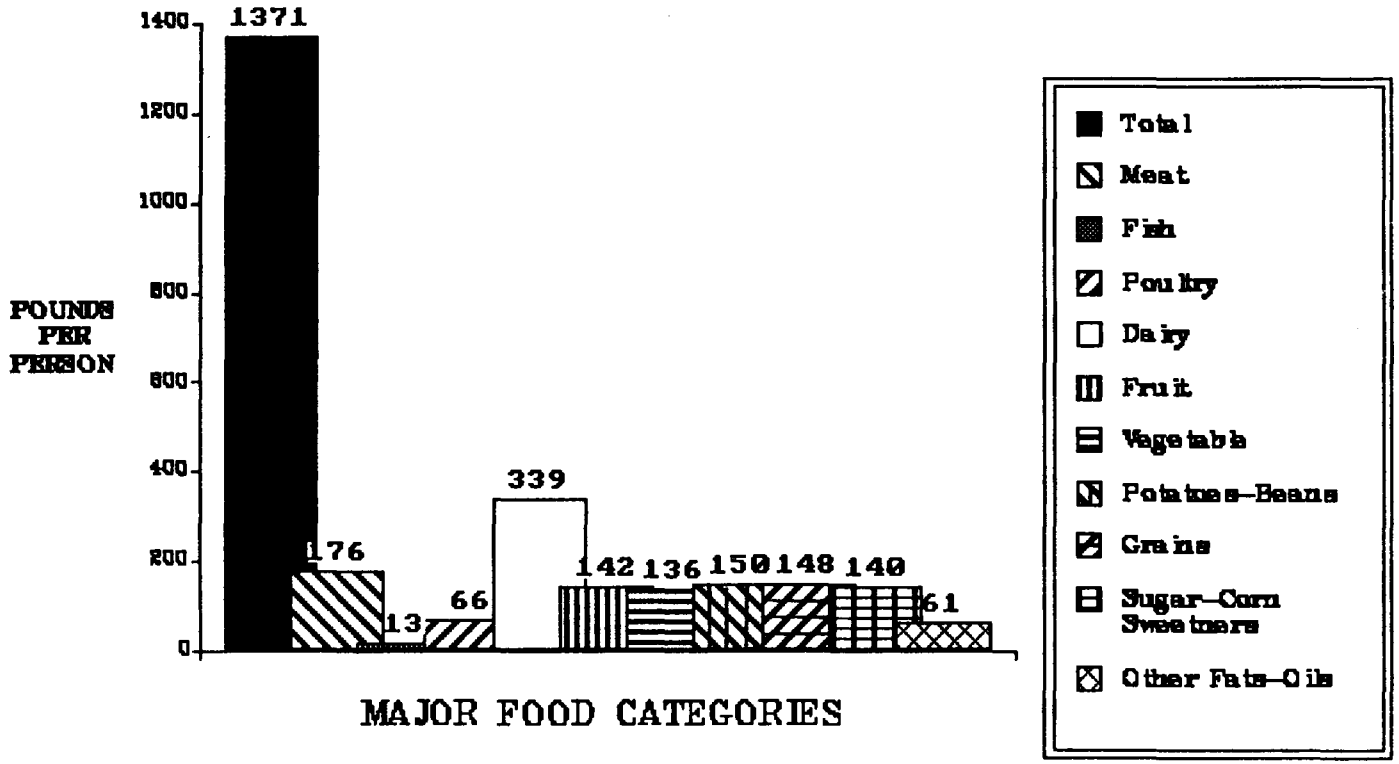


Figure 1. Food consumption in the United States, 1983 (Wolfe and Walker 1986).

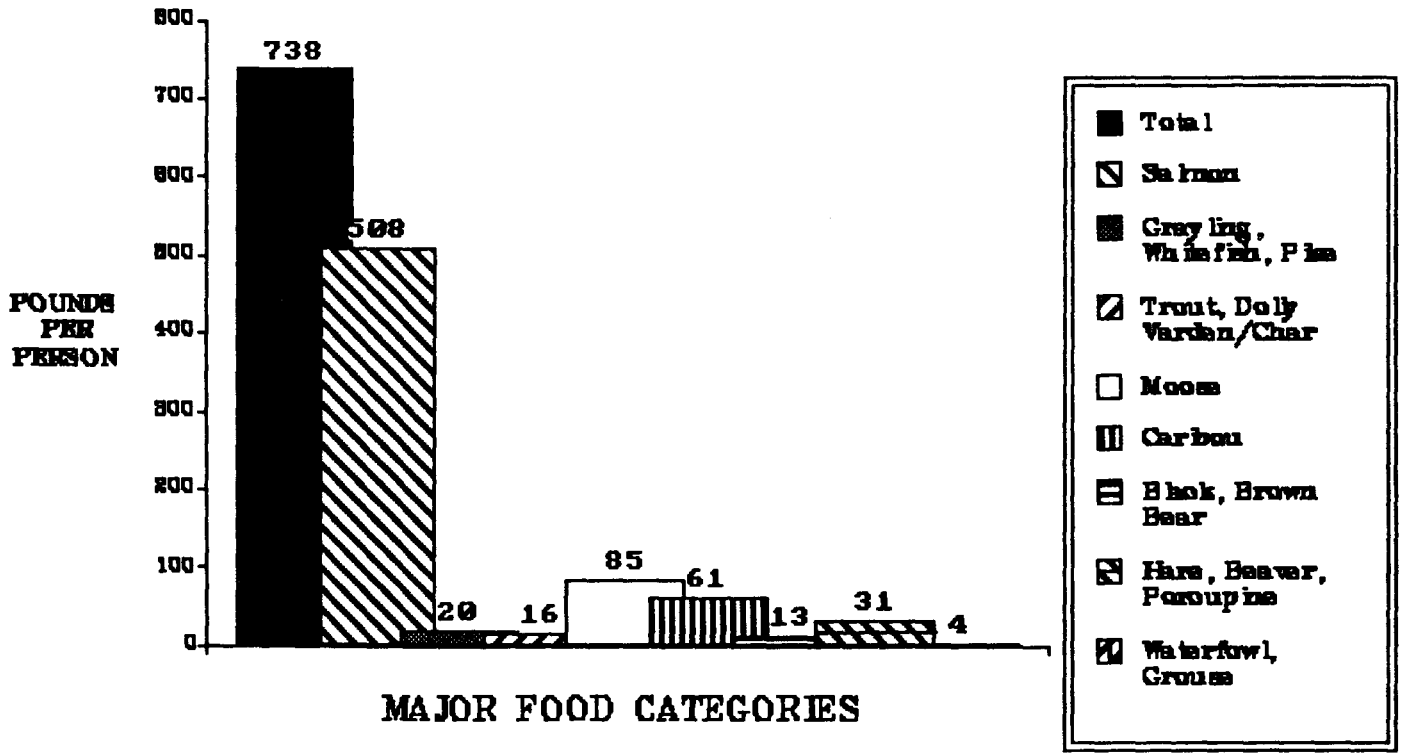


Figure 2. Subsistence food harvest at Nondalton, Southwest Alaska 1981 (Wolfe and Walker 1986).

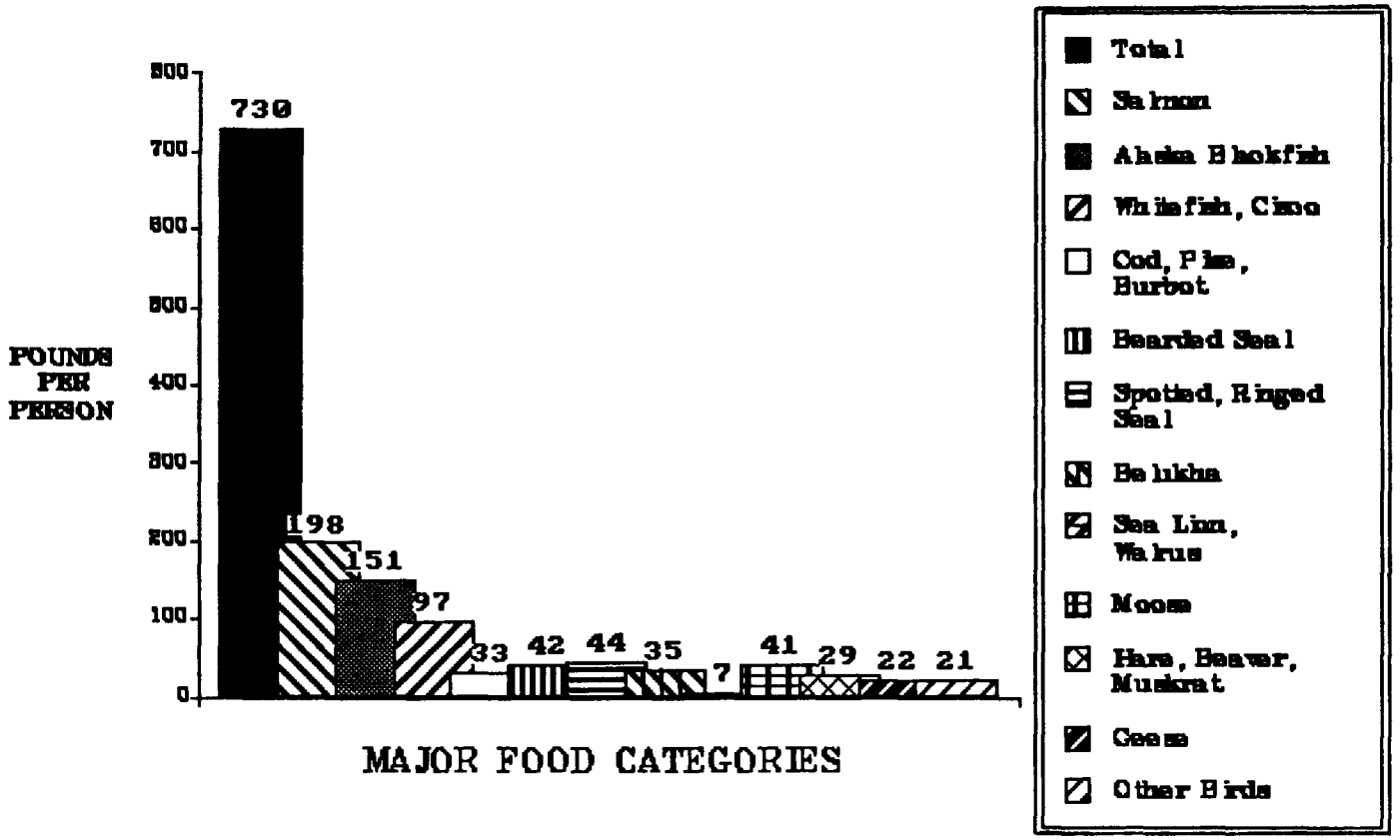


Figure 3. Subsistence food harvests at Alakanuk, Western Alaska, 1981 (Wolfe and Walker 1986).

