Subsistence Harvest and Use of Fish and Wildlife Resources And the Effects of Forest Management in Hoonah, Alaska

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ABSTRACT

Research reported in this document was designed to a) provide baseline data on the subsistence harvest and use of fish and wildlife resources by Hoonah residents and b) examine changes in subsistence that may be taking place due to logging and road construction in the Hoonah area and due to the state and federal regulatory environment. Intensive field research conducted in Hoonah in 1986 and 1987 collected ethnographic data through interviews with Hoonah elders and other residents of the Port Frederick area and gathered subsistence harvest and use and socioeconomic data through a random household survey of 71 of Hoonah's 255 households. Less intensive research activities continued through 1988-1990. Mapped data showing the locations of subsistence harvests and the intensity of subsistence land use were collected through key informant interviews, survey questions, and public meetings. Measures of intensity of land use were developed from these data.

Hoonah residents were found to rely on subsistence harvests for much of the food they use, harvesting an average of 209 lbs per capita and using 234 lbs per capita of fish, wildlife, and plant resources in the study year. Salmon and other fish accounted for 41 percent of the subsistence food harvested; deer accounted for 25 percent. Seals, marine invertebrates, and seaweeds also had important subsistence harvests. Subsistence hunting, fishing, and gathering took place primarily in traditional clan and community harvesting areas. We divided the entire area used by Hoonah residents for customary and traditional subsistence harvests into 30 analytical units and examined intensity of use and change in intensity of use over time. These measures suggested some changes in intensity of use due to recent timber harvesting and showed a sharp decline in use of traditional territories within Glacier Bay National Park since the 1950s. The change in Glacier Bay has been the result of National Park Service policies that have discouraged or prohibited the subsistence harvesting of fish and wildlife from the areas traditionally used by Huna Tlingit that now lie within park boundaries.

We examined deer harvesting in the core area most important to Hoonah residents and found that significant changes were underway affecting local subsistence patterns of use of this species. Logging and logging-related construction has resulted in the establishment of semi-permanent camps and settlements within the Hoonah core area. Residents of these camps compete with Hoonah residents for deer and other resources. Hundreds of miles of logging roads have been constructed in the Hoonah core area since 1982. Hunters from other southeast Alaska communities now use these roads during the deer hunting season, adding to the hunting pressure on deer and the competition with Hoonah hunters. The total deer harvest in areas with logging roads has risen sharply, and, at the time of this study, Hoonah hunters were unable to harvest the number of deer they desire.

Logging of high-volume, old-growth forest on both Tongass National Forest and Native Corporation land near Hoonah has resulted in a progressive, cumulative loss of critical deer habitat. With this loss of habitat, the Hoonah core area's ability to support deer has declined over time. This decrease in the deer habitat due to logging, coupled with increased deer harvests by non-Hoonah residents, may have a long-term impact on Hoonah residents' subsistence hunting. This study indicates that subsistence hunting has been restricted in some parts of the Hoonah core area by past logging. Subsistence harvesting of deer by Hoonah residents may be restricted in all parts of the Hoonah core area if present plans to log on northeast Chichagof Island are followed.

Hoonah residents' harvest and use of fish has been affected by State of Alaska and federal regulations that restrict bag limits, areas where fish may be taken, and gear that may be used for subsistence fishing. Partly because of the restrictive regulatory environment, substantial portions of the fish used for subsistence by Hoonah residents are taken from legal commercial catches. Some fish species, particularly coho and king salmon and halibut, are also caught under sport fishing regulations.

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A number of organizations deserve special mention as well. The Hoonah Indian Association provided special assistance during the field survey interviewing in 1986. The Hoonah City Council provided a review of maps produced from this research project in 1987. Members of the Hoonah Elders Council schooled us in the history of Hoonah and in subsistence traditions. Members of the Hoonah Fish and Game Advisory Committee and many active commercial fishermen provided information not available from other sources. Managers of the Whitestone logging camp assisted us in contacting their employees. Forest Service management and planning staff at both the district and regional level provided us with quantitative data unavailable from other sources.

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CHAPTER 1

STUDY BACKGROUND: PERSPECTIVE AND METHODOLOGY

Introduction

This report presents the results of field research conducted by the Division of Subsistence, Alaska Department of Fish and Game, in Hoonah, Alaska, in 1986 and 1987. The Hoonah community study was part of a larger project designed to examine the relationship between timber management and fish and wildlife utilization in southeast Alaska communities and to gather baseline subsistence data. The overall design for this larger project was developed jointly by the Division of Subsistence and by the U.S. Forest Service (Forest Service) and directed research in six southeast communities. The Forest Service provided partial funding for some early community studies in this project[1].

This is the final community report in this research series. Reports from community studies in Angoon, Kake, Klawock, Tenakee Springs, and Yakutat have been completed (George and Bosworth, 1988; Firman and Bosworth, 1990; Ellanna and Sherrod, 1986; Leghorn and Kookesh, 1986; Mills and Firman, 1986). A summary report examining the data from the six community studies will be completed in 1990.

Hoonah and the other communities were chosen for intensive studies both because they have contrasting histories of forest management and differing potentials for future logging and because they are representative of the small and medium-sized communities of southeast Alaska. Hoonah was chosen as a medium sized Tlingit community where large-scale logging was beginning in the 1980s and where plans called for extensive harvesting of timber resources in areas close to the community. Examining subsistence harvest of fish and game in Hoonah during this time period provided the opportunity to study the impacts of logging in their initial stages.

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1. Forest Service is directed by the Alaska National Interest Lands Conservation Act Sec. 810 to evaluate the impact of its activities upon subsistence. These community studies were aimed at providing data needed for this evaluation.

Since the completion of field work for this study, additional quantitative data covering subsistence harvests has been collected[2], deer population modeling has been developed[3], court cases have examined the impact of logging in the Hoonah area[4], and management of Tongass National Forest has been under congressional review[5]. Where appropriate, reference is made to these recent sources of information.

Study Context

The Tongass National Forest, managed by the Forest Service, comprises 70 percent of the total land area in southeast Alaska, including most of the land used for subsistence harvesting by Hoonah residents on north Chichagof Island. Glacier Bay National Park and Misty Fiords National Monument are other major federally managed lands in southeast Alaska. Other land, including stands of old-growth forest usually located close to communities, is held by Native Corporations which received this land as part of the Alaska Native Claims Settlement Act of 1971[6]. Municipalities and the State of Alaska are the other major land owners.

Timber harvesting in southeast Alaska takes place on Tongass National Forest lands and on state and private land. In the mid-1980s in Hoonah and some other communities the volume of logging on Native Corporation land has been substantial; logging on state land has had an impact in some areas. Because of the sheer size of Tongass National Forest and the timber harvest level ordered by Congress, however, most of the long term changes to fish and wildlife habitat and to subsistence uses of natural resources that are attributable to logging will take place from logging on this federal land.

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2. The Division of Subsistence joined with U.S. Forest Service and the University of Alaska in survey research in 1988 to estimate levels of subsistence harvest and map subsistence use areas in 30 southeast Alaska communities.
3. Recent data and analysis show the number of deer that can be maintained, actual and desired harvest levels, and biologically safe harvest levels under different timber harvesting scenarios.
4. Suits in federal court are adjudicating the impact of logging in the Hoonah area. Court ordered hearings in Hoonah have been held.
5. Various bills are working their way through Congress. In some versions of these bills, funding for forest management would be changed, amount of timber cut would be lowered, and some areas near Hoonah would be closed to logging.
6. The Native corporations for Angoon, Sitka, and some other communities selected timber land outside their hunting and fishing areas.

In 1957 the federal government signed a contract with a Japanese firm to provide a specified level of timber supply to the Alaska Pulp Corporation mill to be located in Herring Cove close to Sitka. The harvest requirements of this 50 year contract, which commenced in 1961, have been the driving force behind U.S. Forest Service land management activities in the Hoonah subsistence area for the past decade. Section 705 (a) of the Alaska National Interest Land Conservation Act (ANILCA), passed December 2, 1980, provided further, albeit difficult to reconcile, direction to U.S. Forest Service on how to manage the Tongass National Forest. On the one hand ANILCA has provided a guaranteed budget of at least $40 million per year to develop roads, log transfer facilities, and other infrastructure to facilitate logging and directed U.S. Forest Service to make available 450 million board feet (mmbf) of timber per year to contract holders from Tongass National Forest: assuming about 30,000 board feet per acre, this means that about 15,000 acres of forest, or about 25 square miles, need to be cut each year. On the other hand, Sec. 810 of the same act provides strong direction to U.S. Forest Service to avoid land use actions that may restrict subsistence uses of federal lands and to mitigate impacts where actions can not be avoided[7].

Timber harvesting, road construction, and other land management for the entire Tongass National Forest is guided by the Tongass Land Management Plan (TLMP), first completed in 1979. As directed by Congress, Forest Service is preparing a TLMP revision with a draft expected some time in 1990. The 1979 plan classified forest lands, divided into value comparison units (VCUs), according to four land use designations (LUD) from most restrictive on timber harvesting, LUD I, to the most harvest oriented, LUD IV.

In addition to TLMP, which sets an overall outline for timber harvests, five-year operating plans and environmental impact statements (EIS) have been prepared for the two timber sale areas

7. At the time of this writing, Tongass reform legislation is working its way through the U.S. Congress. Congress is considering eliminating a guaranteed funding level for U. S. Forest Service for managing the Tongass, removing the direction to Forest Service to cut 4.5 billion board feet per decade, cancelling the long-term contracts, requiring National Marine Fisheries Service requirements for buffer strips bordering anadromous streams where logging can not take place, and creating new wilderness areas.

within the national forest[8]. For the Hoonah area, operating plans and EISs were prepared for the 1981-86 and 1986-90 time periods. Because of court direction, a supplement to the 1981-86 and 1986-90 operating plans was prepared and issued in November, 1989 (Forest Service, 1989)[9]. This level of planning describes the location of timber clear-cuts, roads, log transfer sites, and camps, as well as the harvest schedules to be followed and methods to be used. In 1990 the Forest Service announced that it would no longer prepare five-year operating plans for the northern portion of the Tongass. In place of the five-year plans, a sequence of project plans would be prepared, with each covering a small portion of the forest[10].

ANILCA Sec. 810 evaluations and determinations are a necessary part of all Forest Service land use plans that direct timber harvest or other management activity the may affect subsistence uses of fish and game whether they be the decennial forest-wide management plans, the five-year operating plans and EISs, or the project plans[11]. The TLMP, operating plans, and project plans are required to a) evaluate subsistence uses and determine if significant restrictions on subsistence may occur, b) hold public hearings concerning the restrictions on subsistence, c) show that planned logging and road building are necessary if they may result in restrictions on subsistence, and d) find other land or mitigate the impacts on subsistence of these land use actions.

Formal assessment of the impact of forest management plans and actions on harvest and use of fish and wildlife takes place under the National Environmental Protection Act (NEPA) and under sections 802 and 810 of ANILCA. NEPA requires that an environmental assessment (EA) be prepared

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8. The northern sale area, supplying logs to the Alaska Pulp Corporation mill in Sitka, includes the northern portion of southeast Alaska: Baranof, Chichagof, Kruzof, Kuiu, Yakobi and smaller islands and on the mainland in this area. The southern sale area, supplying logs to the Ketchikan Pulp Corporation, logs on Etolin, Kupreanof, Mitkof, Prince of Wales, Revillagigeda, Zarembo, and smaller islands and on the mainland in this area.

9. The court directed Forest Service in Tenakee v. Ling to prepare supplements showing site-specific and cumulative effects on subsistence due to logging and road building activities. The court provided further direction in Hanlon v. Barton.

10. Plans under way for Kelp Bay Project and for the Southeast Chichagof Island Project anticipate cutting 100,000,000 board feet from each of these areas over the next few years. Subsequent project plans will cover Hoonah Sound, Kruzof Island, and other areas in the Alaska Pulp Corporation sale area. The southern portion of the Tongass completed a five-year plan covering the 1989-94 time period.

11. Procedures for doing legally correct Sec. 810 evaluations and determinations are being developed. The ADF&G recommendations to Forest Service for 810 procedures is found in Appendix IV.

for both TLMP and operational plans. The effects of Forest Service management plans are also examined under the NEPA.

ANILCA requires that the subsistence uses of rural Alaskan residents be considered in the development of management plans and policies for all federal lands in Alaska. Specifically, Section 802 states that:

> *Consistent with sound management principles, and the conservation of healthy populations of fish and wildlife, the utilization of the public lands in Alaska is to cause the least adverse impact possible on rural residents who depend upon subsistence uses of the resources of such lands; consistent with management of fish and wildlife in accordance with recognized scientific principles and the purposes for each Unit established, designated, or expanded by or pursuant to titles II through VII of the Act (ANILCA), the purpose of this title is to provide the opportunity for rural residents engaged in a subsistence way of life to do so. (16 USC 3112)*

In order to insure compliance with this clear direction, Congress further stipulated in Section 810 of ANILCA that:

> *In determining whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands under any provision of law authorizing such actions, the head of the Federal agency having primary jurisdiction over such lands or his designee shall evaluate the effect of such use, occupancy, or disposition on subsistence uses and needs, the availability of other lands for the purposes sought to be achieved, and other alternatives which would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes. No such withdrawal, reservation, lease, permit, or other use, occupancy or disposition of such lands which would significantly restrict subsistence uses shall be effected until the head of such Federal agency:*
>
> > *(1) gives notice to the appropriate State agency and the appropriate local committees and regional councils established pursuant to section 805;*
> > *(2) gives notice of, and holds, a hearing in the vicinity of the area involved; and*
> > *(3) determines that (A) such a significant restriction of subsistence uses is necessary, consistent with sound management principles for the utilization of the public lands, (B) the proposed activity will involve the minimum amount of public lands necessary to accomplish the purposes of such use, occupancy, or other disposition, and (C) reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources resulting from such actions. (16 USC 3112)*

The community studies that are part of the larger Division of Subsistence research program in southeast Alaska and the summary report that will be completed in 1990 are designed to provide data that will be useful in this planning process. Data from these and other studies of the characteristics of subsistence harvest and use of fish and wildlife will assist Forest Service planners to identify the community subsistence uses that depend on Forest Service lands, to assess the potential impact that logging

and road building may have on these uses, to avoid restrictive impacts where possible, and to use mitigation to lessen the impacts where logging and road building have been shown to be necessary as intended in the ANILCA legislation.

Study Purposes

There are three main purposes of this study:

1) collection and analysis of baseline data on subsistence use of fish and wildlife by residents of the community of Hoonah,

2) examination of change over time in the areas used for subsistence harvests by Hoonah residents, and

3) examination of the on-going effects of logging on subsistence uses in Hoonah.

Baseline Research

Since the passage of the State of Alaska law in 1978 giving subsistence a priority over other uses of fish and wildlife, the Division of Subsistence has been engaged in research to document important features of contemporary subsistence use of these natural resources in rural communities throughout the state. Through the research efforts of the Division of Subsistence and other researchers, comparable baseline data are available for more than half of the rural subsistence communities of the state. The current study will contribute to this expanding body of knowledge.

This study presents data on the following aspects of subsistence uses in Hoonah:

1) description of the community cultural context,

2) community socioeconomic and demographic data,

3) listings of species used,

4) seasonal round of subsistence harvests,

5) levels of harvest and use,

6) means of harvesting, and

7) geographical characteristics of harvesting.

The collection of baseline data will enable future studies to examine change in subsistence over time[12]. Subsequent studies in southeast Alaska communities will use baseline data from this round of research to assess changes in subsistence harvest and use due to logging, changes in species distribution and abundance, economic change, and other factors.

Change in Subsistence Use

The second objective of this study is to describe and assess change in the subsistence uses of Hoonah over time. This study discusses changes in the level of use of specific areas in detail. This research attempts to identify forces resulting in change in subsistence use areas in this community including forest management practices, related changes in species distribution and abundance, regulations governing fish and wildlife harvests, improvements in technology of harvesting, and growth of the local cash economy.

Effects of Forest Management

Examining the effects of logging and road building on the subsistence uses of Hoonah residents is the third objective of this research. The study also examines the direct effects of timber harvesting on the cash economy of Hoonah and on its social and demographic composition as well. However, because most logging and road building affecting Hoonah is relatively recent and because much more extensive timber harvesting is scheduled for coming years, many of the effects of this activity are

12. In the few cases where we have good diachronic harvest information for communities, we have found that the composition of subsistence harvests may vary significantly from year to year although the total food weight of harvests remains relatively constant (Burch, 1985; Fall, 198).

not fully manifest as yet. The current research identifies some of the important early changes in subsistence use of fish and wildlife that have been the result of logging and roading and delineates the vectors of change that are likely to affect subsistence use in the coming years.

Methodology

A common methodology has been employed in the series of related community studies in southeast Alaska (Division of Subsistence, 1984). This section outlines the main characteristics of the research approach.

Research Field Time

A major characteristic and strength in all studies has been the continued field presence in study communities and extensive contact of field researchers with community residents both during the active phase of field research and following completion of formal research. Two field researchers worked intensively in Hoonah during the most active period of field research, from January 1986 through June 1986. Two Tlingit speaking Hoonah residents were hired to assist in completion of a community census and to conduct survey interviews. Approximately 15 field visits were made to Hoonah between June 1986 and June 1987 to conduct further interviews, to inform the community of the progress of this research, and to obtain approval of final maps. Survey and mapped data have been discussed with community members during fish and game regulatory meetings and during other field visits to Hoonah in 1988, 1989, and 1990.

Community Review

Before field research was begun in Hoonah, the researchers held public meetings to present the research design and explain what was proposed to the Hoonah City Council and members of the

community. Hoonah residents contacted at public meetings and city council members supported research that would document their subsistence use of fish and wildlife and examine the effect of logging on subsistence. Data collection began after obtaining community support and approval for the research design. Initial research findings were discussed and checked with community residents as analysis proceeded. Members of the Hoonah Indian Association, the tribal governmental body for Hoonah formed under the Indian Reorganization Act, and members of the Hoonah City Council read and reviewed a draft of this report prior to publication.

Literature Review

The literature review conducted as part of this project covered a number of key areas. The theoretical base for understanding contemporary subsistence harvesting comes partly from anthropological literature on small scale hunting and gathering societies and increasingly from recent studies of subsistence harvesting in arctic and subarctic communities (Wolfe and Walker, 1987). Initial work drew heavily on anthropological studies conducted with hunting and gathering peoples in Alaska and elsewhere (cf., Burch, 1975; Lee and Devore eds. 1979; Nelson, 1969; Van Stone, 1967). Research funded by the Bureau of Land Management through its Outer Continental Shelf program (cf. Armstrong and Braund, 1983; Wolfe, 1981) also assisted in developing useful directions for baseline research. The theoretical model of subsistence-based economies developed in the literature guided the analysis of the Hoonah data.

Review of literature on southeast Tlingit societies provided important historical background on the development of Hoonah as a modern community. This literature pointed to features of Tlingit culture and society that are intimately associated with the use of territory and contemporary harvest and use of fish and wildlife. These themes are discussed below.

Review of timber harvesting documents and records kept by ADF&G and by the Forest Service provided historical perspective on the effects of state and federal resource management on Hoonah residents as well as a tracking of important resource questions. Finally, the review of impact

studies provided examples of methods for assessing whether or not significant impacts have occurred or are likely to occur from timber harvesting.

Key Respondent Interviewing

Key respondent interviews were conducted to collect historical data, information on the social structure of Hoonah, harvesting practices, and other information relevant to subsistence harvesting and use. Contacts were made with the recognized heads of all Tlingit clans in Hoonah. These individuals and other elders provided important information on the founding and development of Hoonah, the origin of the Hoonah population, clan territories, and historic use of Glacier Bay. Elders also identified some long term trends in fish and wildlife harvesting not available from other records. Interviews were conducted with active commercial fishermen, Huna corporation leaders, the Hoonah Elders Council, Hoonah Indian Association officers, members of the Alaska Native Brotherhood and Alaska Native Sisterhood, and city government staff. Forest Service staff and staff of Whitestone Logging Corporation, the Alaska Pulp Corporation contractor with a camp near Hoonah, described on going timber harvesting activities on Forest Service and Native corporation land, provided estimates of timber harvest level and size and location of the logger population. Hoonah community residents went with researchers in areas surrounding Hoonah on visits to subsistence harvesting areas. Hoonah residents and Forest Service staff also went with researchers to show logging sites and logging practices on federal and Native corporation land.

More formal interviews in which a schedule or list of questions was used were conducted with 10 active hunters as part of initial work defining the Hoonah subsistence use area and with 15 elders concerning historical and clan events in Hoonah. A large number of less formal interviews took place in the course of initial field research and in subsequent field visits. We found that a great deal of important information was gathered through these less formal contacts as well. Community members had topics that they wished us to know about. Important issues concerning subsistence use of Glacier

Bay and increased competition with non-resident hunters for deer were repeatedly raised by respondents.

Subsistence Use Area Mapping

Two types of use area mapping were done as part of this research project: mapping the extensivity of the area by Hoonah residents for subsistence harvest of the main species used and intensity of use estimation for areas within the boundaries of the total subsistence use area. Standard reference maps at 1:250,000 scale were produced through the first type of mapping. These follow mapping conventions that have been used by the Division of Subsistence to produce reference maps in approximately 100 communities throughout the state (Ellanna and Sherrod, 1986). The research methods used in the second type of mapping were developed specifically for the southeast Alaska community studies to provide a measure of intensity of subsistence use over time.

Extensivity Mapping

The extensivity mapping was done to document the outer boundaries of the territory used for subsistence harvesting by community residents. Maps from this research show the boundaries of the subsistence use area for each major resource that they harvest. Map biographies of ten key respondents provided initial mapped data for developing the community subsistence maps. Key respondents for mapping were chosen on the basis of their community reputation as knowledgeable, active subsistence harvesters. Clan territories and clan ownership are often mentioned in the literature; for this reason, leaders of different clans were asked to contribute mapped data.

In collecting map biographies, we spread out 1:250,000 scale maps with transparent overlays and asked key respondents to draw lines on the overlays to include the areas where they personally had gone for each harvesting activity. We asked respondents to include all the areas they had used while

they had been living in Hoonah for customary and traditional harvests[13]. Areas incidentally or only rarely used were not included. We also did not include areas a respondent knew had been used by his parents or grandparents unless he had also used these areas. Mapping sessions usually lasted three or four hours and two sessions were often needed to complete a map biography.

In the next stage of producing community subsistence maps, the map biographies from the ten key respondents were composited. The resulting composite maps were shown once more to key respondents and were presented to elders and other community members in individual interviews and in meetings called to review these map products. The goal of these interviews and presentations was to insure both that all of the areas used by Hoonah residents for customary and traditional subsistence harvests was represented and that no extra area had been erroneously included[14]. In total, about 60 community residents, including most knowledgeable elders and active hunters, contributed to the field mapping and map review.

Final reference maps were subject to further review by community residents in early 1987. A resolution approving the maps as an accurate representation of the areas used by Hoonah residents for customary and traditional subsistence harvests was passed by the Hoonah City Council on March 17, 1987.

Intensity Mapping

While the reference maps produced through extensivity mapping research provide good documentation of all of the areas used by Hoonah residents for subsistence harvests, they do not provide information about which areas have been used more frequently than others or what changes frequency

13. Map biographies do not include all of the area where key respondents have ever hunted or fished. For example, a hunt with a friend near Klawock or fishing at the southern end of Admiralty Island at the end of the commercial fishing season are not included because these areas are not considered by informants to be customary and traditional use areas.

14. This methodology excludes areas outside the territory of the Huna Tlingit. Hoonah residents have hunted and fished at one time or another throughout southeast Alaska and in many other parts of the state as well. These other areas, however, are not seen by Hoonah residents as being part of their territory or customary and traditional subsistence use area.

of use have occurred over time. In order to examine these questions, we gathered intensity of use data as part of our household survey.

After we knew the outer boundaries of the area used by Hoonah residents from the extensivity mapping, we conducted further key respondent interviews to determine the best way to divide the total use area into small geographical units that would be meaningful to community residents. We were able to divide the total area used into 30 analytical units, each of which corresponds to a geographical area easily recognized by Hoonah residents. These units are smaller, or more fine-grained, in the area closest to Hoonah and larger in areas distant from the community. Where possible, the boundaries of our analytic units are consistent with State of Alaska game management unit boundaries, Glacier Bay National Park boundaries, and Forest Service value comparison unit (VCU) boundaries.

As part of our household survey, we asked respondents what years they used each geographic unit for subsistence harvesting activity (see Appendix II). Analysis of these data provide a quantitative indication of the relative level of use by Hoonah households of different parts of the whole Hoonah use area in a given year and changes in use over time. This technique is adequate for providing these first measures of intensity of use and could be adapted in other research to produce other measures of intensity as well.

Household Survey

We conducted survey of a random sample of Hoonah households to examine levels of subsistence harvest and use of fish and wildlife, rates of participation in harvest and use, demographic characteristics of Hoonah residents, intensity of use of geographical areas, and other quantitative measures. The same survey instrument was also used to examine use of fish and wildlife by residents of the Whitestone logging camp located about six miles from Hoonah. The Whitestone survey was analyzed separately.

The household census completed by the City of Hoonah at the end of 1985 provided a listing of Hoonah residents by household. This listing was updated with the assistance of the Hoonah city

clerk in early 1986, and household locations were mapped. The household listing and household location map was checked and updated by the Hoonah Tribal Council as part of a registration of tribal members.

Sample size was set at 70 households or 25 percent of the 280 households resident in Hoonah. A random sample of 70 households with 10 additional alternates was drawn. Sample size was set at 20 households or about 44 percent of the 45 households living at Whitestone. A random sample of 20 households with five additional alternates was drawn. Interviewing was done by the two Division of Subsistence field researchers, assisted by two Hoonah residents who were trained in survey administration. With some individuals, surveys were conducted in Tlingit.

Survey interviewing began in early May 1986 and was completed by June 1986. A total of 71 households completed surveys in the Hoonah sample. Seven alternates were used because interviewers were unable to contact five households of the original random draw, and one household was not interviewed because of a serious illness in the family. No households refused to complete this survey. A total of 21 households completed surveys in the Whitestone sample; this sample included three alternates. Interviewers were unable to contact two households of the original random draw for Whitestone.[15]

The survey instrument is shown in Appendix II and is similar to those used in other communities in southeast where comparable research has been undertaken. Data for Hoonah are directly comparable with data from most of the other harvest and use surveys conducted by the Division of Subsistence around the state. Questions concerning use of Glacier Bay National Park were unique to the Hoonah survey.

15. Because we had multiple interviewers in the field, we ended up interviewing one more household in each sample than we planned.

Data Analysis

Survey data were coded by the researchers who did the field interviews. Data were entered and proofed by Division of Subsistence data management staff in Anchorage. Data management staff also set up SPSS files and Rbase files to analyze these data and did initial statistical runs. SPSS is a statistical software package used to process survey data. Rbase is a relational database software that was used to process the intensity of use data. Both of these programs run on personal computers.

For most species, survey questions asked for the number of each species harvested and used during the previous 12 month period, May, 1985 through April, 1986. That is, respondents answered in number of king salmon used or number of Sitka deer harvested. For better comparability with other data, these harvest and use numbers were converted to food weights using standard conversion factors (see Appendix I). In this context food weight means the weight of that portion of the harvested animal that is actually brought into the kitchen. Skin, head, entrails, and other animal parts that are not used in this manner are not part of food weight[16].

Further analysis of both the survey and intensity of use data was done in Juneau. Where confidence intervals are presented and elsewhere where appropriate, statistics have been corrected to account for the effect of the relatively large sample proportion of this survey.

Organization of the Report

Chapter Two of this report presents a brief overview of important characteristics of Hoonah as a community. Some of the demographic data were gathered as part of the field research; other information in this chapter is derived from secondary sources. Chapter Three concerns the cash component of the economy of Hoonah and presents information on income, jobs, and cost of living. Some of these

16. Food weight conversions imply a comparison with purchased food sources; bones and other fish and animal parts that are likely to make it into the cooking pot are included in food weight even through they are not edible.

data come from the sample survey. Because of their importance to the cash economy, commercial fishing and timber harvesting jobs are discussed in some detail.

Chapter Four examines the subsistence component of the economy of Hoonah and presents harvest and use data. Chapter Five presents mapped geographic use area data, descriptions of the territory used for subsistence harvests, and measures of land use intensity. These chapters have two main goals: to present baseline data that document subsistence hunting, fishing, and gathering in Hoonah and to provide data that permit examination of change due to forest management and other factors.

Chapter Six uses a case study approach to examine changes in subsistence harvest that have been documented or are suggested by the present research and analyzes the direction of these changes into the future. Chapter Seven discusses the conclusions of this report and presents suggestions for further research.

CHAPTER 2

HOONAH: A COMMUNITY PROFILE

Physical Setting

Hoonah is a predominantly Native community located at the entrance of Port Frederick in the northeastern part of Chichagof Island (Figure 1). As with most other Native communities in southeast Alaska, Hoonah's location provides for good access to subsistence fish and wildlife resources, safe moorage and protection from winter storms, and a local climate suitable for preservation of wild foods.

Cultural, Social, and Historical Context

Huna Tlingit in Icy Straits-Cross Sound

Hoonah grew in importance as a central place for the Huna Tlingit Indian tribe in the late 1800s with the establishment of schools, a post office, and other services[17]. The community represents a coalescence of Huna Indians, primarily of the Chukanei Dee, T'akdeintaan and Woosh Ki Taan clans, who collectively comprise the Huna *kwaan*. Groups of Huna Tlingit previously lived all or part of the year at seasonal camps and small winter settlements throughout the Huna territory. According to Tlingit elders, the Huna Tlingit have been a recognized *kwaan* controlling the Icy Straits and Cross Sound area for as long as Tlingits have inhabited this area[18].

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17. Walter Styles, a Presbyterian missionary sent to Hoonah in 1881, started a school and church in that year. Earlier visits by Presbyterian missionaries were made by John Brady in 1878 and S. Hall Young in 1879 (Bettridge, 1979). S. Hall Young accompanied John Muir on some of his travels in the Icy Strait area.

18. According to Tlingit traditional social organization, a person is a member of a family, a house, a clan, a side or moiety, and a kwaan. The kwaan presently coincides most closely with the village. In an earlier period, the kwaan was the group of interrelated clans living in a defined regional territory. Individual clans or clan houses owned territory and property.

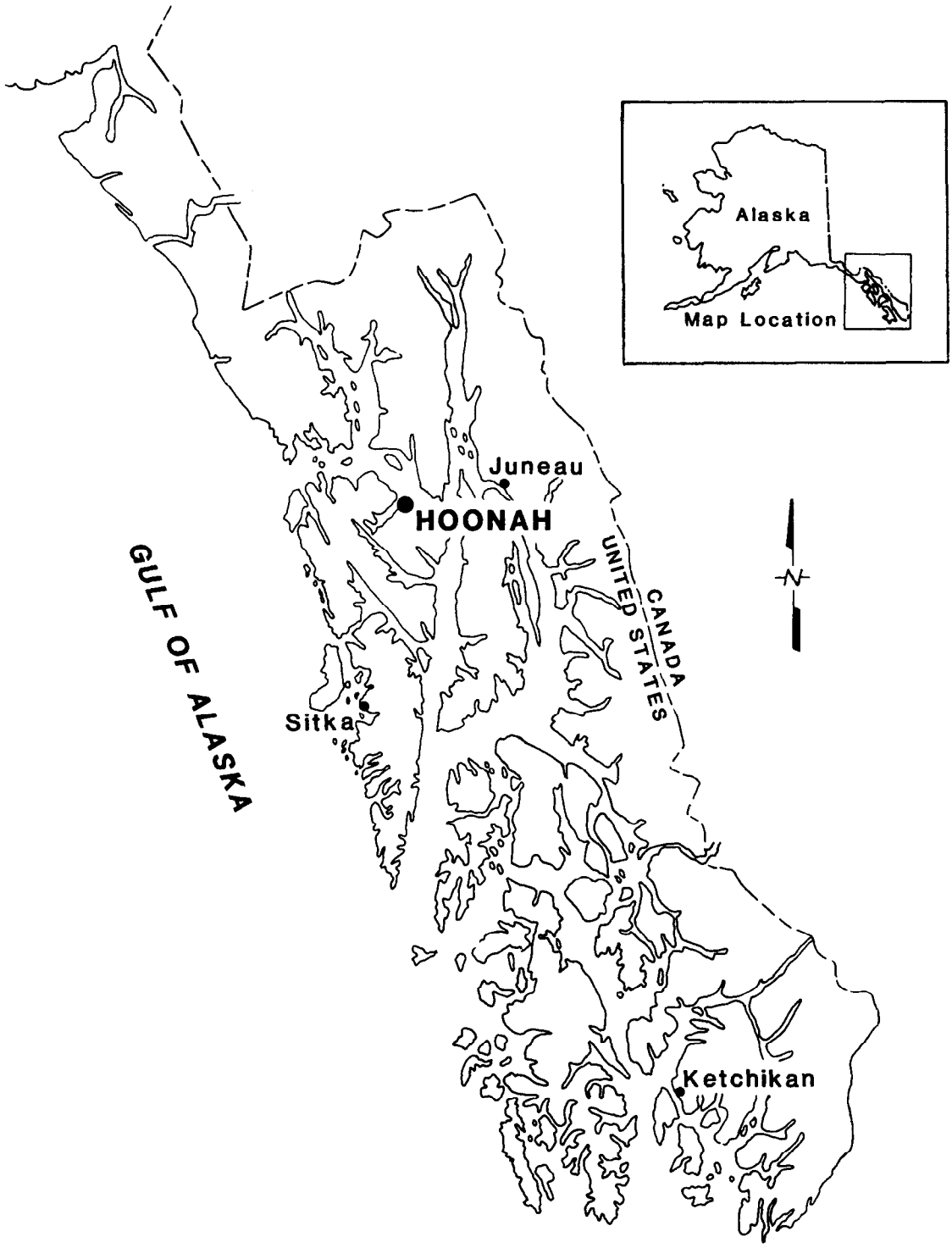


Figure 1. Location of study community and other southeast Alaska communities.

Figure 2. A View of Hoonah from the Water. Courtesy of the Alaska State Library, U. S. Revenue Cutter P. C. A. 79-24.

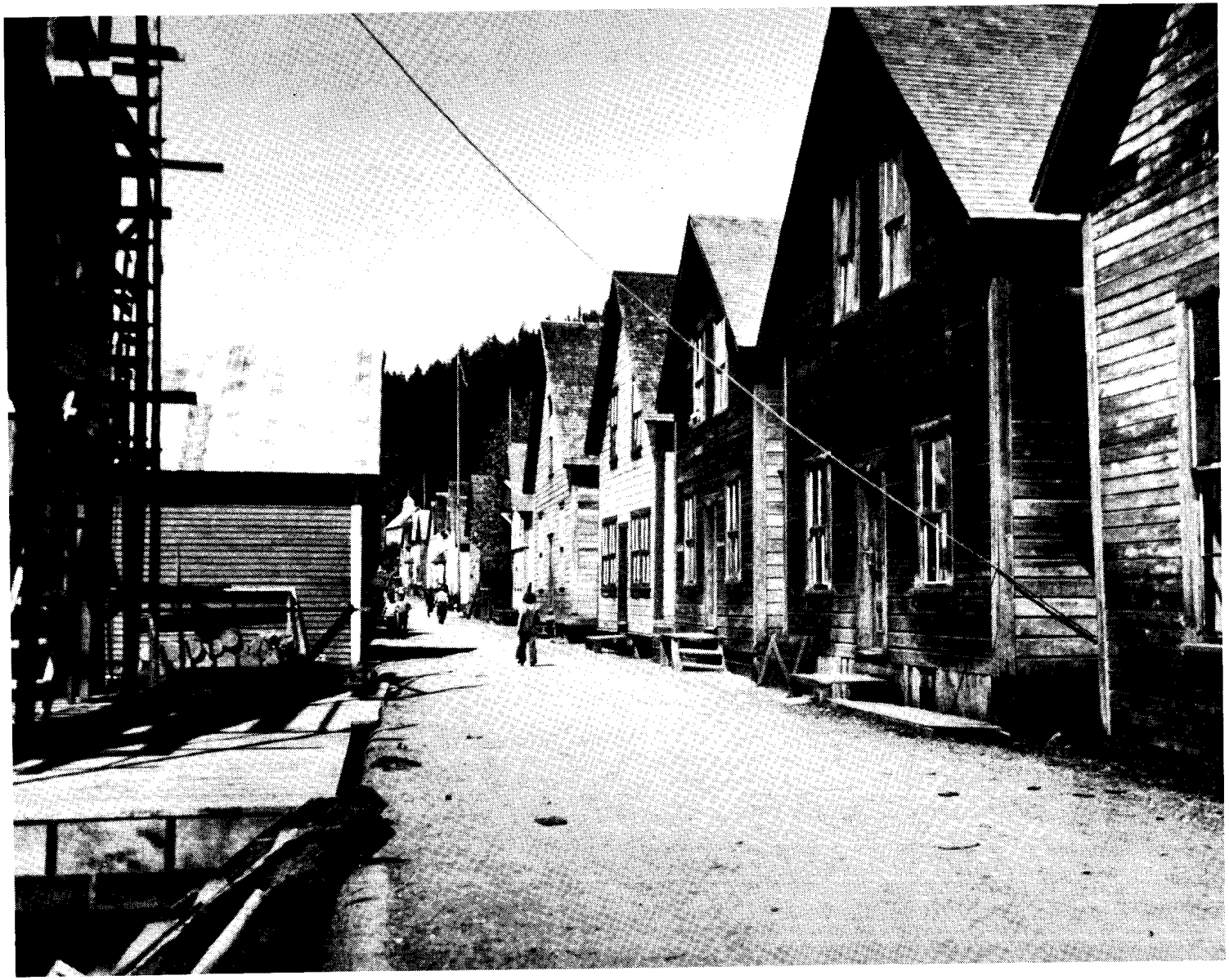


Figure 3. Main Street in Hoonah. Courtesy of the Alaska State Library, Leslie Melvin Call P. C. A. 222-304.

Figure 4. Clan House Entrance, Hoonah. Courtesy of the Alaska State Library, Leslie Melvin Call P. C. A. 222-305.

Swanton (1908) listed six main Huna villages as existing at the time of contact but does not indicate locations for all of them: Gaot!akn (the present Hoonah), L/ucacak!ian, Kaq!anuwu, Xakanawu, Gonaxo (at the mouth of the Alsek River), and Gathini (north of Dry Bay). In the historic period dozens of camps and settlements have been documented through archaeological surveys (Ackerman 1968) and through anthropological research to record Huna Tlingit possessory rights (Goldschmidt and Haas, 1946). Among these are camps and settlements of some size at Point Couverden and Homeshore[19], and in Excursion Inlet, the Beardslee Islands and Beartrack Cove, at Listi[20], in Dundas and in Taylor bays, and on Yakobi Island near Hoktaheen Lake and its outlet. La Perouse (1937, orig. 1799) identifies summer camps at Lituya Bay, and members of Hoonah lineages told us that their grandfathers used that area[21]. Other clearly identified camps and settlements existed throughout the territory controlled by Huna clans and clan houses[22]. All of these places are within the territory documented in 1946 as occupied and owned by Huna Tlingits shown in Figure 5 (Goldschmidt and Haas, 1946)[23].

Oral history establishes the presence of Huna Tlingit in the Icy Straits and Cross Sound area hundreds of years ago. The oral history of Glacier Bay documents events surrounding the last glacial advance, circa 1700. At that time there were five clan houses within Glacier Bay. These were abandoned and covered by the advancing ice. Most of the inhabitants moved to the present site of Hoonah (see James 1987; Marvin, 1987). Other oral history recounted by Hoonah elders refers to a time when there was a large lake within Glacier Bay that may have been a major red salmon system. According to discussions of glaciologists at the 1988 Glacier Bay Science Symposium held at Bartlett Cove in September, 1988, a huge fresh water lake existed in the east arm of Glacier Bay from about 800 to 1200

19. Homeshore is located across Icy Strait from Hoonah between Point Couverden and the entrance to Excursion Inlet.

20. Sometimes written Tlistee.

21. Lituya Bay appears to have marked the border between territory controlled by Huna Tlingit clans and those from Yakutat. After a number of people died in a landslide-induced wave in about 1855, Huna have tended to stay for much shorter periods of time within Lituya Bay.

22. Clans and clan houses owned, controlled and managed important resource harvesting locations such as red salmon streams or camp sites for seasonal harvests. Members of other clans needed permission to use the owned territory and resources. Because of clan exogamy, however, kinship ties between clans were very strong. A man would almost certainly be allowed to use his father's clan area, for example, even though he would be a member of his mother's clan.

23. This research was submitted to the Commissioner of Indian Affairs to record the possessory rights of Natives of Southeast Alaska.

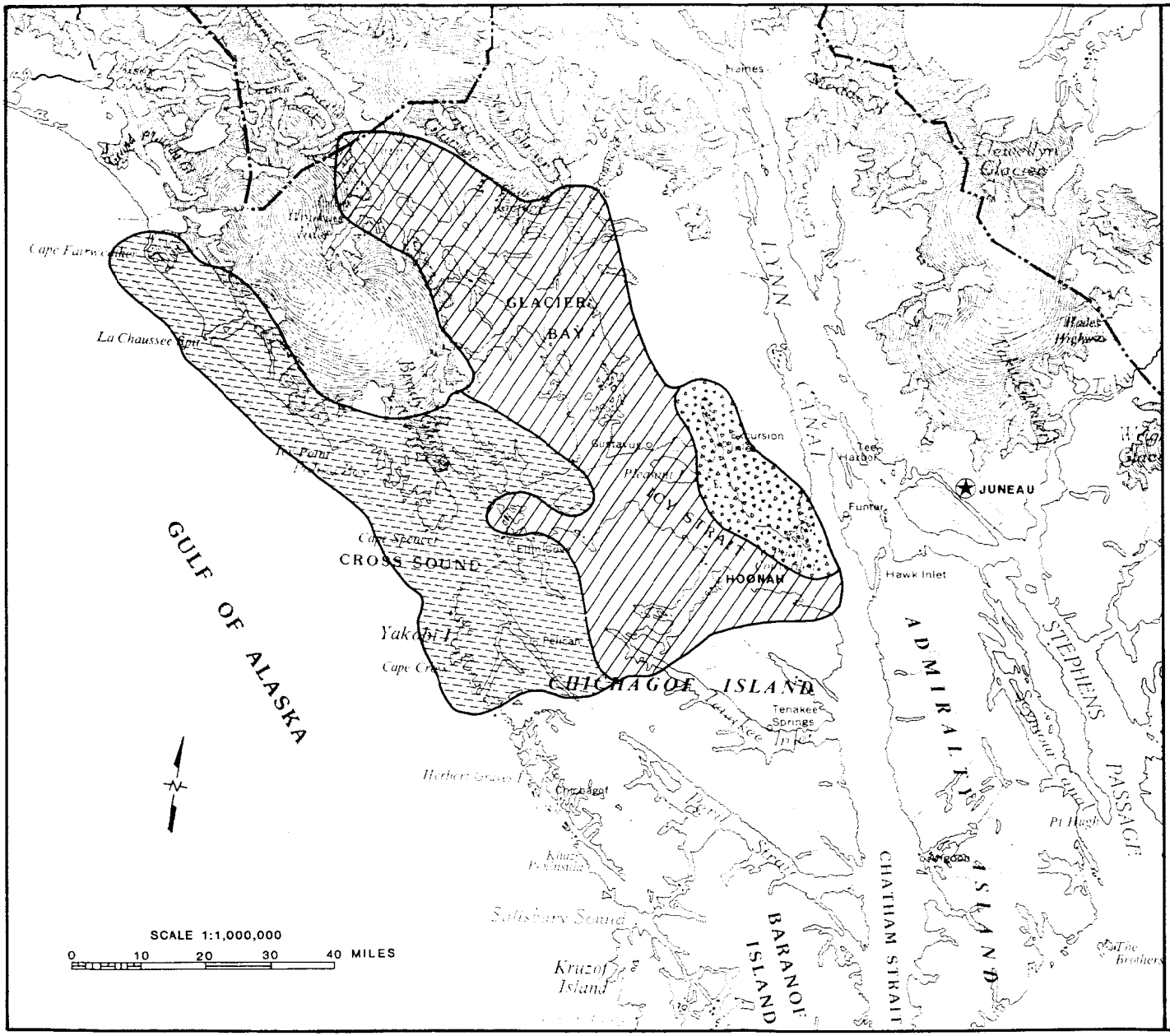


Figure 5.

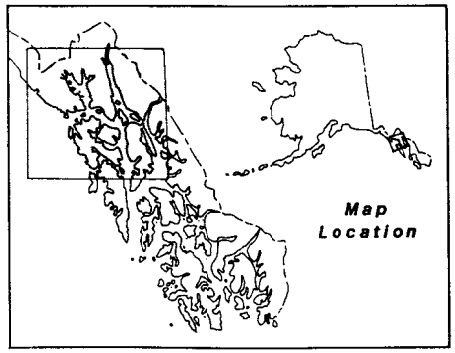
TERRITORIES OF HOONAH TLINGIT CLANS, 1946

CHUKANEI DEE

T'AKDEINTAAN

WOOSH KI TAAN

Source: Redrawn from Goldschmidt and Haas, 1946. Original data were based on field interviews with Tlingit elders in Hoonah, 1945 and review of historical documentation of clan territory.



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AD when this arm was dammed by a moraine formed by glaciers moving down the west arm. Other oral history accounts refer to settlements and events elsewhere in the Huna territory.

Although glacier scouring has removed all sign of human habitation in many parts of the Huna territory, and the rebound of land following glaciation coupled with the thick cover of vegetation in southeast Alaska, have made archaeological sites difficult to locate, human occupation of this area is well represented in the archaeological record. Archaeological surveys have been done in Glacier Bay National Park and intensive excavation has taken place at Ground Hog Bay, located east of Point Couverden. In addition to the numerous sites of relatively recent Tlingit occupation, the Ground Hog Bay site provides a record of much earlier habitation extending back to at least 9,000 years before present (Ackerman 1968). The archaeological record does not tell us whether these very early people of the Icy Strait area were the ancestors of contemporary Tlingit or another people. Between 900 and 450 years ago, this site was inhabited by people who built plank houses, used ground stone tools, and made decorative designs that are associated with Tlingit Indians. Based on this archaeological record, Tlingit habitation dates from at least this time, and the ancestors of Huna Tribe were probably present in the Icy Strait-Glacier Bay area[24].

Other Residents of the Huna Territory

Tenakee Springs, located south of Hoonah on Tenakee Inlet, Gustavus, located across Icy Strait near Point Gustavus, Elfin Cove, located on Idaho Inlet, and Pelican located on Lisianski Inlet are the main other permanent settlements within or near the traditional Huna territory. All of these communities were established in the last hundred years. Tenakee Springs, population 95 in 1988[25], may have been the site of a seasonal Tlingit village before prospectors began to winter there in the late

24. Recent archaeological studies in Angoon found a Tlingit salmon weir 3000 years old, village and fishing sites 1600 years old, and fort occupation 1,000 years ago (Moss, 1989). Tlingit probably inhabited the Huna territory during this time period as well.

25. Population figures in this section are from household enumerations done in February and March 1988 as part of Tongass Resource Use Cooperative Study survey work in each community.

1800s. A cannery was established in 1916 and operated into the 1960s. Tenakee Springs has a small commercial fishing fleet and has numerous retirement and vacation homes (see Leghorn and Kookesh, 1986).

Gustavus, population 218 in 1988, grew around turn-of-the-century homesteads. In addition to year round residents engaged in commercial fishing and limited agriculture, Gustavus houses employees of Glacier Bay National Park. Gustavus has numerous summer homes. The National Park Service maintains an office and staff at Bartlett Cove near Gustavus.

Elfin Cove, population 61 in 1988, and Pelican, population 238 in 1988, are other communities within the Hoonah territory. Both are small fishing communities that were founded around commercial fishing and fish buying or processing stations, economic activities that continue to be community mainstays[26].

During the past decade, another group of persons living in this area has been loggers and road crews, who reside primarily in camps established by contractors. The number and location of logging and road construction camps in the Huna territory varies from year to year with timber sales and road building contracts. From 1985 through 1987 approximately 400 loggers and construction workers and their families were present in the area during the cutting season. Most of this work force and their families leave the area during the winter off season. Whitestone logging camp and the camp at Eight Fathom Bight are located in the area closest to Hoonah. The Whitestone camp, located about seven miles by road from Hoonah, shows some signs of developing into a permanent settlement[27].

Mount Bether, with an estimated population of about 50 year-round residents in 1987[28], is a small intentional Christian community located in the Game Creek drainage near Hoonah. The Mount Bether was founded the late 1970s when its members moved to Game Creek from Massachusetts and other eastern states. The community maintains ties with other intentional Christian communities else-

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26. A fish buyer was in business in Elfin Cove in 1927. Fish buying was underway at Pelican by 1938 with a cold storage later built at that site. Some early mining and fox farming activities also brought people to the area near these communities.

27. This continues to be mainly a movable trailer camp with few permanent buildings. Core company staff, as opposed to more transient loggers, however, have been living at the camp for up to seven years and would consider the camp to be their permanent home. See testimony by loggers at Sec. 810 hearings held in Hoonah in August 1989 (Forest Service, 1989).

28. Figure based on interviews with Mount Bether members.

where in Alaska. In recent years some members of the community have moved to Hoonah. We were told that the number of people living at Mount Bether varies seasonally.

Fur Trade

Huna Indians participated in the fur trade that provided the incentive for Russian exploration and colonization of southeast Alaska. Productive sea otter, fur seal, and other fur-producing areas in the Cross Sound, Icy Strait and north Chichagof Island area were part of the Huna territory. Perhaps just as importantly, the Huna Tlingit exerted some control over some of the trade moving through Chatham Strait and Lynn Canal between Sitka and interior communities[29]. The fur trade continued to be of some importance after the purchase of Alaska in 1867. While sea otter were the most highly valued fur, beaver, fox, fur seal, martin, mink, land otter, wolf, and other furbearers were also traded. Through relationships with the Chilkoot, the Chilkat, and other groups, Huna Indians participated as middlemen in trading fur that originated inland in what is now Yukon Territory and British Colombia.

Huna Tlingit defended their trading position.

> *The Hoonahs.... have been longest preserved from contact with white civilization...In 1862 they seized the Hudson's Bay company' ship Labrouchere at Swanson's Harbor, imprisoned the captain and crew, and looted the vessel completely. It was not the Hudson's Bay Company's policy to retaliate and injure the fur-trade, and they passed by Hoonah anchorages for several seasons. Ambassadors besought the resumption of trade, and when the "fire canoe" came again the whole tribe joined in the water parade, the songs and dances of peace, filled the air with the eagle down of peace, and carpeted the deck with potlatch otter skins. In 1867 the chief in his war canoes met the U.S. Revenue Cutter Lincoln, but was not allowed on board. (He offered to fight the crew of the cutter should they come to Icy Strait.) (Skidmore 1898 quoted in Klein 1975)*

Sea otter were severely depleted in the late 1800s, and hunting of this species for trade was illegal after 1908. Fur trade in other species has continued to the present. Trapping effort has fluctuated with the economics of the fur market relative to other cash earning activities. When prices have

29. Huna Tlingit traded with interior Indians at Gantegastaki (also spelled Yendestaki, other varients also, translated- "gambling or trading place") near Haines. This place was also known for hooligan harvesting and oil-rendering.

been high, Hoonah residents have trapped throughout their territory. According to Hoonah elders, fox farms, usually run by non-Natives, were in operation on many of the small islands in the Huna territory during the 1920s and 1930s. A good market for harbor or hair seal skins existed briefly in the 1960s[30]. Hoonah elders recall snaring brown bear and selling hides earlier in this century[31]. Harvest of sea otter, brown bear, and seal for commercial sale of skins and pelts has been illegal for some years. At the present time Hoonah residents find that low fur prices for other species provide little incentive for trapping.

Development of Commercial Fishing

Major commercial fisheries and canneries were established in the area used by Hoonah residents during the 1880 to 1910 time period. In the space of a few decades fishing changed from being solely a subsistence economic activity to being a politically dominant commercial activity that would change both Huna Tlingits control over their traditional territory and, later, their ability to harvest subsistence fish resources. The earliest canneries packed primarily sockeye salmon from larger sockeye streams in the area. Bartlett Bay Packing Company began operations at Bartlett Bay in 1882, targeting on the sockeye salmon run in the Bartlett River. This cannery operated for a number of years before being dismantled in 1894. Astoria and Alaska Packing Co. operated briefly in Pavlov Harbor, in Freshwater Bay in about 1889; Alaska Packing and Navigation Co. and other companies operated a cannery at that site 1919 to 1923. Western Fisheries Co. opened a cannery at Dundas Bay in 1900 which operated under different management until 1931. Hoonah Packing Co. in Hoonah also opened in 1901, and the site is still used to support processing done at other canneries. Astoria Puget Sound Co. and Pacific American Fisheries opened canneries in Excursion Inlet in 1908; the successor to these companies continues to operate at the present time. Tenakee Fisheries, in Tenakee Inlet, was started

30. Hoonah residents recall selling seal skins to Canadian firms during this time period. They also said that they received a bounty for seal noses from State of Alaska.

31. One elder recalled using the moose hide snares for catching brown bears, most probably in the 1920s and 1930s. These snares were traded through upper Lynn Canal from the interior.

in 1916 and operated into modern times. Cape Cross Salmon Co. began operations at Pelican in 1941; a cold storage continues to operate at that site. Fish buying and possibly some canning and packing was underway at Elfin Cove in 1927. Icicle Seafoods has operated a cold storage plant in Hoonah in recent years. Other fish buying and fish processing activities have also taken place within the Huna territory (Alaska Fisheries Board and Alaska Department of Fisheries, 1949; Cobb, 1930; Moser, 1899).

In the earliest commercial fisheries, those beginning in the 1880s, canneries generally acknowledged Tlingit rights, if not ownership, to the fish in specific drainages. Canneries typically made a payment to the Tlingit clan or Tlingit clan house-group that controlled a particular stream (see Langdon, 1977; Price, 1990; Thornton and Schroeder, 1990). This practice wherein canneries recognized Tlingit ownership and payed for the right to fish in owned streams occurred with the cannery at Dundas Bay. Langdon (1980) reported that George Dalton of Hoonah stated that the owners of the Dundas Bay cannery paid his father a fee for the land used by the cannery and for the use of the sockeye in the Dundas River. With little government recognition or support for these traditional Tlingit use rights or ownership, however, not many years passed before Tlingit rights were no longer acknowledged by cannery operators or before canneries ceased to pay for use of traditional fishing sites and streams[32]. Moser observed this transition during his inspection of Alaska salmon fisheries and wrote in 1899:

> *Many disputes arise concerning the fisheries. A native, whose ancestors have lived on a certain stream for many generations, and whose rights are respected by other natives, supplies a certain cannery with his catch, as possibly he has been doing for years. A rival cannery tells the native that he must sell his catch to it, and that otherwise their men will fish the native's stream. The result is over fishing, complaints, bad feeling, blows, and threats to bloodshed. So far as can be learned, there are now no legal rights or title to any fishing grounds in Alaska except what force or strategy furnish.*

Based on interviews with Tlingit elders, involvement in commercial fishing and cannery work by Huna Natives appears to have been limited until the opening of canneries at Dundas Bay and at Hoonah itself. Fishing operations were owned and run by companies from outside the Alaska Terri-

32. The bombardment of Angoon in the 1880s and the bombardment of Kake in the 1860s were events fresh in Native leaders minds at the beginning of the cannery era.

tory. Fishers from the lower 48 came to southeast Alaska for the fishing season, establishing a pattern that continues to the present time. Canneries initially employed Chinese and later Filipino workers for most jobs (Moser, 1899)[33]. With the invention of the floating fish trap, traps placed at stream mouths became a main means of harvesting salmon. Canneries maintained their own fishing fleets to supplement the trap harvest and also bought fish from independent fishermen. In the early period, most of the fishermen were from outside of Alaska. According to Hoonah elders, after the end of World War I, Huna Natives began to become more involved in the commercial fisheries, both as fishers and as cannery workers[34]. Hoonah developed a strong commercial fishing fleet focused on seining and hand and power trolling for salmon[35]. This fleet generally has fished within the traditional territory of the Huna Tlingit when fishing regulations permit. Commercial fishing for halibut by local fishermen increased in importance after World War II[36]. Halibut continues to be an open entry fishery in which a large number of Hoonah boats participate (see Bell, 1981).

Commercial salmon fishing transformed what had been an abundant and reliable subsistence resource into a market commodity. Severe over-harvesting with seines and fish traps eliminated many runs of the most highly prized salmon species by the late 1930s when regulation of fishing and the elimination of fish traps had become major resource issues in southeast Alaska (Cobb, 1930; Cooley, 1962; Price, 1990). Allocation of salmon and halibut for subsistence and for commercial and other uses has continued to be major issue in the area[37]. During the period of low salmon abundance in the late 1960s and early 1970s, subsistence harvests were restricted by regulation that set bag limits, gear types

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33. Moser (1899, p. 23) noted that, in 1898, " The cannery fishermen are nearly all foreigners, the majority being 'north countrymen,' or, as they are termed, 'hardheads,' though there are some fishing gangs comprised of what are called 'dagoes,' consisting of Italians, Greeks, and the like..... With the exception of Metlakatla and Klawock, the packing at all canneries is done entirely by Chinese, and it is very satisfactory labor."

34. Langdon (1977) traces the development of commercial fisheries and involvement of Natives in these fisheries in southeast Alaska, focusing on Craig and Klawock. Price (1990) provides an insightful description of the transformation of common property fishery resources into commercial harvests.

35. Sockeye salmon runs had been diminished by over fishing by the time Hoonah residents were moving into commercial fishing. Perhaps for this reason no gill net or set net fisheries were developed in the Huna territory.

36. Most commercial fishing for this species before this time was by non-Alaskan fishers. The fishery boomed after the war until decline from the joint effects of over fishing and deep sea trawling in the 1970s. With more effective management and enforcement of the 300 mile exclusive economic zone, the fishery is building again.

37. Salmon are allocated by the Board of Fisheries of the State of Alaska; halibut by the Pacific Halibut Commission.

permitted, and seasons for traditional harvests[38]. Very importantly, no provisions for traditional subsistence use of coho or king salmon was recognized during this time[39]. Currently, no subsistence harvests are recognized by the Board of Fisheries or permitted for king and silver salmon for Hoonah residents despite the long history and tradition of use of these species. These salmon continue to be harvested for home use under commercial and sport regulations. Hoonah residents either follow sport fishing regulations covering gear type, bag limit, and season for these species or use part of their legal commercial catch for home use. Hoonah residents' harvests of red and chum salmon take place under subsistence permits. In 1989, permit limits controlled the numbers of red salmon and chum salmon that could to be taken from streams in the Hoonah subsistence use area. As we will see, these limits are relatively low and restrict traditional subsistence harvest and use patterns.

Demography

The size of the population of Hoonah from 1835 through 1986 is shown in Figure 7[40]. The estimates before 1880 include Huna Indians living in the entire Icy Strait and Cross Sound area[41]. The estimates from 1880 to present are from decennial and other censuses. This figure shows a likely decline in population after 1868 and a gradual doubling of the population from 1900 to present. The calamitous fire that destroyed most of Hoonah in 1946 is probably responsible for the decline in population from 1940 to 1950. The present population of Hoonah is somewhat smaller than the early estimates for the population of the entire Huna tribe in 1880. At the time of field research, about 960 persons living in 280 households resided in Hoonah, with a mean household size of 3.43 persons per

38. Until the passage of state and federal subsistence laws the word subsistence did not have special legal meaning.
39. These two salmon species were traditionally harvested with troll gear in Hoonah since there are no major spawning streams within the Huna territory where returning fish could be netted.
40. The City of Hoonah was not satisfied with the decennial census estimate for 1980 and enumerated its population in a census that was certified in 1982. The incorrect 1980 figure is not presented.
41. These estimates included Huna Tlingit living at other sites than Hoonah within the Huna territory.

Figure 6. Seine Boats near Hoonah. Courtesy of the Alaska State Library, Leslie Melvin Call P. C. A. 222-302.

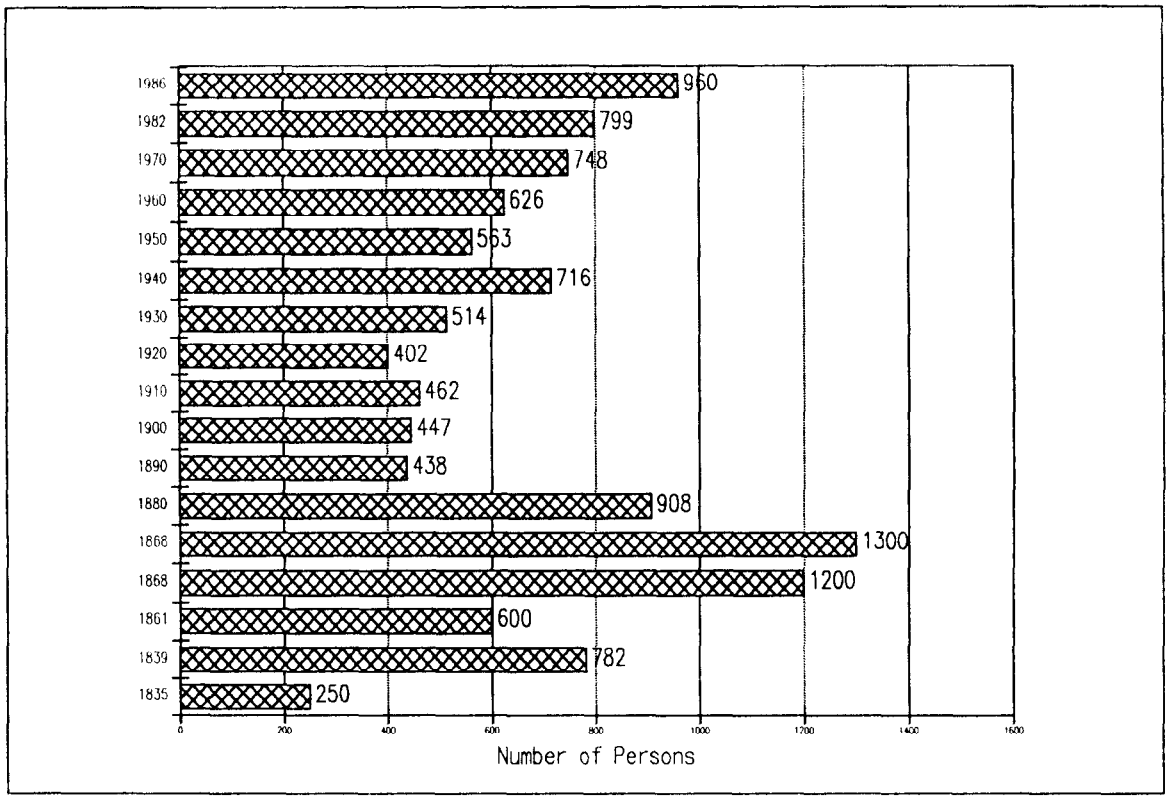

Figure 7. Population of Hoonah, 1835 to 1986.

household[42]. The increase shown in Figure 7 over the 1982 to 1986 time period is partly real growth over that time period and probably partly due to different methods of enumeration[43].

Economic opportunities improved in the last ten years with oil-boom funded expansion of city and state services, capital improvement projects, Huna Corporation activities, the establishment of a Forest Service District Ranger office in town, and the advent and expansion of industrial logging in the area. Commercial fishing income also has risen during this time period. According to our interviews with Hoonah residents, improved economic conditions has meant that fewer people have had to leave Hoonah for employment. There has been some influx of non-Natives moving to the community during this time due to Forest Service or logging employment and due to the Mount Bether intentional com-

42. These are based on a census of Hoonah conducted before survey work was undertaken. Surveyed households had a mean household size of 3.43 persons per household.

43. With the cooperation of the Hoonah Indian Association, a full household enumeration was done as part of the 1986 research. Our total population of 960 includes all persons who live in Hoonah; the 1982 census data appears to include only people present in Hoonah during the census.

munity[44]. The Forest Service employs about 12 permanent professional staff, most of whom have moved to Hoonah with their families. A few families of loggers moved to Hoonah to work for Huna Totem Corporation or Whitestone Logging Corporation. Despite this influx, the change in the ethnic composition of Hoonah has been much less than the change that occurred in Klawock on Prince of Wales Island, where Natives are becoming a minority in the population (Ellanna and Sherrod, 1986). In Klawock non-Native loggers and their families live within the community; in the Hoonah area, most loggers and their families live in camps outside city limits. This, and the recency of industrial logging in the Hoonah area, has limited the demographic effect within the community[45]. Some demographic changes within Hoonah proper have occurred, however. Children from the Whitestone logging camp are bused to the Hoonah schools and have changed the ethnic composition of school classes. The timber manager for Whitestone logging camp has lived in Hoonah and has been elected to the City Council.

The ethnic composition of the parts of north Chichagof Island closest to Hoonah has changed more dramatically. Based on membership rolls that were completed by the Hoonah Tribal Council in 1986 and on 1980 U. S. census estimates, about 80 percent of the population of Hoonah is Native (Grey, 1987; Bureau of Census, 1980)[46]. With the addition of loggers, construction workers, and Forest Service staff and their families, we estimate that the ethnicity of the area's population is now about 56 percent Native[47]. A relatively small increase in the logging-related population would result in a majority of non-Native residents in the north and northwest Chichagof Island area. The Huna Native population could well be in a minority in this area within a few years[48].

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44. Some members of Mount Bether lived all or part of the year in Hoonah in 1986.

45. Should Hoonah expand its city limits to include nearby Whitestone logging camp and the other logging camps that use its services, the ethnic composition of the town would change dramatically.

46. These sources are based on a total enumeration of Hoonah households and are more accurate than ethnicity data from our sample survey.

47. Area population = Hoonah 960 + logging related 400 = 1360. Number of Natives = 960 * .8 = 768. Proportion Natives = 768/1360 = .56

48. If we consider the whole of the traditional Huna territory which includes other Elfin Cove, Gustavus, Pelican, and Tenakee Springs, all communities with primarily non-Native populations, the Huna Tlingit are already in a minority.

Figure 8 presents the age and gender of Hoonah residents based on the households sampled in 1986. As shown in Figure 8, 53.9 percent of the total population is male; 46.1 percent is female. Part of the gender imbalance appears to reflect greater movement of Hoonah women than men away from the community. Interestingly, the pyramid does not show the broad base found in a rapidly growing population, but more the pattern of a relatively stable population. The data do not show a baby-boom in Hoonah. The relatively low number of persons in the 15 through 24 age groups may be due to persons being absent from Hoonah for education and military service. Only a small number of male elders over 65 years of age was in our household sample; some elders reside in care facilities in Juneau. Based on this sample, 57 percent of the male, 58 percent of the female, or 57 percent of the total population is between the ages of 20 and 65. Hoonah thus has a very high proportion of its population in the economically active years. This contributes to the vitality of the community[49].

Figure 9 shows the place of birth of members of sampled households. Fully 46.5 percent were born in Hoonah with another 22.3 percent born elsewhere in southeast Alaska. The 25 percent born outside Alaska represent school district and Forest Service employees and their families, in-marrying spouses and others who have moved to Hoonah, as well as the children of Hoonah Tlingits who were born when their parents lived outside Alaska. A high proportion of Tlingit adults are married to someone from Hoonah. This community endogamy means that both husband and wife are likely to have ancestral and clan ties to subsistence harvesting areas within the Huna territory.

Figure 10 length of residency for the longest residing member of each of the 71 sampled households. Fifty-four or 76.1 percent of the 71 sampled households had at least one member who had lived in Hoonah at least 10 years. Eight households or 11.3 percent were composed of persons who had lived in Hoonah for less than four years. These data show that a large majority of households in Hoonah have some longevity in the community.

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49. Demographers calculate a dependency ratio that compares the number of persons in their working productive years with the numbers of children and elderly. Dependency ratio = (population under 20 years + 65 years and over) / (population 20 to 65 years) x 100. Hoonah's dependency ratio of 74 is quite low. By comparison, the dependency ratio for the United States was 91 and that for Europe was 76 in 1960 (Bogue, 1969).

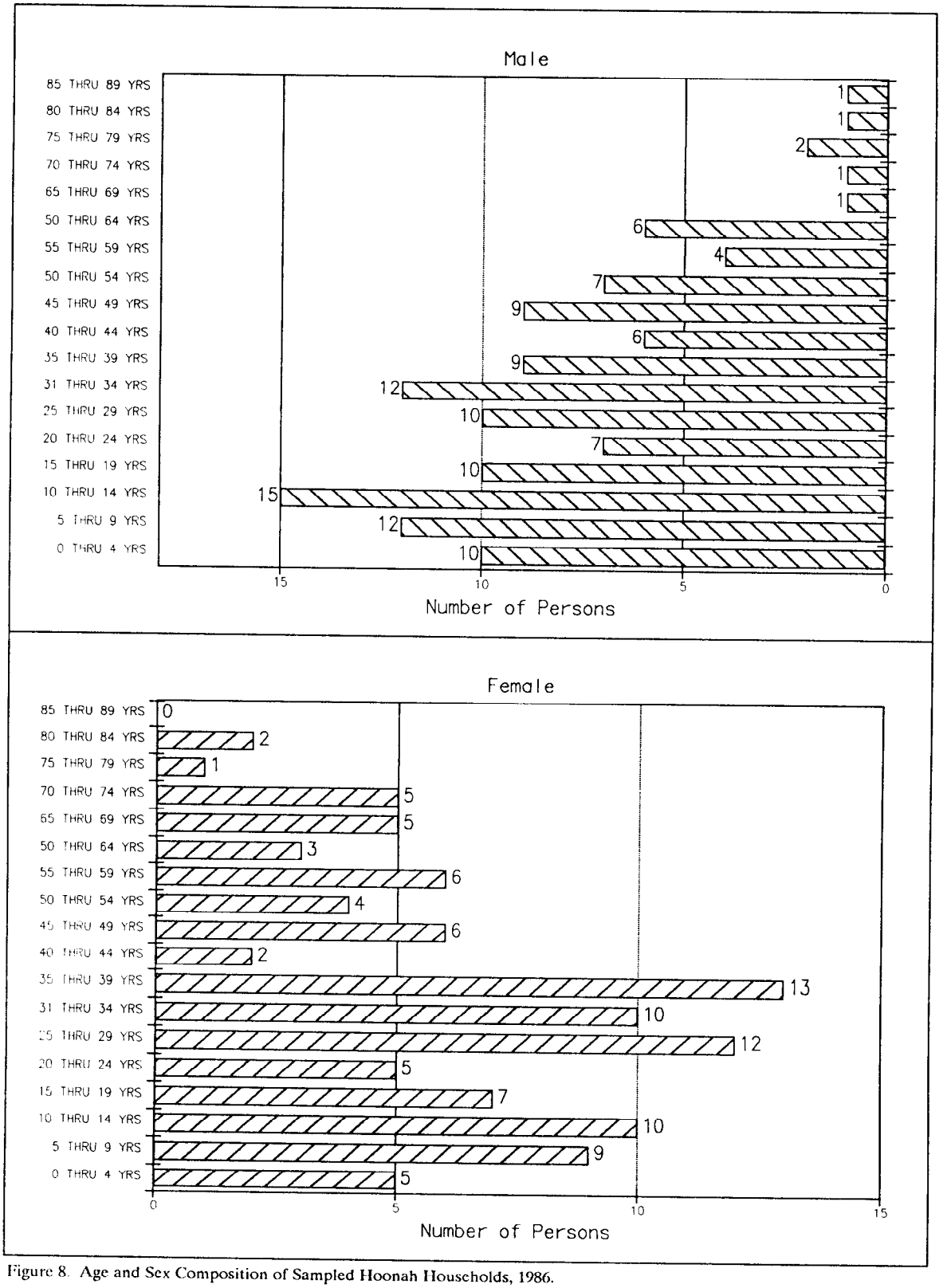


Figure 8. Age and Sex Composition of Sampled Hoonah Households, 1986.

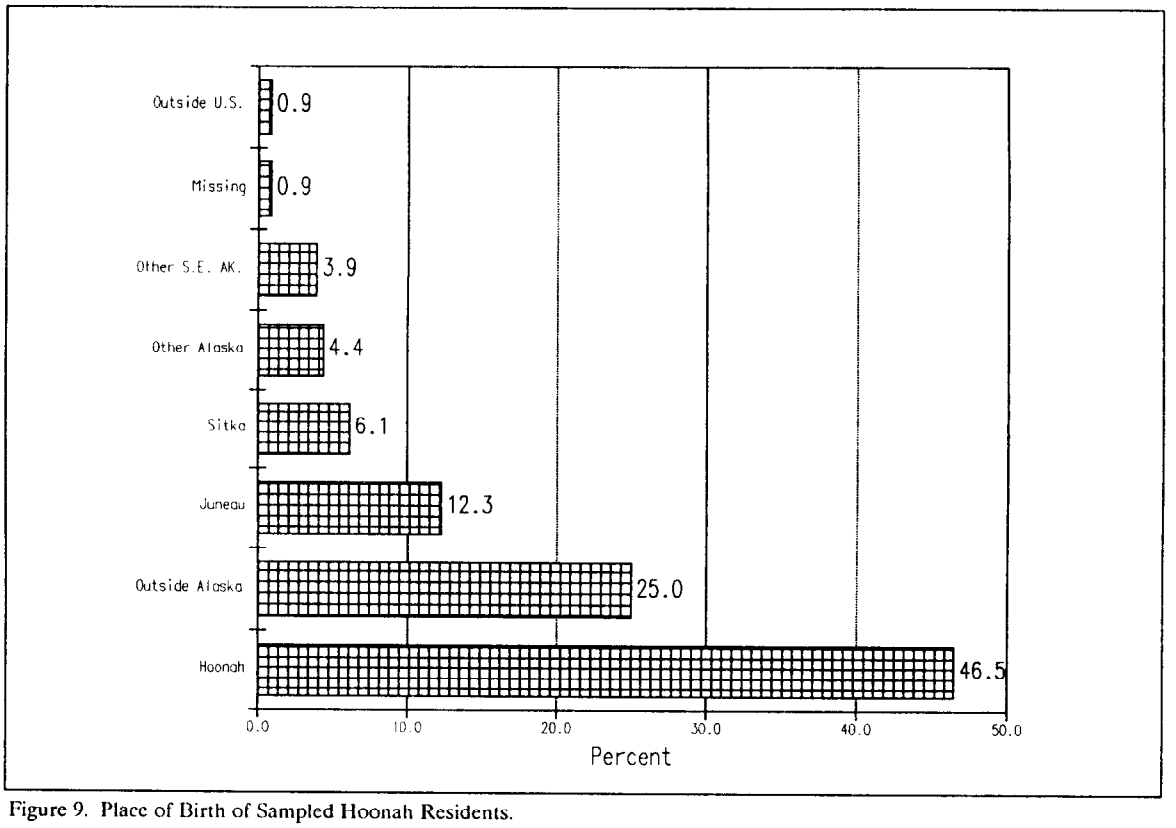


Figure 9. Place of Birth of Sampled Hoonah Residents.

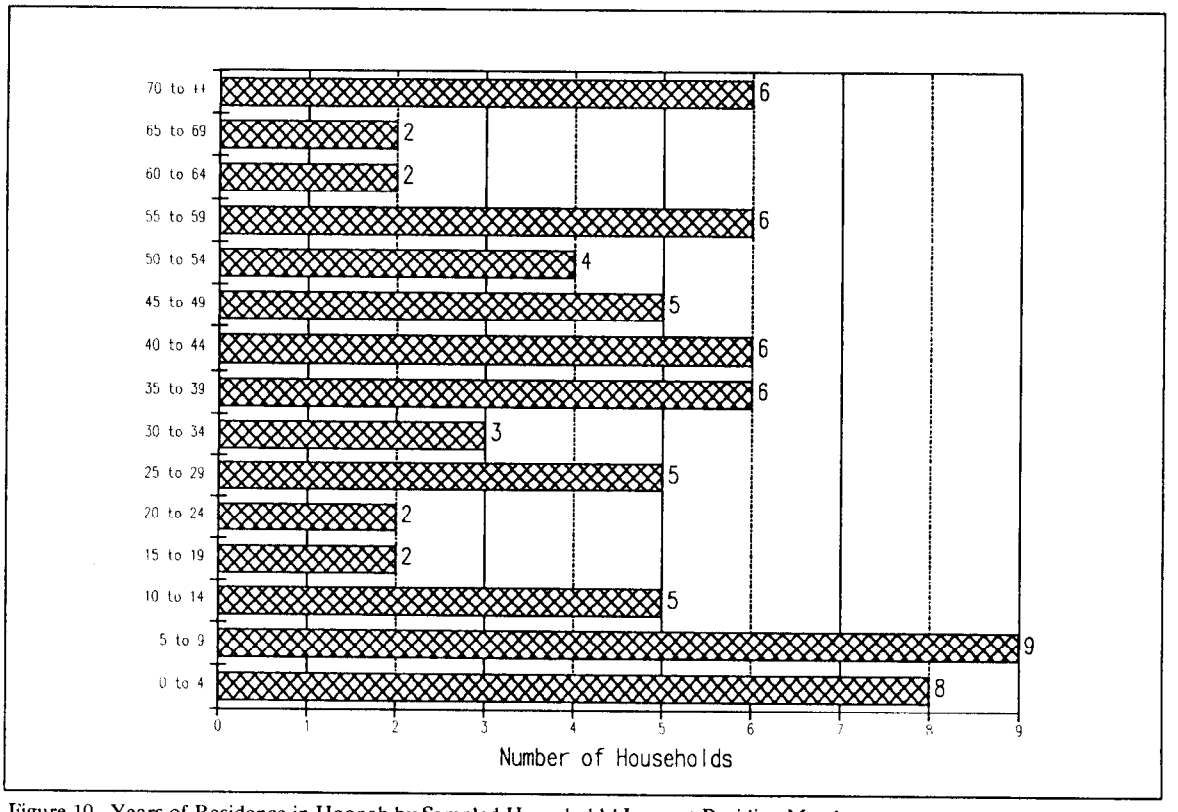


Figure 10. Years of Residence in Hoonah by Sampled Households' Longest Residing Member.

Figure 11 shows the educational level of adults in sampled households in Hoonah. Persons 18 years of age or older were considered adults for the purpose of this figure. Based on these data, Hoonah's adults are well educated. Over 36 percent of adults have studied beyond high school. The 12.5 percent of the adults with from 3 to 8 years of schooling are mainly elders who did not have access to educational facilities when they were growing up.

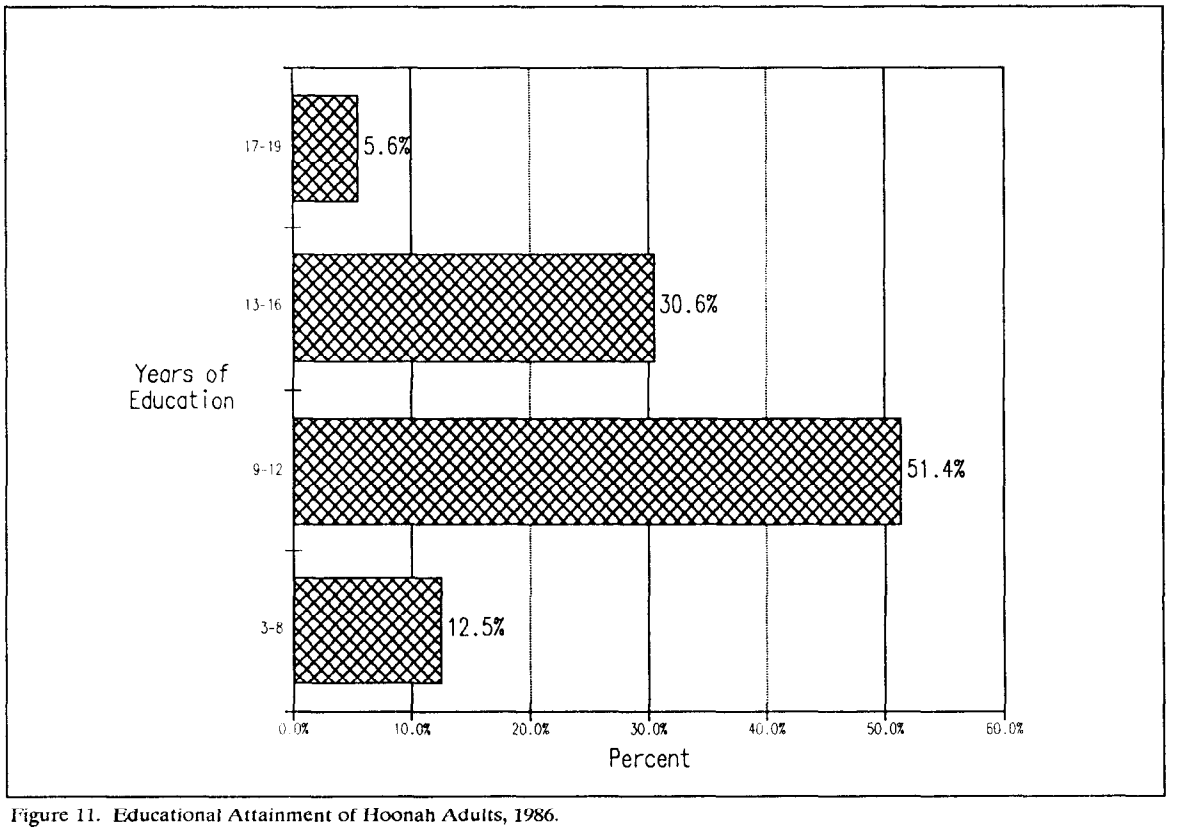


Figure 11. Educational Attainment of Hoonah Adults, 1986.

Land Status

When land was selected under the Alaska Native Claims Settlement Act (ANSCA) of 1971, Native corporations made extensive selections in the area closest to Hoonah. Figure 12 shows the location of Huna Totem Corporation, Sealaska Corporation, and private land in the area near the community. Huna Totem's selection includes about 22,000 acres (Hoonah Planning and Zoning Commission, 1984). Because Sealaska Corporation selections are not final, the acreage of its holdings cannot be ac-

curately determined. Almost all of the other land on Chichagof Island on Figure 12 is federally owned and managed by the Forest Service. There is, of course, private land around Elfin Cove, Pelican, Tenakee Springs (see Leghorn and Kookesh, 1986), and there are scattered Native allotments and private parcels throughout the Hoonah use area. Much of the acreage selected by the Huna Totem and Sealaska corporations contain high-yielding old-growth forest.

The Forest Service also manages federal land across Icy Strait from Excursion Inlet to Point Couverden and continuing up Lynn Canal, and land across Chatham Strait on Admiralty Island. Glacier Bay National Park is managed by National Park Service. The State of Alaska is not a major landowner in the area used by Hoonah residents[50].