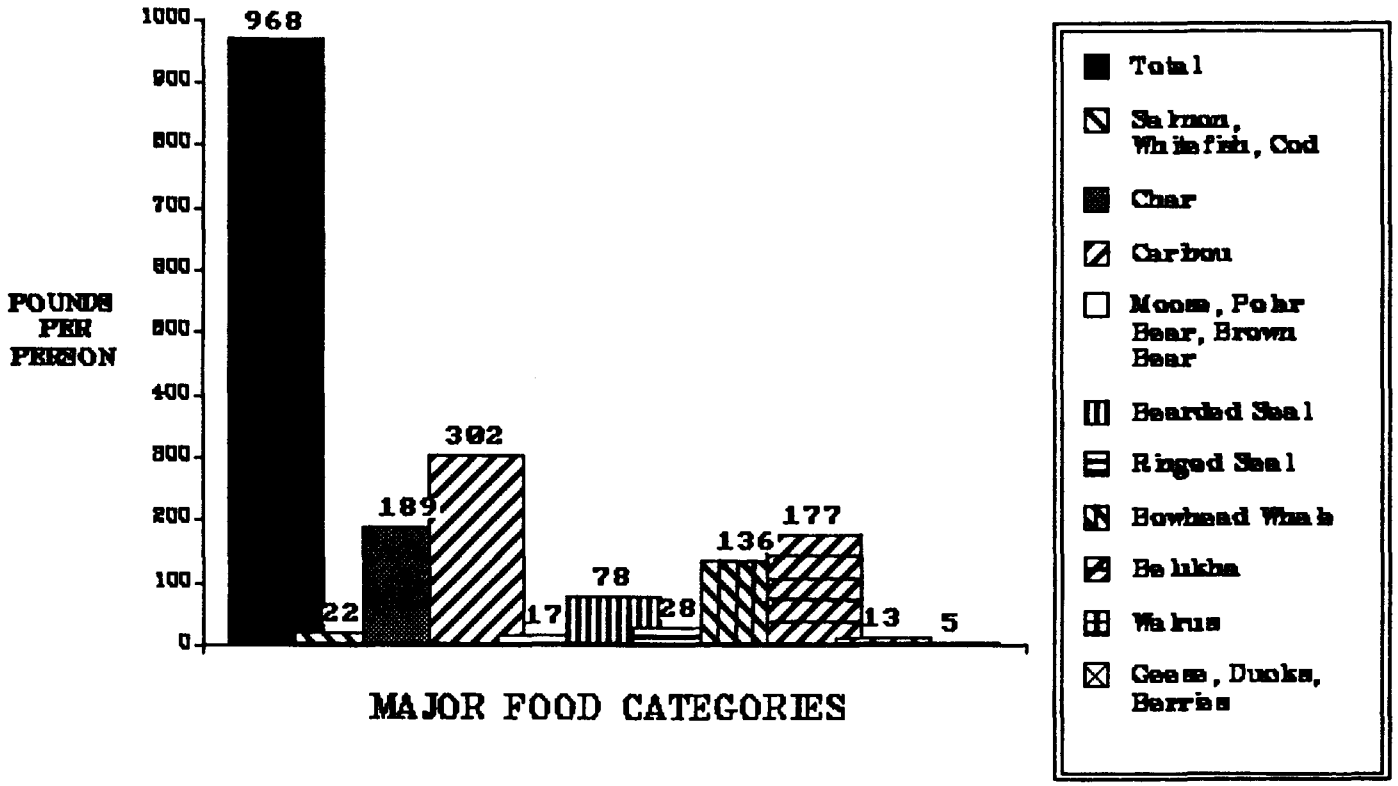


Figure 4. Subsistence food harvests at Kivalina, northwest Alaska, 1983 (Wolfe and Walker 1986).

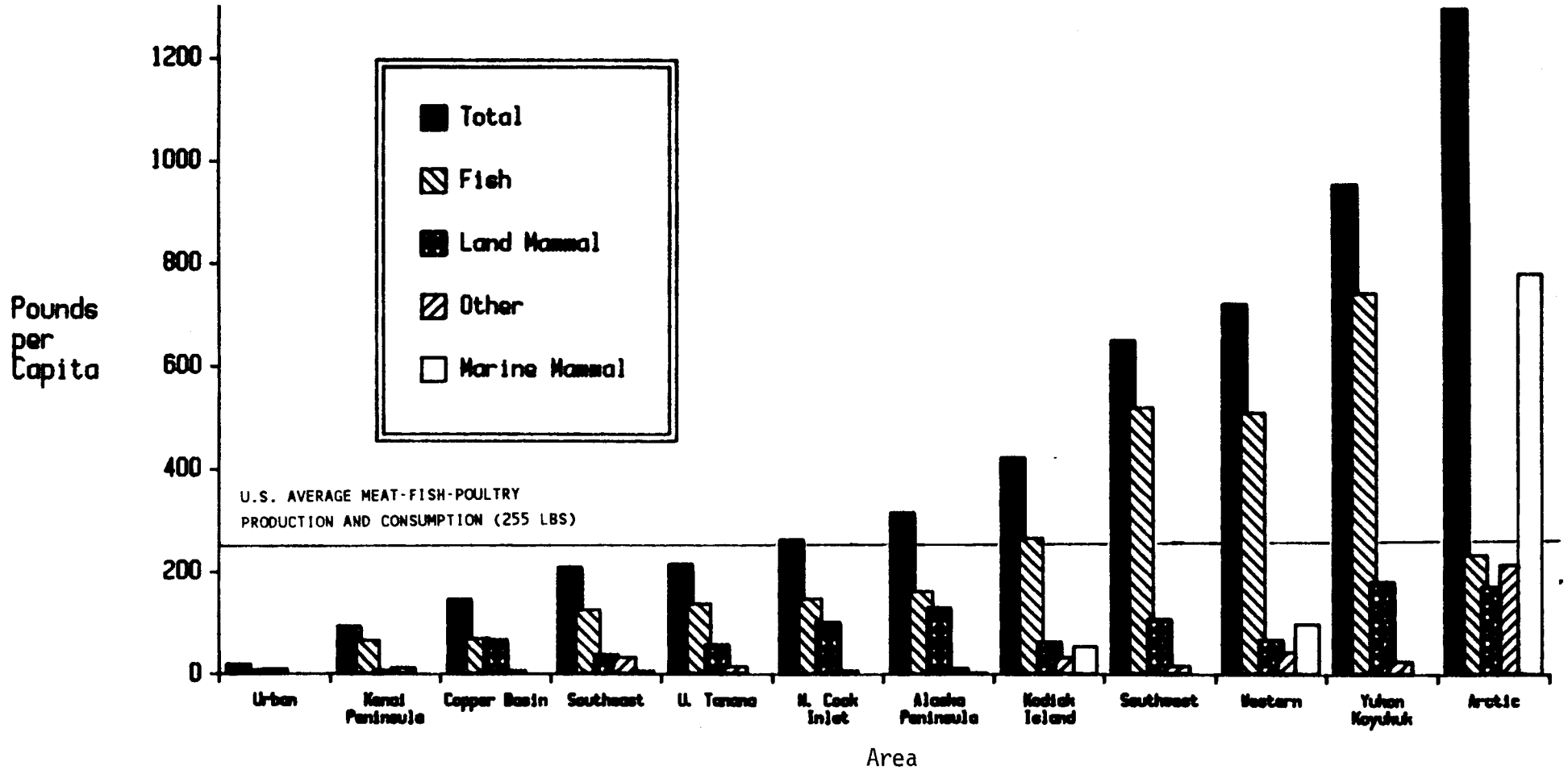


Figure 5. Resource harvest, by area (Wolfe and Walker 1986).

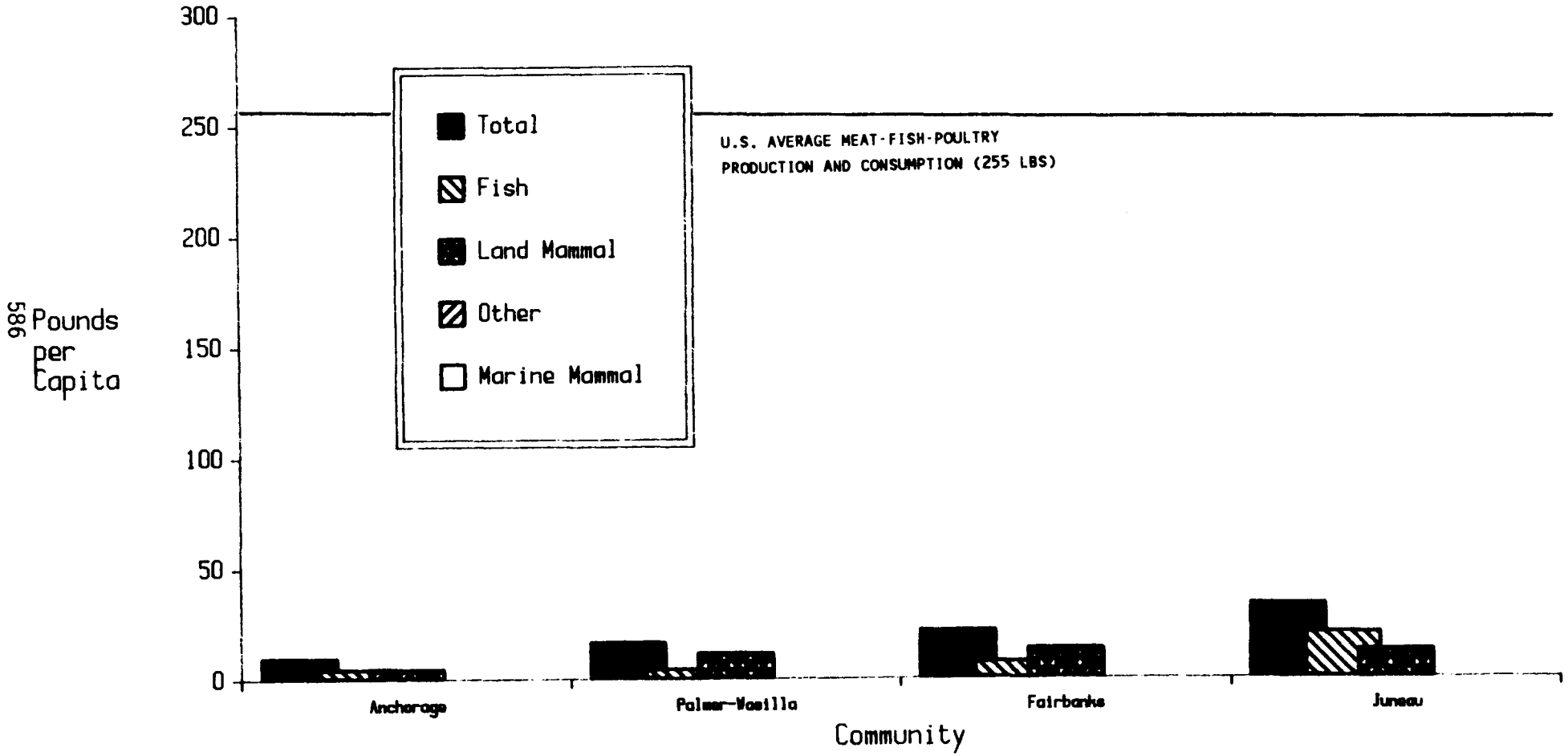


Figure 6. Resource harvest, four urban areas (Wolfe and Walker 1986).