Logging Activities

Some logging in subsistence use areas took place before the most recent period of intensive harvesting activity which began in about 1980. This earlier logging was much more limited in scale and scope than the present activity in terms of the amount of timber harvested, infrastructure developed, and planned duration. Because earlier logging was limited, lasting effects on subsistence harvesting do not appear to have taken place, even though logging practices were environmentally unsound by today's standards and included logging shorelines, yarding logs through stream beds, and little concern for effects on fish and wildlife resources. Logging primarily occurred along beach areas during this earlier era did not result in a lasting network of logging roads in the subsistence territory nor the development of semi-permanent logging camps and communities. Large scale, industrial logging began after 1980 with the co-temporaneous development of greatly accelerated logging on Tongass National Forest Lands and logging on Native Corporation lands.

50. Underwater land within the three miles of shore and beneath navigable waterways belong to the State of Alaska. The State of Alaska is responsible for management of fish and wildlife for subsistence on these lands.

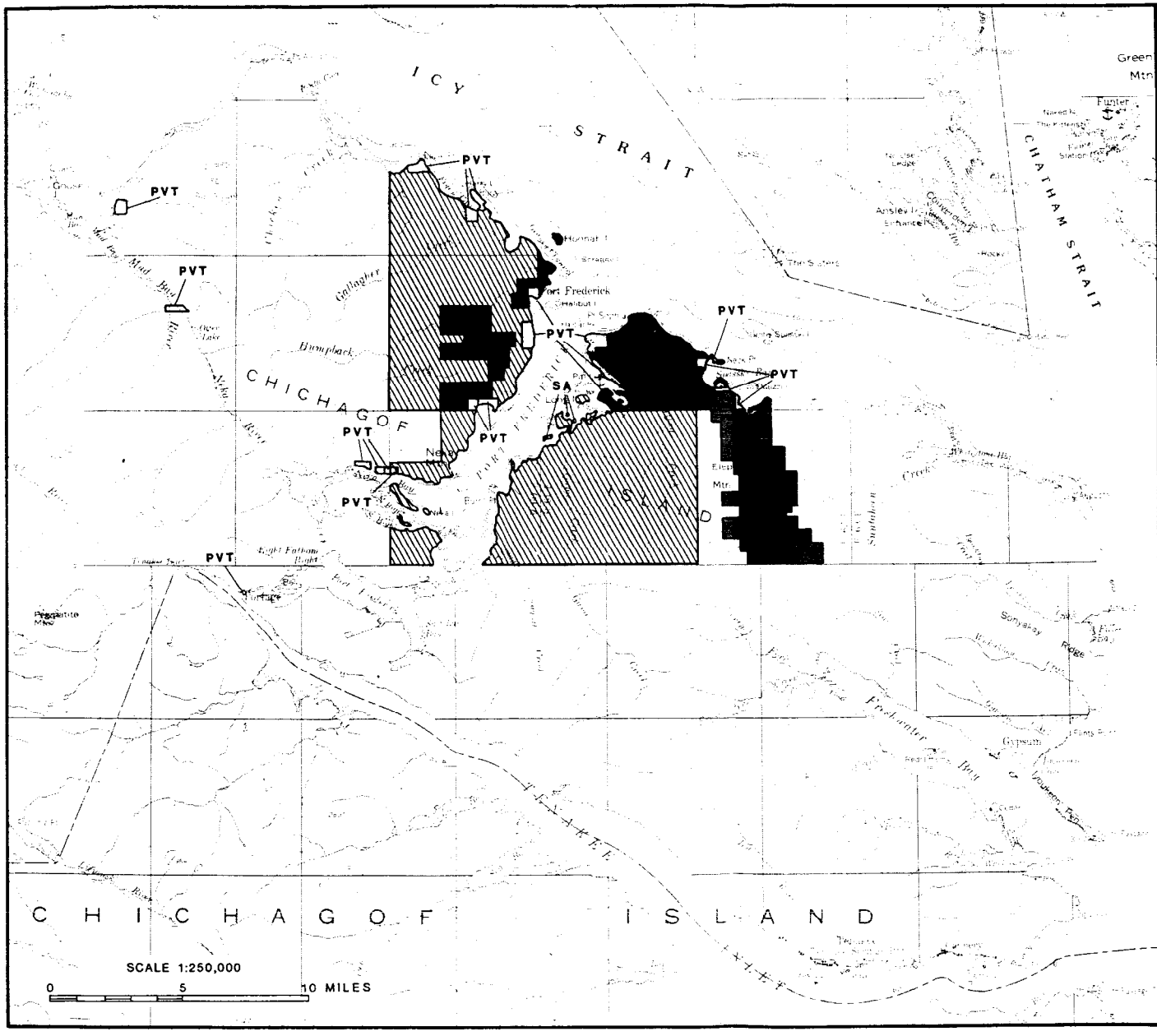


Figure 12.
MAJOR PRIVATE AND CORPORATION LAND OWNERSHIP ON CHICAGOF ISLAND NEAR HOONAH , 1986.*

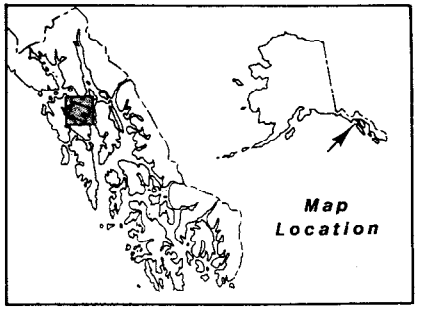
HUNA TOTEM CORPORATION

PVT PRIVATELY OWNED

SA SEALASKA CORPORATION

Source: Bob Schroeder and Matt Kookesh, field research and document review, 1986, 1987.

* This map does not delineate privately owned land boardering Tenakee Inlet and may not include an exhaustive depiction of small private land holdings.



STATE OF ALASKA
DEPT. OF FISH AND GAME
Subsistence Division

Logging Roads

In recent years, a substantial system of logging roads has been built in areas near Hoonah to facilitate logging. Figure 13 shows the major logging roads completed in this area through 1985, totalling about 159 miles (Table 1). Most of these roads have been built since 1981. Additional roads will continue to be constructed in the coming years as logging on Forest Service and Sealaska Corporation lands expands into new areas. The Hoonah network of roads may one day connect with the Tenakee Springs system through a road following upper Game Creek[51].

This developing road system is in itself an important impact. Hoonah residents have road access to areas that were previously difficult to reach. Roads have also opened up a good deal of Hoonah hunting territory to outside hunters who use the Alaska State ferry system to reach Hoonah. These impacts are discussed more fully in Chapters 5 and 6.

Logging on Forest Service Land

Almost all of the area most intensively used by Hoonah residents has been designated as Land Use Designation IV or LUD IV by Forest Service in the Tongass Land Use Management Plan (TLMP)[52]; LUD IV lands are managed for intensive timber harvesting. The head of Port Frederick and the area around Freshwater Bay are designated LUD III. LUD III lands are managed for timber harvesting and other uses. Forest Service provides timber from its lands in the Hoonah area under the long term contract with the Alaska Pulp Corporation to supply its mill in Sitka. In recent years two or three logging companies have held the contracts to do the actual logging.

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51. Tenakee Springs residents have gone to court and to Congress in attempts to prevent this road connection.
52. A congressionally mandated 10-year revision of TLMP is underway at the time of this writing. A reading of the draft revision does not show major departure from the earlier TLMP. That is, most land used by Hoonah residents will be managed for timber production.

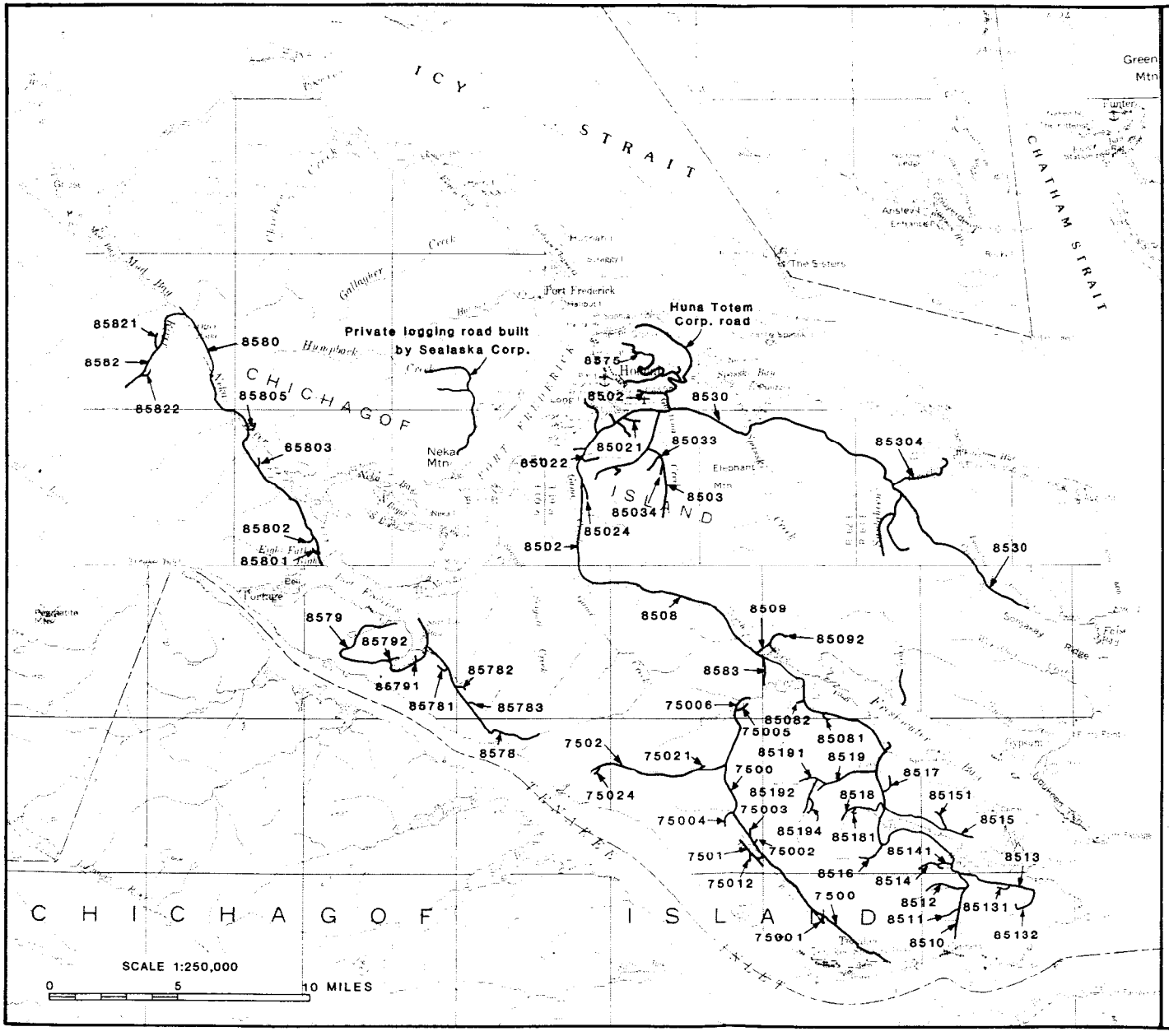


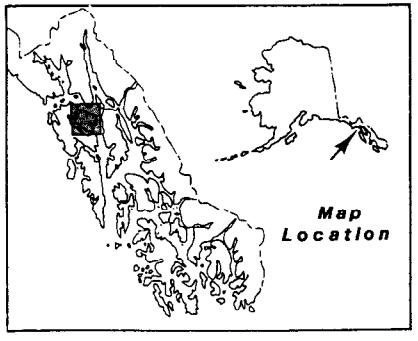
Figure 13.

MAIN CHICAGOF ISLAND LOGGING ROADS WITHIN AREAS USED BY HOONAH RESIDENTS, 1985.*

8582 ROAD

Source: Bob Schroeder and Matt Kookesh, field research and document review, 1986, 1987, from data supplied by Susan Flora, 1985, 1986.

* Roads completed through 1985 located north of Tenakee Inlet are included. Refer to text and tables for road length and date of completion.



STATE OF ALASKA
DEPT. OF FISH AND GAME
Subsistence Division

TABLE 1. Principle Logging Roads in Hoonah Core Area in Miles, through 1986.

ROAD#	LENGTH
8502	11.4
8503	4.2
85031	2.4
8508	16.6
8510	9.3
8513	2.7
8515	3.8
8518	2.6
8519	2.4
85191	1.8
85192	1.7
8530	11.2
8575	6.5
8578	6.0
8579	8.1
8580	13.4
8582	4.5
TOTAL MI.	108.6

Source: Ron Quilliam and staff, 1986, 1987.
Estimated additional miles of other roads- 50.
Acres cut for roads using 50' right of way- 961.
Acres cut for roads using 70' right of way- 1345.

Figure 14 shows the location of timber harvests on Forest Service lands in areas near Hoonah as of 1985; Table 2 gives the harvest year and acreage for pre 1986 clear-cuts as well as for more recent years. Figure 15 shows total area logged each year on Forest Service land from 1979 through 1985. About 3,200 acres were logged during this time period, not including the estimated 961 to 1,345 acres logged during road construction (Table 1). Leghorn and Kookesh (1986) provide similar information for logging adjacent to Tenakee Springs and on the Indian River system.

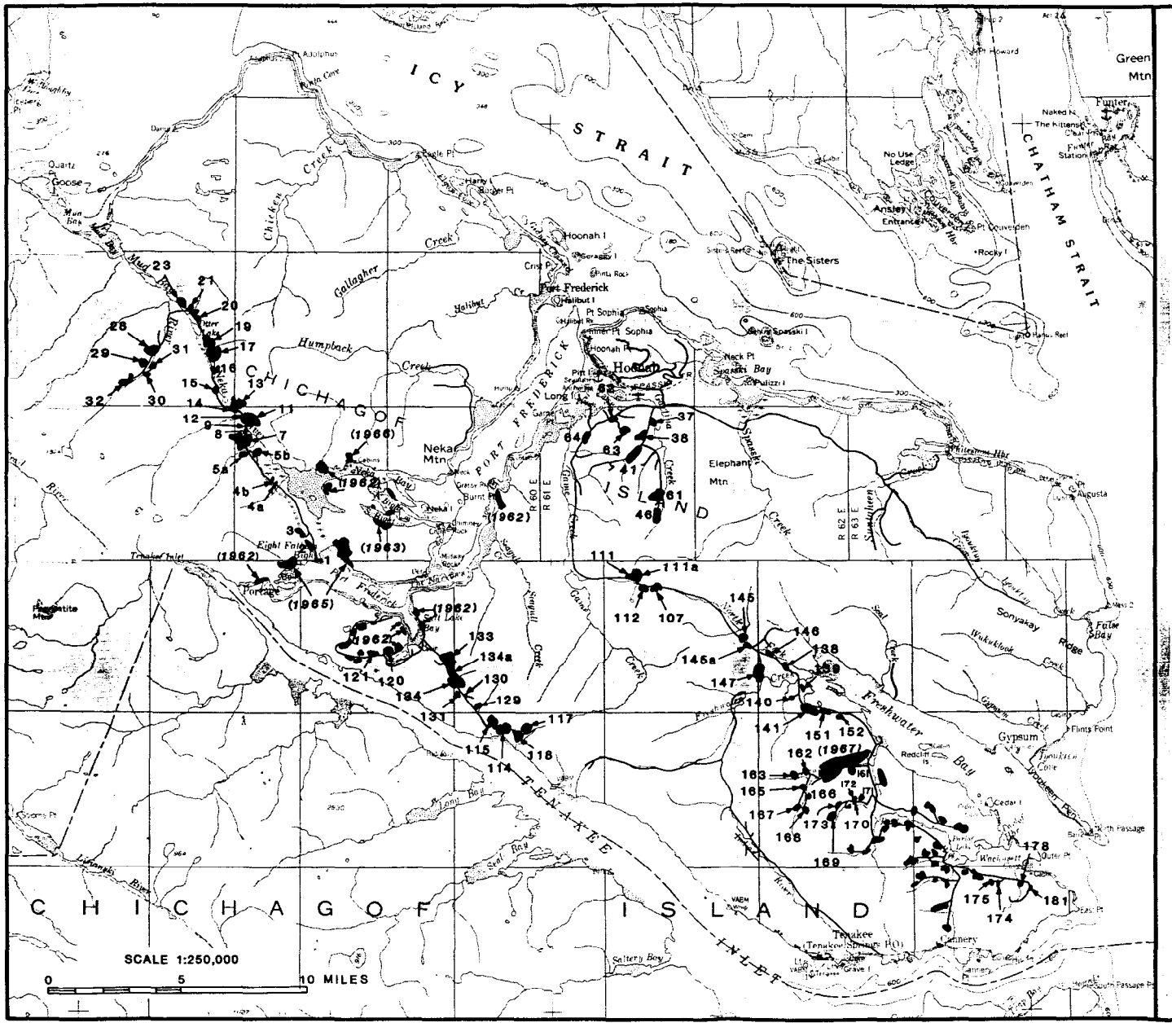


Figure 14.

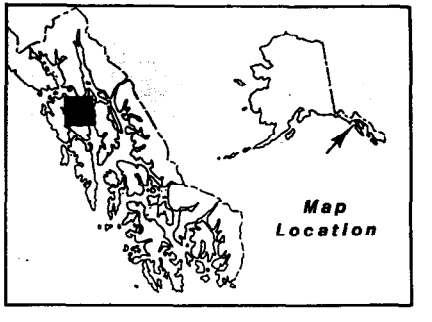
COMPLETED LOGGING ON U.S. FOREST SERVICE LANDS WITHIN HOONAH RANGER DISTRICT BY CUTTING UNIT, 1985.*

41 CUTTING UNIT

ROAD

Source: Bob Schroeder and Matt Kookesh, field research and documentation review, 1986, 1987, from data supplied by Susan Flora, 1986, 1987

*** Refer to text and tables for year of harvest and acreage cut by cutting unit Logging along the Indian River road system, logging south of Tenakee Inlet, and logging north of Icy Strait are not represented on this map. Refer to Leghorn and Kookesh, 1986, for data on the area boarding Tenakee Inlet.**



STATE OF ALASKA
DEPT. OF FISH AND GAME
Subsistence Division

TABLE 2. Logging on Tongass National Forest Land near Hoonah.
Part A, by Unit and Year, 1979 through 1985, Ordered by Unit Number.

UNIT #	YEAR	ACRES
MUD BAY - NEKA RIVER		
1	79	8
2	79	44
3	79	39
4a	82	7
4b	82	12
5	82	11
7	82	109
8	82	44
9	82	22
11	80	119
13	84	154
14	82	17
16	83	28
17	84	144
19	83	76
21	81	96
23	81	56
27	84	68
28	82	58
29	81	66
29a	82	2
30	81	30
31	82	12
32	81	118
GARTINA CREEK/LOWER GAME CREEK		
37	85	26
38	85	66
41	85	43
46	85	11
61	85	62
62	85	29
63	85	21
64	85	59
SALT LAKE BAY		
114	85	54
115	85	74
117	86	54
118	85	75
120	85	29
121	86	50
129	85	25
130	85	12
131	84	22
133	85	73
134	84	39
134a	85	22
UPPER GAME CREEK		
107	87	41
111	87	95
111a	87	103
112	86	40
155	87	17
KENNEL CREEK		
161	81	78
162	81	58
163	81	54
165	83	33
166	81	48
167	81	55
168	81	49
HANGING VALLEY		
169	83	72
170	81	35
171	83	30
172	82	30
173	81	41
174	81	11
175	84	23
EAST POINT		
178	84	14
181	84	47
FRESHWATER BAY		
138	83	13
139	84	8
140	82	20
141	82	88
144	83	65
145	83	39
145a	84	27
146	84	31
147	84	76
151	82	60
152	84	19

TABLE 2, continued. Logging on Tongass National Forest Land near Hoonah.
Part B, by Unit and Year, 1979 through 1985, Ordered by Year.

UNIT #	YEAR	ACRES	UNIT #	YEAR	ACRES
1	79	8	169	83	72
3	79	39	19	83	76
2	79	44	139	84	8
11	80	119	178	84	14
174	81	11	152	84	19
30	81	30	131	84	22
170	81	35	175	84	23
173	81	41	145a	84	27
166	81	48	146	84	31
168	81	49	134	84	39
163	81	54	181	84	47
167	81	55	27	84	68
23	81	56	147	84	76
162	81	58	17	84	144
29	81	66	13	84	154
161	81	78	46	85	11
21	81	96	130	85	12
32	81	118	63	85	21
29a	82	2	134a	85	22
4a	82	7	129	85	25
5	82	11	37	85	26
31	82	12	62	85	29
4b	82	12	120	85	29
14	82	17	41	85	43
140	82	20	114	85	54
9	82	22	64	85	59
172	82	30	61	85	62
8	82	44	38	85	66
28	82	58	133	85	73
151	82	60	115	85	74
141	82	88	118	85	75
7	82	109	112	86	40
138	83	13	121	86	50
16	83	28	117	86	54
171	83	30	155	87	17
165	83	33	107	87	41
145	83	39	111	87	95
144	83	65	111a	87	103

YEARLY TOTAL ACREAGE LOGGED:

YEAR	ACRES
1979	91
1980	119
1981	795
1982	340
1983	560
1984	657
1985	1518
SIX YEAR TOTAL ACREAGE LOGGED	4080

Source: U.S. Forest Service records. Note that data for 1986 and 1987 are incomplete.

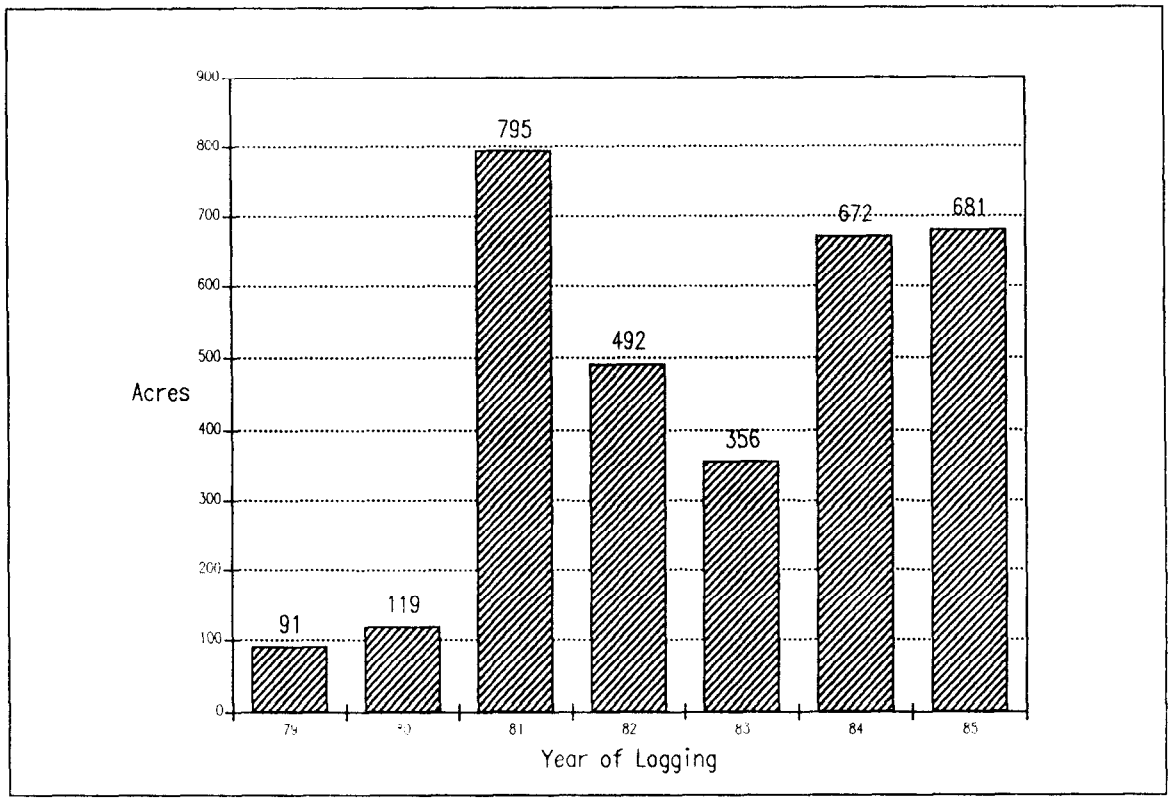


Figure 15. Acres Logged on Forest Service Land Near Hoonah by Year.

Most of the logging on Forest Service land through 1987 took place in the Neka River drainage, using the log transfer facility (LTF) at Eight Fathom Bight, about 15 to 20 water miles from Hoonah, and south of Freshwater Bay, using the LTF on Tenakee Inlet, also about 15 to 20 miles from the community. The final sections of road 8530 were completed at the time of this study, signaling the start of logging in a third area south of Whitestone Harbor. Logs from the Whitestone Harbor area and from timber harvest on Forest Service land elsewhere on the Hoonah road system are loaded at the Long Island LTF about one mile from Hoonah or at other LTFs constructed closer to clear-cuts[53].

53. The use of specific LTF sites changes from year to year with according to terms of cutting contracts made with the logging companies.

Native Corporation Logging

In the late 1970s Huna Totem Corporation began developing their landholdings. At that time timber prices were high, and it appeared to the corporation that sustained-yield logging could provide steady employment and substantial dividends to Huna Totem shareholders. In 1982 Huna Totem Corporation entered into a timber contract with Timber Pacific of Washington State to begin harvesting its 22,000 acres of timber resources. Plans included whole log export, chip export or sale to Alaska Lumber and Pulp, and possible large dimension structural timber and piling. A log transfer facility was built at Long Island, about one mile from Hoonah, and harvesting began in 1982 (Hoonah Planning and Zoning Commission 1984).

The corporation was forced to change its cutting plans in response to the steep fall in timber prices that took place in the early 1980s. In order to cover the start-up costs for building roads, constructing the log transfer facility, and other expenses, Huna Totem decided to accelerate its cutting schedule and planned to cut virtually all of its harvestable timber by the end of 1986 or 1987. In place of sustained yield management and long-term economic benefits from commercial harvest of timber on Huna Totem land, Hoonah is left with extensive clear-cuts in prime subsistence areas close to the community.

Table 3 shows the year and size of each clear-cut on Huna Totem land. Figure 16 shows the acres logged on Huna Totem Corporation land through 1985. As these data show, logging proceeded rapidly throughout Huna Totem lands. A total of 3,075 acres were logged through 1985. Logging has occurred in Spasski Bay, along Spasski Creek, and in other areas close to Hoonah. All of Huna Totem Corporations' land is located within three to five miles of the community.

TABLE 3. Huna Corporation Logging by Year and Unit, 1982 through 1985.

UNIT #	YEAR	ACRES	UNIT #	YEAR	ACRES	UNIT #	YEAR	ACRES
19a	85	5	1	82	37	19a	85	5
23a	85	2	1	82	74	23a	85	2
24	85	130	17	82	25	24	85	130
25a	85	10	1b	82	33	25a	85	10
26	85	29	3,3a	82	69	26	85	29
27	85	214	4	82	64	27	85	214
28a	85	49	Airport	82	38	28a	85	49
29c	85	5	12,12a	83	41	29c	85	5
30	85	21	13	83	45	30	85	21
31	85	62	15	83	18	31	85	62
32	85	170	16	83	24	32	85	170
34	85	60	1a	83	31	34	85	60
37	85	77	23a	83	10	37	85	77
40	85	145	23,25	83	157	40	85	145
41	85	20	28	83	70	41	85	20
42	85	21	5	83	54	42	85	21
4a	85	17	7	83	32	4a	85	17
9c	85	17	8	83	15	9c	85	17
WP1	85	94	9	83	63	WP1	85	94
WP2	85	139	10	84	128	WP2	85	139
WP4	85	15	11	84	43	WP4	85	15
WP5	85	18	11a	84	8	WP5	85	18
WP6	85	18	14	84	75	WP6	85	18
WP6	85	177	18	84	56	WP6	85	177
One Unit	85	3	19	84	113	One Unit	85	3
29	84	107						
29a	84	70						
9a	84	17						
All Roads	84	40						

YEARLY TOTAL ACREAGE LOGGED:

YEAR	ACRES
1982	340
1983	560
1984	657
1985	1518

FOUR YEAR TOTAL ACREAGE LOGGED 3075

Source: Huna Totem Corporation and ADNR Division of Forestry.

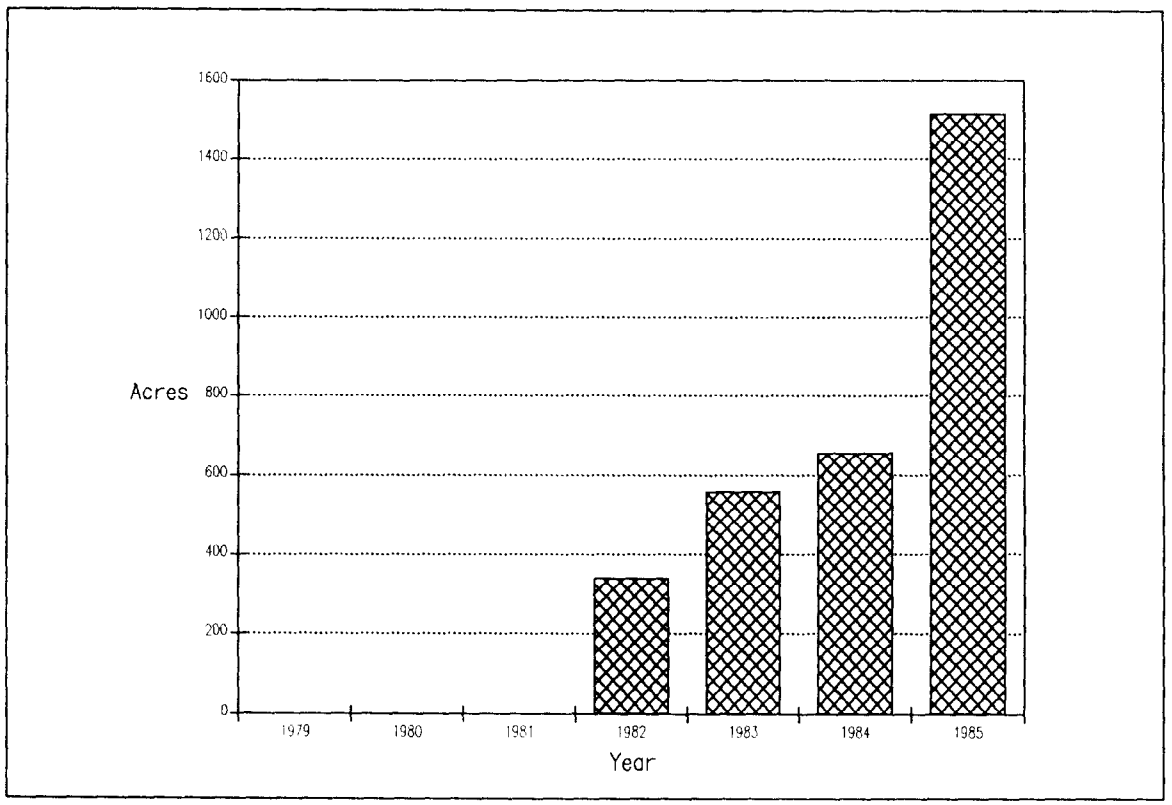


Figure 16. Acres Logged on Huna Totem Corporation Land Near Hoonah by Year.

Logging on Sealaska Corporation land commenced in 1987 on corporation land on northwest Chichagof Island, across Port Frederick from the Hoonah city site. Some of the clear-cuts are visible from the community. As shown on Figure 12, logging on Sealaska land will be within about 5-15 miles of Hoonah.

Figure 17 shows the combined total acreage logged close to Hoonah from 1979 through 1985 on both Tongass and private lands. In the years 1979 through 1985, about 6,400 acres, or about 10 square miles, of old-growth forest were clear-cut in the area surrounding Hoonah, again not including logging for road corridors. During this time period about 52 percent of the acres logged were on Forest Service land and 48 percent were on Huna Totem Corporation land. In summary, 1979 through 1985 saw a relatively rapid development of the timber industry in the area near Hoonah, including construction of 159 miles of road in a previously roadless area, opening of three LTFs and a number of large logging camps, the introduction of a logging population of about 400 persons, and the clear-cutting of 6,400 acres of timber within about 20 miles of Hoonah.

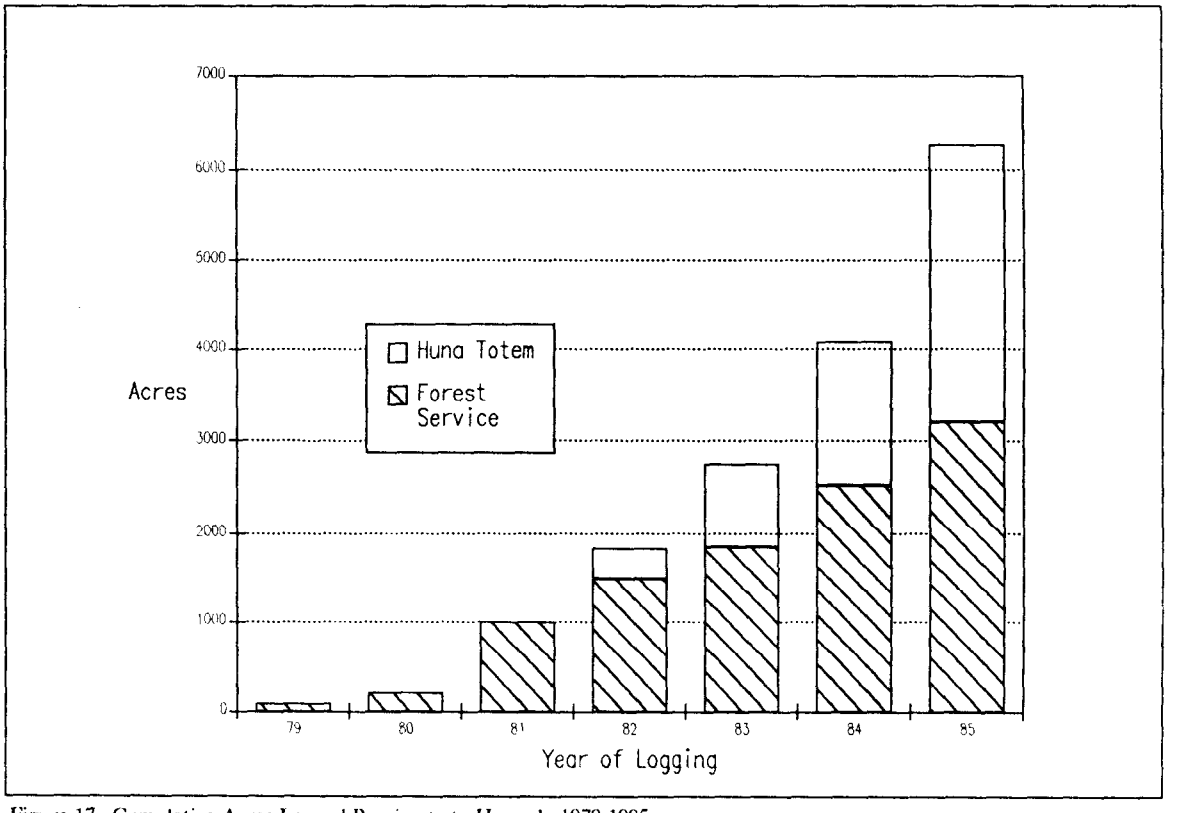


Figure 17. Cumulative Acres Logged Proximate to Hoonah, 1979-1985.

CHAPTER 3

THE HOONAH ECONOMY: CASH SECTOR

Employment and Income Levels

At the time research was conducted, the cash sector of Hoonah's economy depended heavily on employment in government service, in commercial fishing, and in logging. Overall employment and income levels were better than in some small southeast Alaska communities but very limited compared to opportunities in the urban areas of Juneau and Ketchikan. Table 4 presents income estimates for recent years for Hoonah and selected other southeast communities based on federal income tax returns (Alaska Department of Revenue, 1987). Taxable income per return for 1982 in Hoonah at $13,172 was intermediate between that of Angoon and Kake which had incomes of $11,605 and $15,902 respectively, but considerably lower than that for Juneau and Ketchikan which had incomes of $22,968 and $21,693 respectively. Higher costs for goods and services in Hoonah, compared with Juneau and Ketchikan, exacerbates the difference in income.

TABLE 4. Mean Taxable Income per Income Tax Return, Selected Southeast Alaska Communities, 1978, 1981, 1982.

COMMUNITY	1978	1981	1982
Angoon	8107	9542	11605
Hoonah	9413	12618	13172
Juneau	17446	22725	22968
Kake	8645	12845	15902
Ketchikan	16043	21301	21693
Sitka	17383	22259	20392
Tenakee Springs	10519	13405	12129
Yakutat	13646	17525	17402

Source: Alaska Department of Revenue, 1985.

Figure 18 depicts reported 1986 taxable household income for the households in the Hoonah sample. In 1986, 36.2 percent of sampled households had income of less than $15,000. About half or 46.3 percent of sampled households had incomes of less than $20,000 per year. At the other end of the scale, 7.2 percent of households had incomes of $50,000 or more[54].

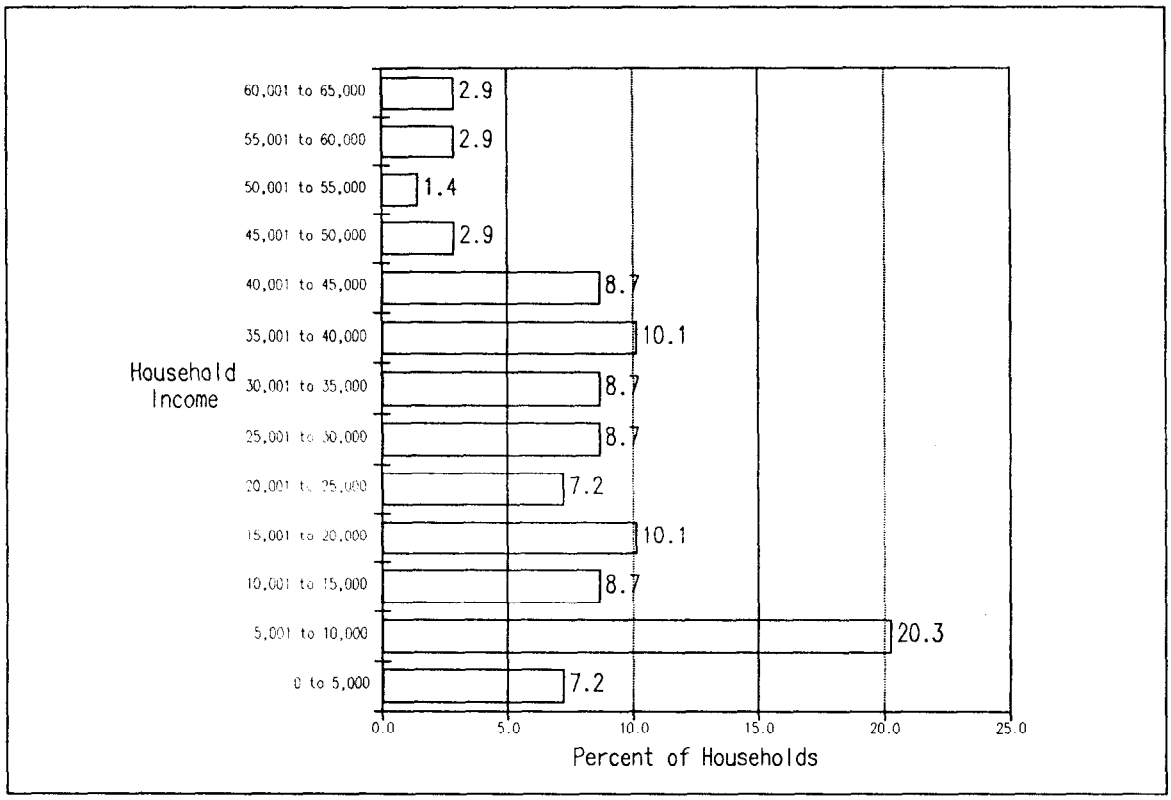


Figure 18. Income of Sampled Households, Hoonah, 1986.

The range of incomes is related to the types of employment available in Hoonah. Figure 19 shows the number of jobs reported by adults, persons aged 18 and over, in the sampled households. Figure 20 shows the hours worked at each category of jobs. Note that one person could hold multiple jobs in the course of a year. In these figures, the category *government* lumps all publicly funded jobs. Longshoring refers to jobs loading log ships that transport round logs to Japan. Jobs building Forest Service buildings accounted for an estimated half of the construction jobs in the

54. Survey income data are not directly comparable to income tax data.

base year. A total of 123 jobs were held by adult members of sampled households during the base year or about 0.7 jobs per household. The total number of hours worked was about 142,000. This is equivalent to about 50 weeks of full time work (40 hours per week) per household.

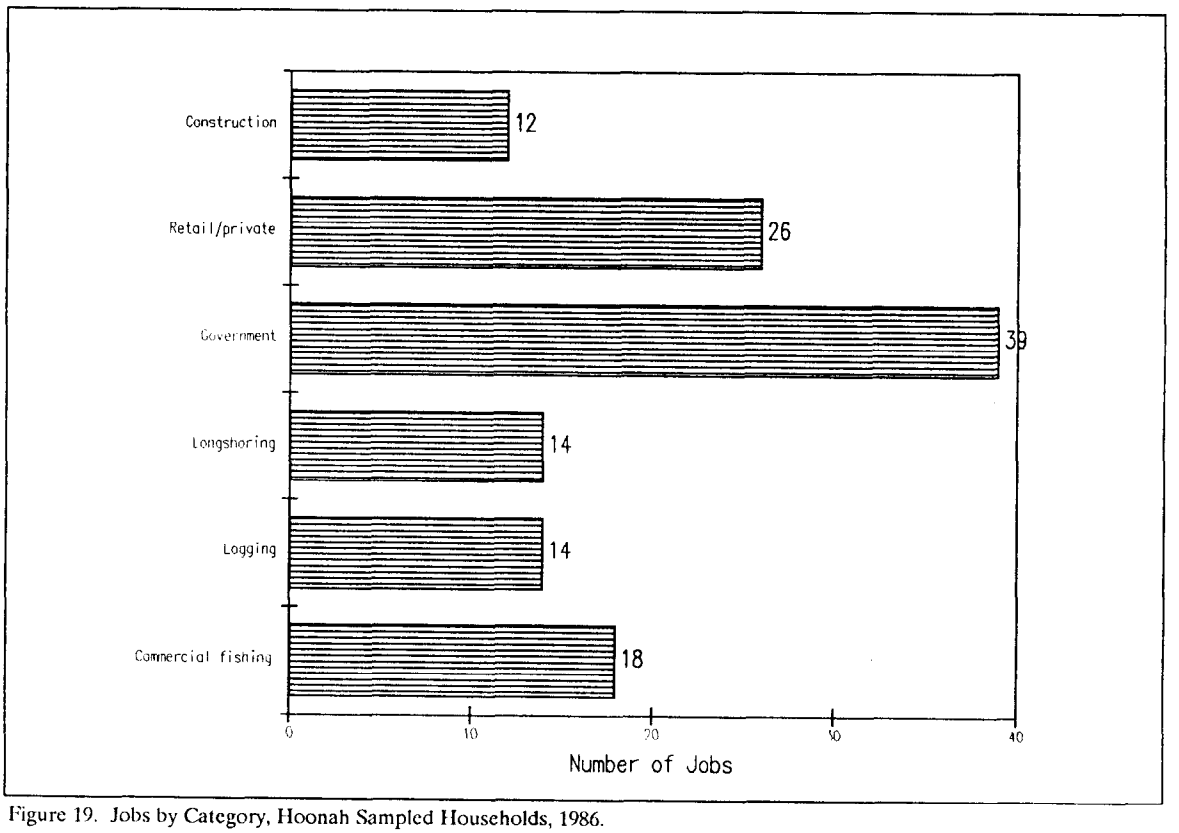


Figure 19. Jobs by Category, Hoonah Sampled Households, 1986.

About a third (32 percent) of the reported jobs were in government covering all publicly funded jobs. These accounted for about 37 percent of the hours worked. The largest public sector employers in 1987 were the school system with about 40 employees, the City of Hoonah with from 15 to 25 employees, and the Forest Service with from 15 to 25 employees. Most of the higher paying jobs with both the school district and with the Forest Service were held by persons who moved to Hoonah from elsewhere. The post office and health clinic also provided government funded employment in the community[55]. About 28 percent of the reported jobs and 25 percent of the hours worked were directly

55. The health clinic is operated by the Southeast Alaska Regional Health Corporation and funded mainly by the federal government.

related to timber management or timber harvesting, including logging, longshoring, and related construction work, see Figure 20. Longshoring provided 14 jobs loading logs onto ships for transport to Japan or other Asian countries. Jobs building Forest Service facilities accounted for half the construction jobs in the base year. Logging accounted for 14 jobs in the sample. Longshoring was highly seasonal and accounted for fewer work hours than the more regular occupations. Employment in logging and longshoring due to timber harvest on Native corporation land will end in the near future with the completed exploitation of timber resource holdings. The Forest Service land base could support logging jobs for some years to come, although stands with high grade harvestable timber are being rapidly exhausted[56]. Thus jobs resulting from timber management activities and timber harvesting are not likely to provide employment at the study year level on a sustained basis.

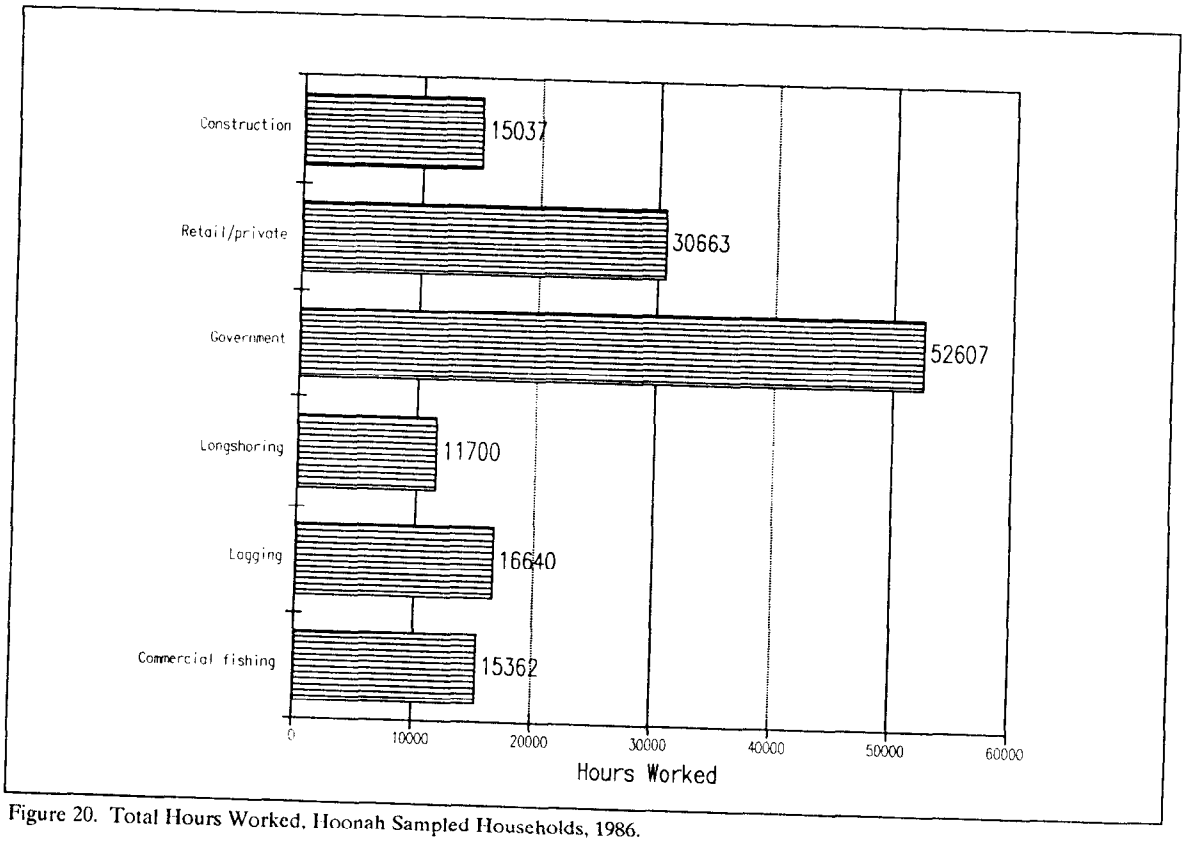


Figure 20. Total Hours Worked, Hoonah Sampled Households, 1986.

56. Longshoring will end with the end of logging on Native land. Timber from National Forest land may not be exported in-the-round.

Figure 21 shows mean household income by employment source for households with the income source and for all households. Households reporting longshoring income, for example, earned about $7,000 from this source in the base year.

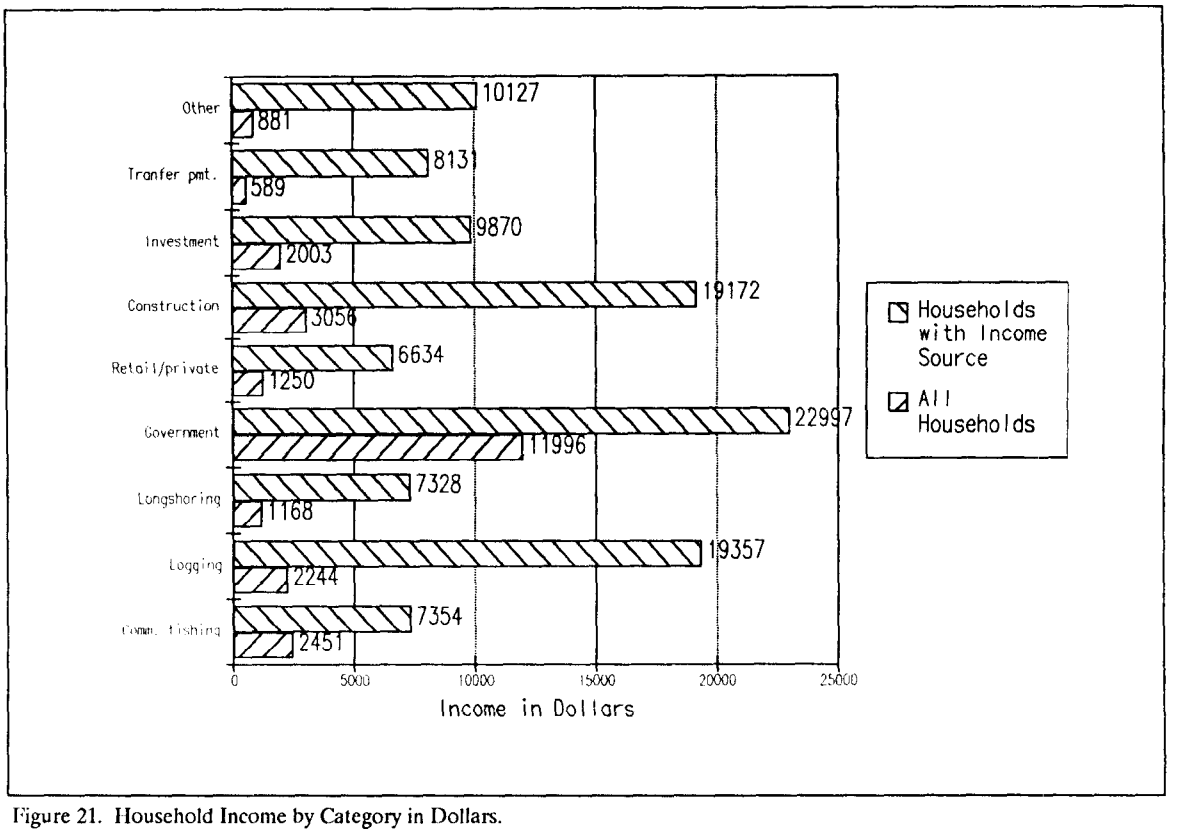


Figure 21. Household Income by Category in Dollars.

Figure 22 presents the total 1986 household income by source for the whole community, based on the sampled households. Income from publicly funded jobs accounted for about 47 percent of the taxable income of survey respondents and was by far the largest component of the local cash sector in 1986. Forest Service employment is included in this category and accounted for an estimated five percent of the total household income on a community basis.

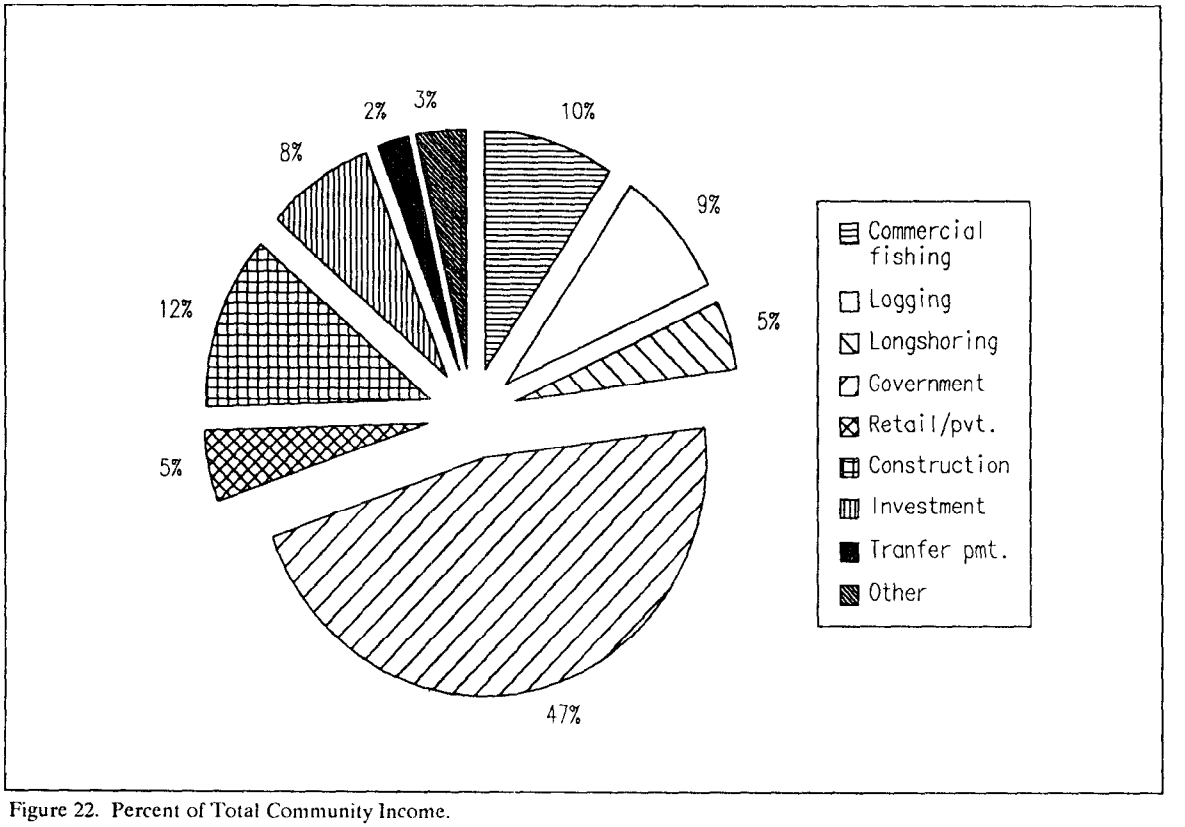


Figure 22. Percent of Total Community Income.

Logging and longshoring accounted for 9 percent and 5 percent of the community's taxable income respectively, and construction accounted for about 12 percent. The construction total was high due to a number of federal or state funded projects in 1986. Combining the logging and longshoring income, direct income from the timber industry was about 14 percent of the total income for the sample in 1986. Forest management accounted for an additional estimated six percent in construction and five percent in Forest Service employment. Combining all these income sources, about 26 percent of total community income was directly or indirectly related to the timber industry in 1986.

Commercial fishing brought in about 10 percent of the total taxable income. This total is lower than expected and may be related to tax provisions that provide incentive to independent fishermen by allowing for major deductions from gross income. Commercial fishing has been relatively more important in previous years before the growth of the logging industry and before the equally recent expansion of government funded construction and services. Until a few years ago the Excursion Inlet cannery provided quite a few jobs to Hoonah residents. Employment at the cannery was low in

the base year, however. There are also a small number of fishing related jobs at the local fish packer in Hoonah.

Income reported from transfer payments for the sampled households was relatively low at about two percent of all income. This may reflect the general economic soundness of the Hoonah economy in 1986[57]. Investment income at eight percent was higher than expected and reflects the earnings of the households with stable high incomes in the community.

Participation in Commercial Fishing

Commercial Fisheries Entry Commission (CFEC) records for limited entry fisheries were analyzed to provide a more complete picture of the role of commercial fisheries in Hoonah's economy. CFEC records from the beginning of limited entry regulation in 1975 through 1984 were examined. These data do not include permits that were owned but not fished.

Figure 23 shows the number of limited entry permits fished by Hoonah residents by year and by type. A maximum of 201 permits were fished in 1978; 173 were fished in 1984, or about .62 permits per household. Over this time period there has been a decrease in the number of hand troll salmon permits that have been fished; a significant number of permits are inactive. Permit sales and transfers have not resulted in a large movement of permits out of the community overall, however, some transfer of the more valuable power troll and salmon seine permits appears to have taken place since the enactment of limited entry legislation. Participation in commercial halibut fishing has increased markedly in this time period. Figure 24 shows the number of Hoonah residents who fished with permits in limited entry fisheries in the 1975 through 1984 time period. Since a commercial fisher could fish in more than one fishery, the number of fishers is less than the number of permits. The total number of permit holders who fished declined from a high of 158 in 1978 to 106 in 1984, ignoring the start up year, 1975. Much of this decline is the result of fewer persons fishing with hand troll permits in later years.

57. Permanent fund checks were not considered transfer payments in this study. Respondents appeared to include these payments as regular income.

In addition to the 106 permit holders, an estimated 100 other persons worked as crew in these fisheries. Thus, about 206 Hoonah residents fished for commercial salmon or halibut in 1984.

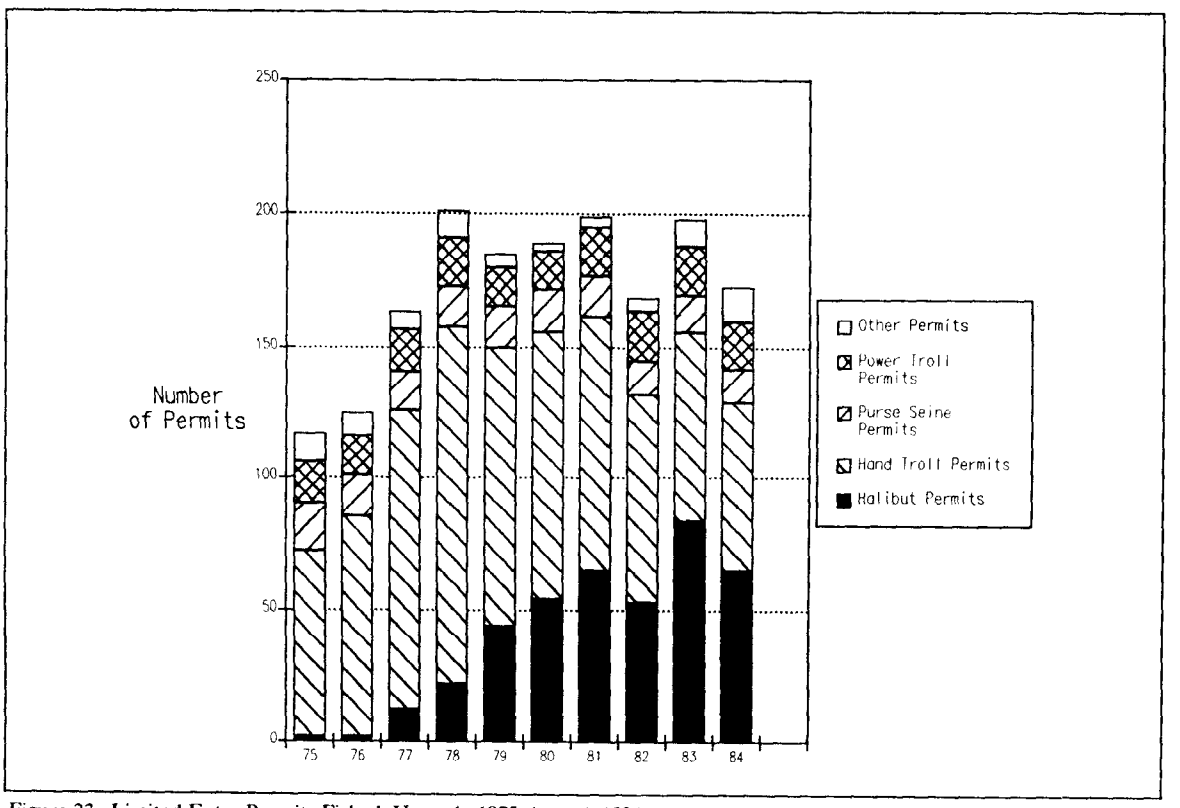


Figure 23. Limited Entry Permits Fished, Hoonah, 1975 through 1984.

Figure 25 depicts the gross earnings to Hoonah fishermen from limited entry fisheries in the 1975 through 1984 time period. Gross earnings or ex vessel value is the approximate amount paid to fishers for their catch before allowances for expenses. The limited entry system was in full force from 1977 to present. Gross earnings during the 1977 through 1984 time period have varied from about $1.7 million in 1982 to about $2.8 million in 1981. Gross earnings were about $2.2 million in 1984.

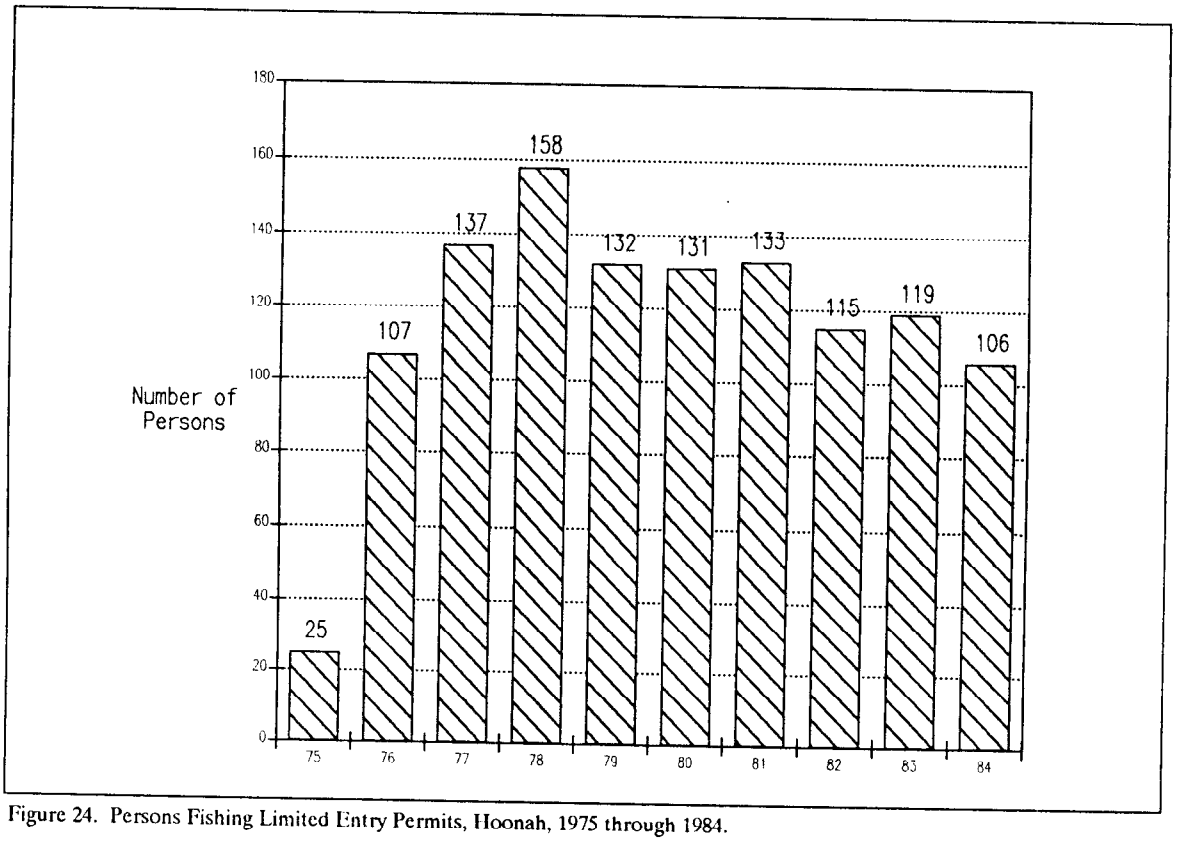


Figure 24. Persons Fishing Limited Entry Permits, Hoonah, 1975 through 1984.

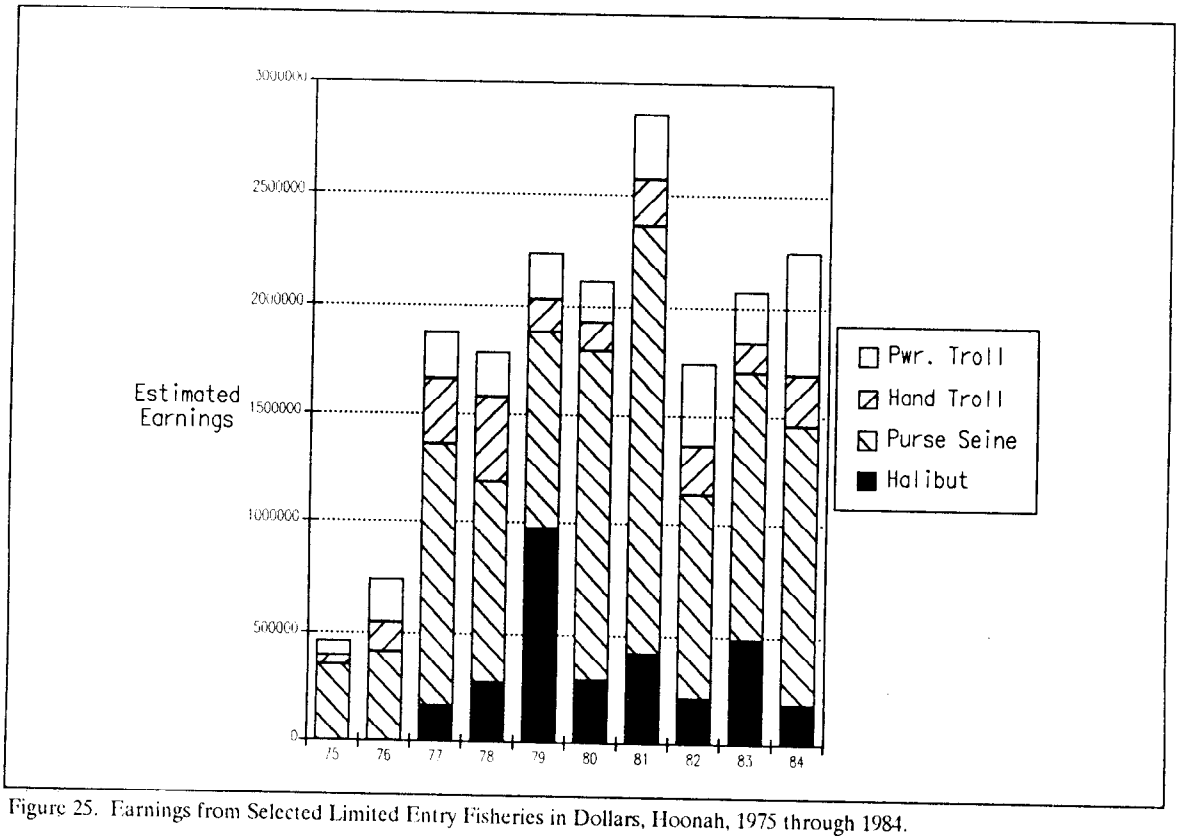


Figure 25. Earnings from Selected Limited Entry Fisheries in Dollars, Hoonah, 1975 through 1984.

Figure 26 presents the percent of gross earnings from each fishery from 1975 through 1984. Earnings of purse seine salmon fishers account for the largest portion of total gross earnings in almost all years, although only about 10 permits are fished in each year (Figures 26, 27). Purse seine fishers pay shares for a crew of four or five and have operating costs that are much higher than other gear types. In poor income years a seiner will be unlikely to break even, (see Figure 27). Figure 28 shows the average income for power trollers over the 1975 through 1984 time period. Average income has ranged between $11,000 and $31,000 in recent years. About 20 permits are fished in most years. The average gross income for each permit holder by year shown in Figure 29 has varied between about $7,500 and $23,000 in recent years. Note that a single person can hold more than one permit.

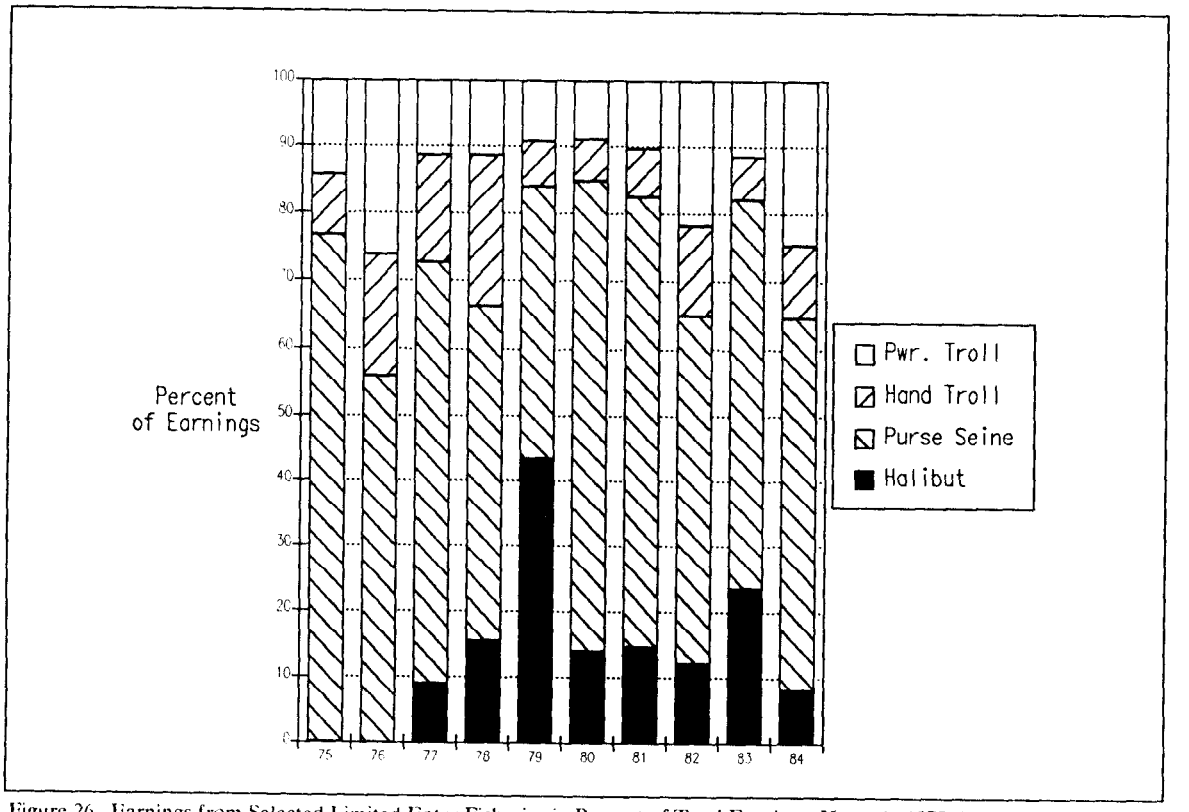


Figure 26. Earnings from Selected Limited Entry Fisheries in Percent of Total Earnings, Hoonah, 1975 through 1984.

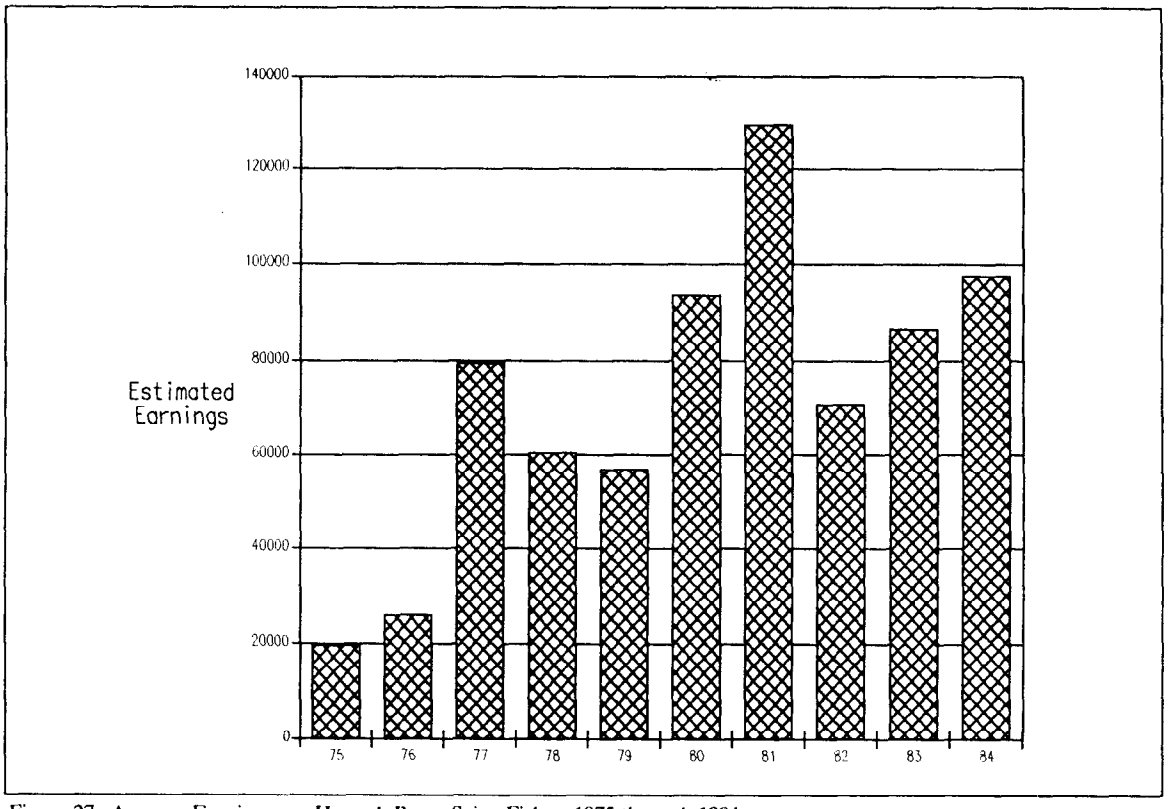


Figure 27. Average Earnings per Hoonah Purse Seine Fisher, 1975 through 1984.

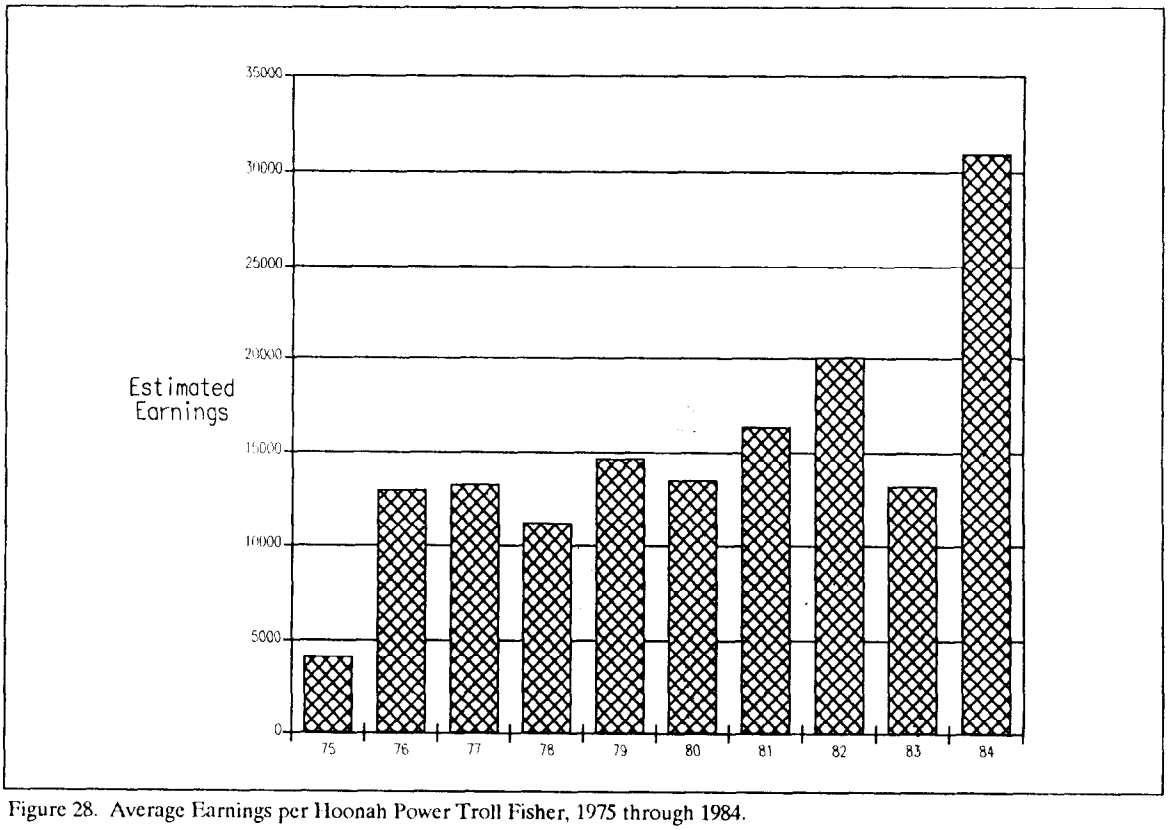


Figure 28. Average Earnings per Hoonah Power Troll Fisher, 1975 through 1984.

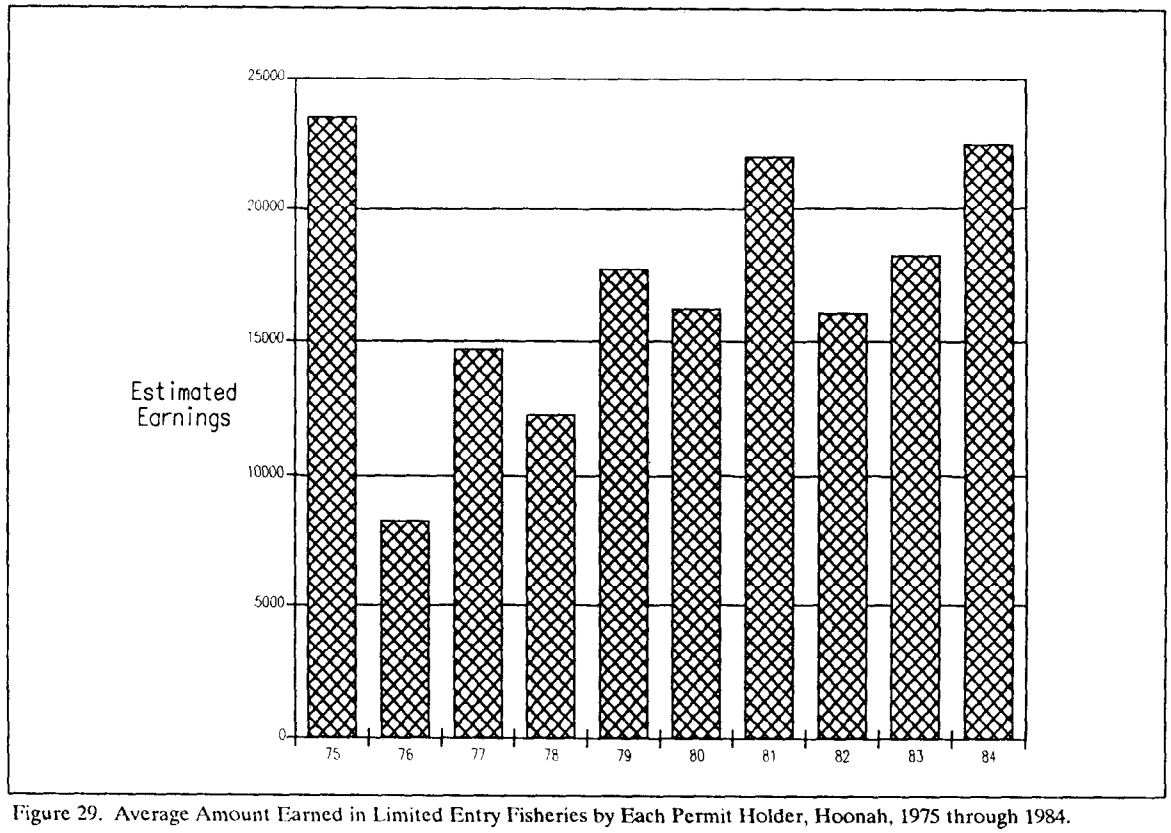


Figure 29. Average Amount Earned in Limited Entry Fisheries by Each Permit Holder, Hoonah, 1975 through 1984.

In reviewing CFEC records and the survey data it is clear that commercial fisheries continue to be an important component in Hoonah households' cash economy. Income from commercial fisheries is fairly well distributed in the community with 106 permit holders and an estimated total of 200 fishers in 1984. If salmon and halibut stocks continue to recover and move toward historic population levels, the value of commercial fisheries could increase for Hoonah residents.

The cash contribution commercial fishing makes to the Hoonah economy does not provide a measurement of other benefits to the community that come from this economic activity. Boats and other gear paid for through commercial fishing are often used for subsistence harvesting when commercial seasons are closed. In addition, commercial fishing is seasonal, and most fishers are self-employed. Because of this they frequently have more time for subsistence harvesting than people employed in occupations with more regular hours. Finally, commercial fishers were found to regularly use a portion of their legal commercial catch for home use; this latter use is discussed below.

CHAPTER 4

THE HOONAH ECONOMY: SUBSISTENCE SECTOR

Introduction

The other sector of Hoonah's economy is the subsistence sector: harvesting, processing, using, distributing, bartering, and trading wild resources. This chapter provides information on the wild resources harvested and used by Hoonah residents, the means of harvest of these resources, quantity of harvest and use, and areas of harvest. Data on intensity of land use will also be presented. Hoonah residents harvest the natural resources in their territory for food, and, as will be shown, wild foods provide a major portion of the high quality meat and fat that is consumed in the community.