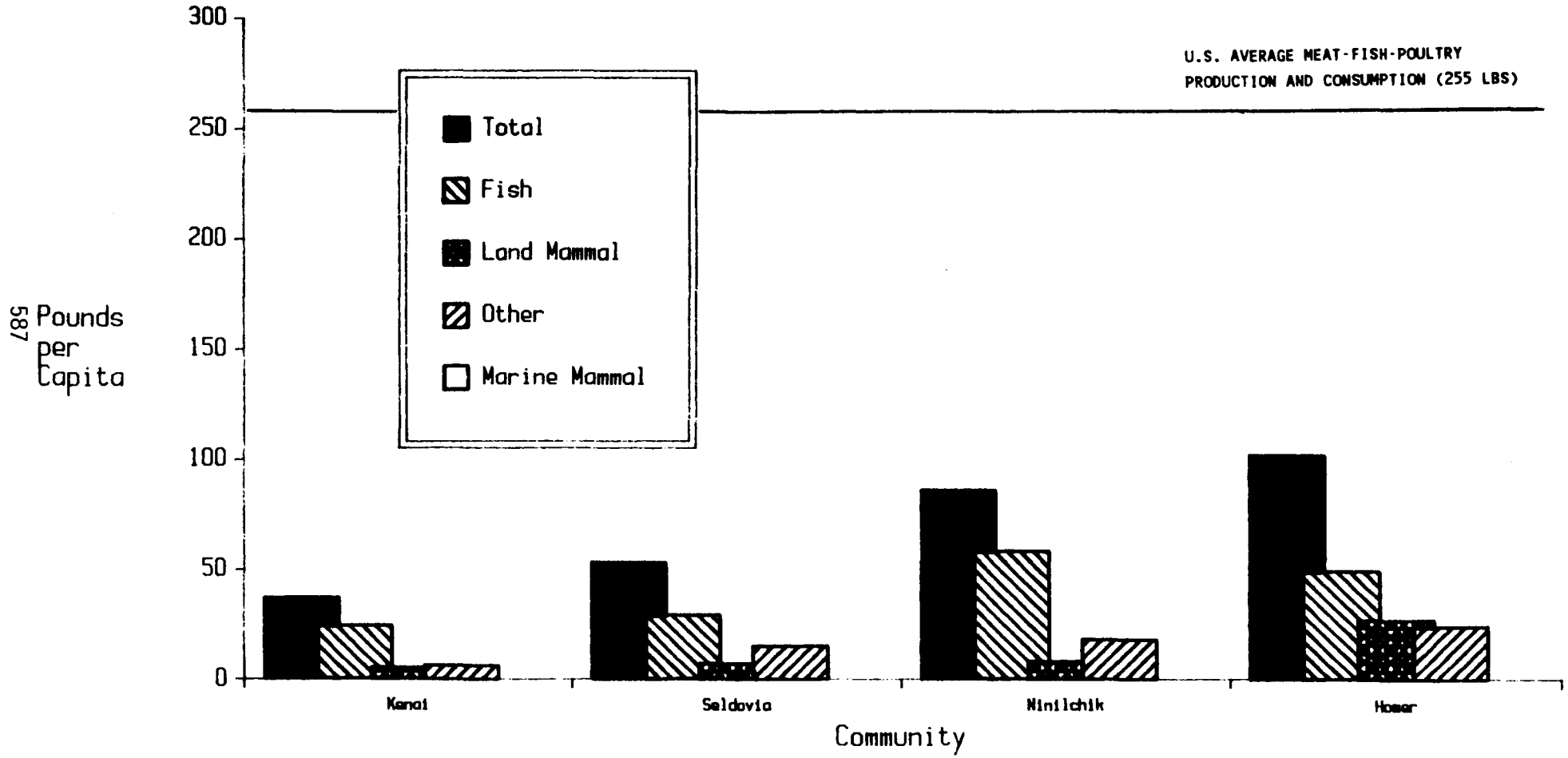


Figure 7. Resource harvest, northern Kenai Peninsula (Wolfe and Walker 1986).

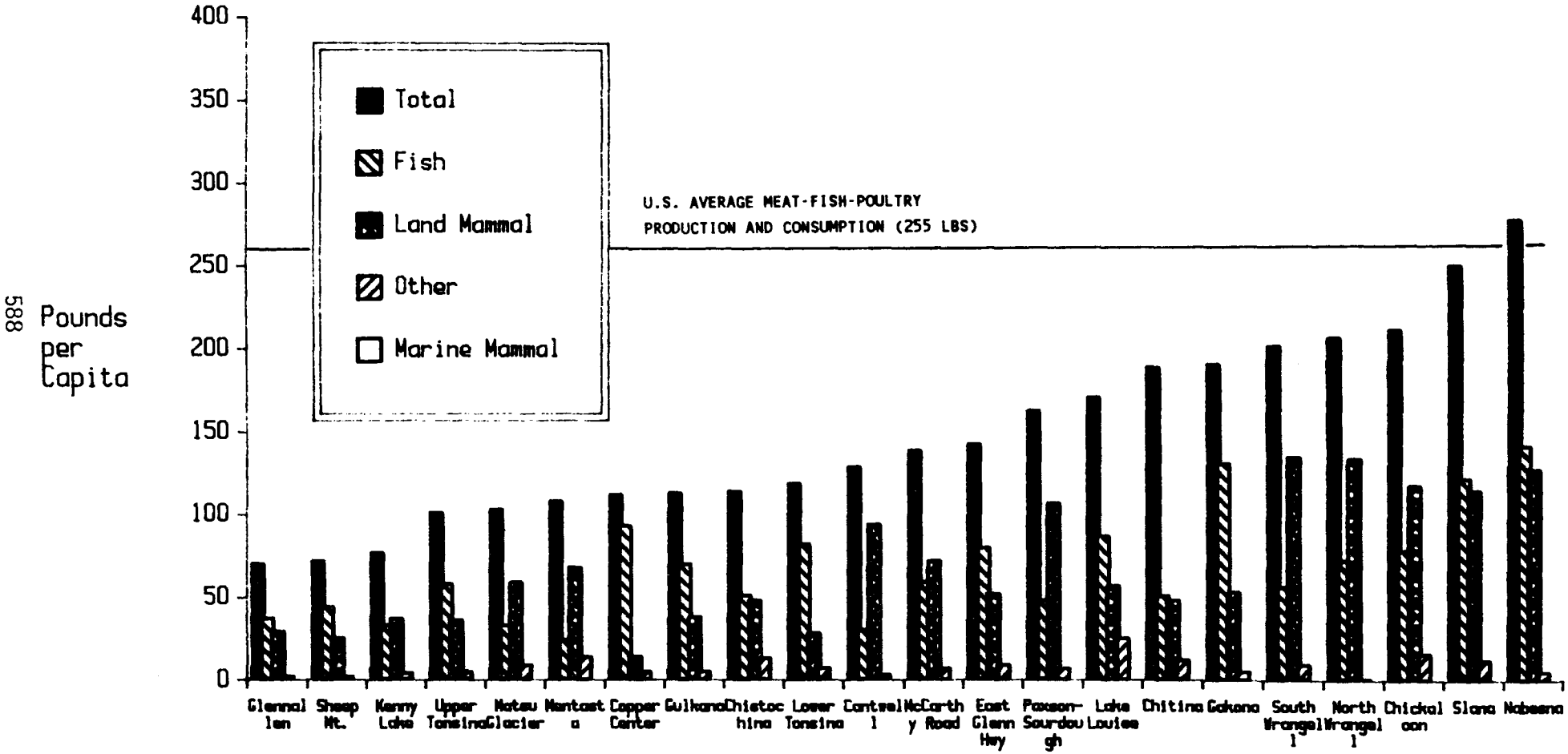


Figure 8. Resource harvest, Copper River basin (Wolfe and Walker 1986).

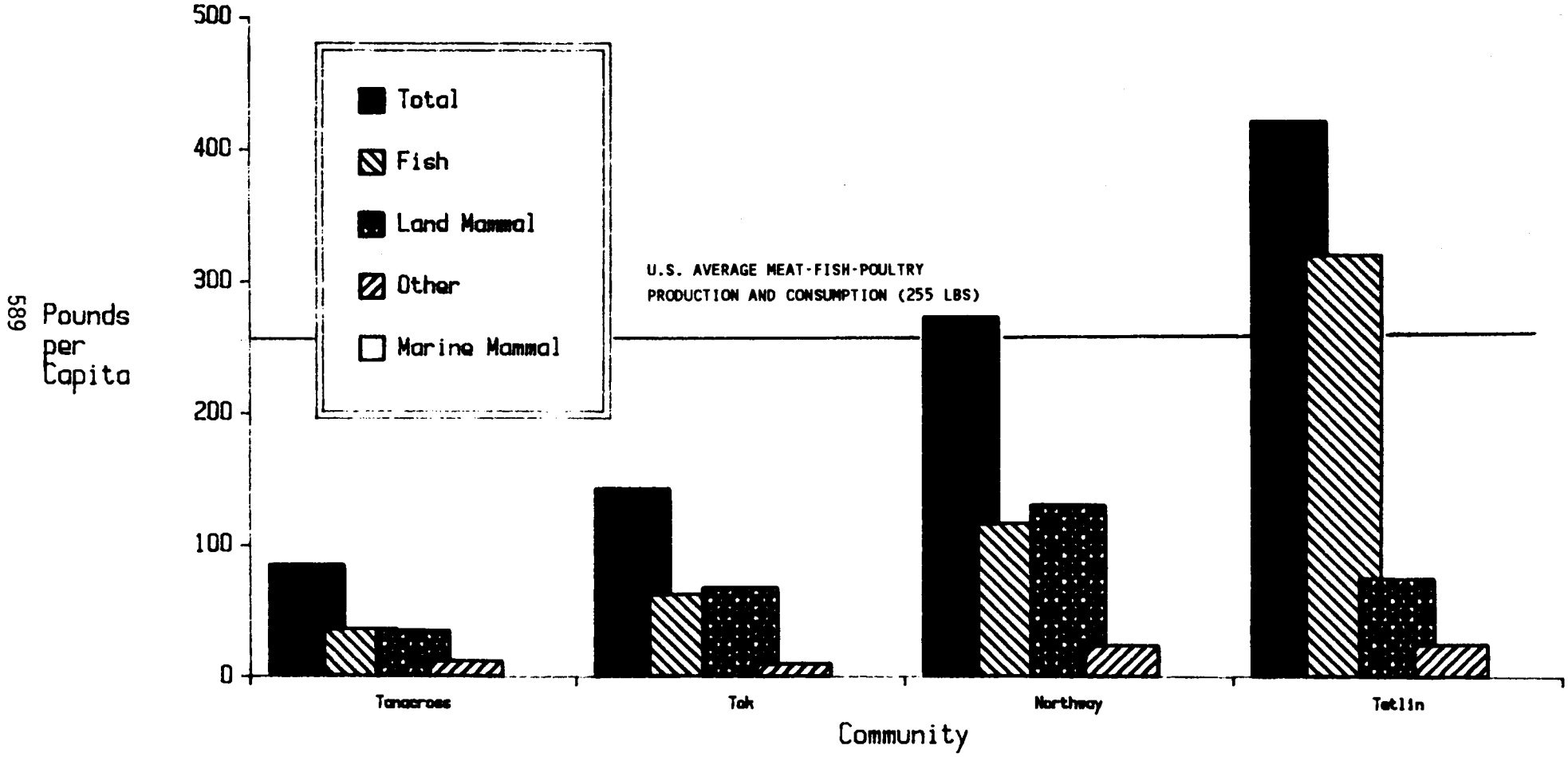


Figure 9. Resource harvest, upper Tanana River (Wolfe and Walker 1986).

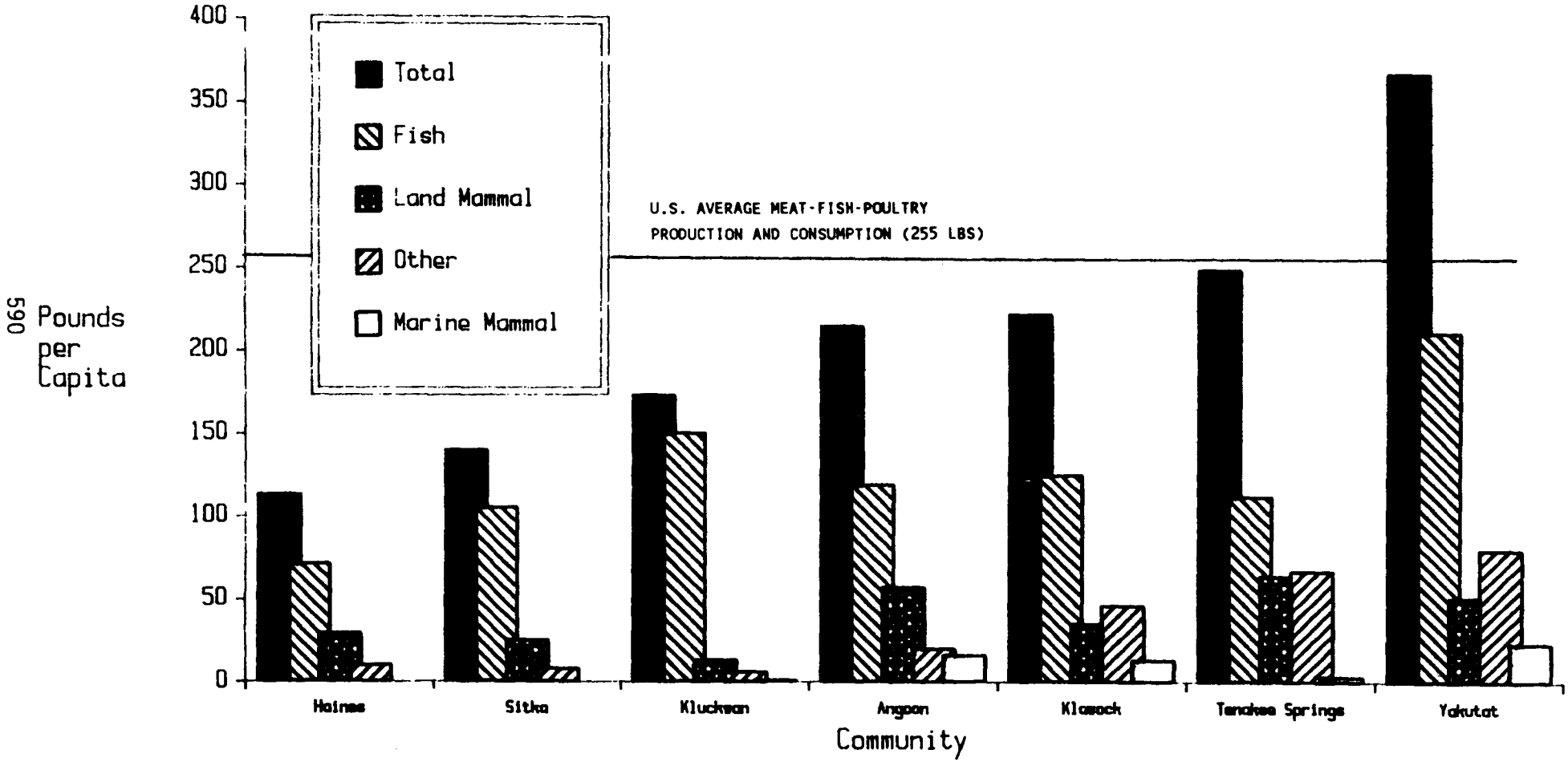


Figure 10. Resource harvest, Southeast Alaska (Wolfe and Walker 1986).

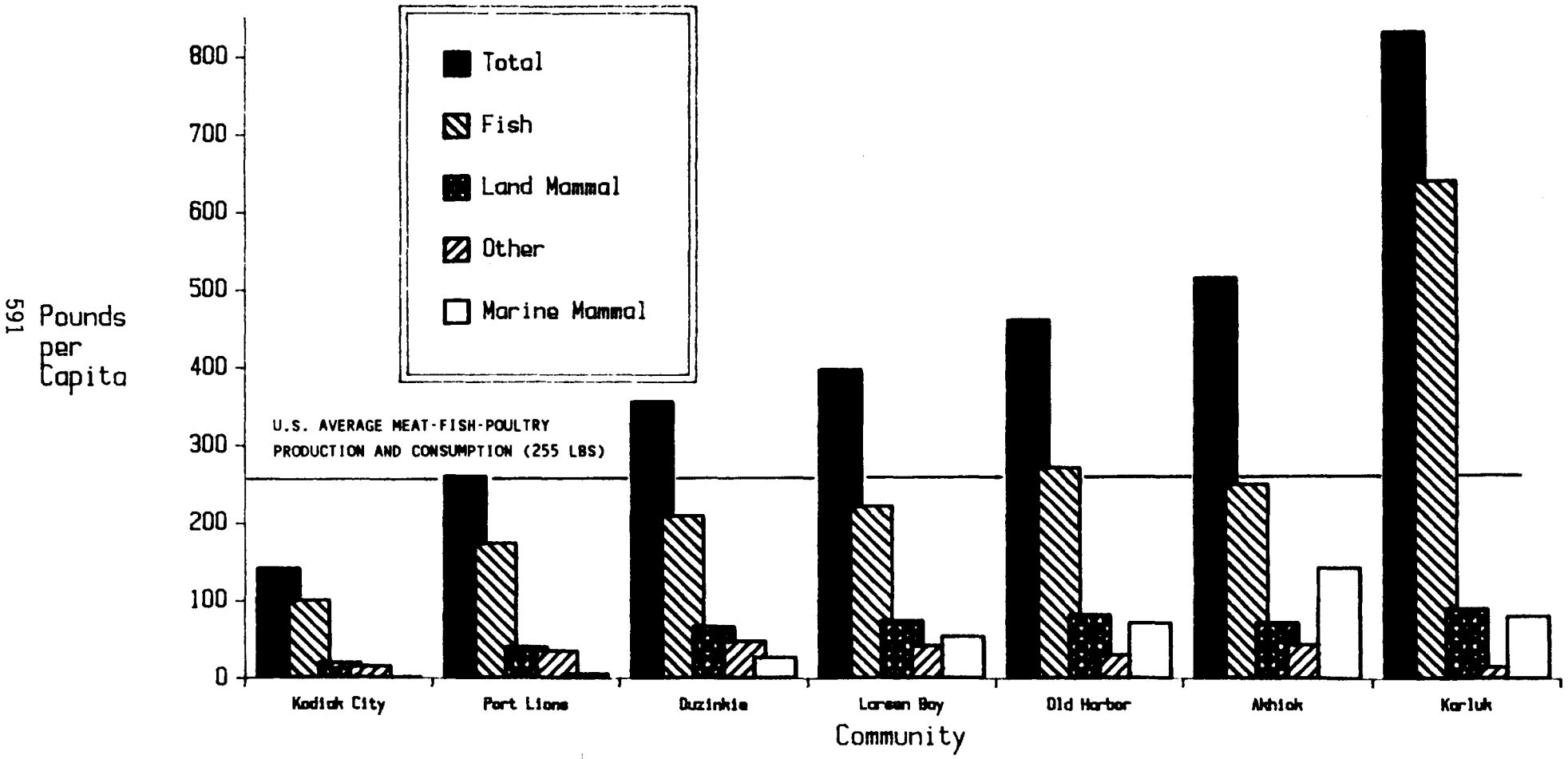


Figure 11. Resource harvest, Kodiak Island (Wolfe and Walker 1986).