Species Harvested and Principle Harvest Methods

Table 5 lists the species that have been harvested and used for subsistence by Hoonah residents with common name, taxonomic binomial, and Tlingit name[58]. Other species may be used occasionally. Hoonah residents occasionally harvest and use other fish species, in addition to the 24 species listed, including other species of rock fish and bottom fish, and also hunt for other species of waterfowl and birds that are less abundant than the 17 bird species listed. We have included shark, skate, sea snails, starfish, bear, cranes, swans and other species that Hoonah residents do not use frequently at the present time out of preference or concern for the species. Huna Tlingit have taken whales histor-

58. Binomials for the species most commonly harvested are listed. Additional species of king crab and shrimp, for example, are also harvested. Tlingit names were collected by Matt Kookesh from Native speakers in Hoonah and in Angoon; note that spelling variations in Tlingit names may occur from speaker to speaker. We are not able to list Tlingit names for all species.

Figure 30. Hoonah Tlingit in Ceremonial Regalia. Courtesy of the Alaska State Library, Case Call P. C. A. 01-3191.

Figure 31. Hoonah Basket Weavers. Courtesy of the Alaska State Library, Case Call P. C. A. 01-2251.

TABLE 5. Species Traditionally Harvested and Used by Hoonah Residents, 1986.

COMMON NAME	BINOMIAL	TLINGIT
MARINE PLANTS		
Broad kelp	Irtadaea flaccida	Daaw
Sea ribbon	Rhodymenia pacmata	K'aach'
Giant kelp	Nereocystis	Geesh
Hair grass	Obelia sp.	Ne
Rockweed	Pelvettiopsis limitata	Tayeidi
Black seaweed	Porhyra laciniata	Laak'ask
Yellow seaweed	Fucus distichus	Tayeidi
FISH		
Blackbass	Sebastes melanops	Lit.isduk
Cod, black	Anopiopoma fimbria	Ishkeen
Cod, Pacific	Gadus macrocephalus tilesius	S'aax'
Cod, ling	Ophiodom elongatus	X'aax'w
Cod, tom	Microgadus proximus	Chudei
Cutthroat	Salmo clarki	X'eitaa
Dog fish	Squalus acanthias	X'atgu
Dolly Varden	Salvelinus malma	X'waat
Eel	unidentified	Loot'
Eulachon, hooligan	Thaleichthys pacificus	Saak
Flounder	Plattichthys stellatus	Wankashxeet, dzántee
Halibut	Hippoglossus stenolepis	Cháatl
Herring	Culpea harengus pallasi	Yaaw
	valenciennes	Gáax'w
Herring eggs		
(collected on hemlock branches, hair grass, and macrocystis kelp)		
Irish lords		
Needle fish	unidentified	took
Red snapper	Sebastes alutus	Leik'w
Salmon, chum	Keta oncorhynchus	Téel
Salmon, coho	Kisutch oncorhynchus	l'ook
Salmon, king	Tshawytscha oncorhynchus	T'á
Salmon, pink	Gorbuscha oncorhynchus	Chaas'
Salmon, sockeye	Nerka oncorhynchus	Gaat
Sculpin	Myoxocephalus	Weix' Tloox
Shark	Lamna ditropis	Toos'
Skate	Raja stellulata	Ch'eetgaa
Smelt, surf	Hypomesus pretiosus	
Steelhead	Salmo gairdneri	Aashat
Salmon eggs	all five species	Kahaakw

TABLE 5, continued. Species Traditionally Harvested and Used by Hoonah Residents, 1986.

COMMON NAME	BINOMIAL	TLINGIT
MARINE INVERTEBRATES		
Abalone	Haliotis kamtschatkana	Gunxaa
Clams, butter	Saxidomus giganteus	Gaal'
Clams, horse	Tresus Nuttalli	Yeis
Cockles	Clinocardium nuttalli	Yalooleit
Gumboots, chitons	Katherina tunicata	Shaaw
Lady slipper	Cryptochiton stelleri	Koow
Limpets	Notoacmea Scutun	Yeil Ts'aaxu
Mussels	Mytilus edulis	Yees', yaak
Octopus	Octupus dofleini	Náakw
Sea cucumbers	Parastichopus californicus	Yéin
Sea snails	Fusitriton oregonensis	Ts'esx'w
Sea urchins, neets	Strongylocentrotus sp. purpartus	Nees'
Shrimp	Pandalus sp.	
Squid	unidentified	Dagasaa
Starfish	Pycnopodia helianthoides	S'ax
Dungeness crab	Cancer magister	S'aaw
King crab	Parilithodes camtschatica	X'eix
Tanner crab	Chionocoetes bairdi	X'eix
MARINE MAMMALS		
Harbor seal	Phoca vitulina	Tsaa
Fur seal	Callorhinus ursinus	X'óon
Sea lion	Eumetopias jubata	Taan
Sea otter	Enhydra lutris	Yáxwch, Yúxch'
Dall porpoise	Phocenoides dalli	Cheech
Harbor porpoise	Phocoena phocoena	K'aan
Killer whale	Orlinus orca	Kéet
Humpback whale	Megaptera novaeangliae	Yaay
LAND MAMMALS		
Black bear	Ursus americanus	s'eek
Brown bear	Urus arctos	Xóots
Beaver	Castor canadensis	Sikeidi
Deer	Odocoileus heminonus sitkensi	Guakaan
Land otter	Lutra canadensis	Koosh Ta Kaa, kóoshdaa
Marten	Martes americanus	K'oox
Mink	Mustela vison	Nukshiyaan
Moose	Alces alces	Dzízk'w
Mountain goat	Oreamnos americanus	Tawei, jánwoo
Muskrat	Ondatra zibethicus	Tsin
Porcupine	Erethizon dorsatum	Xalak'ách'
Weasel	Mustela erminea	Dáa

TABLE 5, continued. Species Traditionally Harvested and Used by Hoonah Residents, 1986.

COMMON NAME	BINOMIAL	TLINGIT
BIRDS AND BIRD EGGS		
Bufflehead	Bucephala albeola	Hintakx'was'gi
Canada goose	Branta canadensis	T'aawak
Golden eye	Bucephala clangula	Hinyik Gaaxu
Grouse, spruce	Canachites canadensis	Kaax', núkt
Harlequin	Histrionicus histrionicus	S'us'
Heron	Ardea herodias	Lax'
Loon	Gavia immer	Kageet
Mallard	Anas platyrhynchos	Kindachooneit
Old squaw	Clangula hyemalis	Yaa.aa.oonéi
Pintail	Anas acuta	Gaaxw
Ptarmigan, Willow	Lagopus mutus	X'eis'awaa
Puffins, horned	Fratercula corniculata	
Sandhill crane	Grus canadensis	Dool
Scooter	Melanitta deglandi	Wakkals'oox'
Seagull	Larus philadelphia	Keidladi
Swan, trumpeter	Olor buccinator	Gukl'
Swan, whistling	Olor Colubianus	Gukl'
Bird eggs	Mostly gull species	K'wat'
PLANTS		
Beach asparagus	Salicrnia pacifica	
Deer cabbage	Maianthemum dilitatum	K'uwaani
Devils club	Oplopanax horridus	S'axt'
Ferns	Dryopteris austriaca	S'aach
Fireweed	Epilobium angustifolium	Lool
Goose tongue	Plantago martima	Sukeitl'
Hemlock (branches)	Tsuga heterophylla	Haaw
Hemlock (bark)		
Hudson Bay tea	Ledum palustre	S'ikshaldeen
Indian rice	Fritillaria camchatcensis	Koox
Nettles	Urtica lyalli	Duk'
Skunk cabbage	Lysichiton americanum	X'áal'
Sourdock	Rumex sp.	
Spruce roots		
Tall cotton grass	Eriophorum angustifolium	Shaachk Kax'waal'i
Water sedge	Carey aquatilis	Anahoo
Wild celery	Angelica lyrata	Yaana.eit
Wild cucumber	Streptopus amplexifolius	Tleik
Wild parsley	Ligusticium scoticum	
Wild rhubarb	Polygonum alaskanum	Tl'aak' wach'
Wild sweet potato	Potentilla pacifica	Tseit

TABLE 5, continued. Species Traditionally Harvested and Used by Hoonah Residents, 1986.

COMMON NAME	BINOMIAL	TLINGIT
BERRIES		
Blueberry		Kanat'a
Blueberry, dwarf	Vaccinium caespitsun michx.	Kakatlaax
Blueberry, early	Vaccinium alaskensis howell	Naan yaa, Kanat'aayi
Blueberry, mountain	Empetrum nigrum	Ts'eekáxk'w
Blueberry, swamp	Vaccinium uliginosun	Lax' Loowu
Cloudberry	Rubus chamaemorus	Néx'w
Cranberry, bog	Oxycoccus microcarpus turcz	K'eishkahaagu
Cranberry, low bush	Rubus vitisdaea	Dáxw
Cranberry, tall bush	Viburnum educe	Kaxweix
Currant,trailing black	Rubes laxiflorum pursh	Kaneilts'akw
Currants, blue	Rubes bracteosum dougl	Shaax
Elderberry	Sambucus callicarpa greene	Yéil'
Gooseberry		
Groundberry	Cornus canadensis	K'eikaxetl'k
Huckleberry	Rubus parvifolium	Tleikatank
Nagoonberry,	Rubus articus	Neigoon
Raspberry	Rubus spectabilis	Was'x'aan, Tleigu
Salmonberry	Rubus spectabilis	Was'x'aan, Tleigu
Serviceberry, Pacific	Amelanchier florida lindl	Gaawak'
Soapberry	Shepherdia canadensis	Xakwl'ee
Strawberry	Fragaria childensis	Shakw
Thimbleberry	Rubus Parviflorus	Ch'eix'

cally but do not presently harvest cetaceans. Fur seal harvest has been limited since decline in Alaska fur seal populations and restrictions on their utilization[59].

Marine plants are harvested from skiffs and fishing boats by small parties of gatherers and usually brought back to Hoonah for drying, less commonly dried on rocks at the harvest site in dry weather. Some of the best beds for harvesting marine plants are located at some distance from Hoonah. Marine plants typically are air dried on frames or screens, depending on the species of plant; marine plants may also be hung on lines to dry. The dried product is used throughout the year in soup

59. Porpoises and killer whales were probably never major food items. They are included to make the species list as complete as possible. Fur seals were traditionally hunted and figured in the indigenous fur trade and that with colonial powers. Sea otter was taken historically and has recently reappeared in areas used by Hoonah residents. Both species may be occasionally taken at the present time.

and stews. Dried seaweeds are particularly prized Tlingit traditional foods and may be featured items at potlatches and other traditional parties. They also are important trade and exchanges items.

Fishing with nets for chum, pink, and sockeye salmon, usually using beach seines, takes place under subsistence permits. Handling the gear requires three or more people, so seining is frequently a group activity. Purse seines are also occasionally used for subsistence harvest of chum and, sockeye salmon[60]. Current State of Alaska subsistence fishing regulations do not permit subsistence net fishing for subsistence for king and coho salmon. These salmon and other fish species are taken with rod and reel and, occasionally, with hand lines by Hoonah residents. Current regulations do not permit subsistence long line fishing for halibut and restrict fishers to one line with a maximum of two hooks. Because of these restrictions put on subsistence harvesting of coho and king salmon and of halibut, commercial fishers often keep part of their legal salmon and halibut catch for home use. Black cod, ling cod, red snapper or yellow eye, and various species of rockfish are also frequently retained by commercial fishers for home use. In addition to being used for direct consumption, herring, grey cod, and other less delectable species are used as bait for subsistence fishing of more prized fish and for marine invertebrate species. Halibut and salmon are the fish species most often taken in quantity and preserved. These and other species are air dried, smoked, canned, or frozen for later use. Herring eggs are preserved by freezing or drying and may be used throughout the year. Eulachon or hooligan oil is a highly valued and traded item in the Tlingit community. Dried and smoked fish, herring eggs, and eulachon oil are prized traditional foods.

Most marine invertebrates are dug or collected from the intertidal and high subtidal zones at low tides. Crab are caught using pots. Chitons, butter clams, cockles, and dungeness crab are taken in quantity. Sea cucumbers, octopus, urchins and other intertidal species account for a smaller proportion of the subsistence harvests. Harvesting in the intertidal zone can be effectively done by a single individual. However, more than one person is needed to pull larger crab pots easily. Clams, cockles, and

60. In most years one or more of the Hoonah seine boats receives approval for group subsistence fishing, generally for chum salmon from Excursion Inlet. When this occurs, the seiner fishes for people who would otherwise be unable to harvest these salmon.

other marine invertebrates are preserved by freezing and occasionally by smoking and drying. Crab species are preserved by freezing. Most marine invertebrates are eaten fresh.

Harbor seal is the main marine mammal species taken at the present time. Some food use also is made of sea lions flippers. Some hunting for sea otters, whose pelts are used for craft items, may be taking place since sea otters have been re-established in the Hoonah territory. Fur seals may occasionally be taken, although their abundance has declined in areas used by Hoonah hunters[61].

Hunters take seal at haul-out rocks and in coastal areas. Hunters usually shoot from shore, where they have a stable shooting platform, after locating the animals with small boats. Seals often sink after they are killed; for this reason hunters move quickly to retrieve seals after shooting them to avoid loss. Seals are butchered in the field and usually brought back to Hoonah for final processing. Seal blubber is cut into small pieces, simmered carefully on low heat, and slowly rendered into seal oil. Hoonah families either eat seal meat fresh or preserve it by freezing. Some seal meat may be dried. Some seal skins are tanned and used for production of craft items. Hoonah Tlingit place a high value on seal oil and use it extensively in the preparation of traditional foods. Seal oil is traded between households and communities and is a featured food at traditional celebrations.

Deer is the predominant land mammal harvested by Hoonah residents. Hunters on foot stalk deer in inland areas. When deer are harvested far from the community, meat is boned out for easier transport. Hunters using skiffs and small boats hunt in the beach fringe and the immediately adjacent coastal area. Boat hunters usually bring gutted deer back to Hoonah for final processing. In the last few years, hunters have begun to use the logging road system for access to hunting areas. As with deer shot in the coastal area, deer shot close to the road system are gutted and brought back to Hoonah. Black bear, moose, and mountain goat are occasionally hunted by Hoonah residents in mainland areas[62]. They are not major food species at the present time. Low fur prices relative to other income opportunities have depressed trapping effort.

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61. Elephant seals and possible other pinniped species occasionally are found in the Hoonah territory. These may be infrequently hunted.

62. Brown bear are not frequently hunted for subsistence purposes, and, for this reason, hunting patterns for brown bear are not discussed.

Berries and, to a lessor extent, wild plants are gathered in quantity and preserved by freezing for use throughout the year. Although a great deal of berry and plant harvesting takes place close to Hoonah, special trips are made to particularly good areas with berries and edible plant.

Because key respondents highlighted their importance in Tlingit diet, survey respondents were asked if they used selected traditional foods[63]. Figure 32 presents these data. Almost two thirds of the sample households (64.8 percent) used some seal oil in 1986. High use rates were also noted for dried salmon (54.9 percent) and dried halibut (45.1 percent). Herring eggs were used by 56.3 percent of all households. About 30 percent of the sample made traditional use of salmon eggs, usually as the fermented product. Sea lion flippers continue to be used by some members of the community, although meat of this species is not regularly used at the present time.

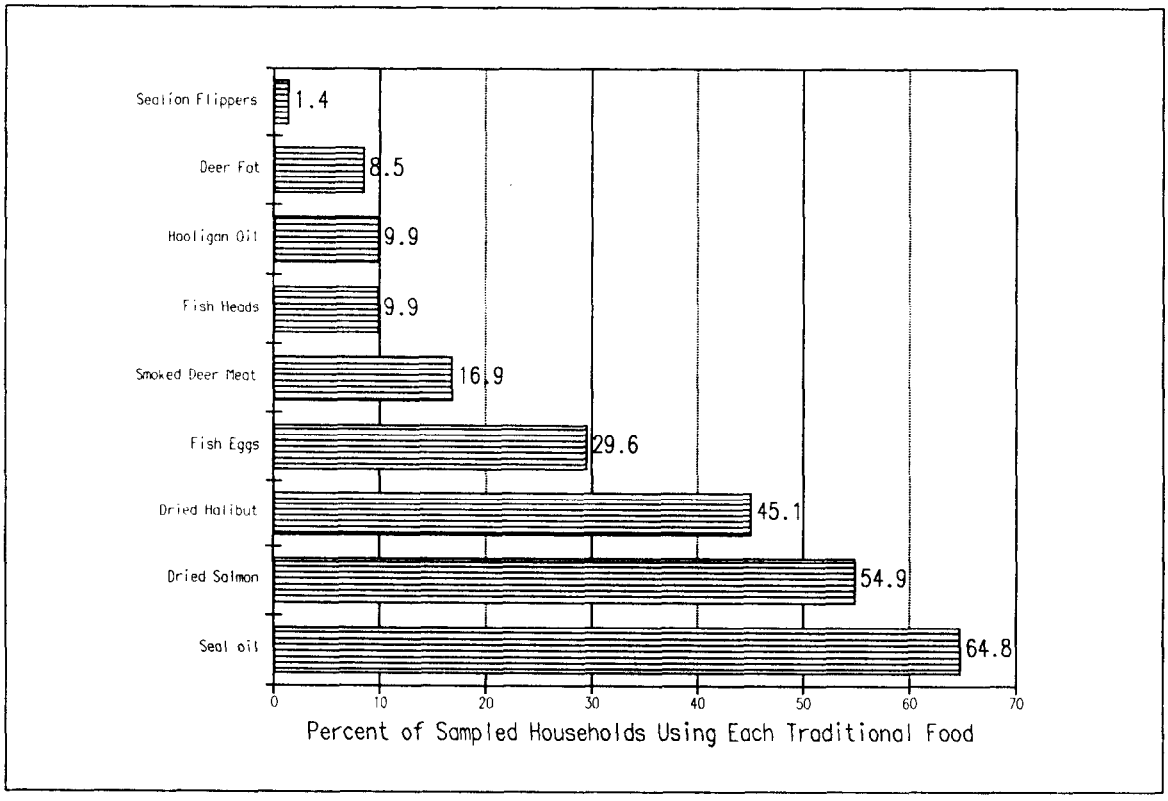

Figure 32. Use of Traditional Foods by Hoonah Residents, 1985.

63. Sea lion flippers, deer fat, and fish heads were understood in the survey to refer to the traditional Tlingit use of these items.

Seasonal Round of Resource Harvests

Figure 33 shows the seasonality of subsistence harvests for selected species used by Hoonah residents. The figure indicates periods when harvesting usually occurs.

Halibut and king salmon are available and harvested to some extent year round. However, relatively little fishing for these species takes place from December through February when days are short and seas are usually rough. The majority of both halibut and king salmon are caught from June through September. While the seasonal round does show strong seasonality of harvest for most of the fish species harvested, it also shows that at least some species are available for harvest in every month of the year for the subsistence fisher. Halibut, cod, rockfish, and other bottom fish can be harvested even in mid-winter. The salmon harvest seasons are likewise much longer than in more northern parts of Alaska.

As with fish species, marine invertebrate and intertidal species are harvested throughout the year. Clams are not harvested as frequently in summer months, as much because of the abundance of other subsistence resources during that time period as because of decline in quality and increased risk of paralytic shellfish poisoning. Dungeness and tanner crab harvests are lower in winter months when these species of crab are deeper and boat handling more difficult. King crab species are too deep for most subsistence fishers except in the summer months when they move to shallower waters. Octopus harvesting is most productive in warmer months when octopus move into shallow waters and can be caught at low tide.

Most deer hunting takes place during the regulated hunting season, currently August 1 through January 31. Some hunting for bucks traditionally took place in spring with warming weather; some spring hunting may continue to occur. Most deer are taken later in the hunting season after cold weather and snow at high elevations have forced deer down to more accessible lowland locations. More active hunters harvest deer from alpine areas early in the season in August and September. Other land mammals are hunted in regulated hunting seasons. Although seals may be taken opportunistically at any time during the year, hunting effort is concentrated in late fall and early spring.

Figure 33. Seasonal Round of Subsistence Resource Harvest by Hoonah Residents for Selected Species, 1986.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
FISH												
Cod, Pacific	▒▒▒▒	▒▒▒▒	▒▒▒▒									▒▒▒▒
Cod, Black						▒▒▒▒			▒▒▒▒			
Cod. ling						▒▒▒▒	▒▒▒▒	▒▒▒▒				
Dolly Varden			▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒					
Flounder (sole)	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒
Halibut	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒
Herring eggs				▒▒	▒▒▒▒							
Herring, Pacific				▒▒▒▒	▒▒▒▒				▒▒			
Hooligan				▒▒▒▒	▒▒▒▒	▒▒						
Irish Lords			▒▒▒▒									
Other rockfish	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒			
Red snapper	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒
Salmon, chum							▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒		
Salmon, coho						▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒		
Salmon, king	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒
Salmon, pink						▒	▒▒▒▒	▒▒▒▒	▒▒			
Salmon, sockeye						▒	▒▒▒▒	▒				
Smelt, surf			▒▒	▒▒								
Trout, cutthroat			▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒					
Steelhead			▒▒	▒▒								
BIRDS												
Crane, sandhill									▒▒▒▒			
Ducks				▒▒▒▒	▒▒▒▒				▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒
Geese						▒▒▒▒	▒▒▒▒		▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒
Grouse, spruce				▒▒▒▒	▒▒▒▒				▒▒▒▒	▒▒		
Ptarmigan, willow								▒▒▒▒				
Seagull eggs					▒▒▒	▒▒						
Waterfowl eggs					▒▒▒▒							
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.

Figure 33 (continued). Seasonal Round of Subsistence Resource Harvest by Hoonah Residents for Selected Species, 1986.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
INTERTIDAL												
Abalone						▒▒▒▒	▒▒▒▒	▒▒▒▒				
Clams*	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒					▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒
Crab, dungeness	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒
Crab, king	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒
Crab, Tanner	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒
Gumboot, black	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒
Gumboot, red	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒
Mussels, blue				▒▒▒▒	▒▒							
Octopus	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒
Sea cucumber					▒▒▒▒	▒▒▒▒	▒▒▒▒		▒▒▒▒	▒▒		
Shrimp	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒
Seaweed, black				▒▒	▒▒▒▒	▒▒						
Sea ribbon						▒▒▒▒						
Seaweed, garden				▒▒▒▒						▒▒		
MAMMALS												
Bear, black				▒▒	▒▒							
Deer	▒▒▒▒			▒▒	▒▒▒			▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒
Land otter	▒▒▒▒											▒▒▒▒
Marten	▒▒▒▒											▒▒▒▒
Mink	▒▒▒▒											▒▒▒▒
Moose									▒▒▒▒	▒▒		
Mountain goat			▒▒	▒▒				▒▒▒▒				
Seal, harbor / hair	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒
Weasel	▒▒▒▒											▒▒▒▒
Weasel (ermine)	▒▒▒▒											▒▒▒▒
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.

Figure 33 (continued). Seasonal Round of Subsistence Resource Harvest by Hoonah Residents for Selected Species, 1986.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
BERRIES												
Blueberry							▒	▒▒▒▒	▒▒▒▒			
Cranberry, highbush									▒▒	▒▒▒▒		
Cranberry, lowbush									▒▒	▒▒▒▒		
Current, grey									▒	▒▒		
Elderberry								▒▒▒▒	▒			
Goose berry								▒▒▒▒				
Huckleberry, black									▒▒▒▒			
Huckleberry, red									▒▒▒▒			
Jacob berry (ground berry)							▒▒	▒▒				
Nagoon berry								▒▒	▒▒▒▒			
Raspberry								▒▒▒▒				
Salmonberry							▒▒▒▒					
Soapberry							▒▒	▒▒▒▒				
Strawberry							▒▒▒▒	▒▒▒▒	▒▒			
PLANTS												
Devil's club	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒
Ferns				▒▒	▒▒							
Firewood	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒
Goose tongue	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒
Hemlock bark				▒▒▒▒	▒▒▒▒							
Hudson Bay tea	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒	▒▒▒▒
Indian rice				▒▒▒▒				▒▒▒▒				
Sourdock					▒▒▒▒							
Spruce roots					▒▒▒▒	▒▒						
Wild celery					▒▒▒▒	▒▒						
Wild parsley					▒▒▒▒							
Wild sweet potato							▒▒▒▒					
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.

Hunters usually do not harvest seals in late spring and early summer when fetuses are well developed in females.

Hunters take ducks and geese when their migrations take them through Hoonah territory. Most hunting takes place during fall seasons, although traditional spring waterfowl hunting continues to occur. Some duck and geese populations over-winter in the Hoonah territory. Most plants and berries are harvested during their relatively short periods of availability.

Harvest and Use Levels of Main Subsistence Resources

This section presents information from the household survey on the quantities of fish, wildlife, and other natural resources harvested and used by Hoonah households in 1985 (see methodology section above). *Harvest quantities* include all subsistence resources actually caught, captured, dug, snared, netted, shot, picked, gathered, or collected by sampled households in 1985, including resources that were harvested for distribution to other households and not consumed in the harvesting household. *Use quantities* include all wild resources actually consumed by members of sampled households, regardless of source. Differences between mean and total harvest and use quantities provide an indication of the flow of resources between households and between communities in southeast Alaska. These data are analyzed at the household level and provide measures of the extent of subsistence participation and distribution and exchange of subsistence products in the community.

Tables 6 and 7 present mean household harvest levels and mean household use levels in numbers for Hoonah for 1985. Harvest figures for salmon in Table 6 are dis-aggregated into salmon retained for subsistence use from commercial harvests and salmon caught by other means.

TABLE 6. Subsistence Harvest in Numbers, Hoonah Sampled Households, 1985.

SPECIES	NUMBER PER HOUSEHOLD	SPECIES	NUMBER PER HOUSEHOLD
GAME AND BIRDS			
Caribou	0.00	Clams*	2.76
Deer	2.09	Cockles*	1.23
Moose	0.03	Geoduck and mussels*	0.04
Seal	0.75	Shrimp	0.56 lbs
Ducks	0.97	Crab, dungeness	10.23
Canada geese	0.10	Crab, king	0.49
Grouse	0.03	Crab, Tanner	0.20
		Gumboots (chitons)*	0.41
FISH AND INVERTEBRATES		Neets (sea urchins)*	0.01
		Octopus	0.01
Salmon, chum	3.56	Sea cucumbers*	0.02
Salmon, coho	3.52	Black seaweed*	2.04
Salmon, king	1.90	Red sea ribbon*	0.01
Salmon, pink	2.04	Red sea ribbon*	0.01
Salmon, sockeye	1.39	Berries, plants	25.97 qts.
Cod, Pacific	0.62 lbs		
Cod, black	0.78 lbs	SUBSISTENCE HARVEST FROM COMMERCIAL CATCH. lbs[1].	
Dolly Varden	4.10		
Halibut	2.20	Salmon, chum	1.14 lbs
Herring	7.34 lbs	Salmon, coho	1.42 lbs
Herring eggs	17.14 lbs	Salmon, king	2.21 lbs
Eulachon, hooligan	0.70 lbs	Salmon, pink	0.42 lbs
Other rockfish	0.25 lbs	Salmon, sockeye	0.68 lbs
Other marine fish	0.85 lbs		
Red snapper	1.11		
Sculpin	0.21		
Steelhead	0.04		
Trout, cutthroat	3.03		
Trout, rainbow	2.14		

Note: Intertidal resources marked with a "*" are recorded in five gallon buckets. Data for some fish and invertebrate species were collected in pounds; berries and plants are in quarts. Some species appearing in Table 5, page 74, were not harvested by sampled households in 1985 and do not appear in Table 6.

1. Salmon taken under commercial regulation are included in this category. Total salmon subsistence harvest is the sum of salmon caught under commercial and other regulation.

TABLE 7. Subsistence Use in Numbers, Hoonah Sampled Households, 1985.

SPECIES	NUMBER PER HOUSEHOLD	SPECIES	NUMBER PER HOUSEHOLD
GAME			
Caribou	0.01	Clams*	2.95
Deer	2.40	Cockles*	1.43
Moose	0.02	Geoduck and mussles*	0.04
Seal	0.87	Shrimp	1.01 lbs
Ducks	1.17	Crab, dungeness	11.55
Canada geese	0.18	Crab, king	1.87
Grouse	0.10	Crab, Tanner	0.75
		Gumboots*	0.73
FISH AND INVERTEBRATES		Neets*	0.00
		Octopus	0.04
Salmon, chum	6.28	Sea cucumbers*	0.19
Salmon, coho	4.55	Black seaweed*	2.31
Salmon, king	3.51	Red sea ribbon*	0.01
Salmon, pink	4.32	Berries, plants	17.69 qts.
Salmon, sockeye	3.28		
Cod, Pacific	1.47 lbs		
Cod, black	4.47 lbs		
Dolly Varden	3.73		
Halibut	2.80		
Herring	11.24 lbs		
Herring eggs	36.85 lbs		
Eulachon, hooligan	1.37 lbs		
Other rockfish	0.54 lbs		
Other marine fish	0.85 lbs		
Red snapper	3.28		
Sculpin	0.21		
Steelhead	0.04		
Trout, cutthroat	2.18		
Trout, rainbow	2.25		

Note: Intertidal resources marked with a "*" are recorded in five gallon buckets. Data for some fish and invertebrate species were collected in pounds; berries and plants are in quarts. Some species appearing in Table 5, page 74, were not harvested by sampled households in 1985 and do not appear in Table 7.

Subsistence use includes resources harvested and retained for use by the sample household and resources given to that household by others. Resources harvested under commercial regulation but used for subsistence are included in the data presented.

In general harvest and use levels are quite similar for most resources. Herring eggs, black cod, and red snapper are some exceptions that should be examined. We found that significant quantities of herring eggs are traded into Hoonah from kinsmen in Sitka in recent years (Schroeder and Kookesh, 1990). In some years, the herring spawn in Port Frederick and other parts of the Hoonah territory permits harvest of this product. In recent years, spawn has been thin or unreliable near Hoonah, forcing greater use of herring eggs from Sitka. Huna Tlingit appear to have made early use of both the very productive herring spawning areas in Sitka Sound and those that once existed in Auke Bay[64]. This trade in and exchange of herring eggs is reflected in the much higher use per household (36.9 lbs) than harvest (17.1 lbs)[65].

Similarly, black cod are typically found in deep waters and are not intensively fished near Hoonah; mean harvest was .78 lbs harvest per household. Fish brought into the community from elsewhere by commercial fishermen or through trade and exchange networks raises the mean use to 4.5 lbs used per household. Red snapper is another species more commonly fished in outside waters and brought into the community, with a mean household harvest of 1.1 lbs and mean household use of 3.3 lbs.

Deer use is about 20 percent higher than harvest and halibut use about 30 percent higher. Some exchange of deer and halibut into the community may take place, although this trade or exchange was not frequently mentioned in interviews[66]. Some of this difference for these species may be due to the random draw of households[67]. These and other relatively small differences between the harvest and use means are probably the result of sampling rather than patterned differences.

Tables 8 and 9 convert the mean household harvest and mean household use numbers into mean pounds food weight per household. By *food weight* we mean the estimated weight of the subsis-

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64. Traditional use of these areas depended on the relations between Huna Tlingit and the Tlingit of Auke Bay and Sitka Sound.

65. Trade and exchange includes both gifts, reciprocal exchange or barter, and non-commercial sale.

66. Deer harvest may be under-estimated in the survey data because of a reluctance of respondents to report harvests of more than the legal limit for deer of six deer per hunter. High harvesters, who may under report their kills, supply other community members through exchange, trade and barter. Halibut harvest estimates may be low because respondents may not recall fish that they distributed to others.

67. That is, under selection of high harvesting households who distribute their subsistence harvest widely may have occurred.

tence product that is actually used. This is substantially less than live weight for most species. Food weight excludes heads, hides, inedible organs, and other fish and wildlife parts that are not normally considered to be food. It includes meat, bones, internal organs, and other food parts of certain subsistence resources and is a comparable measure of purchased food which may also includes bones, fat, skin, or body parts that are not consumed. Appendix I presents the factors used to convert harvest or use numbers to food weight.

Wildlife and fish resources provided roughly equal amounts of subsistence foods, with 251.8 lbs of game and 277.4 lbs of fish harvested per household. The same was true for subsistence use with 278.4 lbs of game and 289.9 lbs of fish used. Marine invertebrates and marine plants provided about 112.8 lbs of food harvested per household and about 146.0 lbs used per household.

Figures 34 and 35 show the percent contribution by food weight of each resource category to the total subsistence harvest. In 1985, deer accounted for 25.0 percent of the subsistence harvest and 25.9 percent of subsistence use. Salmon contributed 22.6 percent of harvest and 21.9 percent of use. These two resource categories jointly comprised about 48 percent of total harvest and use. Harbor seal accounted for about 10.2 percent of harvest and 10.6 percent of use by food weight; this was somewhat higher than expected based on interview data. The category *other fish* supplied 18.8 percent of the harvest and 17.3 percent of the food used. Marine invertebrates and seaweed were found to contribute 16.9 percent of the harvest and 19.7 percent of the food used.

TABLE 8. Subsistence Harvest in Pounds, Hoonah Sampled Households, 1985.

SPECIES	POUNDS PER HOUSEHOLD	
GAME AND BIRDS		
Deer	166.76	
Moose	15.49	
Seal	67.80	
Ducks	1.46	
Canada geese	0.49	
Grouse	0.02	
ALL GAME AND BIRDS		251.76
FISH AND INVERTEBRATES		
SUBSISTENCE HARVEST FROM COMMERCIAL CATCH*		
Salmon, chum	8.33	
Salmon, coho	11.38	
Salmon, king	31.62	
Salmon, pink	1.10	
Salmon, sockeye	3.79	
SUBSISTENCE HARVESTS		
Salmon, chum	26.01	
Salmon, coho	28.20	
Salmon, king	27.20	
Salmon, pink	5.31	
Salmon, sockeye	7.81	
Cod, Pacific	0.62	
Cod, black	0.78	
Dolly Varden	5.74	
Halibut	79.04	
Herring	7.34	
Herring eggs	17.14	
Eulachon, hooligan	0.70	
Other rockfish	0.25	
Other marine fish	0.85	
Red snapper	3.34	
Sculpin	0.21	
Steelhead	0.25	
Trout, cutthroat	4.54	
Trout, rainbow	4.28	
ALL FISH		277.39

TABLE 8, continued. Subsistence Harvest in Pounds, Hoonah Sampled Households, 1985.

SPECIES	POUNDS PER HOUSEHOLD
MARINE INVERTEBRATES AND PLANTS	
Clams*	22.10
Cockles*	11.03
Geoduck and mussles*	0.21
Crab, dungeness	26.56
Crab, king	3.54
Crab, Tanner	0.43
Gumboots (chitons)*	8.17
Neets (sea urchins)*	0.04
Octopus	0.07
Sea cucumbers*	0.04
Black seaweed*	40.85
Red sea ribbon*	0.28
ALL MARINE INVERTEBRATES AND MARINE PLANTS	112.79
ALL BERRIES AND PLANTS	5.58
ALL SPECIES	671.49
PER CAPITA HARVEST	209.10

Note: Grouped harvest totals include minor species not listed. Because of this and statistical rounding, grouped total harvest figures may differ slightly from constituent species harvests.

*. Salmon taken under commercial regulation are included in this category. Total salmon subsistence harvest is the sum of salmon caught under commercial and other regulations.

TABLE 9. Subsistence Use in Pounds, Hoonah Sampled Households, 1985.

SPECIES	MEAN POUNDS USED	
GAME AND BIRDS		
Bear	0.06	
Caribou	1.69	
Deer	192.13	
Moose	10.07	
Seal	78.34	
Ducks	1.75	
Canada geese	0.92	
Grouse	0.07	
ALL GAME AND BIRDS		278.33
FISH		
Salmon, chum	45.86	
Salmon, coho	36.39	
Salmon, king	50.15	
Salmon, pink	11.22	
Salmon, sockeye	18.38	
Cod, Pacific	1.47	
Cod, black	4.47	
Dolly Varden	3.73	
Halibut	47.83	
Herring	11.24	
Herring eggs	36.85	
Eulachon, hooligan	1.37	
Other rockfish	0.54	
Other marine fish	0.85	
Red snapper	9.85	
Sculpin	0.21	
Steelhead	0.25	
Trout, cutthroat	3.28	
Trout, rainbow	4.51	
ALL FISH		289.93
MARINE INVERTEBRATES AND PLANTS		
Abalone	2.82	
Clams	23.56	
Cockles	12.87	
Geoduck and mussels	0.21	
Crab, dungeness	28.87	
Crab, king	13.11	

TABLE 9, continued. Subsistence Use in Pounds, Hoonah Sampled Households, 1985.

SPECIES	MEAN POUNDS USED
Crab, Tanner	1.64
Gumboots, chitons, urchins, etc.	14.66
Neets	0.02
Octopus	0.42
Sea cucumbers	0.38
Black seaweed	46.18
Red sea ribbon	0.28
ALL MARINE INVERTEBRATES AND SEAWEEDS	146.04
ALL BERRIES AND PLANTS	19.12
ALL SPECIES	785.32
PER CAPITA USE	234.22

Note: Grouped use totals include minor species not listed. Because of this and statistical rounding, grouped total use figures may differ slightly from constituent species harvests. Abalone and some other species may show use but no harvest among sampled households.

Subsistence use includes resources harvested and retained for use by the sample household and resources given to that household by others. Resources harvested under commercial regulation but used for subsistence are included in the data presented.

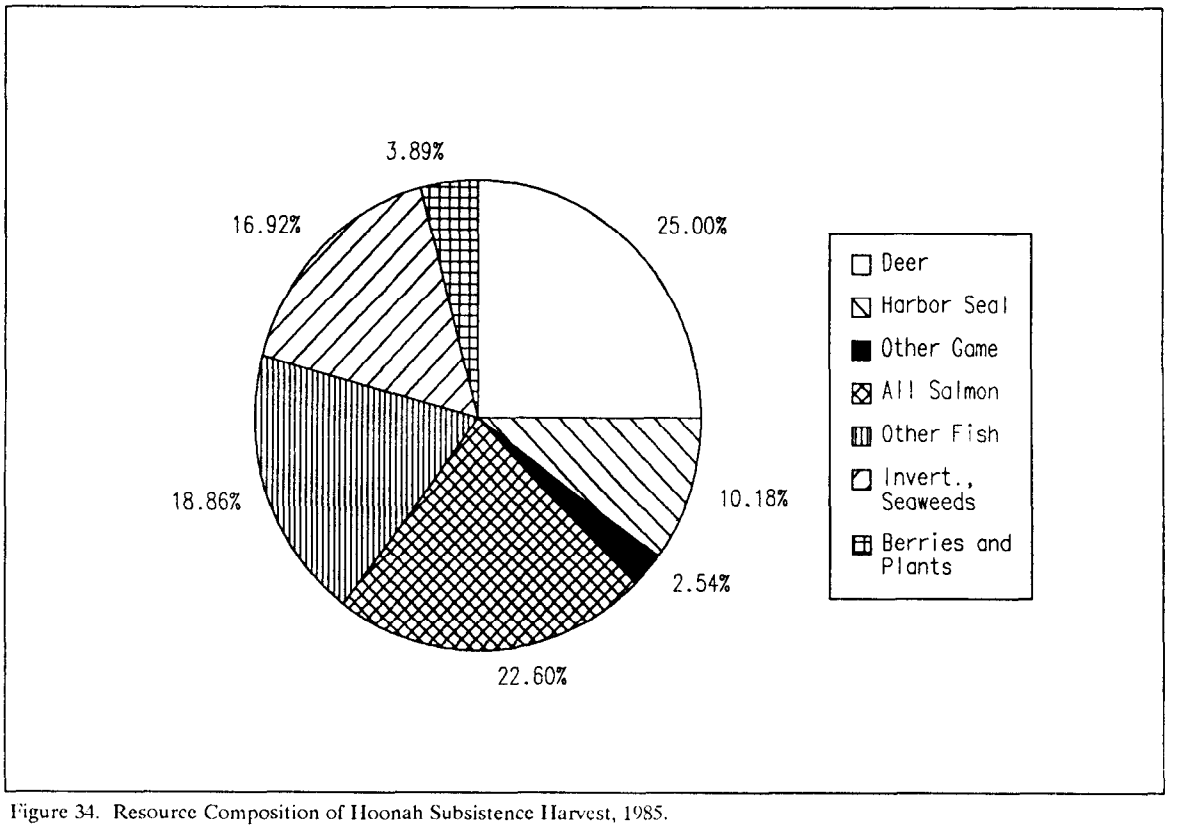

Figure 34. Resource Composition of Hoonah Subsistence Harvest, 1985.