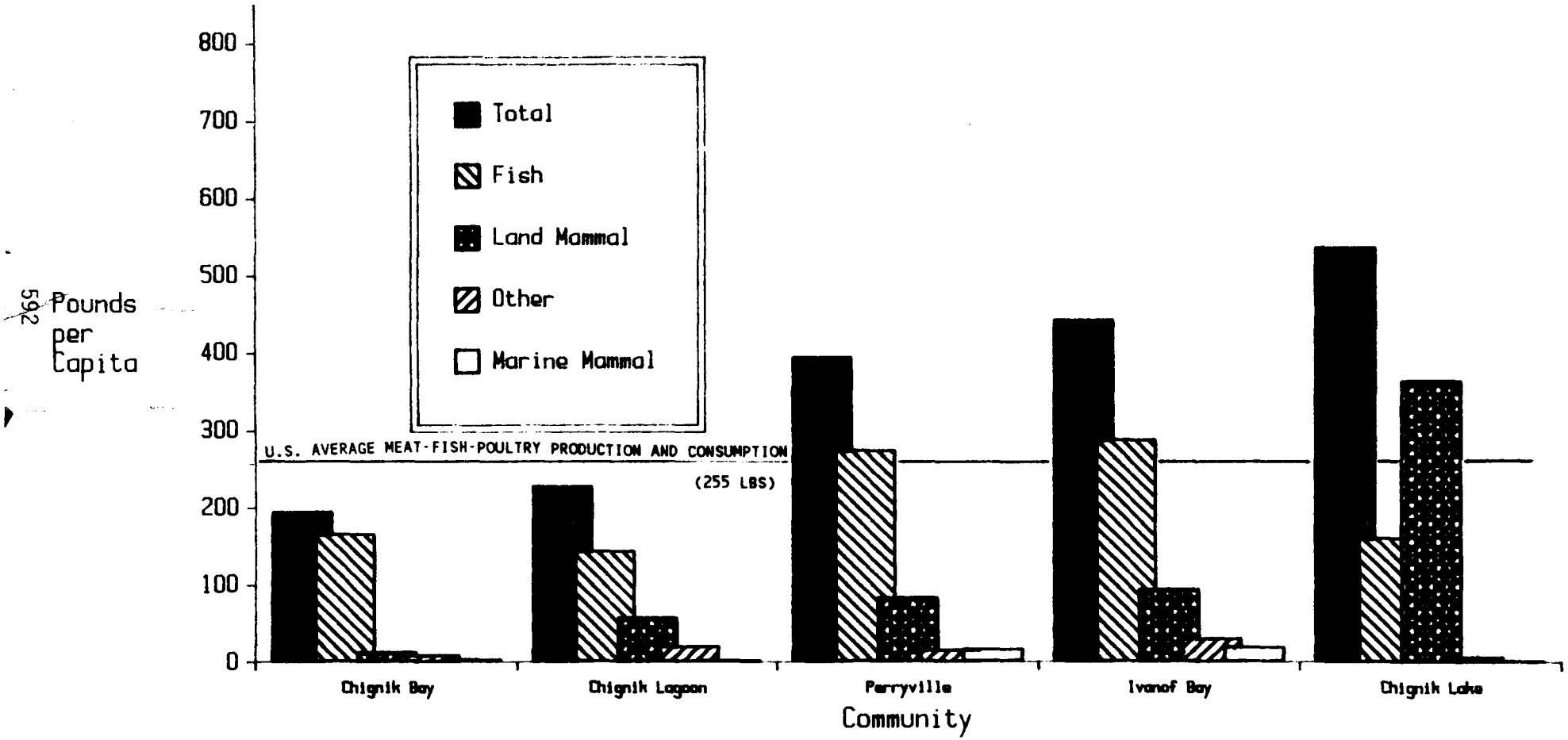


Figure 12. Resource harvest, Alaska Peninsula (Wolfe and Walker 1986).

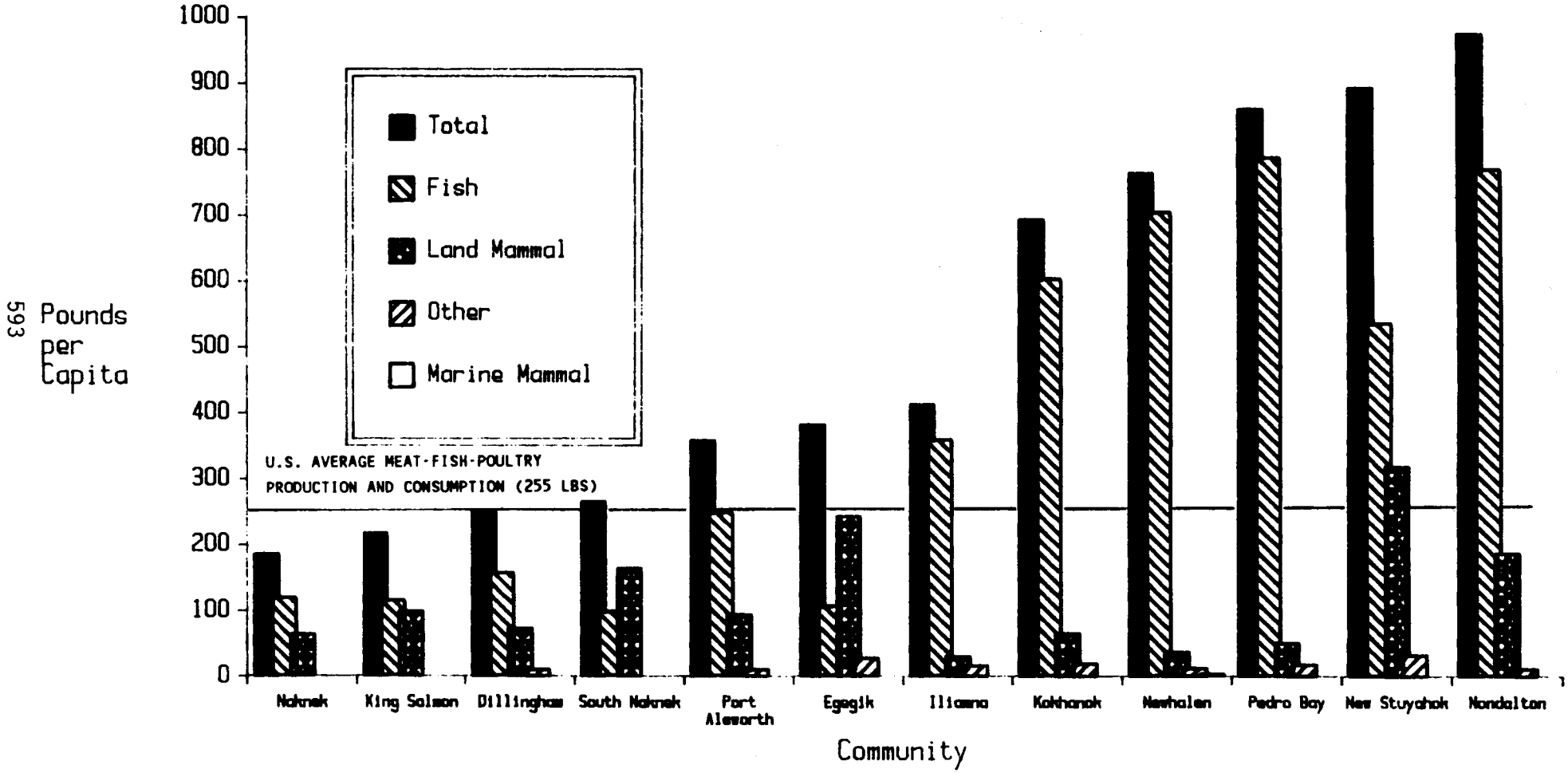


Figure 13. Resource harvest, Bristol Bay - Iliamna (Wolfe and Walker 1986).

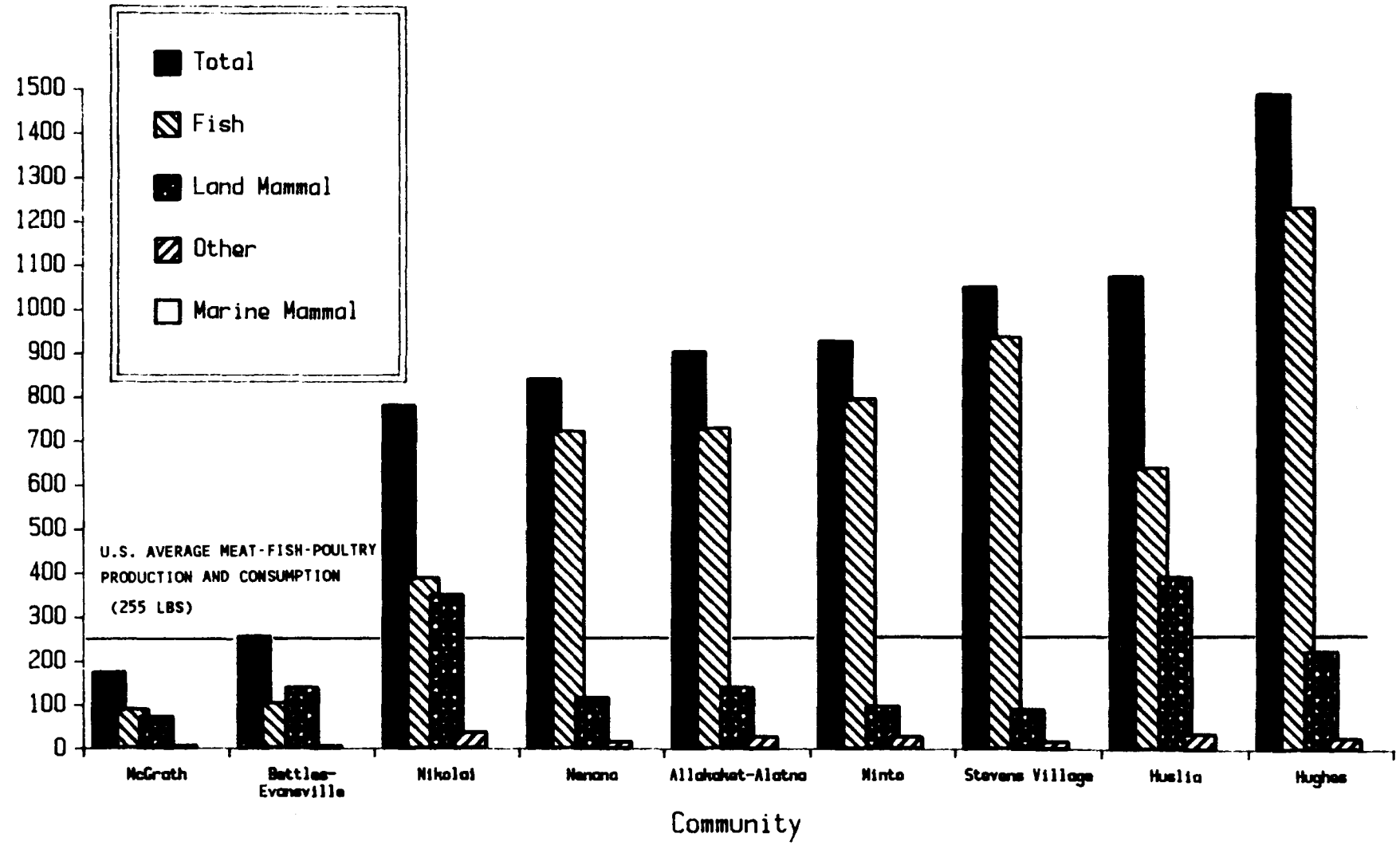


Figure 14. Resource harvest, subarctic interior (Wolfe and Walker 1986).