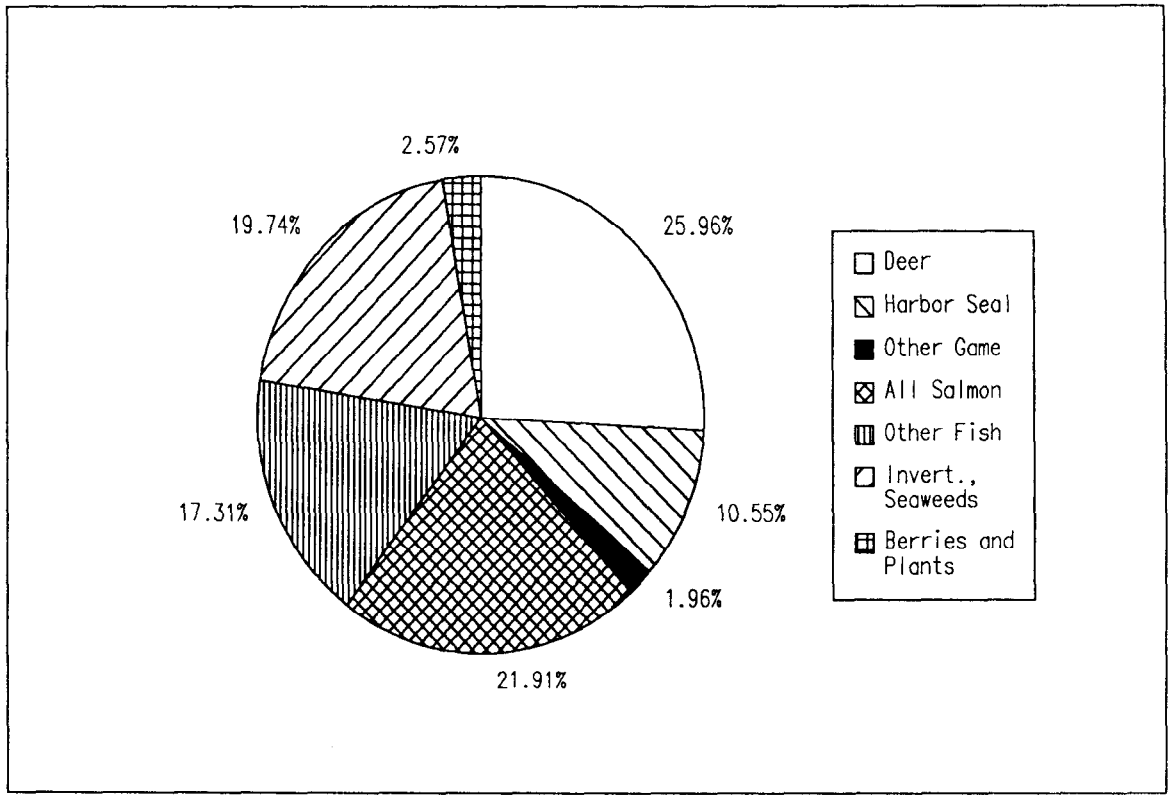

Figure 35. Resource Composition of Hoonah Subsistence Use, 1985.

Tables 8 and 9 presented per household harvest and use food weight. Per capita subsistence harvest and use is calculated by dividing the total weight of subsistence foods harvested and used by all sampled households by the number of persons living in these households. About 209 lbs of subsistence food per capita were harvested in Hoonah in 1985. About 245 lbs of subsistence foods per capita were used in 1985. By means of comparison, the average American family purchases and brings into the kitchen about 222 lbs per capita of domestic meat, fish, and poultry per year (U. S. Department of Agriculture 1983).

Table 10 present per capita subsistence harvests for 120 communities throughout Alaska. Hoonah 1985 harvest levels at 209 lbs per capita are comparable to those of other southeast communities: Kake with 160 lbs per capita, Angoon with 242 lbs per capita, or Klawock with 239 lbs

TABLE 10. Subsistence Harvest Levels in 120 Alaska Communities, in Pounds per Capita.

COMMUNITY	POUNDS	COMMUNITY	POUNDS	COMMUNITY	POUNDS
1. Hughes	1498	41. Egegic	385	81. Gakona	192
2. Gambell	1309	42. Dot Lake	378	82. Craig	189
3. Huslia	1082	43. Chenega	361	83. Naknek	188
4. Stevens Village	1058	44. Port Alsworth	361	84. Thorne Bay	188
5. Minto	1015	45. Ouzinkie	358	85. Coffman Cove	186
6. Stebbins	1012	46. Pelican	355	86. Kasaan	186
7. Nondalton	976	47. Point Baker	345	87. Copper Center	173
8. Alakaket	909	48. Tenakee Springs	343	88. Hollis	164
9. New Stuyahok	896	49. Chitna	340	89. Wrangell	164
10. Pedro Bay	865	50. Hydaburg	337	90. Kake	160
11. Karluk	835	51. Kaktovik	328	91. Tonsina	156
12. Kivalina	824	52. Port Protection	311	92. Gulkana	152
13. Mt. Village	822	53. Port Alexander	306	93. Cordova	151
14. Kwethluk	792	54. Lake Louise	292	94. Tok	150
15. Galena	787	55. S. Wrangell Mts.	288	95. English Bay	147
16. Scammon Bay	787	56. Paxson	287	96. Port Graham	145
17. Nikolai	785	57. Chignik Lake	282	97. Kodiak City	143
18. Newhalen	767	58. Northway	278	98. Sitka	139
19. Quinhagak	756	59. Tyonek	272	99. Kenny Lake	136
20. Alakanuk	733	60. South Naknek	268	100. E. Glenn Hwy.	133
21. Beaver	723	61. Elfin Cove	264	101. Cantwell	130
22. Kokhanok	767	62. Port Lions	262	102. Mentasta Lake	126
23. Nunapitchuk	697	63. Chistochina	261	103. Sourdough	115
24. Iguigik	618	64. Bettles	260	104. Tazlina	107
25. Emmonak	612	65. Upper Yentna	257	105. Haines	105
26. Russian Mission	599	66. Gustavus	256	106. Matsu Glacier	104
27. Akhiok	518	67. Tanacross	250	107. Homer	103
28. Edna Bay	517	68. Nabesna Road	249	108. Glennallen	99
29. Kotlik	510	69. Slana	248	109. Saxman	90
30. Old Harbor	464	70. Angoon	242	110. Ninilchik	87
31. Ivanof Bay	445	71. Dillingham	242	111. Sheep Mt.	73
32. Tetlin	424	72. Klawock	239	112. Metlakatla	71
33. Iliamna	416	73. Klukwan	239	113. Talkeetna	66
34. Meyers Chuck	414	74. McCarthy Road	230	114. Seldovia	54
35. Manokotak	411	75. Chignik Lagoon	229	115. Skagway	52
36. Hyder	401	76. King Salmon	220	116. Kenai	38
37. Larsen Bay	400	77. Chickaloon	213	117. Juneau	34
38. Nuiqsut	400	78. N. Wrangell Mts.	208	118. Fairbanks	22
39. Yakutat	398	79. Petersburg	203	119. Matsu	17
40. Perryville	396	80. Chignik Bay	196	120. Anchorage	10

per capita[68]. Hoonah's per capita harvests are much higher than in urban areas: Anchorage with 10 lbs per capita, Juneau with 34 lbs per capita, and Kenai with 38 lbs per capita. Hoonah's harvests are much lower than harvests reported in northern portions of Alaska such as harvests of 742 lbs per capita in Kwethluk and 1015 lbs per capita in Minto.

Tables 11 through 14 present Hoonah's estimated total community harvest and use of wild resources in numbers. Estimated totals are computed by expanding the survey data based on a 71 household sample to the 280 households resident in the community at the time research was conducted. Hoonah's estimated total community harvests for 1985 included 584 deer, 211 seal, 1317 chum salmon, 1384 coho salmon, 1151 king salmon, 690 pink salmon, and 579 sockeye salmon (see Table 11). Estimated total community use for 1985 included 672 deer, 243 seal, and 1758 chum salmon, 1274 coho salmon, 982 king salmon, 1211 pink salmon, and 919 sockeye salmon (Table 12). Hoonah's estimated total subsistence harvest in 1985 was 70,493 lbs for all game, 77,669 lbs for all fish, and 188,017 lbs for all resources (Table 13). Estimated total subsistence use was 77,932 lbs for all game, 81,180 lbs for all fish, and 219,889 lbs for all resources (Table 14).

68. Figures in Table 10 are from the Division of Subsistence community profile data base. Those for southeast Alaska communities are from Tongass Resource Use Cooperative Study data. Earlier Division of Subsistence studies found Kake with a 217 lbs per capita harvest, Angoon with a 216 lbs per capita harvest, and Klawock with a 223 lbs per capita harvest. Differences between the two sets of figures are due to a combination of actual year to year changes in subsistence harvesting and to stochastic variation and the computation methods used in different studies.

TABLE 11. Estimated Total Community Subsistence Harvest in Numbers, Hoonah, 1985.

SPECIES	ESTIMATED TOTAL HARVEST
GAME AND BIRDS	
Caribou	2.8
Deer	583.8
Moose	7.84
Seal	211.12
Ducks	271.88
Canada geese	27.44
Grouse	7.87
FISH AND INVERTEBRATES	
Salmon, chum	997.64
Salmon, coho	985.88
Salmon, king	532.28
Salmon, pink	571.76
Salmon, sockeye	390.32
Cod, Pacific	173.6 lbs
Cod, black	218.4 lbs
Dolly Varden	1147.72
Halibut	615.16
Herring	2055.2 lbs
Herring eggs	4799.2 lbs
Eulachon, hooligan	196.0 lbs
Other rockfish	70.0 lbs
Other fish	236.6 lbs
Red snapper	311.64
Sculpin	59.08
Steelhead	11.76
Trout, cutthroat	847.84
Trout, rainbow	599.48
Clams *	773.36
Cockles *	344.4
Geoduck *	11.2
Shrimp	156.8 lbs
Crab, dungeness	2863.6
Crab, king	138.04
Crab, Tanner	55.16
Gumboots (chitons)*	114.24
Neets (sea urchins)*	1.96
Octopus	1.96
Sea cucumbers*	5.88
Black seaweed*	571.76
Red sea ribbon*	3.92
Berries, plants	7243.6 qts.

TABLE 11, continued. Estimated Total Community Subsistence Harvest in Numbers, Hoonah, 1985.

SPECIES	ESTIMATED TOTAL HARVEST
SUBSISTENCE HARVEST FROM COMMERCIAL CATCH.#	
Salmon, chum	319.48
Salmon, coho	398.44
Salmon, king	619.08
Salmon, pink	118.44
Salmon, sockeye	189.28

Note: Intertidal resources marked with a "*" are recorded in five gallon buckets. Data for some fish and invertebrate species were collected in pounds; berries and plants are in quarts. Some species appearing on Table 5 on page 74 were not harvested by sampled households in 1985 and do not appear in Table 11.

#. Salmon taken under commercial regulation are included in this category. Total salmon subsistence harvest is the sum of salmon caught under commercial and other regulations.

TABLE 12. Estimated Total Community Subsistence Use in Numbers, Hoonah , 1985.

SPECIES	ESTIMATED TOTAL USE
GAME AND BIRDS	
Caribou	3.92
Deer	672.00
Moose	5.04
Seal	243.60
Ducks	327.32
Canada geese	51.24
Grouse	27.44
FISH AND INVERTEBRATES	
Salmon, chum	1758.96
Salmon, coho	1273.72
Salmon, king	981.96
Salmon, pink	1210.72
Salmon, sockeye	918.96
Cod, Pacific	410.20 lbs
Cod, black	1251.60 lbs
Dolly Varden	1044.96
Halibut	784.56
Herring	3147.20 lbs
Herring eggs	10318.00 lbs
Eulachon, hooligan	383.60 lbs
Other rockfish	151.20 lbs
Other marine fish	236.60 lbs
Red snapper	918.96
Sculpin	59.08
Steelhead	11.76
Trout, cutthroat	611.24
Trout, rainbow	631.12
Clams*	824.60
Cockles*	400.40
Geoduck and mussles*	11.76
Shrimp	282.80 lbs
Crab, dungeness	3233.72
Crab, king	524.44
Crab, Tanner	208.88
Gumboots (chitons)*	205.24
Neets (sea urchins)*	1.12
Octopus	11.76
Sea cucumbers*	53.20

TABLE 12, continued. Estimated Total Community Subsistence Use in Numbers, Hoonah , 1985.

SPECIES	ESTIMATED TOTAL USE
Black seaweed*	646.52
Red sea ribbon*	3.92
Berries, plants	4953.20 qts.

Note: Intertidal resources marked with a "*" are recorded in five gallon buckets. Data for some fish and invertebrate species were collected in pounds; berries and plants are in quarts.

Subsistence use includes resources harvested and retained for use by the sample household and resources given to that household by others. Resources harvested under commercial regulation but used for subsistence are included in the data presented. Some species appearing on Table 5 on page 74 were not harvested by sampled households in 1985 and do not appear in Table 12.

TABLE 13. Estimated Total Community Subsistence Harvest in Pounds, Hoonah, 1985.

SPECIES	ESTIMATED TOTAL HARVEST	
GAME AND BIRDS		
Deer	46692.80	
Moose	4337.20	
Seal	18984.00	
Ducks	408.80	
Canada geese	137.20	
Grouse	5.60	
ALL GAME AND BIRDS		70492.80
FISH AND INVERTEBRATES		
SUBSISTENCE HARVEST FROM COMMERCIAL CATCH.[1]		
Salmon, chum	2332.40	
Salmon, coho	3186.40	
Salmon, king	8853.60	
Salmon, pink	308.00	
Salmon, sockeye	1061.20	
SUBSISTENCE HARVESTS		
Salmon, chum	7282.80	
Salmon, coho	7896.00	
Salmon, king	7616.00	
Salmon, pink	1486.80	
Salmon, sockeye	2186.80	
Cod, Pacific	173.60	
Cod, black	218.40	
Dolly Varden	1607.20	
Halibut	22131.20	
Herring	2055.20	
Herring eggs	4799.20	
Eulachon, hooligan	196.00	
Other rockfish	70.00	
Other marine fish	238.00	
Red snapper	935.20	
Sculpin	59.08	
Steelhead	71.12	
Trout, cutthroat	1271.76	
Trout, rainbow	1198.40	
ALL FISH		77669.20
Clams*	6186.88	

TABLE 13, continued. Estimated Total Community Subsistence Harvest in Pounds, Hoonah, 1985.

SPECIES	ESTIMATED TOTAL HARVEST
Cockles*	3087.84
Geoduck and mussles*	59.08
Crab, dungeness	7437.64
Crab, king	991.48
Crab, Tanner	121.52
Gumboots (chitons)*	2287.32
Neets (sea urchins)*	9.80
Octopus	19.60
Sea cucumbers*	11.76
Black seaweed*	11436.60
Red sea ribbon*	78.96
ALL MARINE INVERTEBRATES AND PLANTS	31581.20
ALL BERRIES AND PLANTS	7162.12
ALL SPECIES	188017.20

Note: Grouped harvest totals include minor species not listed. Because of this and statistical rounding, grouped total harvest figures may differ slightly from constituent species harvests. Some species appearing on Table 5 on page 74 were not harvested by sampled households in 1985 and do not appear in Table 13.

1. Salmon taken under commercial regulation are included in this category. Total salmon subsistence harvest is the sum of salmon caught under commercial and other regulation.

TABLE 14. Estimated Total Subsistence Use in Pounds, Hoonah, 1985.

SPECIES	ESTIMATED TOTAL USED	
GAME		
Bear	17.64	
Caribou	473.20	
Deer	53796.12	
Moose	2819.60	
Seal	21934.64	
Ducks	491.12	
Canada geese	256.20	
Grouse	19.32	
ALL GAME		77931.84
FISH AND INVERTEBRATES		
Salmon, chum	12839.68	
Salmon, coho	10190.32	
Salmon, king	14042.28	
Salmon, pink	3142.72	
Salmon, sockeye	5145.56	
Cod, Pacific	411.60	
Cod, black	1251.60	
Dolly Varden	1044.40	
Halibut	13392.40	
Herring	3147.20	
Herring eggs	10318.00	
Eulachon, hooligan	383.60	
Other rockfish	151.20	
Other marine fish	238.00	
Red snapper	2756.60	
Sculpin	59.08	
Steelhead	71.12	
Trout, cutthroat	917.00	
Trout, rainbow	1261.96	
ALL FISH		81180.40
Abalone	789.60	
Clams	6597.08	
Cockles	3602.48	
Geoduck and mussels	59.08	
Crab, dungeness	8084.44	
Crab, king	3671.64	
Crab, Tanner	459.76	

TABLE 14, continued. Estimated Total Subsistence Use in Pounds, Hoonah, 1985.

SPECIES	ESTIMATED TOTAL USE
Gumboots (chitons)	4104.80
Neets (sea urchins)	5.60
Octopus	117.60
Sea cucumbers	106.40
Black seaweed	12930.40
Red sea ribbon	78.96
ALL MARINE INVERTEBRATES AND SEAWEEDS	40891.20
ALL BERRIES AND PLANTS	5353.60
ALL SPECIES	219889.60

Note: Grouped use totals include minor species not listed. Because of this and statistical rounding, grouped total use figures may differ slightly from constituent species harvests. Abalone and some other species may show use but no harvest among sampled households. Some species appearing on Table 5 on page 74 were not harvested by sampled households in 1985 and do not appear in Table 14.

Subsistence use includes resources harvested and retained for use by the sample household and resources given to that household by others. Resources harvested under commercial regulation but used for subsistence are included in the data presented.

Replacement or Substitution Value of Subsistence Resources

As the tables in the previous section indicate, subsistence harvest and use of natural resources provides a substantial portion of the meat, fish, and other foods used by Hoonah residents. Subsistence foods are shown to continue to be a dietary mainstay in Hoonah. Vegetables, carbohydrates, starches, and non-local food products are purchased by Hoonah households to round out their food supply. If the subsistence foods currently consumed were not available, Hoonah residents would have to substitute for these foods or replace them with purchased foods in order to fulfill dietary requirements and maintain current levels and composition of food consumption.

We have estimated the dollar substitution value or dollar replacement value of the subsistence foods currently being consumed by assigning a range of dollar values per pound to subsistence food weights. Based on the cost of substitute foods available in Hoonah at retail stores, we estimated the substitution value of subsistence foods to lie between a minimum of $4.00 per pound and a maximum

of $7.00 per pound for comparable food purchased locally. Using this value range, the estimated replacement value of all subsistence harvests in Hoonah is between $2,686 and $4,700 per household and between $752,069 and $1,316,120 for the whole community[69]. The estimated replacement value of all subsistence use in Hoonah is between $3,141 and $5,497 per household and between $879,558 and $1,539,227 for the whole community. The substitution value of the 1985 subsistence harvest was equivalent to between 26.8 percent and 35.7 percent of the taxable income for 1982. The substitution value of the 1985 subsistence use was equivalent to between 23.8 percent and 41.7 percent of the taxable income for 1982[70].

Replacement value represents only one component of the total value of subsistence production. A full economic analysis of the value of subsistence production would attempt to measure this value directly through willingness-to-pay and willingness-to-accept economic models and would consider non-tangible cultural and social values as well[71]. Even though it is but one economic component, estimated replacement value is quite high compared to household income and demonstrates that the food component of subsistence harvest and use is an important component of Hoonah's mixed subsistence-based economy.

Target Harvest Levels

The random sample survey included questions designed to estimate the use level of selected species of fish and game that respondents believed would be adequate for their household for one year. These data provide an indication of what an average target subsistence use might be for Hoonah households and, when compared with other survey data, how close actual harvests come to meeting the

69. In this calculation mean household harvest quantity and total community harvest quantity are multiplied by the per pound substitution value.

70. Mean taxable income was $13,172 for 1982. Because of skewing, most households have incomes lower than this mean. For this reason the substitution value percent would be higher than the figures presented for most Hoonah households.

71. Willingness-to-pay provides an estimate what users would be willing to pay for harvesting and using subsistence resources; this estimating technique is often used to put a value on sport hunting or sport fishing. Willingness-to-accept provides an estimate of what people would accept to forgo the opportunity to hunt and fish; this estimating technique is often used to put a value on hunting and fishing activities that will be eliminated or reduced due to resource extraction or land development.

target harvests. Respondents were asked, *If fish and game regulations allowed, what would be the right amount of each of the following species for your household for one year?* Figure 36 presents mean desired use in numbers for selected species and in pounds for halibut. As expected, the overall relative composition of the target subsistence use resembled the actual harvest for 1985. According to survey responses, 2.6 seal, 24.5 sockeye salmon, 109.9 lbs of halibut, and 7.9 deer would be the right amount of harvest for the average household for a year. Actual harvest levels were .87 seals, 3.28 sockeye salmon, 47.83 lbs of halibut, and 2.4 deer for 1985.

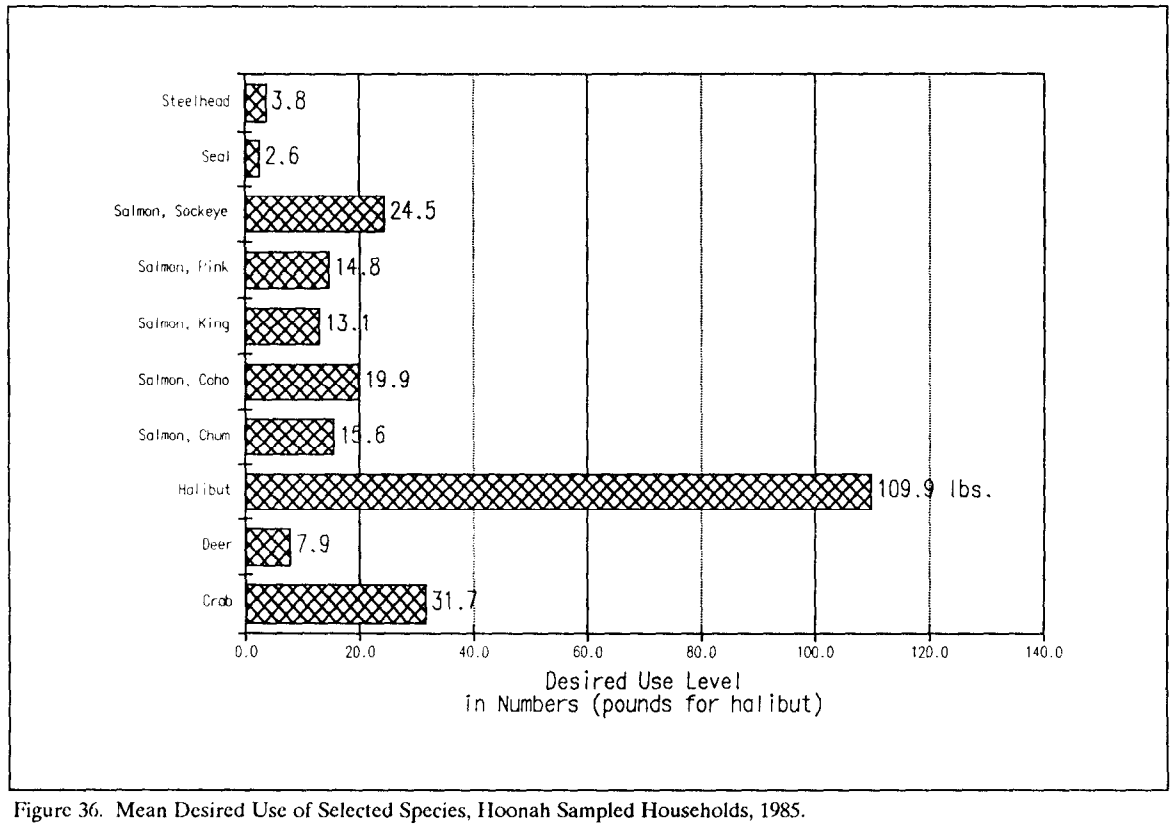

Figure 36. Mean Desired Use of Selected Species, Hoonah Sampled Households, 1985.

Figure 37 shows actual use as reported in the survey as a percent of desired use. Actual harvest for all species is less than 45 percent of the target subsistence use. With sockeye salmon, the actual harvest is only 13.4 percent of what respondents said would be the right amount for the year. In no case does the actual use level approach 50 percent of the target harvest level, and, for salmon species and deer which collectively make up a major proportion of total subsistence use, actual use was 30 per-

cent or less than desired use. To understand the reasons for the sharp difference between reported target harvest level and actual harvest, we considered: 1) other research where desired harvest levels were measured, 2) whether or not the target harvest level for Hoonah was reasonable, and 3) factors that could account for the difference.

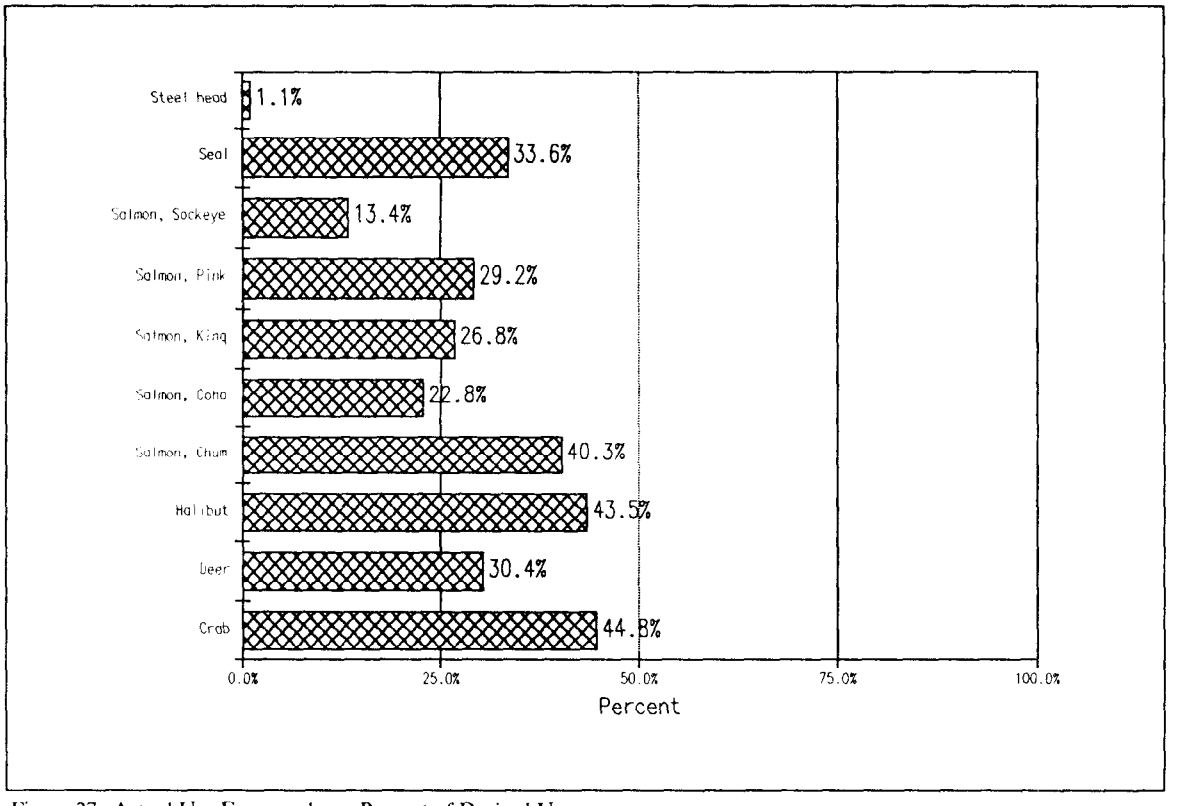

Figure 37. Actual Use Expressed as a Percent of Desired Use.

Two data sources were found to be relevant. In research conducted in Kodiak Island rural communities in 1982-83 a similar set of *desired use* questions was asked, providing data directly comparable to the present study. Moreover, the salmon and Sitka deer resources on Kodiak Island are similar to those use by Hoonah residents (Kodiak Area Native Association, 1983). Recent Division of Wildlife Conservation hunter surveys for southeast Alaska include questions asking hunters how many deer they desire and how many deer would satisfy them (Flynn 1989).

For the six rural Kodiak communities, actual use expressed as a percentage of desired use is uniformly much higher than comparable figures for Hoonah (Figure 38). In Akhiok actual use was the

same or greater than desired use for all species other than halibut[72]. In Karluk actual use was between 71 and 91 percent for all species other than crab. Larsen Bay actual harvests were between 71 and 88 percent of desired use for four species categories[73]. Old Harbor met or exceeded desired use levels for all species but red salmon. Ouzinkie harvested between 55 and 109 percent of desired levels. Port Lions had the lowest attainment of desired levels among the Kodiak rural communities. Household use ranged from about 754 pounds food weight in Port Lions to about 2,344 pounds in Karluk during the survey year. If Port Lions came closer to attaining its desired harvest level, its actual harvest would be closer to that of the other communities.

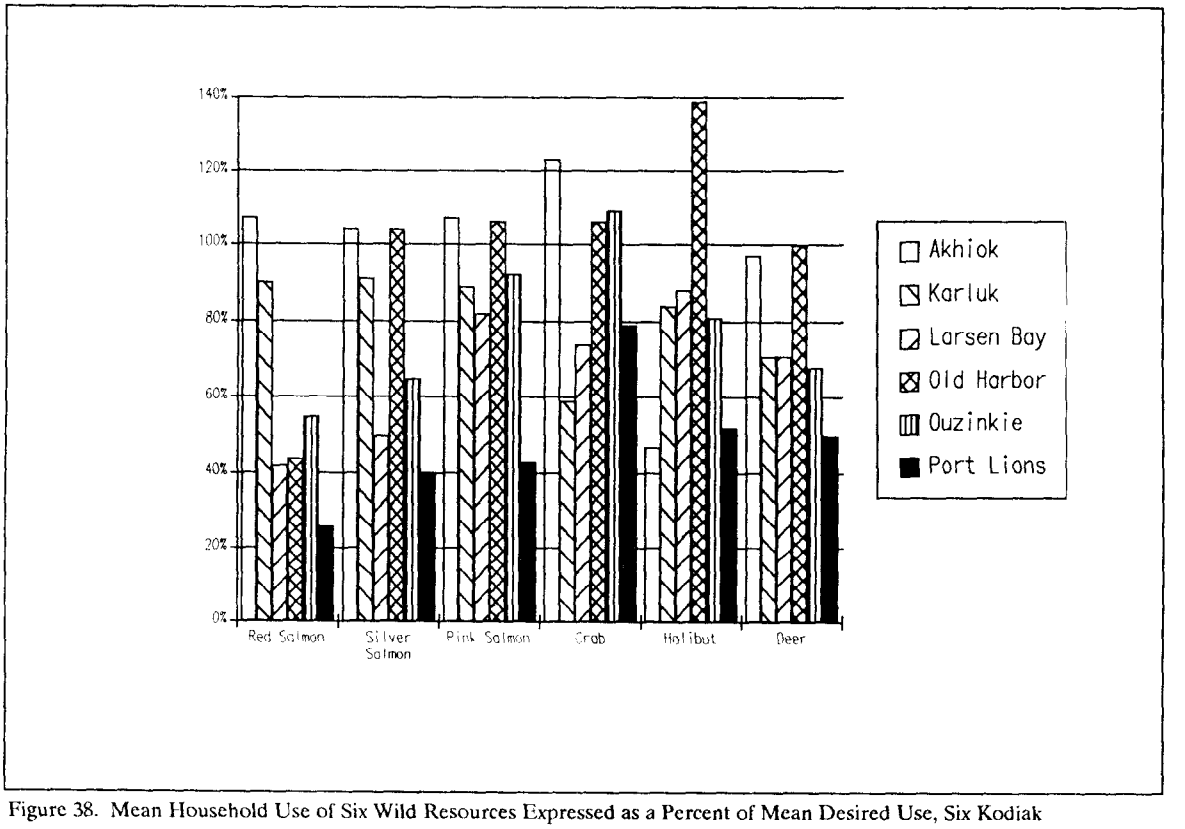

Figure 38. Mean Household Use of Six Wild Resources Expressed as a Percent of Mean Desired Use, Six Kodiak Communities, 1982-1983.

72. Akhiok does not have a good harbor or maintain many fishing boats that could fish effectively for halibut during much of the year.

73. Red salmon can not be easily harvested locally at this community; much of the Larsen Bay red salmon harvest takes place in Karluk Lagoon.

Of the six communities, Port Lions most resembles Hoonah in its overall harvest level and in attainment of desired harvests[74]. Port Lions is connected by ferry to Kodiak City and the Kenai Peninsula and experiences competition for resources with harvesters from these areas; Port Lions subsistence harvest areas are also easily accessible by skiff or boat from Kodiak town. We found that only 50 percent of the desired use of deer was met in Port Lions[75]. The other five Kodiak communities attain harvest levels for deer between 68 and 100 percent of the desired levels. Actual deer harvest per household for Akhiok, Karluk, Larsen Bay, Old Harbor, Ouzinkie, and Port Lions was 3.6, 5.4, 5.8, 5.5, 2.6, and 2.6 respectively. The Kodiak communities' harvests, particularly for the five satisfied communities, represent levels reached under conditions of abundant deer, limited hunting competition, and liberal seasons and bag limits[76]. The actual harvest levels in the high harvesting communities on Kodiak are close to the target level of 7.8 deer per household for Hoonah.

Recent Division of Wildlife Conservation hunter surveys have asked hunters in southeast Alaska to report actual deer harvest, desired harvest, and the harvest level that would satisfy them. For 1987 these surveys have found that the desired level of harvest of deer for all southeast hunters is about 2.1 times the actual harvest level; hunters also report that they would be satisfied with 1.35 times the actual harvest level. Consistent with data for all of southeast Alaska, Hoonah residents desired level was 2.1 times the actual harvest for 1987; the satisfaction level was 1.36 times the actual harvest for 1987. Put another way, the actual harvest was 48 percent of desired harvest and 74 percent of the satisfaction level harvest for Hoonah hunters.

If desired use levels were attained, the level of use of in Hoonah would be much higher than it was during the base year. That is, the estimated desired use level would be about 3.27 times the 1985 use level or about 2,568 lbs per household and 765.9 lbs per capita. Harvest levels of this magnitude have been measured in rural communities elsewhere in Alaska, but not in southeast Alaska communi-

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74. Ouzinkie also is similarly situated. However, it is more closely tied with Kodiak and its economy and fishing fleet are not as developed as Port Lions.

75. Bag limits in the Port Lions area for deer for non-local hunters have been reduced by the Board of Game to protect subsistence hunting opportunities. Similar reductions to protect subsistence hunting opportunities have been inacted for areas on north Chichagof Island near Hoonah.

76. Existing bag limit regulations for deer are not vigorously enforced in Kodiak rural communities.

ties (see Table 10). Edna Bay with 517 lbs per capita and Yakutat with 397 lbs per capita are among the highest harvest levels documented for southeast Alaska communities to date[77]. Based on the data from other communities, we conclude that the target use level for Hoonah is higher than might be reasonably attained, given the regulatory structure and the status of wild resources in southeast Alaska. A total use level for Hoonah similar to the Kodiak Island rural communities or to the high harvesting communities in southeast would be more reasonable. We also conclude that the 1985 harvest level is below what would be a reasonable target level. A number of factors may be responsible for this under attainment:

1) Basket Bay and Hoktaheen Creek have been the closest sockeye salmon systems open for subsistence sockeye harvests by Hoonah residents. Both systems are far from the community and bag limits have been low. This has limited subsistence harvests of sockeye salmon. Other salmon species and halibut are also subject to limiting harvest restrictions[78].

2) Deer populations most accessible to Hoonah may have declined due to over-harvesting and habitat degradation. Competition with non-local hunters has may have increased the time and cash costs of deer hunting and may have limited hunter success in traditional deer hunting areas.

3) Glacier Bay has been closed to subsistence harvesting of fish and wildlife.

4) Increased involvement in cash economy activities may limit the time available for subsistence pursuits and the amount of fish and wildlife harvested.

5) Other regulatory policies and competition from recent arrivals to the Hoonah area may have depressed harvests.

6) The harvests for 1985 may have been lower than usual.

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77. These data are from Division of Subsistence household surveys. See Kruse et al (1988a, 1988b) and Kruse and Muth (nd) for more lengthy reporting of the TRUCS data. Hoonah's harvests in the TRUCS survey were higher than those in the present study possibly as a result of stochastic variation, variation in administration of the TRUCS survey in Hoonah, or actual year to year variation in harvest quantities.

78. The situation for sockeye salmon might change should Hoonah Tlingit regain use of sockeye streams within Glacier Bay National Park.

In light of this analysis, we believe that use levels of subsistence fish and wildlife may have been depressed in Hoonah in 1985. The factors that may be restricting subsistence harvest are discussed in following sections of this report.

Use of Fish from Commercial Catch

Tables 6, 8, 11, and 13 (pp. 86, 90, 97, 101) show that a substantial portion of the subsistence salmon harvested by Hoonah residents is taken under the terms of commercial regulations and with commercial fishing gear, particularly for the most prized species: coho, king, and sockeye salmon. Figures 39 and 40 show the composition of Hoonah subsistence salmon harvests by amount and percent of food weight. The *other harvests* category includes salmon caught under subsistence regulation as well as salmon caught with rod and reel.

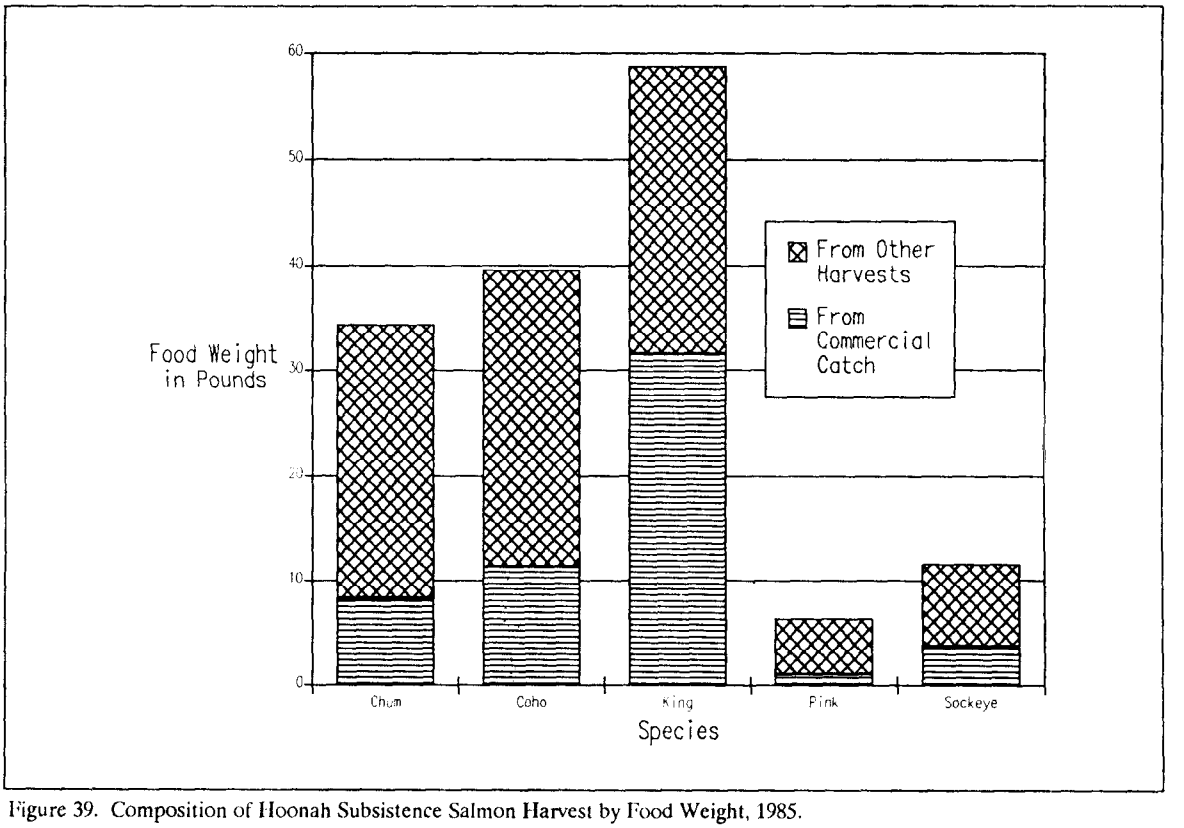

Figure 39. Composition of Hoonah Subsistence Salmon Harvest by Food Weight, 1985.

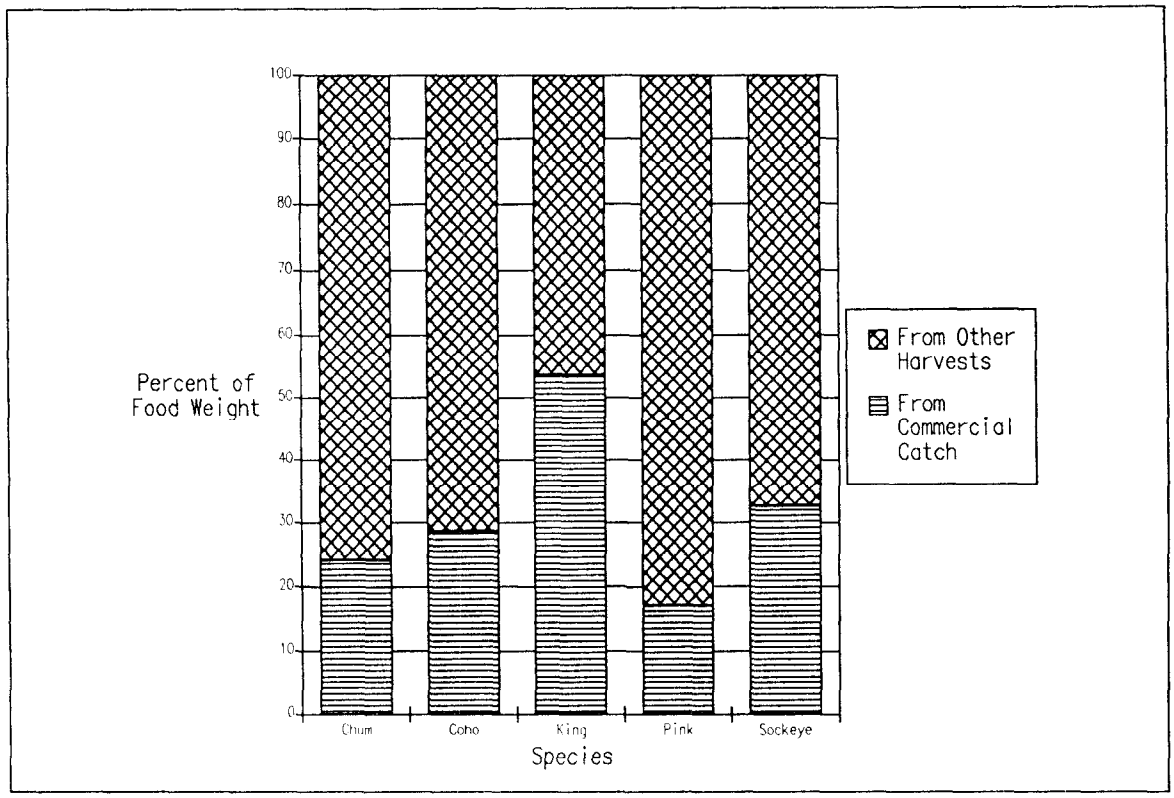

Figure 40. Composition of Hoonah Subsistence Salmon Harvest by Percent, 1985.

About 24 percent of the chum, 28 percent of the coho, 53 percent of the king, and 32 percent of the sockeye salmon harvested for use at home by families in Hoonah are removed by commercial fishers from their legal commercial catch (Figure 24). In terms of harvested food weight, commercially caught salmon account for about 56 lbs or 37 percent of the 151 lbs of salmon harvested per household (Figure 23). Under current regulations no subsistence fishing for king and coho salmon is permitted for Hoonah residents, and fishing for sockeye salmon has been limited to Basket Bay, Hoktaheen Creek, and other drainages distant from the community.

Subsistence Harvest of Deer

Harvest and Use-Survey Data

Since deer is the main land mammal harvested for subsistence use by Hoonah residents, we have analyzed deer harvests in some detail. Table 15 presents the number of deer harvested per

household and the expanded community total harvest for Hoonah for 1983 through 1985 based on our survey. Mean household deer harvests has ranged during this time period from 2.51 deer per household in 1984 to 2.09 deer per household in 1985. The 1983 deer harvest was intermediate at 2.31 deer per household. Estimated total community deer harvests based on the 1986 survey were 647 in 1983, 702 in 1984, and 584 deer in 1985.

TABLE 15. Subsistence Deer Harvest for Sampled Hoonah Households and Estimated Total Community Harvest 1983, 1984, 1985.

YEAR	DEER HARVEST /HOUSEHOLD	ESTIMATED COMMUNITY HARVEST
1983	2.31	647
1984	2.51	702
1985	2.09	584

Figure 41 shows the number of deer harvested by each sampled household for the same three years. This figure indicates both high variability across households in the number of deer harvested and also high consistency in particular household harvests from year to year. Eleven or 15 percent of households in our sample harvested 15 or more deer over the 1983-85 time period, with two households reporting 30 or more deer. Twenty-four households or 34 percent of surveyed households reported harvesting no deer in any of the three years. High harvesting households consistently harvested much more than the mean harvest level in each year. In 1985, 70.4 percent of households harvested fewer deer than the allowable individual bag limit of four deer per year. Fourteen percent of households reported harvesting exactly four deer, making the individual bag limit the mode for the community. Figure 42 shows the reported harvest of deer of the 71 sampled households. Almost half of surveyed households (34 households) reported no deer harvests for 1985; two households reported harvests of 12 deer. Figure 43 shows the cumulative deer harvest by households and produces a regular hyperbolic

harvest curve. Harvest data conclusively show that most of the deer are taken by a relatively small number of productive households[79].

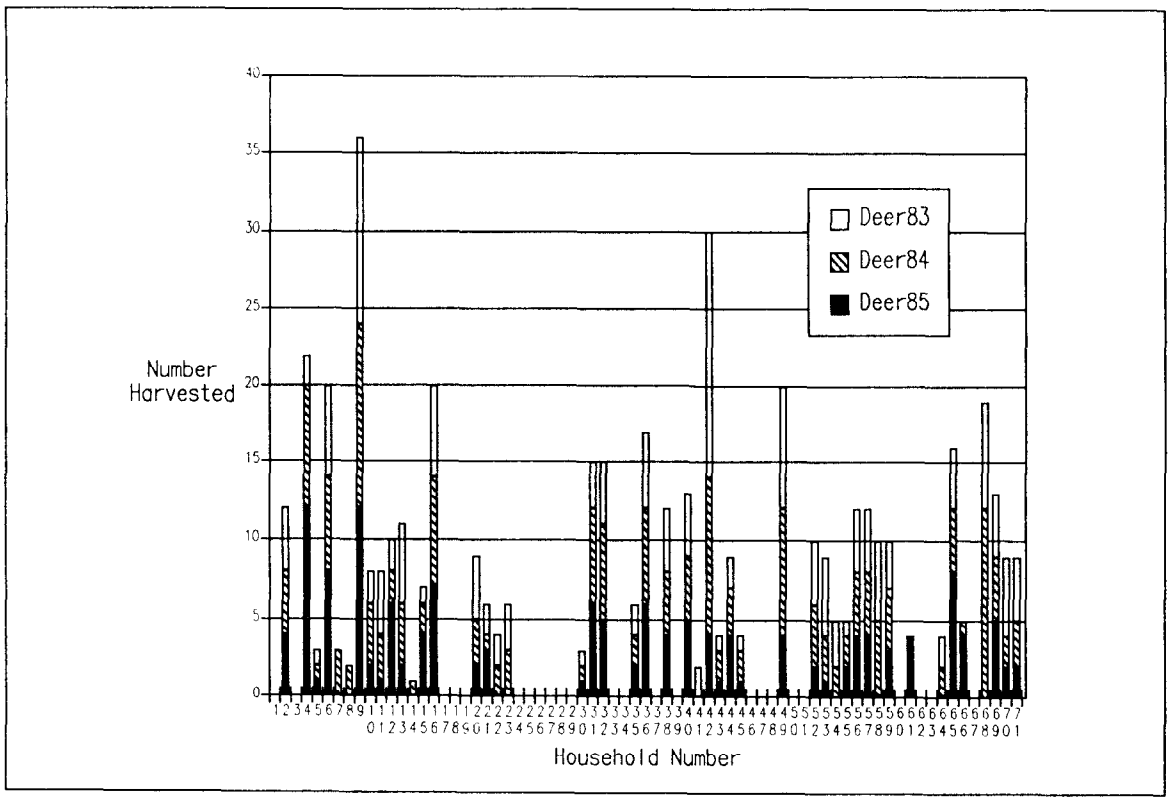

Figure 41. Reported Deer Harvest by Sampled Households, 1983-85.

Figure 44 shows number of deer used by each household, including deer harvested by household members and deer received from others and used. About 52.1 percent of households harvested deer in 1985; 85.3 percent used deer as food in their household. What is occurring here is that high producing households are sharing deer that they harvest with households that harvest few or no deer. Distribution of deer from harvesting to non-harvesting households follows traditional patterns of sharing, barter, and trade[80].

79. This concentration of subsistence harvests has been found to be a regular characteristic of many rural communities.

80. Elders and others who are unable to hunt are usually supplied with deer by kinsmen. Deer are supplied by active hunters for potlatches, payoff parties, and other traditional celebrations. Some barter and trade in cash and kind for deer takes place as well.

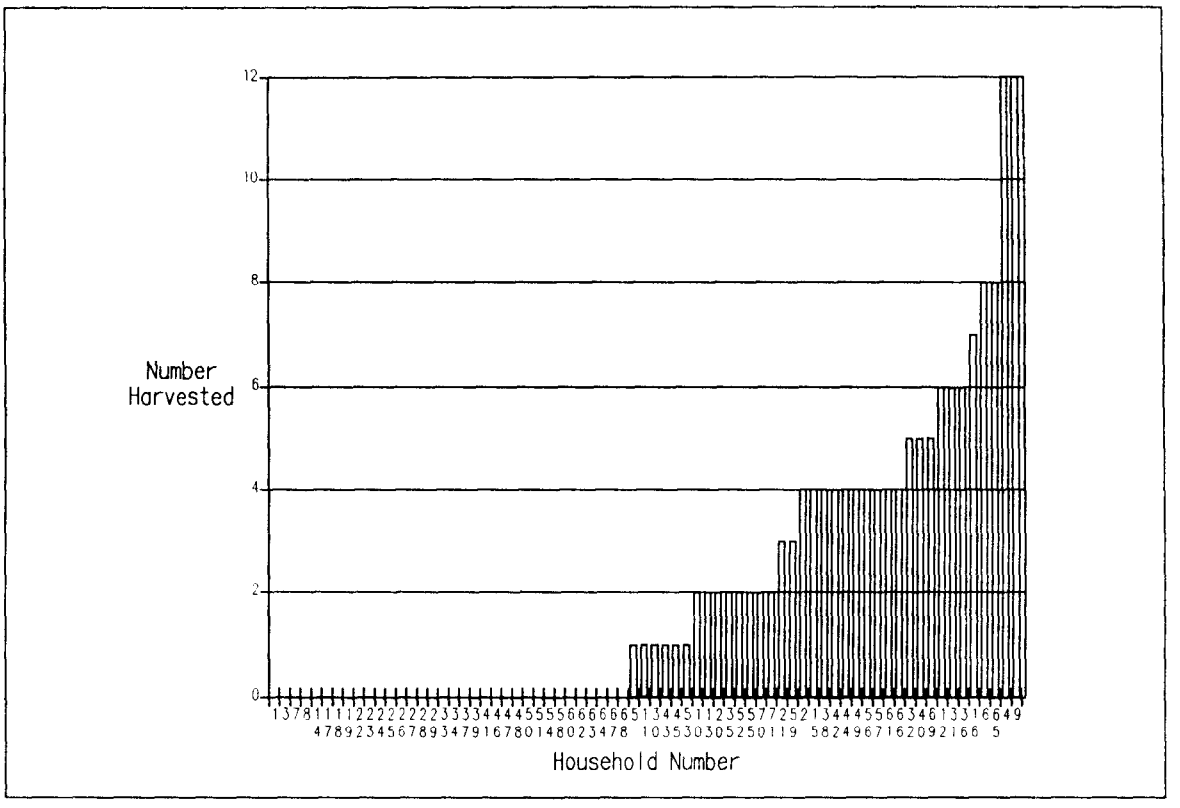

Figure 42. Reported Deer Harvest by Sampled Households, 1985.

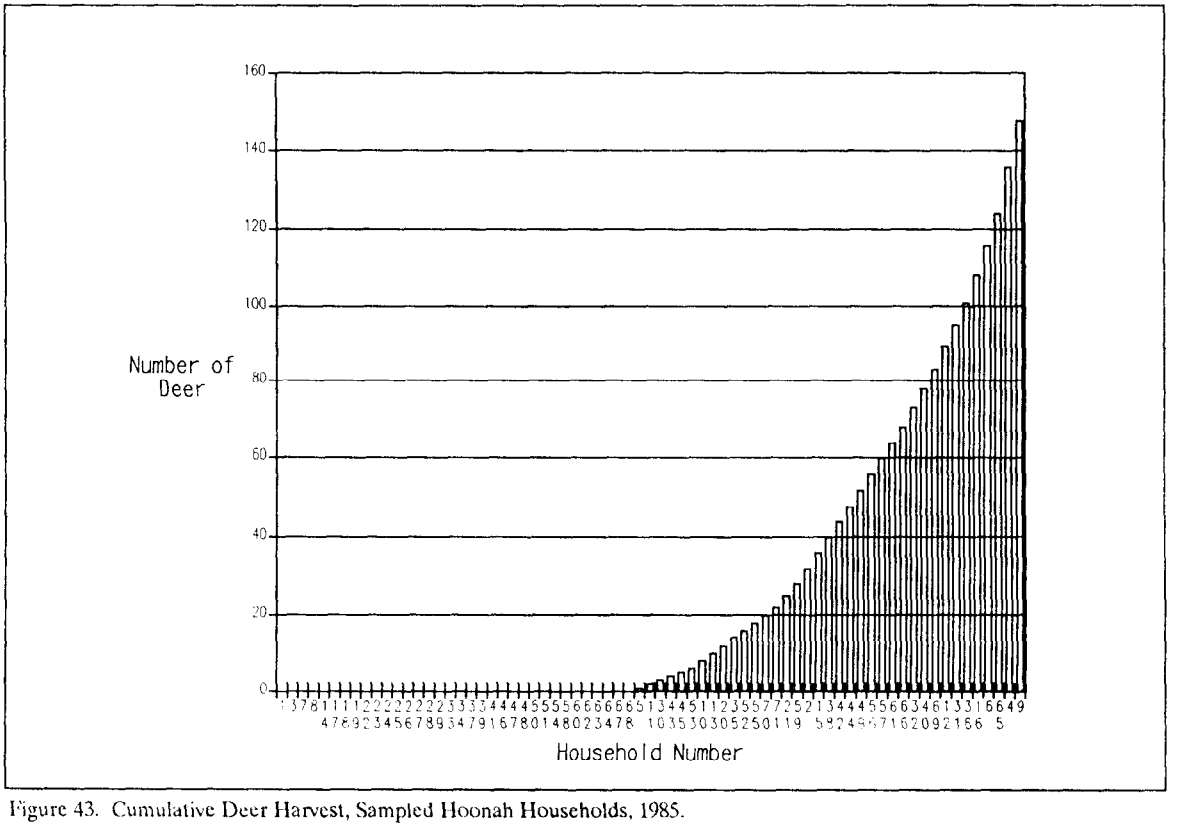

Figure 43. Cumulative Deer Harvest, Sampled Hoonah Households, 1985.

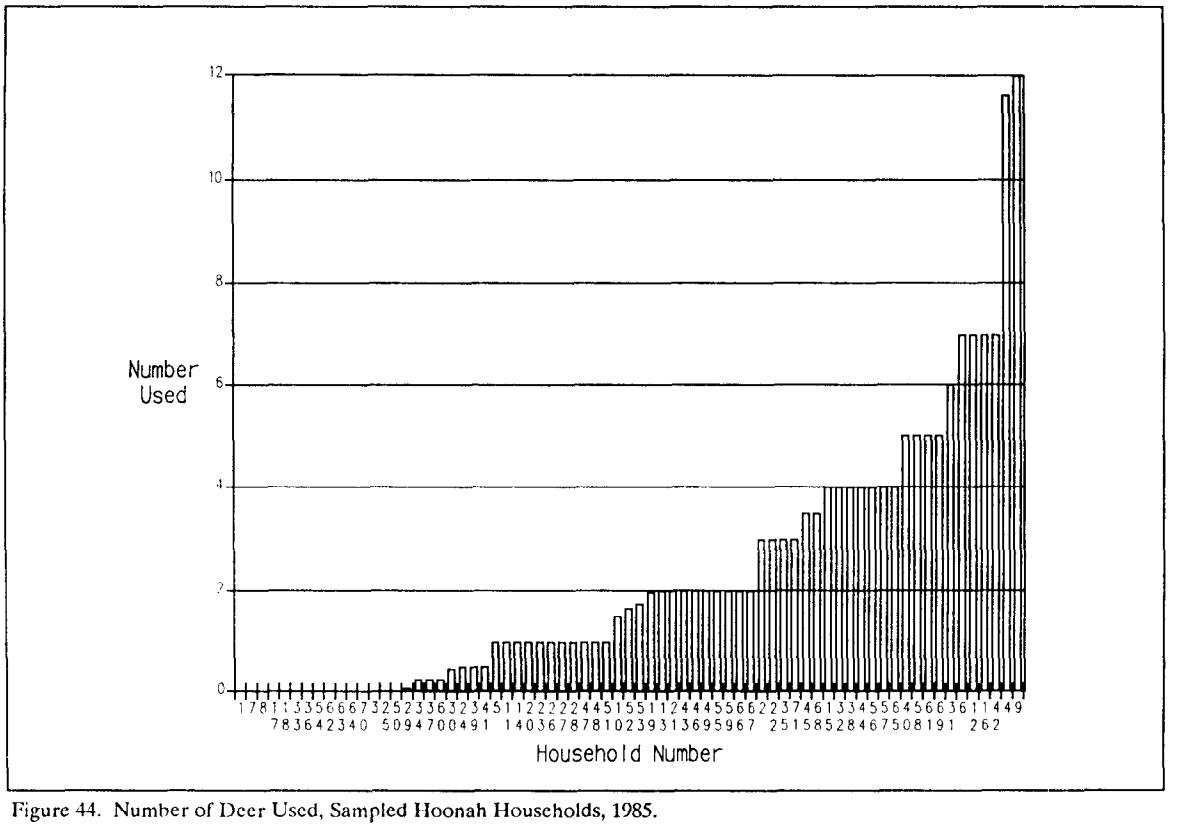

Figure 44. Number of Deer Used, Sampled Hoonah Households, 1985.

Target Use Levels for Deer

As a means of investigating whether current use of deer met the needs of Hoonah households, survey respondents were asked the number of deer that would be the right amount for their households use for one year. These responses are presented in Figure 45. All households indicated that they wanted at least one deer per year. All but nine households indicated that they desired twelve or fewer deer per year. One household felt they needed 40 deer per year to meet their needs[81]. Comparing this figure with Figure 44 indicates that actual use falls short of desired use. The mean number of deer desired was 7.9 deer per household. The actual level of use in 1985 was 2.4 deer per household. On average, 5.5 more deer per household, or 1,540 deer for the community, were needed to reach the desired level. This would represent roughly a tripling of current use levels.

81. Households wanting large numbers of deer generally have kinship and social obligations to supply a number of other households with deer.

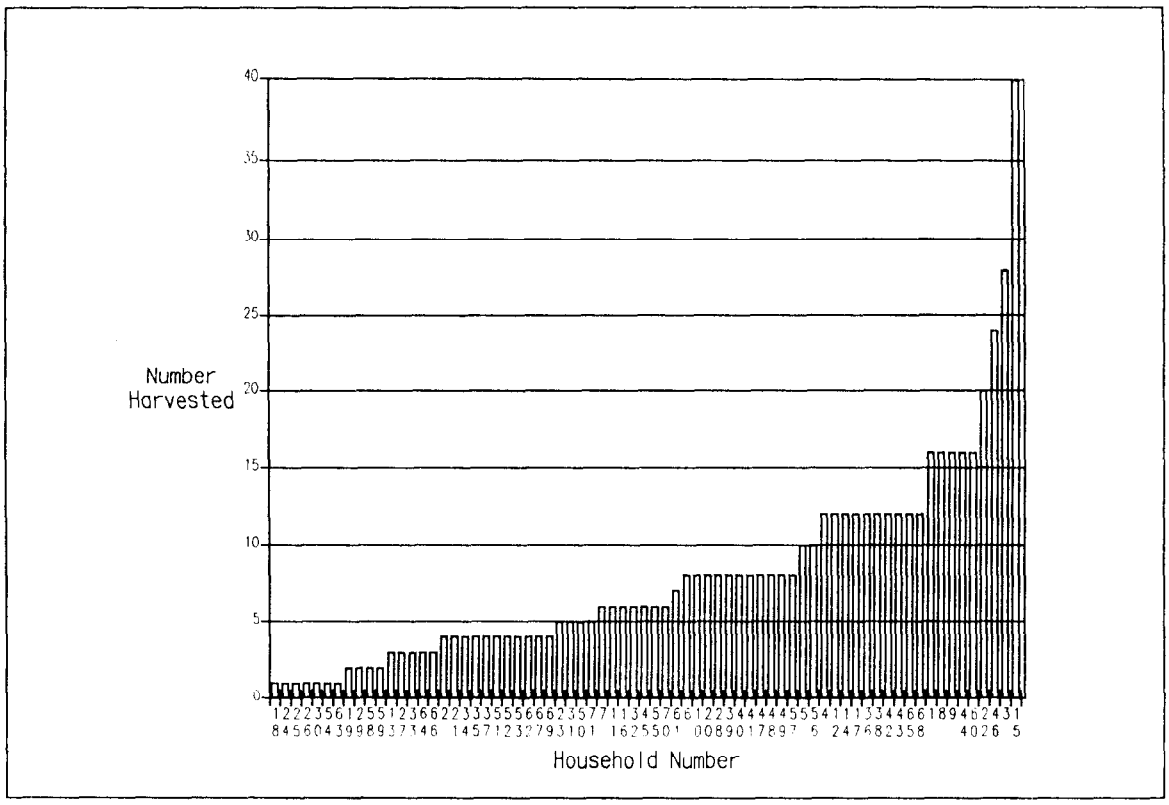

Figure 45. Number of Deer Desired, Hoonah Sampled Households, 1985.

Although harvest levels of 7.9 deer per household might seem high in the context of southeast Alaska, this level of harvest of land mammals is not particularly high compared to other communities in the state that rely heavily deer or on other large ungulates. This level of deer harvest would increase the total use of game from 252 lbs per household or about 78 lbs per capita to about 692 lbs per household or about 215 lbs per capita. Quite a number of communities in the Alaska approach or exceed this level of harvest of game (Table 10, p. 95). Egigik, Hughes, Huslia, Kivalina, New Stuyahok, and Nikolai exceed this harvest level of land mammals[82].

Looking once again at harvests for Kodiak Island communities, presented in Figure 38 (p. 108) above, we may use Larsen Bay as an example of harvest levels of Sitka black tail deer under near ideal hunting conditions and with season and bag limit regulations similar to those that apply to Hoonah.

82. Data are not available for many North Slope and Kotzebue Sound communities that rely heavily on land mammals for subsistence.

Larsen Bay hunters have very little competition from subsistence hunters from other communities or from sport hunters from urban communities. Although hunting regulations may have limited subsistence take by Larsen Bay residents, deer are abundant near this community, and community residents have had little difficulty in recent years in meeting their subsistence needs or filling their bag limits with relatively little hunting effort. Research conducted in 1982-83 documented a mean harvest of at least 5.8 deer and a mean use of at least 5.5 deer per household (KANA 1983). Field observation of hunters found subsistence hunters at Larsen Bay able to harvest all the deer they wished to harvest from beach areas during periods of settled weather.

The main reasons for the difference between desired use and actual use appear to have to do with the time and energy needed to harvest deer in areas used by Hoonah residents. Hoonah sampled households spent 441 days hunting and harvested 148 deer in the 1985 base year; this equals about 2.98 hunting days per deer[83]. This survey result agrees closely with Division of Game's estimate of 2.75 hunting days per deer in subunit 35 and 2.78 for all of Unit 4 for 1985 for all hunters based on a mailed deer harvest survey to a sample of randomly drawn hunting licensees (Flynn 1987). This level of effort required to bag a deer appears to be higher than that required in the Kodiak examples described above and is a limiting factor on deer harvests by Hoonah residents[84].

Using the survey effort rate, harvesting enough deer to reach the desired use level would have meant that each household would have had to spend about 23.5 days deer hunting during the season. If we consider only those households that actually fielded a hunter in 1985, this total goes up to about 45 hunting days per household. We found that some very active hunters spend this amount of time in the field each year, but that the average household spent a little more than six days hunting in 1985. We believe that few households or hunters would be able to spend 45 days per year deer hunting given work and family obligations[85]. The amount of time and effort needed to harvest a deer for a Hoonah

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83. Respondents were asked how many days they had spent hunting deer in 1985.

84. Comparable level of effort data are not available for Kodiak rural communities. I have observed that beach hunting in Larsen Bay produces more than one deer per hunter per day of hunting.

85. Cost of fuel and maintaining a skiff or boat for this 45 days of hunting would be a major cost that might be prohibitive for many households.

resident are in turn related to the abundance and distribution of accessible deer and to competition with other hunters.

Number of Hunters in Hoonah

In May, 1986, there was slightly less than an average of one hunter per household in Hoonah; mean number of hunters per household was .95 based on our survey. Projecting this survey finding to the community, we estimate that there were about 265 resident hunters in Hoonah in spring of 1986. We have used this survey finding to estimate the number of Hoonah hunters in other years in the 1982 to 1989 time period. For example, after adjusting for population growth over the 1982 to 1986 time period, we estimate that there were about 220 Hoonah hunters in 1982, the last official census year[86].

Harvest Ticket Data

State of Alaska hunting regulations for deer require hunters to use deer harvest tickets, and a mail-out survey of deer hunters based on a listing of harvest ticket recipients has been conducted annually in recent years[87]. The data from the mail-out surveys provide quantified deer harvest information over a multi-year time period that is not available from our random sample household survey. Because of methodology of the mail-out survey, harvest estimates for small communities based on the mail-out survey may differ somewhat from harvest estimates based on more intensive household interview methodologies[88]. However, the mail-out survey provides a good method for assessing trends in deer

86. This estimate uses population data presented in Figure 7, p. 33, and assumes that the proportion of hunters to non-hunters in the population has not changed in the 1982-86 time period. We have no data showing any change in the proportion of hunters to non-hunters in the 1980 decade.

87. The mail-out survey has been sent to a random draw of ¼ of rural harvest ticket recipients in recent years. Response rate for Hoonah has ranged from .27 to .45 in the 1986-89 time period. No actual count of the total number of harvest tickets issued to Hoonah residents has been made in these years; the number of harvest tickets issued to Hoonah residents is computed to be 4 times the number of tickets randomly drawn.

88. For example, our household survey found that 584 deer were harvested by Hoonah residents in 1985; the best estimate from the mail-out survey shows 597 deer harvested in that year.

harvest levels for communities like Hoonah and Juneau, by allowing annual deer harvests to be compared over a series of years.

The numbers of harvest tickets issued to persons using Hoonah addresses or addresses elsewhere in the Port Frederick area are shown in Table 16. The mail-out survey separated *other Port Frederick residents* living at the Whitestone and Eight Fathom Bight logging camps, at Game Creek, and elsewhere who use Hoonah as an address but do not live within the study area for 1987, 1988, and 1989. For earlier years, the breakdown of the total number of harvest tickets issued into Hoonah residents and other Port Frederick residents was done by comparing a listing of the names of mail-out survey recipients with a listing of names of Hoonah residents and by using the mean hunters-per-household estimate for Hoonah from the 1986 household survey.

The low number of tickets issued in 1980 mean that many hunters did not apply for tickets in that year because of low deer numbers or other unknown factors. From 1982 to 1989 the number of Hoonah hunters appears to have kept pace with population growth in the community. For years 1982 through 1989, the estimated number of tickets issued to Hoonah residents varied between 220 and 293 harvest tickets per year. The greatest number of tickets, 293, was issued in 1988. The number of tickets issued to other Port Frederick residents varies from a low of 63 in 1984 to an estimated 230 in 1986[89]. Non-Hoonah residents of the Port Frederick area have accounted for between 21 percent and 46 percent of the harvest tickets issued to residents of the Port Frederick area over 1980-1989.

Figure 46 presents 1985 deer harvests by community mailing address for all of Game Management Unit 4 based on the mail-out survey of harvest ticket recipients. Unit 4 includes Admiralty, Baranof, and Chichagof islands and almost all of the areas hunted by Hoonah residents. As this figure shows, a large majority (69 percent) of the 10,390 deer harvested in Unit 4 were taken by Juneau and Sitka hunters. Note that the deer harvests of hunters with a Hoonah address (807 deer), are a combi-

89. The very high number of tickets apparently issued to other Port Frederick residents in 1986 may be an over-estimate due to methodological factors peculiar to that year (Flynn, 1989).

TABLE 16. Number of Deer Harvest Tickets Issued to Hunters with Addresses in Port Frederick Area, 1980 through 1989.*

YEAR	HOONAH	OTHER PORT FREDERICK	TOTAL
1980	200	NA	200
1982	220	87	307
1983	230	128	368
1984	240	63	303
1985	250	88	338
1986	265	230	495
1987	280	170	450
1988	293	86	379
1989	258	87	345

Source: Rod Flynn, 1989; Division of Subsistence analysis of deer harvest data.
* Data for 1981 are not available.

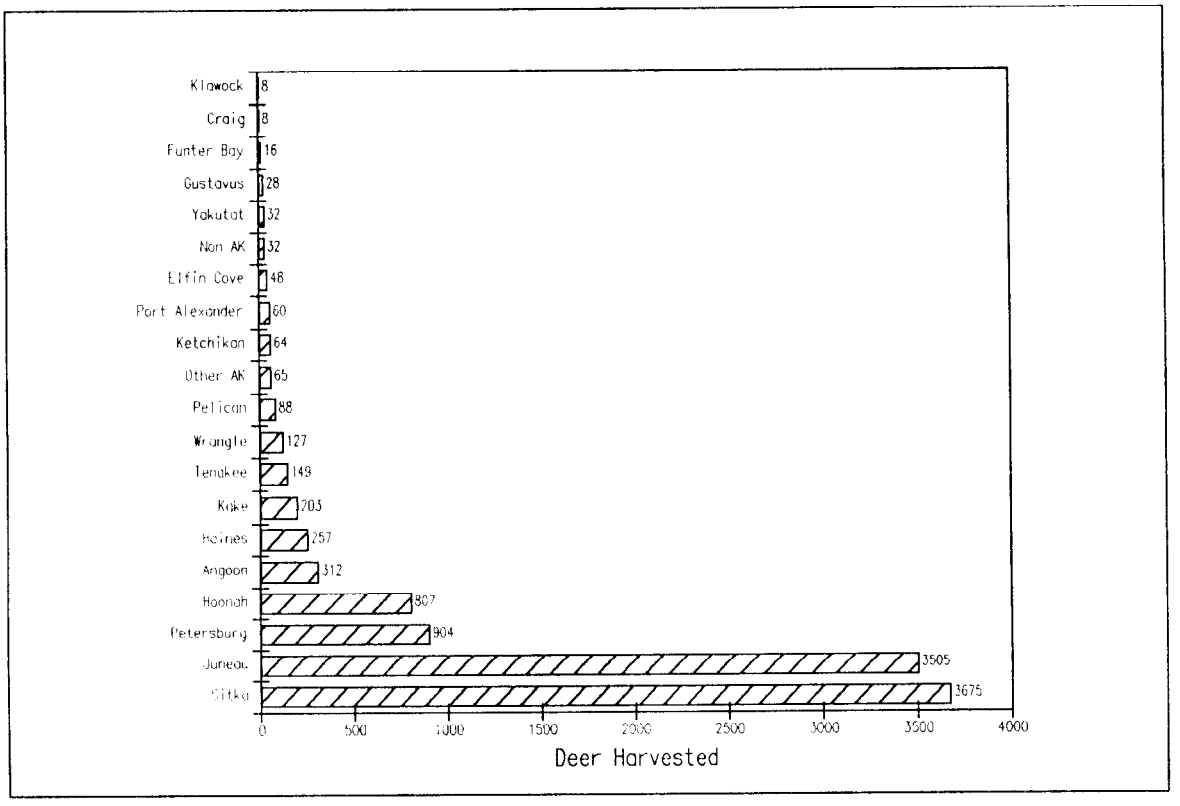

Figure 46. 1985 Deer Harvest in Unit 4 by Mailing Address of Hunters.

nation of Hoonah hunters with others using Hoonah as a mailing address in this figure. We estimate that, of the 807 deer taken, 597 deer were taken by Hoonah residents and 208 deer were taken by other residents of the Port Frederick area.

Unit 4 was divided into Major Harvest Units for game management purposes. The division followed for the 1985 and 1986 data presented below is shown in Figure 47. In order to improve understanding of hunting patterns and the effect of logging practices on deer hunting, major harvest units were subdivided into Harvest Areas for the 1987 data; the subdivision used for the 1987 data is shown in Figure 48. Harvest Areas numbers and boundaries were modified for the 1988 data and Harvest Areas were renamed *Wildlife Harvest Areas* (WHA). The WHAs used for the 1988 deer data are shown in Figure 49. WHAs were renumbered for the 1989 deer data. This new numbering system is shown in Figure 50. In the discussion that follows, Harvest Areas and Wildlife Harvest Areas have been grouped in such a way that similar geographical areas are being compared across each year in the time series.

We found that most of the deer harvested by Hoonah hunters were taken from the areas in Major Harvest Unit 35 as depicted in Figure 47. This unit comprises the Hoonah core area. Table 17 shows the Harvest Areas or Wildlife Harvest Areas treated as the *Hoonah core area* in the following discussion.

Figure 51 shows the location of harvest for deer taken in 1985 by hunters using Hoonah as an address[90]. By far the largest portion of deer were taken from Major Harvest Unit 35, comprised of the Hoonah core area: the Hoonah town site, all of Port Frederick, and other nearby areas in north and northwest Chichagof Island. Major Harvest Unit 36, including Tenakee Inlet and Freshwater Bay, accounted for a significant, although much smaller proportion of the deer harvested.

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90. Because of the expansion method, this figure shows 14 more deer for Hoonah than the figure for all of Unit 4 (821 deer versus 807 deer). Also note that our household survey estimated 584 deer as the community harvest level. The difference (821 - 584) or 236 deer is an other approximation of the harvest of non residents using Hoonah as an address in that year. Note that this estimate is 29 deer higher than the estimate presented in the text above.

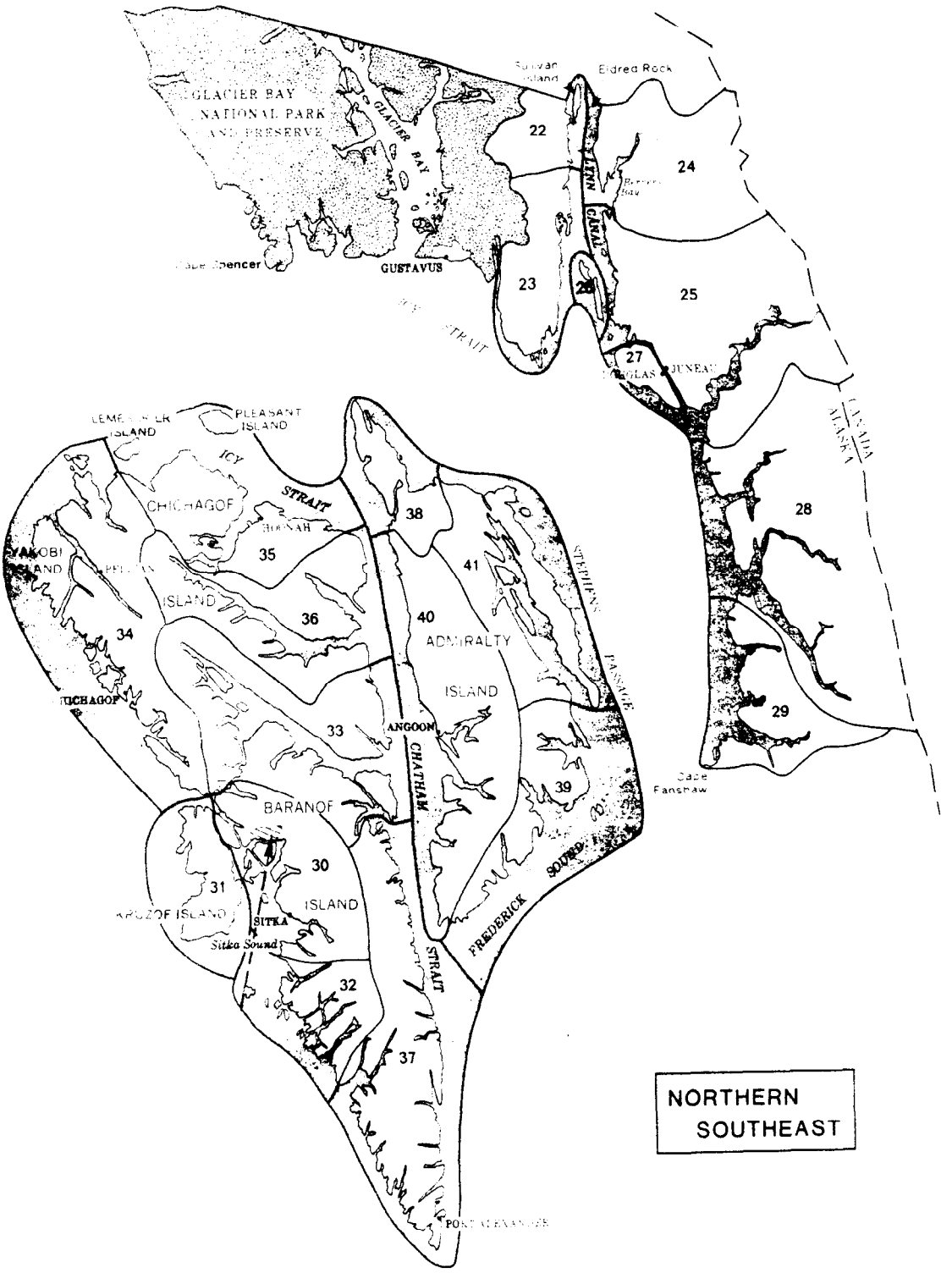

Figure 47. Northern Southeast Alaska, Showing Major Harvest Unit Boundaries, pre-1987.

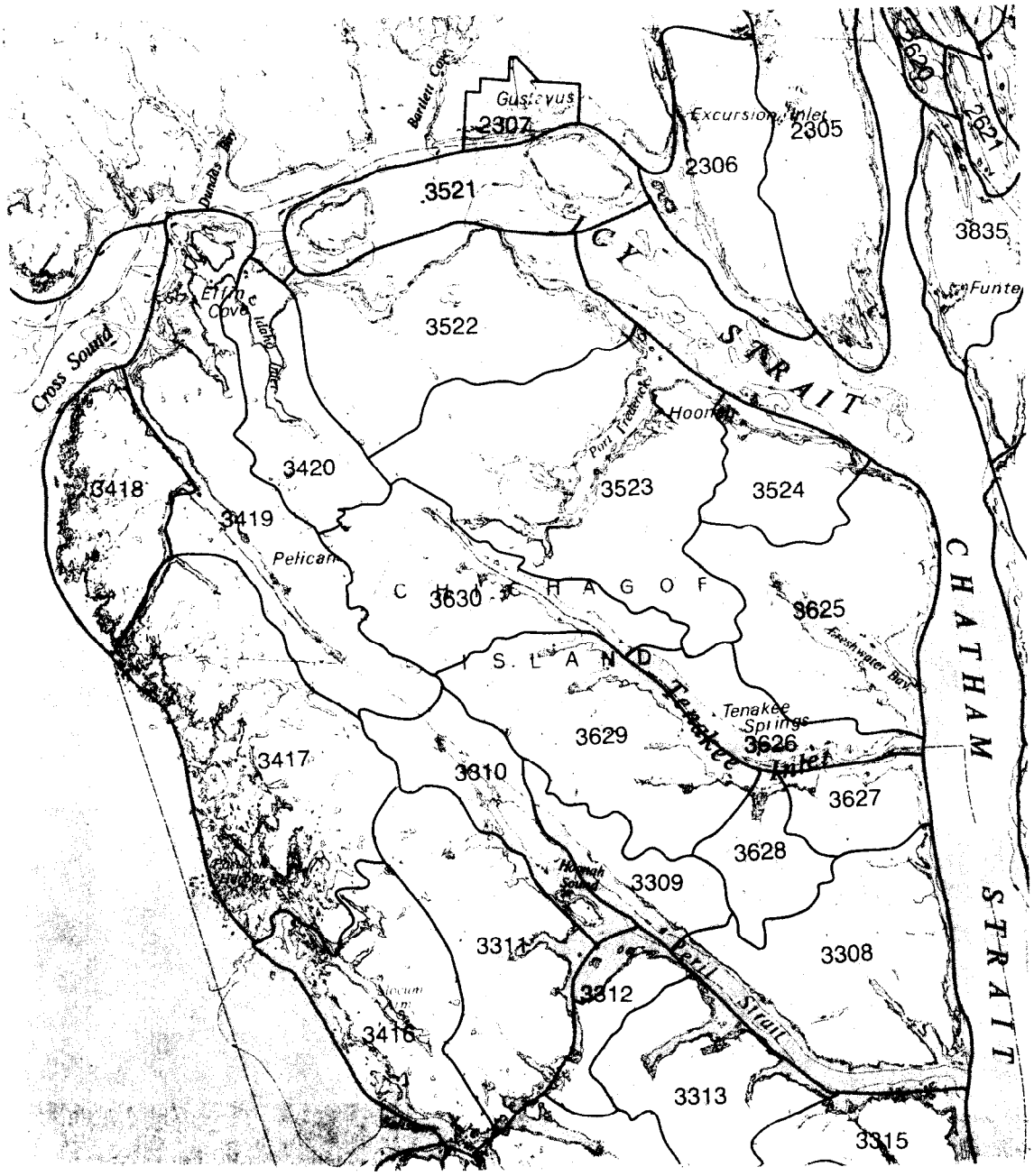

Figure 48. Harvest Areas, 1987 Designations.