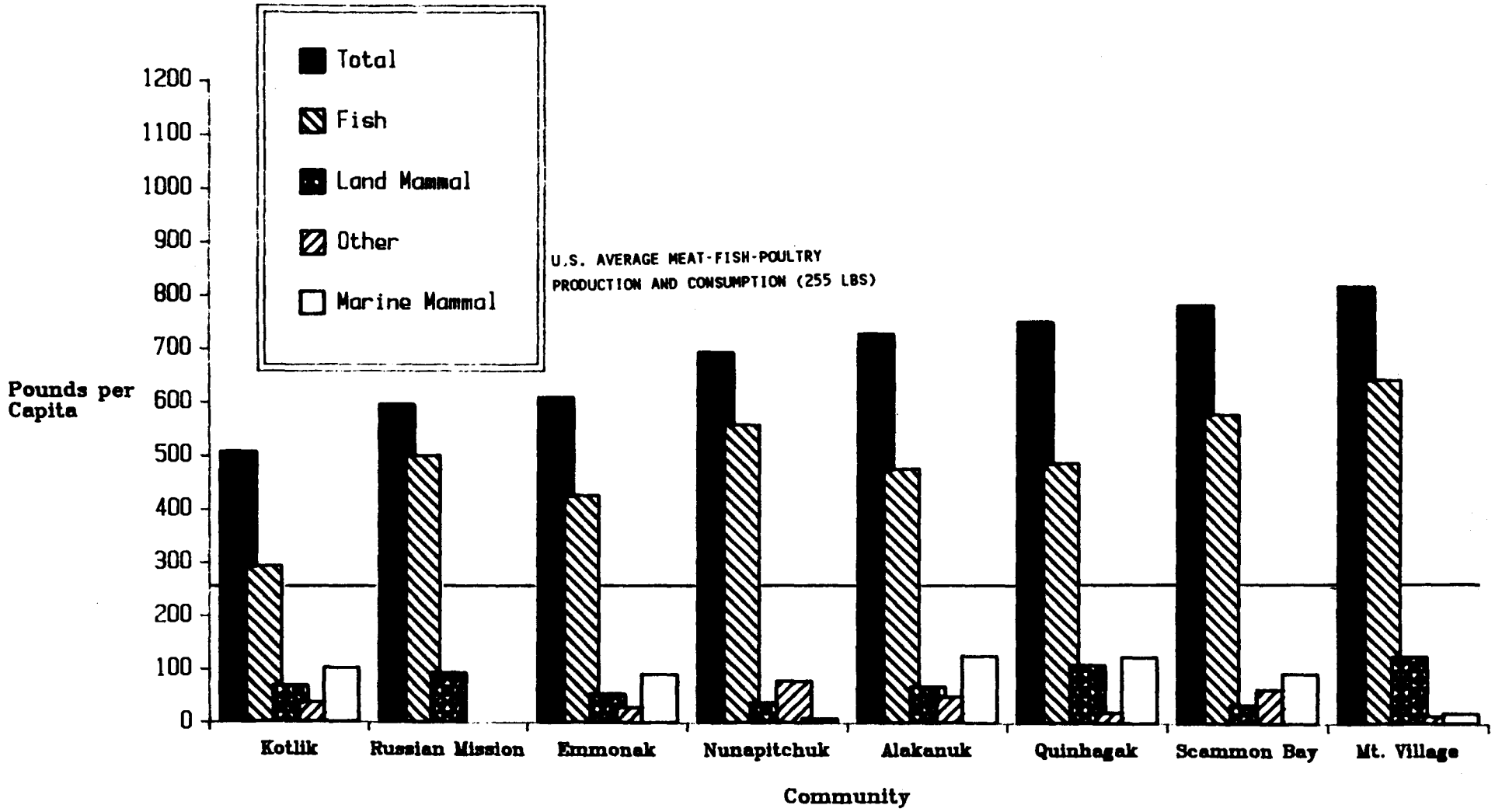


Figure 15. Resource harvest, Yukon-Kuskokwim delta (Wolfe and Walker 1986).

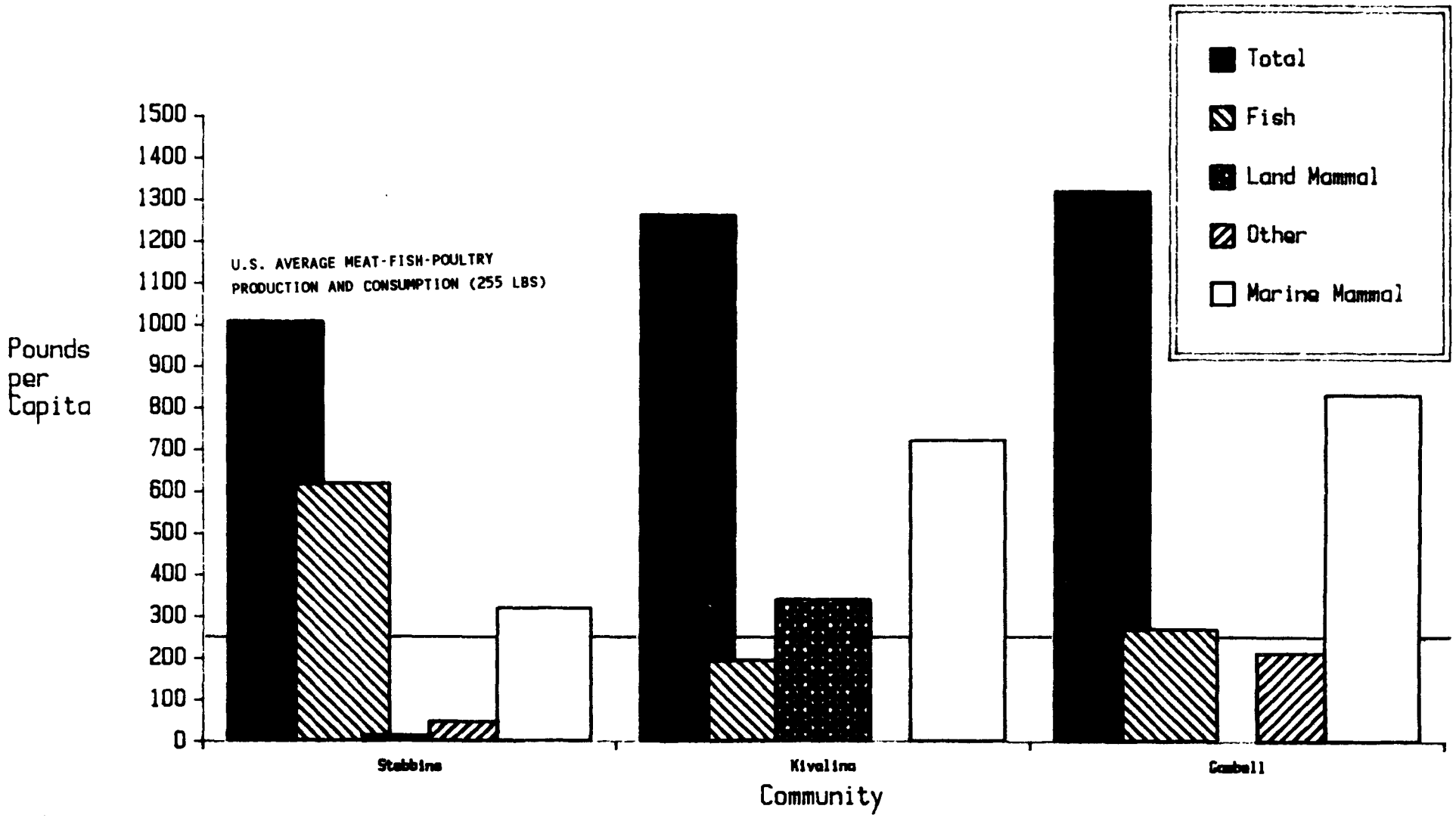


Figure 16. Resource harvest, arctic coast (Wolfe and Walker 1986).

Appendices

A. ADF&G, Division of Game, Database

Division of Game data are organized for use in two broad categories: 1) management and 2) research. Management data are collected annually and are regional and statewide in scope. Research data are project-specific in contents, methods, and time schedules. Results from specific projects, however, occasionally have statewide implications.

The Alaska Habitat Management Guides project has analyzed this database in order to summarize and consistently interpret information that is relevant to land management decisions and economic assessments in each region. (See the regional guides for summaries and interpretations of the data from the information sources described in this appendix.)

Management data are devoted primarily to monitoring the production and mortality of game populations. Populations are monitored by a variety of field techniques: aerial trend surveys and population censuses, photo censuses, pellet transects, capture-recapture studies, and radio telemetry techniques. These data are used in several ways, one of which is in the issuance of controlled hunt permits. The harvest of resources is monitored through the return of hunter harvest and permit reports, deer and waterfowl hunter surveys, and bear and furbearer sealing documents, and fur export reports. Much of this information is summarized in narrative form in the Federal Aid in Wildlife Restoration Annual Reports of Survey and Inventory Activities ("S and I reports").

Research projects range in scope from small, single-year projects to large, complex, multi-year endeavors. Information is gathered by techniques similar to those used in management applications. Research reports on various projects are produced periodically in compliance with the Federal Aid in Wildlife Restoration program.

I. MANAGEMENT

The Division of Game currently has three management data files: 1) the big game data index file (BGDIF), 2) the big game harvest file, and 3) the furbearer harvest file. Postal hunter surveys, harvest and permit reports, and survey and inventory data are all sources of information for these files. A Controlled Hunt Permit Allocation System processes several information files. Details of location and the means of accessing these files can be found in the ADF&G Information Systems Plan, April 1985.

A. BGDIF

The BGDIF summarizes population information. On a priority basis, game biologists annually conduct censuses and trend surveys in order to derive population estimates and/or trends. Aerial surveys and photo censuses are two of the most commonly used techniques for monitoring populations.

The BGDIF has existed in the form of a paper file since 1970. This paper system is being replaced by a microcomputer-based system with communications to area, regional, and headquarters offices via the state's computer network. When completed, the system will enable area management biologists to more easily compute trends, compare population status to other areas of the state, and to recognize harvest trends, and so forth. A complete history of survey and inventory data and harvest data for each species in each game management unit will be available to examine population trends over time and to develop potential management strategies. The system components for moose became operational in early 1986. Other big game species will follow, with sheep, bear, and possibly caribou on line during the next year.

B. Big Game Harvest File

The big game harvest file contains information on noncommercial harvest (subsistence, general, and defense of life and property) and describes characteristics of both the hunter and the game harvested, by geographic area. Raw data are obtained from returned permit report forms, returned harvest tickets, and postal hunter surveys. Because a great deal of this information is provided through the voluntary cooperation of the public, the database, although the best available, is incomplete. Nevertheless, the results are used to supply information for making harvest management decisions, for biometric research, and as the harvest figures component of the BGDIF. The Division of Game publishes separate annual reports for eight different species or species groups. In addition, two or three preliminary reports per species are published during the year. These reports are simply compilations of harvest data containing no discussion or analysis. The data are currently available to area biologists on request, but eventually they will be able to access the data directly with microcomputers.

C. Furbearer Harvest File

The furbearer harvest file contains information on the harvest and sealing of 16 types of furs for commercial purposes. It has been operating since 1975. Information comes from three legally required documents: fur sealing forms from local area offices and ADF&G representatives, and fur export permits and fur dealer forms

from commercial dealers. Annual statewide reports, five-year summmaries, reports to the USFWS, and ad hoc reports to other agencies and the public are produced. Because seals are required before a fur can be sold or exported, the data are more complete than those from voluntary sources. Historical data are stored off-line on tape at the Anchorage Data Center. (See fig. A.1 and 2 for samples of furbearer report forms.)

D. Bear Harvest File

The bear harvest file contains information on the harvest of all brown/grizzly bears in the state and on all black bears harvested in GMUs 1 through 7, 11 through 16, and 20. Information is obtained from a sealing document that is completed when each bear skull and hide receives its legally required seal. All skulls and hides must be sealed within a certain time period, and all seals must remain attached to the hides while in Alaska or until the tanning process has commenced. Annual statewide reports are produced. Historical data are stored off-line on tape at the Anchorage Data Center. (See fig. A.3 and 4 for samples of bear-sealing report forms.)
Besides the above files, there are other sources of management information for the Division of Game.

E. Postal Hunter Surveys

Postal hunter surveys are another source of information for the BGDIF and big game harvest files. They are used regularly to gather information on waterfowl, deer, and occasionally small game sheep, goat, moose, and brown bear harvest. Voluntary information comes from postal surveys of randomly selected hunting license holders. The results of the compilations are used to determine harvest estimates and their patterns and trends, the economic value of hunting, and the extent of use of the resources as part of the department's annual survey and inventory reports. The voluntary nature of hunter reports and the fact that not all hunters are queried make the database incomplete.

The waterfowl postal survey was inhibited in the past by the necessity of drawing a random sample from the large general hunting license file because no specific waterfowl stamp or permit file existed to identify waterfowl hunters. The state's first duck stamp was issued in 1985. Division biologists hope they can obtain ADR cooperation to identify duck stamp purchasers and thus specifically target waterfowl hunters for the waterfowl postal survey. Three annual reports are generated from the data. All provide summary and detailed information on bird populations, species composition, hunter demographics, and estimated waterfowl

harvest. (See fig. A.5 for a sample of the waterfowl hunter postal survey.)

A postal survey of deer hunters is taken annually in the Southeast Region and periodically in the Southcentral Region. Each fall, the division produces 20 separate reports detailing various biological and statistical criteria, hunter demographics, comparative data, and geographic information regarding deer harvests. (See fig. A.6 for a sample of the deer hunter postal survey.)

F. Controlled Hunt Permit Allocation System

Permit hunts have been held since 1977. The computerized controlled hunt permit allocation system was installed in 1981. It operates on a semiannual basis, processing applications for spring and fall big game hunts. This system consists of data files such as hunter permit applications and permit reports that contribute to the database of the BGDIF and the big game harvest file. Permit hunts have increased in number almost annually, and approximately 170 hunt drawings were held in the state in 1984. Permit hunt applications are increasing by about 20% per year.

The permitting process has changed since the recent court decisions affecting subsistence use of big game. In 1985, the processing of applications and the scoring of affidavits for Tier II subsistence hunts were done manually by Division of Game personnel, whereas the selection of the permit-drawing winners based on scores received was computerized. Further changes in this process will probably occur as the state attempts to comply with federal laws.

II. RESEARCH

Two research applications of the Division of Game database are 1) map-based information management and 2) simulation modeling. Both systems use a collection of information files and various software to produce data for specific projects.

A. Map-based Information Management

Computerized geoprocessing of field data and radio and satellite telemetry signals allows the examination of animal movement and habitat relationships. The field studies provide physical survey data for each subject area, and radio and satellite telemetry studies track an animal or herd by monitoring movements of animals equipped with transmitters. The system makes possible detailed

maps showing the relationships between animal movements and habitats. Some current projects include goats and bears on Kodiak Island and moose and bears on the Susitna.

B. Simulation Modeling

This research application of the Division of Game database projects wildlife population trends for specific geographic areas, given certain demographic, geographic, and habitat scenarios. Information supplied by these models is used to aid both scientific research and regional planning efforts. Some current projects include a population model for moose in the upper Susitna basin and for caribou in the western arctic and a deer habitat and forest practices model in Southeast Alaska.

B 01505
NO.

STATE OF ALASKA **FURBEARER SEALING CERTIFICATE** DEPARTMENT OF FISH AND GAME

NAME _____ / ____ / _____
FIRST INITIAL LAST

MAILING ADDRESS _____
STREET OR BOX NO.

_____ / _____ / _____
CITY STATE ZIP

SEALED BY _____

☐ FISH AND GAME ☐ FURBUYER ☐ PUBLIC SAFETY ☐ APPOINTED SEALER

_____ / ____ / _____ / _____
MONTH DAY YEAR PLACE OF SEALING
DATE OF SEALING

LICENSE NUMBER ____/____/____/____/____/____

RECORD ONLY ONE SPECIES PER FORM

☐ BEAVER ☐ LYNX ☐ OTTER ☐ WOLF ☐ WOLVERINE

SEAL NO.	LOCATION OF HARVEST				DATE TAKEN	METHOD OF TAKE*	SEX**			USE THIS SPACE FOR BEAVER, LYNX OR OTTER		WOLF			
	GMU	SUB-UNIT	DO NOT USE THIS SPACE	DRAINAGE-SPECIFIC AREA	MO/YR		M	F	UNK	LENGTH	WIDTH	PELT COLOR W	PELT COLOR GR	PELT COLOR BL	NUMBER IN PACK

FALSIFICATION OF INFORMATION ON THIS FORM IS PUNISHABLE UNDER AS 11.56.210(a)
I CERTIFY THAT THE INFORMATION PROVIDED HEREIN IS ACCURATE AND TRUE TO THE BEST OF MY KNOWLEDGE.

* METHOD OF TAKE
1. GROUND SHOOTING 2. TRAPPING
3. SNARING 4. AERIAL SHOOTING
5. OTHER

** EXCEPT BEAVER, LYNX

_____
HUNTER/TRAPPER SIGNATURE

RETURN ALL COPIES TO DEPARTMENT OF FISH AND GAME

FORM 11-12-78 7/84

Figure A.1. Furbearer sealing certificate.

ATTACH TO FUR SHIPMENT

RAW FUR SKIN EXPORT PERMIT
STATE OF ALASKA
Department of Fish and Game

Raw Fur Skins May Not Be Exported From Alaska Without This Permit Attached

The skins herein having been legally taken, I, _____ of _____
PRINT NAME

_____
PRINT ADDRESS

certify that I have completed and mailed on _____ at _____ a
DATE POST OFFICE OR CARRIER NAME

Export Report listing all furs contained in this shipment _____
SIGNATURE

FORM 11-006B (Rev 5/84)

Figure A.2. Raw fur export form.

Date: Mo._____ Day_____ Yr._____ **DETACH & MAIL**

Name _____
Print Name of Shipper

Address _____

_____

License No. _____

Species	No.	Taken In GMU*	Species	No.	Taken In GMU*
1. Beaver			10. Mink		
2. Coyote			11. Muskrat		
3. Fox, Blue			12. Otter, Land		
4. Fox, White			13. Red Squirrel		
5. Fox, Cross			14. Weasel (Ermine)		
6. Fox, Red			15. Wolf		
7. Fox, Silver			16. Wolverine		
8. Lynx			17. Other (Specify)		
9. Marten					

Shipped To: Name _____

Address _____

_____

RAW FUR SKIN EXPORT REPORT

INSTRUCTIONS: This report must be mailed at the time furs are shipped. The permit must be detached from this report and attached to fur shipment.

*GMU to be filled out by hunters and trappers only. Fur dealers place an "X" in both blanks.

FORM 11-006B (Rev. 5/84)

(For State Use Only)

STATE OF ALASKA
DEPARTMENT OF FISH AND GAME
BLACK BEAR SEALING CERTIFICATE

Hide _____ (Seal Numbers) _____ (Place of Sealing) _____ (Date of Sealing)

Skull _____ CERTIFICATE NUMBER 31923

SPECIES	*SEX	SEX IDENTIFIERS
Black _____	Male _____	Penis Sheath _____
Cinnamon _____	Female _____	Vaginal Orifice _____
Blue _____	Unknown _____	Teats: L ____ M ____ S ____
		None _____

SKULL	SPECIMENS COLLECTED	TRANSPORTATION USED
Length _____ in.	Tooth _____	Aircraft _____
Width _____ in.	Skull _____	Off-road Vehicle _____
Total _____ in.	Repro. _____	Boat _____
(to nearest 1/16 in.)	HIDE _____	Horse _____
	Cem. Age _____	Other _____

Days Hunted _____ ***Date of Kill** _____

***Location of Kill:** Unit _____ Sub Unit _____

Mt. Range and Drainage _____

Specific Location _____

Name of Hunter _____

(Address) (City) (State) (Zip)

License No.	Tag No.	Guided Hunt
Resident		Yes _____ No _____
Non-Resident		Guides Name _____

X _____ _____

Signature of Hunter Sealed by (PLEASE PRINT) Ⓟs

REMARKS: Incidental Take Yes ☐ No ☐ (55 56) Meat Salvaged Yes ☐ No ☐ (57 58)

*MUST BE FILLED OUT Code _____

Figure A.3. Black bear sealing certificate.

(FOR STATE USE ONLY)

STATE OF ALASKA DEPARTMENT OF FISH AND GAME
BROWN/GRIZZLY, POLAR BEAR CERTIFICATE

Hide_____ _____ _____
(Seal Numbers) (Place of Sealing) (Date of Sealing)

Skull_____ CERTIFICATE NUMBER 62114

SPECIES	*SEX	SEX IDENTIFIERS
Brown-Grizzly_____	Male_____	Penis Sheath_____
Polar_____	Female_____	Vaginal Orifice_____
	Unknown_____	Teats: L_____ M_____ S_____
		None_____

SKULL	SPECIMENS COLLECTED	TRANSPORTATION USED
Length_____ In.	Tooth_____	Aircraft_____
	Skull_____	Off-road Vehicle_____
Width_____ In.	Repro_____	Boat_____
	Hide_____	Horse_____
Total_____ In. (To Nearest 1/16 in.)	Cem. Age_____	Other_____

DAYS HUNTED_____ *DATE OF KILL_____

*LOCATION OF KILL: UNIT_____ SUB UNIT_____

MT. RANGE AND DRAINAGE_____

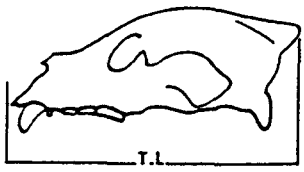
SPECIFIC LOCATION_____

NAME OF HUNTER_____

_____
(Address) (City) (State) (Zip)

LICENSE NO.	TAG NO.	GUIDED HUNT
RESIDENT		YES ☐ NO ☐ GUIDES NAME_____
NON-RESIDENT		

X_____ _____
SIGNATURE OF HUNTER SEALED BY (PLEASE PRINT)



REMARKS_____

_____

_____

_____

CODE_____

11-78A
8/80

*MUST BE FILLED OUT

Figure A.4. Brown bear/grizzly, polar bear sealing certificate.

STATE OF ALASKA

DEPARTMENT OF FISH AND GAME

WATERFOWL HUNTER SURVEY
1985 - 1986

DEAR HUNTER:

Your cooperation is needed to better manage Alaska's waterfowl. By accurately answering the questions below concerning your hunting activities in 1985, you can help insure proper management and good hunting for the future. If you can't remember exact numbers, give your best estimate. Complete the form printed below and drop this card in the mail. No postage stamp is necessary. Thank you for your cooperation.

PART I (ALL RECIPIENTS COMPLETE)

A. DID YOU BUY A FEDERAL DUCK STAMP IN 1985?
YES ☐ NO ☐

B. HOW MANY ALASKA STATE DUCK STAMPS DID YOU BUY? ☐

C. DID YOU HUNT FOR WATERFOWL DURING THE 1985-1986 SEASON? YES ☐ NO ☐

PART II (COMPLETE ONLY IF YOU HUNTED)

D. PLEASE LIST ALL THE PLACES WHERE YOU HUNTED WATERFOWL, NUMBER OF DAYS HUNTED AT EACH LOCATION AND NUMBER OF BIRDS SHOT AND RETRIEVED.

PART II (CONT.)

PLACES HUNTED (FOR EXAMPLE, MINTO FLATS, STIKINE FLATS, SUSITNA FLATS, ETC.)	NUMBER BIRDS SHOT AND RETRIEVED										
	7. DAYS HUNTED	8. DUCKS	9. SEA DUCKS & MERGANSERS	10. CANADA GEESE	11. SNOW GEESE	12. WHITE-FRONTED GEESE	13. BRANT	14. EMPEROR GEESE	15. UNKNOWN GEESE	16. CRANE	17. SNIPE
1.											
2.											
3.											
4.											
5.											

Figure A.5. Waterfowl hunter postal survey questionnaire.

INFORMATION SHEET

1984 DEER HUNTER SURVEY QUESTIONNAIRE

1150
1
99811

(1) Did you hunt deer in Southeast Alaska? ☐ Yes ☐ No

(2) What was the **total** number of deer killed in Southeast? ☐

(3) How many **total** days did you hunt deer? ☐☐

(4) Number of Harvest Area*	(5) Number of Days Hunted In Area	(6) Month(s) Deer Killed (Circle)	(7) Number of Deer Killed	
			Bucks	Does
☐☐	☐☐	Aug. Sept. Oct. Nov. Dec.	☐☐	☐☐
☐☐	☐☐	Aug. Sept. Oct. Nov. Dec.	☐☐	☐☐
☐☐	☐☐	Aug. Sept. Oct. Nov. Dec.	☐☐	☐☐
☐☐	☐☐	Aug. Sept. Oct. Nov. Dec.	☐☐	☐☐
☐☐	☐☐	Aug. Sept. Oct. Nov. Dec.	☐☐	☐☐
☐☐	☐☐	Aug. Sept. Oct. Nov. Dec.	☐☐	☐☐
☐☐	☐☐	Aug. Sept. Oct. Nov. Dec.	☐☐	☐☐

(8) Comments: ☐☐ ______________________________

____

____

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*Use numbers from maps located on inside pages. Also, please mark the location of each individual hunt on the map with a small "x".

Figure A.6. Deer hunter postal survey questionnaire.

B. ADF&G, Division of Subsistence, Database

Unlike other divisions of the Department of Fish and Game, which work to understand animal biological systems, the Division of Subsistence works to understand human systems and their uses of fish and game resources. It is basically a research agency, with no direct resource management or regulatory functions. Its primary responsibility is collecting information on the role of subsistence hunting, fishing, and gathering in the lives of state residents. The Division of Subsistence makes information available to various government agencies and the general public when questions of habitat management and development arise.

The Alaska Habitat Management Guides project has summarized portions of this database that are relevant to land management decisions and economic assessments for the different regions. (See the Alaska Habitat Management Guides for summaries and interpretations of the data from the information sources described below.)

Division of Subsistence personnel rely on four major field techniques for collecting information: 1) key respondent interviews, 2) systematic household surveys, 3) participant observation of the activities described in surveys and interviews, and 4) mapping sessions with resource users. Information is compiled and arranged in the following forms which are available to other government agencies and the public.

I. CURRENT INFORMATION SOURCES

A. Technical Papers

Since the Division of Subsistence was established in 1979, it has produced over 125 technical papers. They cover a wide range of subjects and areas. They document patterns of harvest and use of fish, game, marine mammals and invertebrates, plants, and other wild resources. They describe resource use by families, communities, and regions. Both historic and current hunting and fishing practices are covered. The papers include information on harvest levels, seasonality of harvests, means and methods of harvest, distribution and exchange of harvested resources, geographic harvest areas, and the cultural, social, and economic importance of subsistence resource use in the lives of the residents of the study area. Information about community income and demographics is included in many reports. A complete list of these papers is presented in table A.5.1.

B. Regional Subsistence Bibiliographies

Regional subsistence bibliographies have been compiled and computerized for all regions of the state. In 1985, published copies of these bibliographies were available for all but the

Southeast and Western regions. Copies for those regions are expected to be available in early 1986. The computerized bibliography is accessible to researchers in all regional offices of the ADF&G. A key-word filing system enables people to search sources by subject. The bibliographies are a unique information source and provide a relatively complete retrieval of existing literature on subsistence.

C. Subsistence Land Use Maps and Map Catalog

The Division of Subsistence routinely collects information on subsistence fishing, hunting, gathering, and trapping areas, a large proportion of which is in the form of mapped data. The maps depict resource use areas for species on a household and community basis. Subsistence use maps are available in regional offices of the ADF&G. During FY 1985, the division began the process of systematically describing and cataloging subsistence use maps. Microcomputers in each regional office maintain regional map catalogs. The Juneau headquarters office and the Anchorage and Fairbanks regional offices also keep a statewide catalog. Users are able to search for maps by community, region, resource, quadrangle, and longitude and latitude coordinates. It is estimated that the final map catalog will list over 1,000 finished maps available to users outside the Division of Subsistence.

II. FUTURE INFORMATION SOURCES

A. Community Profiles

Community profiles are planned for over 300 communities in the state. Some have already been completed and exist in unpublished versions in regional offices. The profiles contain comparable information on community demography (population, average household size), household income, resources used, seasonality of harvests, resource harvest levels, harvest methods, and the systems of distribution and exchange of food and goods in the community. Community profiles are the next information sources to be filed in computers. This database will simplify management and retrieval of information that is commonly needed to respond to subsistence resource use questions. All regional offices as well as Juneau headquarters will have computer access to the community profiles database.

B. Geoprocessing

This is the term for a sophisticated computer filing and access system for subsistence land use maps. With it, one can overlay different combinations of resource use, habitat, or topographic

maps on any scale desired. Such overlays often make conflicting or compatible land uses readily apparent. In late 1985, the division was developing this capability for Arctic Region subsistence information for use in development and resource management issues on the North Slope.

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D. List of Abbreviations

ACMP	Alaska Coastal Management Program
ADCED	Alaska Department of Commerce and Economic Development
ADCRA	Alaska Department of Community and Regional Affairs
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADL	Alaska Department of Labor
ADNR	Alaska Department of Natural Resources
ADR	Alaska Department of Revenue
AEIDC	Arctic Environmental Information and Data Center
AOU	American Ornithological Union
BBCMP	Bristol Bay Cooperative Management Plan
BLM	Bureau of Land Management
CFEC	Commercial Fisheries Entry Commission
CIRPT	Cook Inlet Regional Planning Team
EPA	Environmental Protection Agency
EPS	Environmental Protection Service (Canada)
ERL	Environmental Research Laboratory
FAO	Food and Agriculture Organization of the United Nations
GMS	Game Management Subunit
GMU	Game Management Unit
IMS	Institute of Marine Science
INPFC	International North Pacific Fisheries Commission
IPHC	International Pacific Halibut Commission
IUCN	International Union of Conservation of Nature and Natural Resources
ISEGR	Institute of Social, Economic and Government Research
LCI	Lower Cook Inlet
MMS	Mineral Management Service
NEGOA	Northeast Gulf of Alaska
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPFMC	North Pacific Fishery Management Council
NPS	National Park Service

NWAFC	Northwest and Alaska Fisheries Center
NWR	National Wildlife Refuge
OCSEAP	Outer Continental Shelf Environmental Assessment Program
OMPA	Office of Marine Pollution Assessment
PWS	Prince William Sound
PWSRPT	Prince William Sound Regional Fisheries Planning Team
UCI	Upper Cook Inlet
USDC	United States Department of Commerce
USDA	United States Department of Agriculture
USDI	United States Department of Interior
USDL	United States Department of Labor
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service