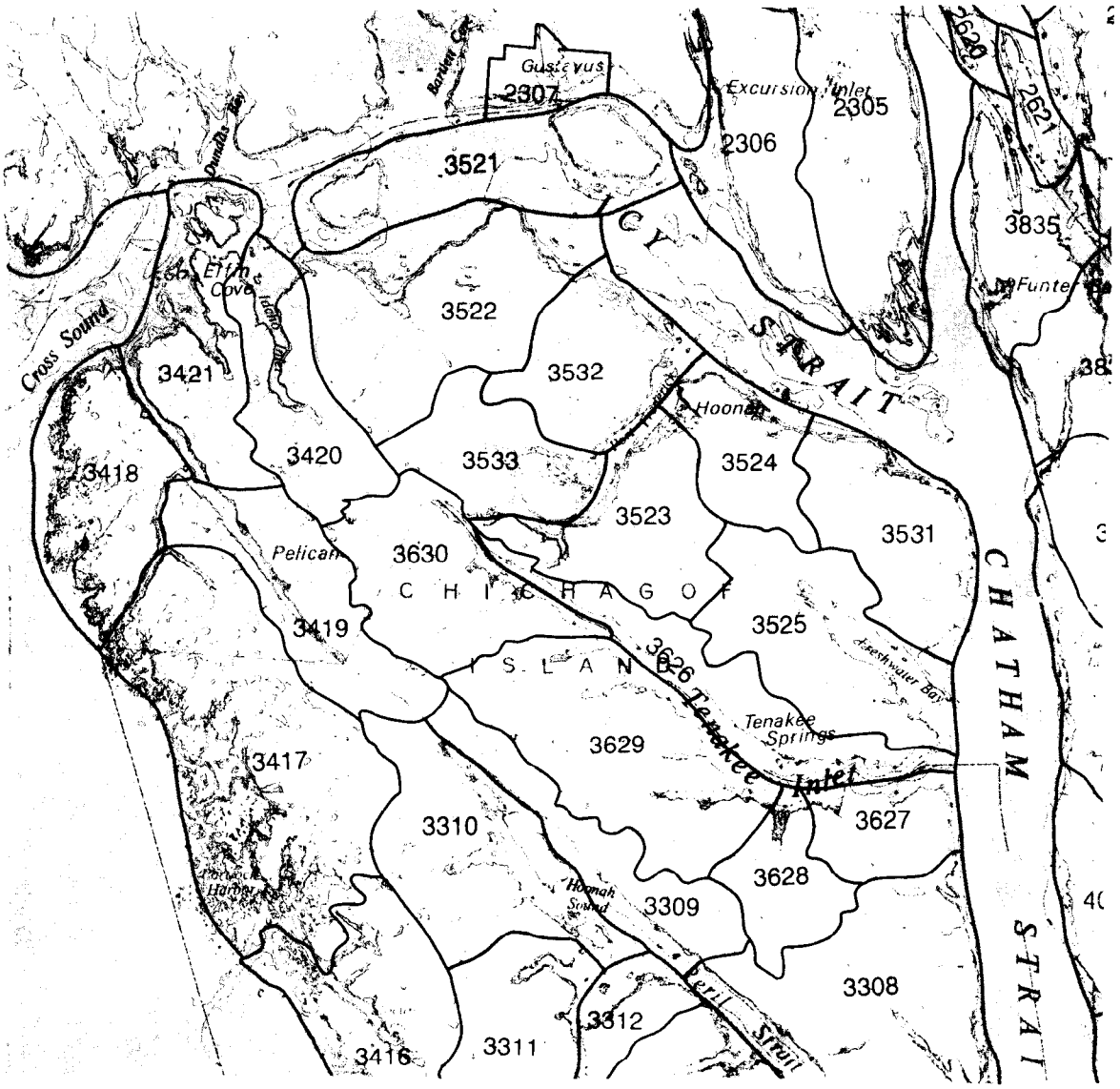

Figure 49. Wildlife Harvest Areas, 1988 Designations.

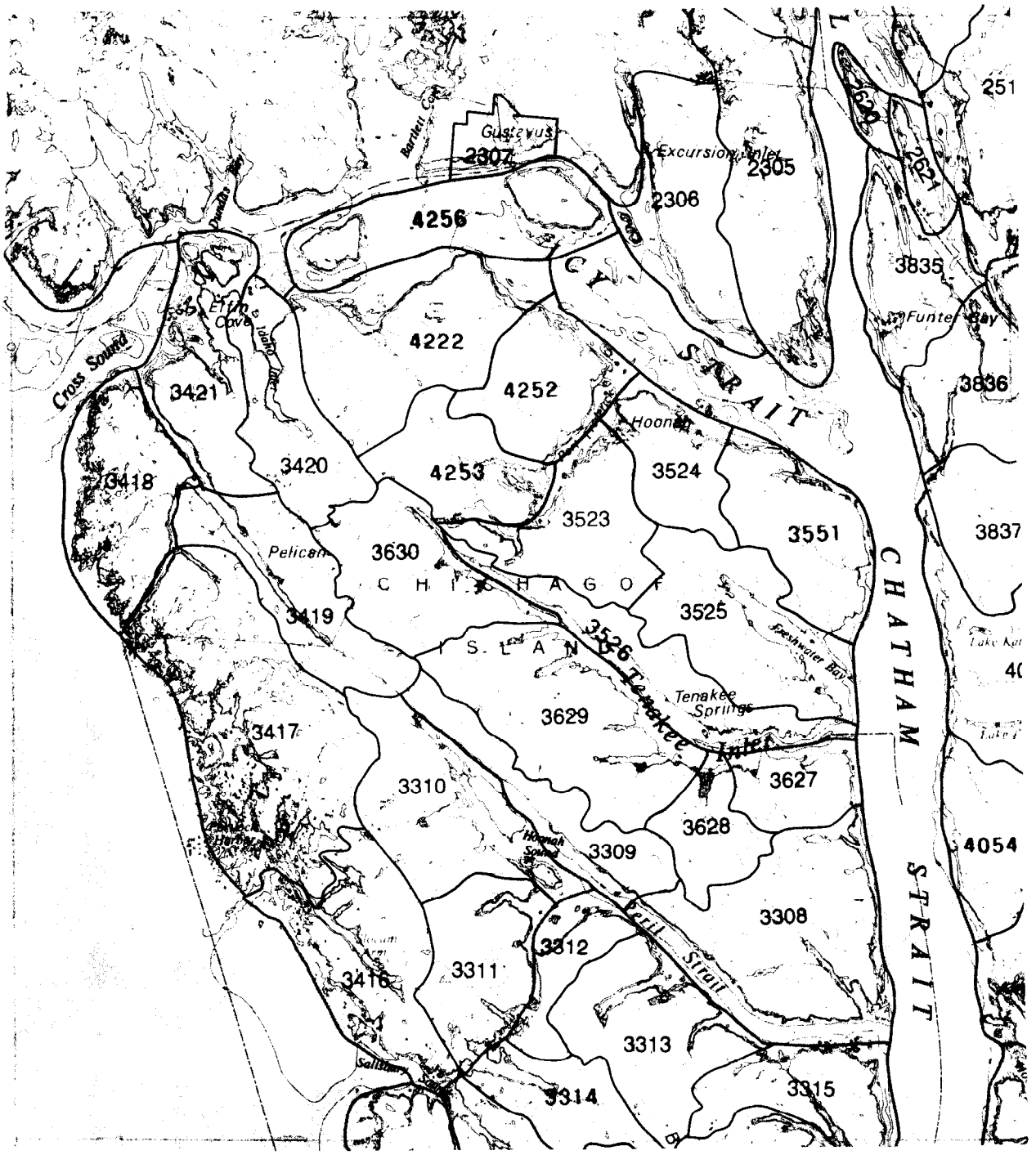

Figure 50. Wildlife Harvest Areas, 1989 Designations.

TABLE 17. Major Harvest Units and Wildlife Harvest Areas Comprising Hoonah's Core Deer Hunting Area, 1985 through 1989.

YEAR	AREA
1985	Major Harvest Unit 35.
1986	Major Harvest Unit 35.
1987	Harvest Areas 3521, 3522, 3523, 3524.
1988	Wildlife Harvest Areas 3521, 3522, 3523, 3524, 3531, 3532, 3533[91].
1989	Wildlife Harvest Areas 3523, 3524, 3551, 4222, 4252, 4253, 4256.

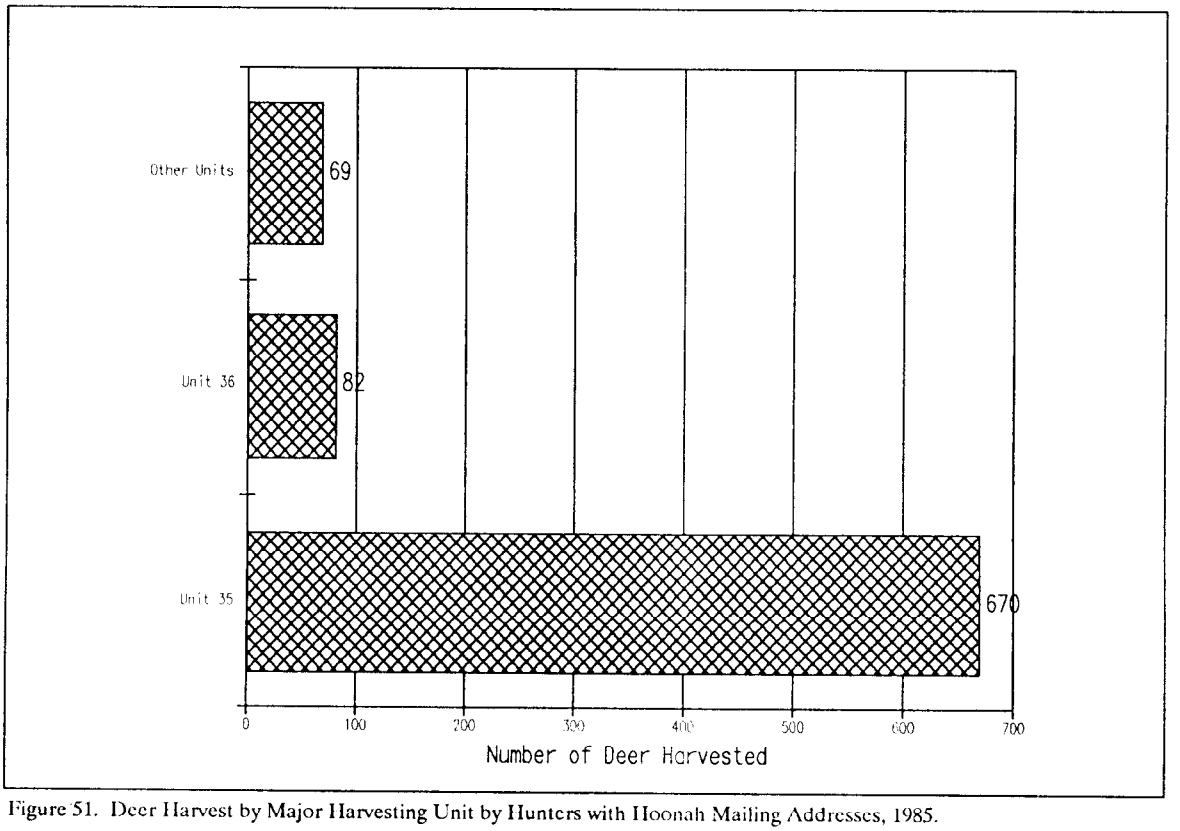

Figure 51. Deer Harvest by Major Harvesting Unit by Hunters with Hoonah Mailing Addresses, 1985.

91. Because of the way units were redrawn in 1988, False Bay and adjacent coastal areas are included in the Hoonah core area for 1988 and 1989. According to our field interviews Whitestone Harbor is the more heavily used area in this portion of northwest Chichagof Island, and it properly needs to be included in the Hoonah core area.

Figure 52 breaks down the total deer harvested in the Hoonah core deer hunting area by the hunter residence for 1984-89. In this figure, Hoonah hunters have been separated from hunters in *Other Port Frederick* who use Hoonah as a mailing address. Hoonah residents' deer harvest ranged from a low of about 356 deer harvested in 1984 to a peak of 608 deer in the 1987. Harvest has fallen off from the high in 1987 to 524 in the most recent year. Juneau hunters have taken from a low of 206 deer in 1984 to a high of 615 deer in 1987. The deer harvest of other Port Frederick residents, comprising residents at logging camps and the Mount Bether settlement, has varied from 95 deer in 1984 to an estimated 461 deer in 1989. Haines hunters also were found to harvest a relatively large number of deer from this area.

Figure 53 rearranges these data by year of harvest and shows that the significant increase in the total number of deer taken from the Hoonah primary deer harvesting area over this time period is attributable to non-local hunters from Juneau and to other Port Frederick hunters. Figure 54 presents these data as percents and shows that, in 1984, Hoonah residents harvested 44 percent of the deer taken in Hoonah core area. This proportion declined to 32 percent in 1989.

Figure 55 shows similar data for Tenakee Inlet and Freshwater Bay; the Major Harvest Unit and the Wildlife Harvest Areas comprising this area are listed in Table 18. Juneau residents have accounted for the majority of deer taken in this area over the 1984-1989 time period. Hoonah residents' harvests in Tenakee Inlet and Freshwater Bay have fluctuated from a harvest of 7 deer in 1989 to a high of 140 deer in 1987. Freshwater Bay has accounted for most of Hoonah resident's deer harvest from this area. Figure 56 shows that total deer harvest in the Tenakee Inlet and Freshwater Bay area more than doubled over the 1984-87 time period before declining in the last two years. Figure 57 shows that Hoonah's share of the deer harvest in this area reached 10 percent in 1987, but it was less than 1 percent in 1989.

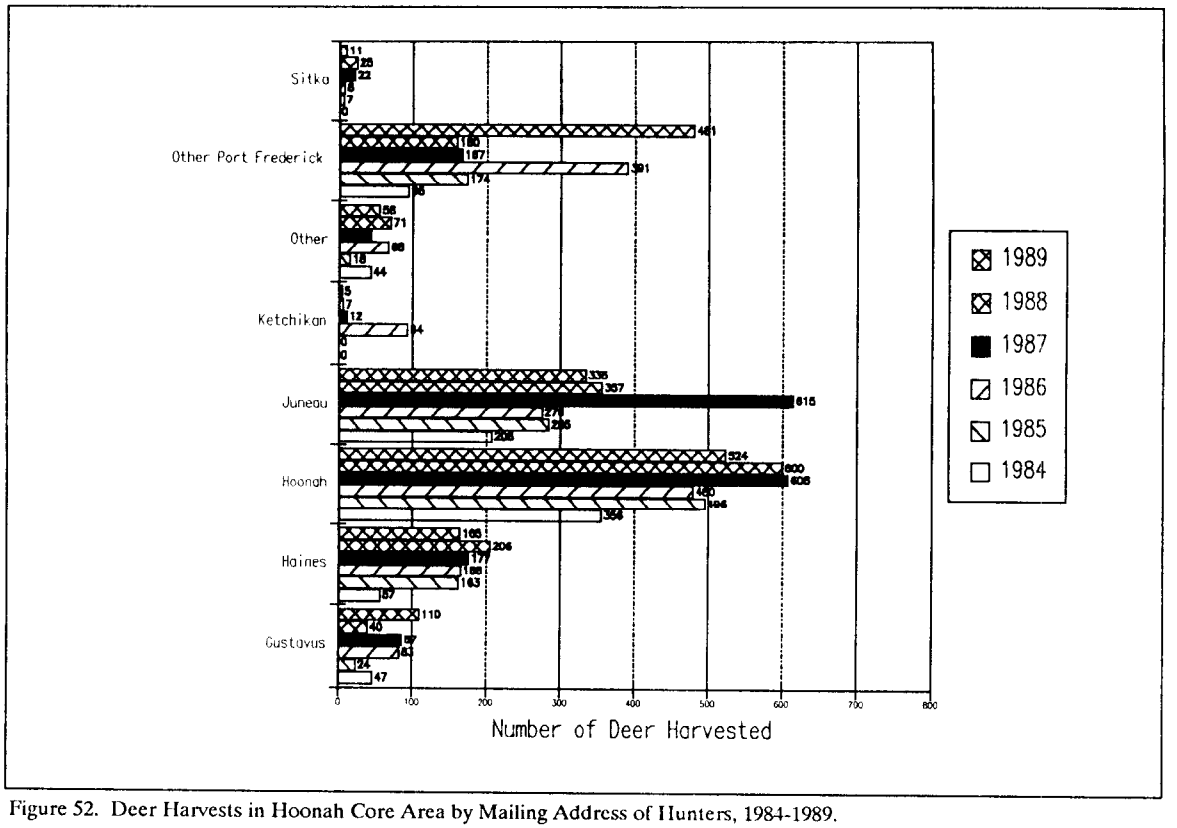

Figure 52. Deer Harvests in Hoonah Core Area by Mailing Address of Hunters, 1984-1989.

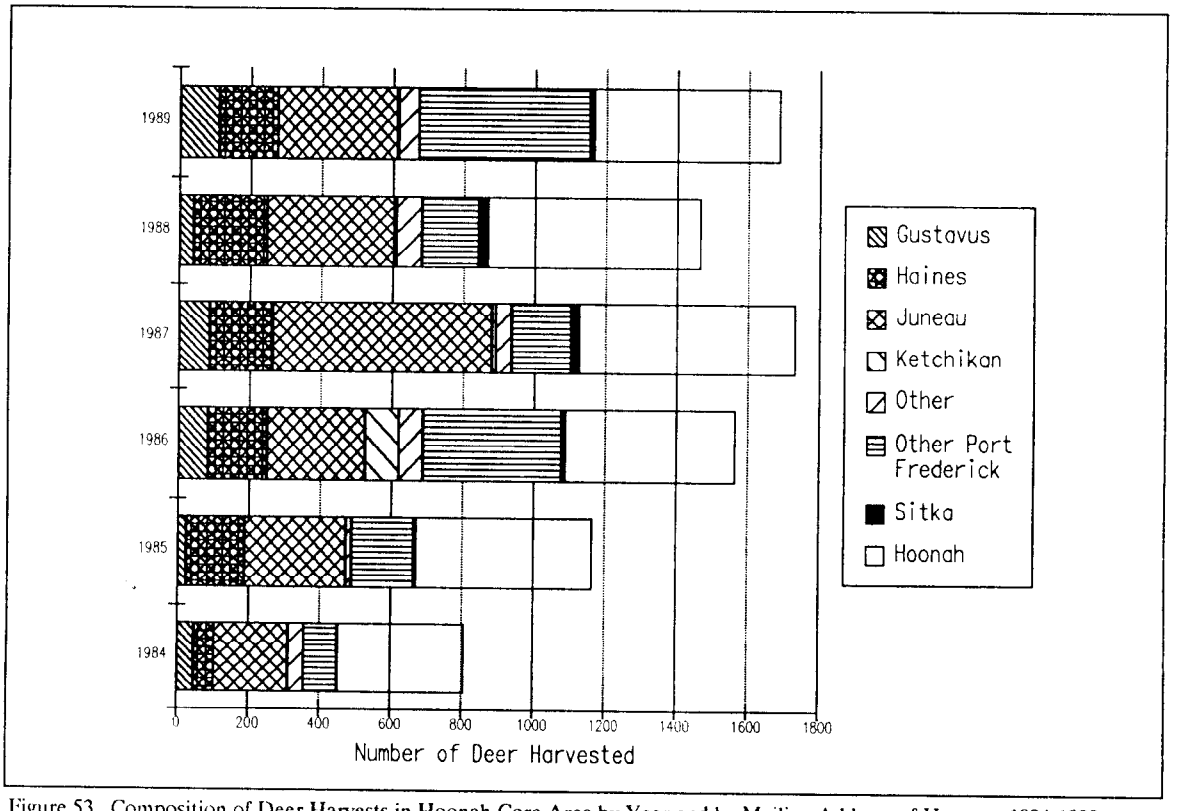

Figure 53. Composition of Deer Harvests in Hoonah Core Area by Year and by Mailing Address of Hunters, 1984-1989.

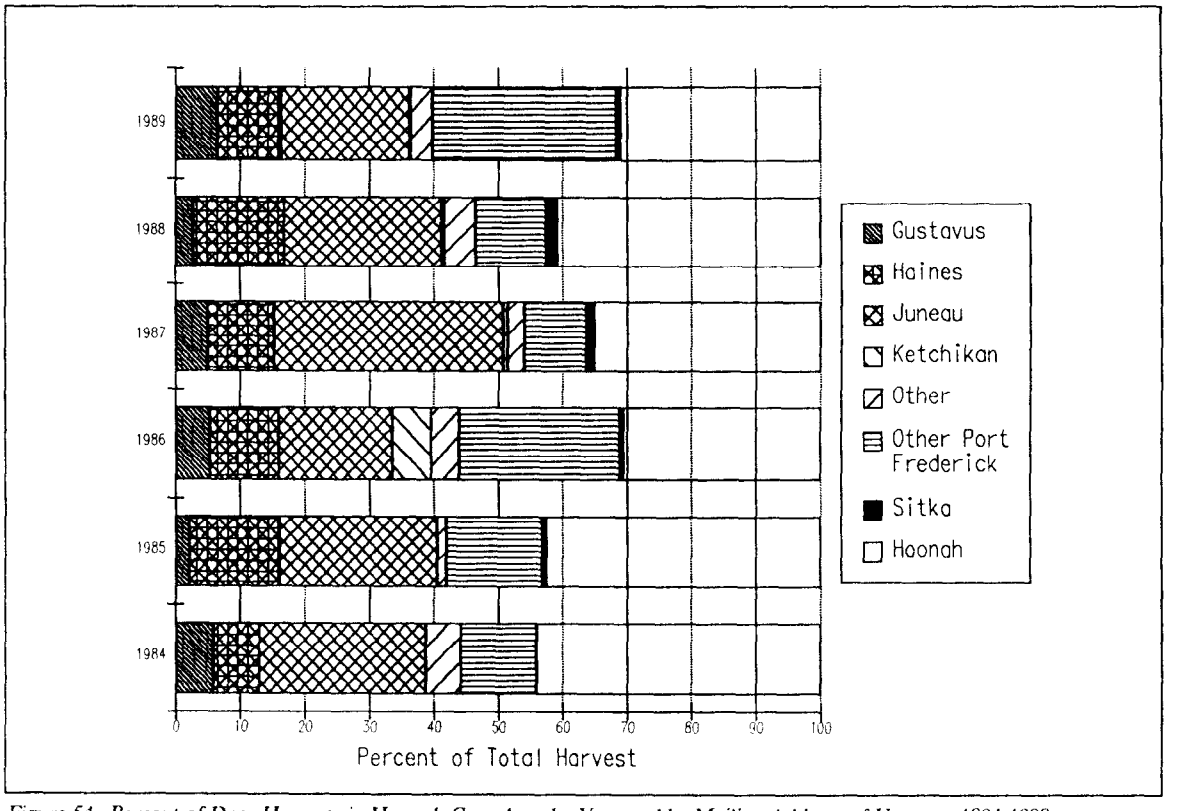

Figure 54. Percent of Deer Harvests in Hoonah Core Area by Year and by Mailing Address of Hunters, 1984-1989.

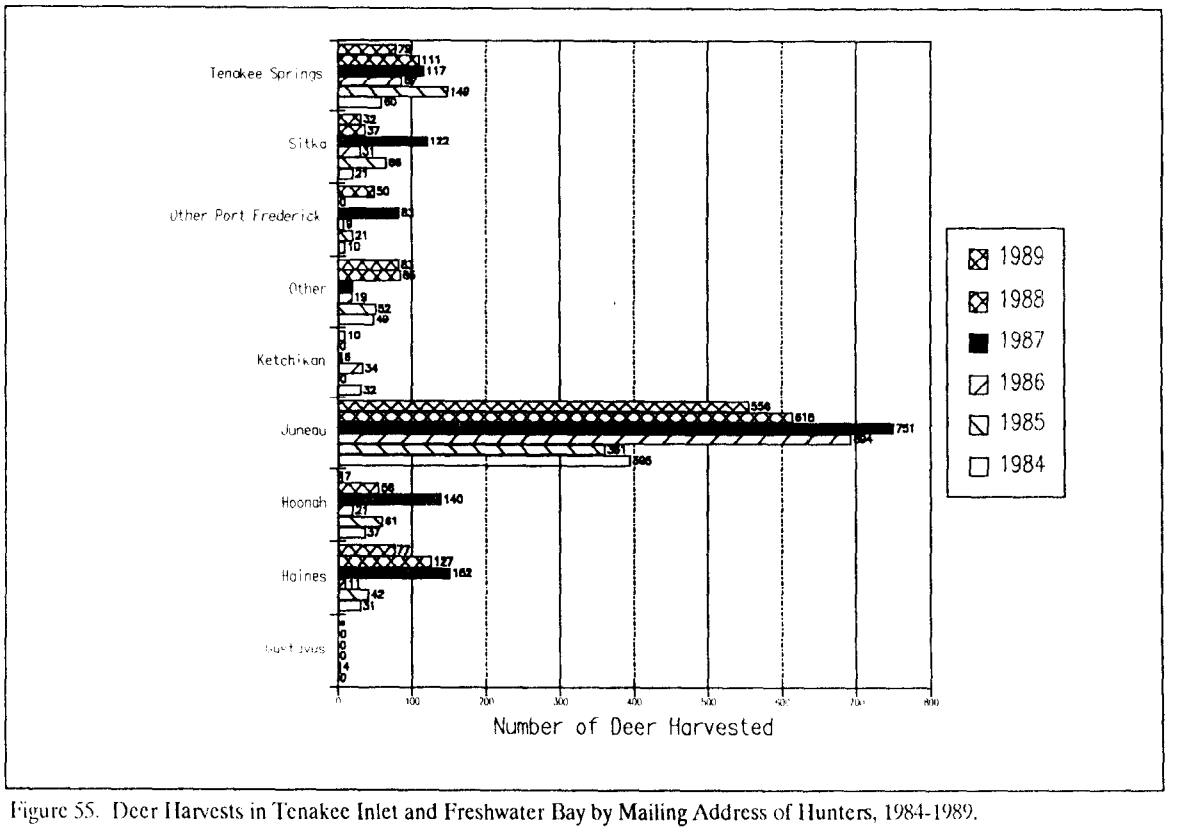

Figure 55. Deer Harvests in Tenakee Inlet and Freshwater Bay by Mailing Address of Hunters, 1984-1989.

TABLE 18. Major Harvest Units and Wildlife Harvest Areas Comprising the Tenakee Inlet and Freshwater Bay Area, 1985 through 1989.

YEAR	AREA
1985	Major Harvest Unit 36.
1986	Major Harvest Unit 36.
1987	Harvest Areas 3625-3630.
1988	Wildlife Harvest Areas 3525, 3626-3630.
1989	Wildlife Harvest Areas 3525, 3526, 3627-3630.

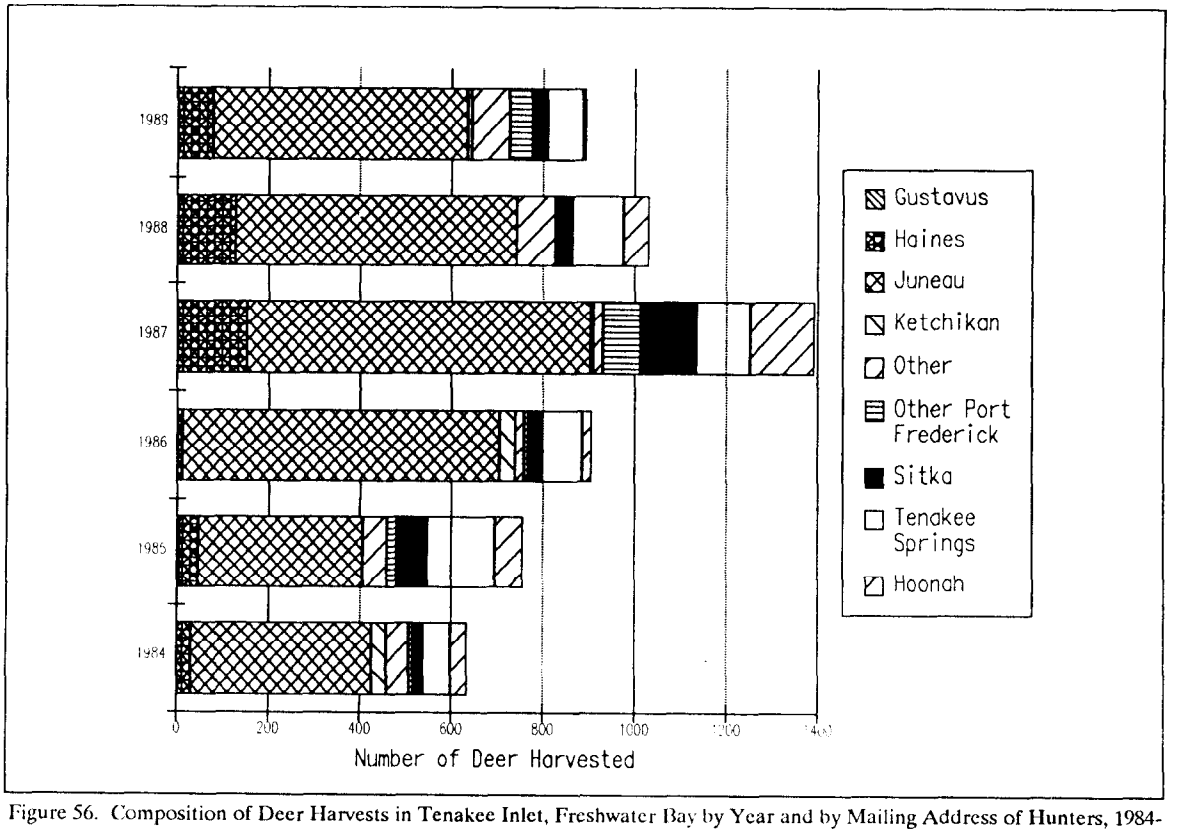

Figure 56. Composition of Deer Harvests in Tenakee Inlet, Freshwater Bay by Year and by Mailing Address of Hunters, 1984-1989.

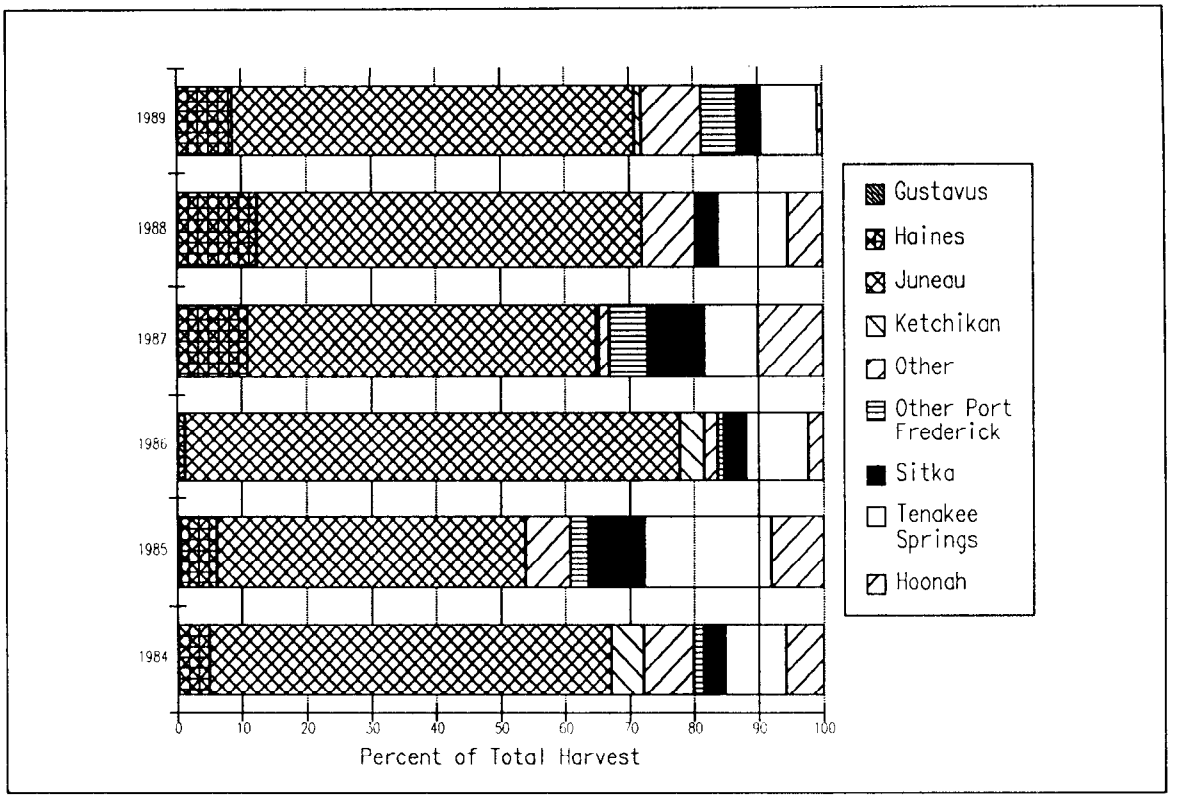

Figure 57. Percent of Deer Harvests in Tenakee Inlet, Freshwater Bay by Year and by Mailing Address of Hunters, 1984-1989.

Harvest ticket data for the Hoonah core area and for the Tenakee Inlet and Freshwater Bay area for the 1980-1989 time period are presented in Figure 58. The total deer harvest for the Hoonah core area increased from a low of 420 in 1980 to a high of 1732 deer in 1987,then declined in 1988 to 1456 deer, and then rose to 1687 deer in 1989. Deer harvests in the Tenakee Inlet and Freshwater Bay area increased from 320 deer in 1980 to a high of 1,392 in 1987 before declining to 894 deer in the 1989 season.

Trend in Deer Harvests

Some trends in deer harvest need to be examined in order to understand changes in areas used by Hoonah residents. Figure 59 shows deer harvest in GMU 4 from 1969 to 1989[92]. Unit 4 harvests

92. Data for this figure are based on different methodologies: hunter questionnaires for 1980-89, harvest ticket and harvest report data for 1975-79, and interviews with hunters for 1969-74. For 1975, another estimate, based on hunter interview came up with 14,700 deer. See Townsend, ed. (1986) for 1969-74 data.

have varied from a low of 950 deer harvested in 1979 to a high of 14,331 in 1987. Records show a total of 125,656 deer harvested in this 21 year period, with a mean harvest of about 6,000 deer per year. Over half of the deer harvested in this time period have been taken in the last six years, during which the harvest level has been well over the long-term average.

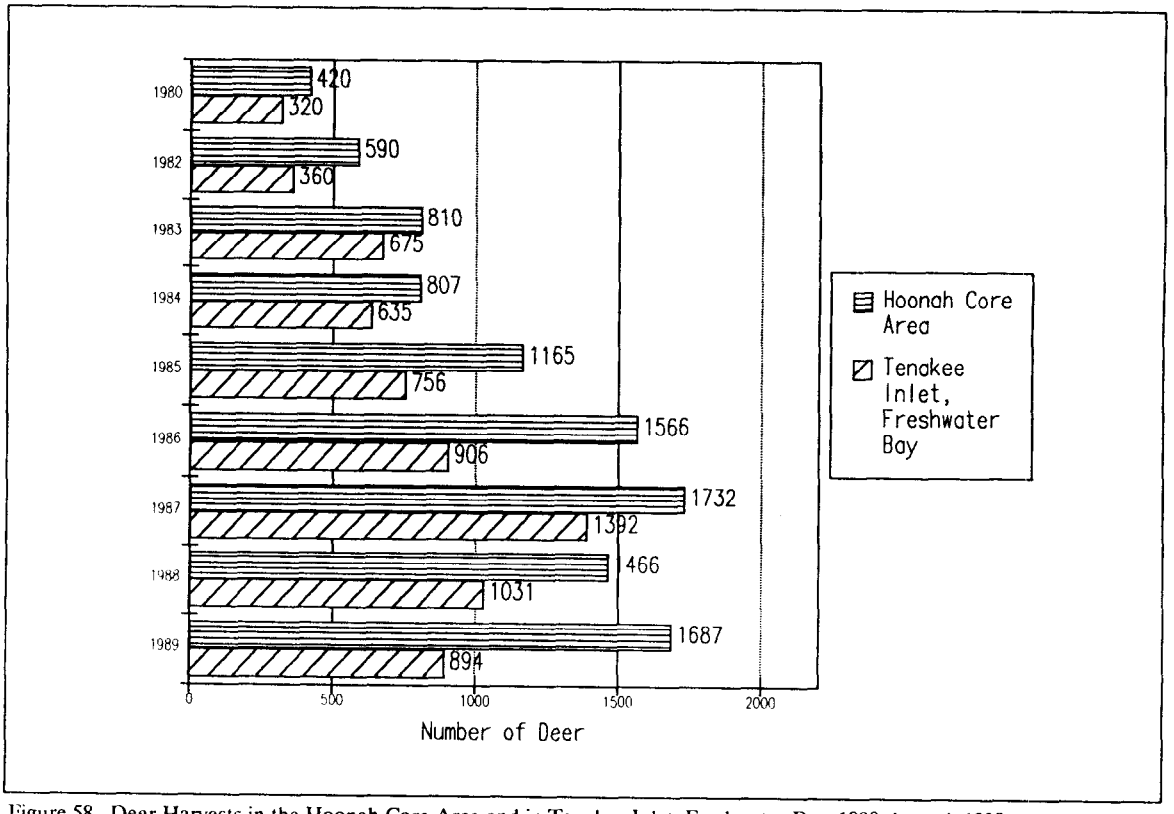

Figure 58. Deer Harvests in the Hoonah Core Area and in Tenakee Inlet, Freshwater Bay, 1980 through 1989.

The total deer harvest in Unit 4 in 1987, the year of highest recorded harvest, was 318 percent of the 1980 harvest. Compared with Unit 4 trends, deer harvest levels increased more steeply in the Hoonah core area and in Tenakee Inlet and Freshwater Bay area. Deer harvest in the Hoonah core area in 1987 was 412 percent of the 1980 level (Fig. 58); that of Tenakee Inlet and Freshwater Bay area was 435 percent of the 1980 harvest (Fig. 58). Harvest levels continued to be close to the 1987 high in the Hoonah core area in the 1988 and 1989 seasons, although harvests dropped sharply in the Tenakee Inlet and Freshwater Bay area in 1988 and 1989.

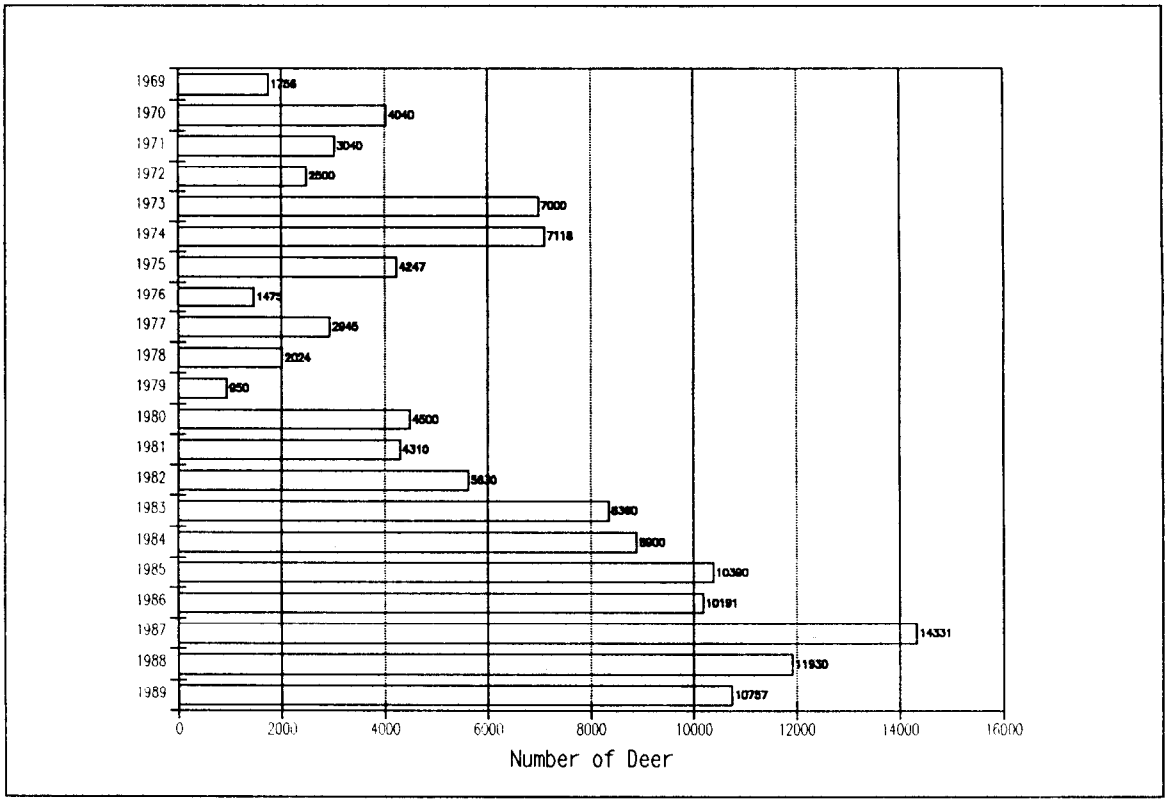

Figure 59. Deer Harvests in Units 4, 1969 through 1989.

Figure 60 normalizes these yearly harvests and expresses harvests for the Hoonah core area, Tenakee Inlet and Freshwater Bay area, and for Unit 4 as a percent of the highest harvest during the past eight years. The general shape of the graphs for Unit 4 and Tenakee Inlet and Freshwater Bay show fairly similar rates of increase over most of this time period, both peaking in 1987. The Hoonah core area shows an extremely rapid rate of harvest increase in the 1984 through 1987 time period. Harvests had a peak in 1987 and again in 1989.

We know from survey data presented in Table 15 (p. 113) that deer harvests by residents of Hoonah proper fluctuated slightly from 1983 to 1985. We also have seen from analysis of harvest ticket data presented in Figures 52, 53, and 54 (pp. 129, 129, and 130) that Hoonah residents' deer harvests varied between 480 and 608 deer per year over 1985-1989 and that Hoonah residents' share of the total harvest in the Hoonah core area has declined. Therefore, we conclude that most of the increase in harvest in the Hoonah core area over this time period is due to increased deer harvests by hunters from outside Hoonah proper, especially due to hunting by the introduced population of loggers and their

families and to greater use of Port Frederick by residents of other southeast Alaska communities. The analysis of household survey data and deer harvest ticket data show that the Hoonah core area has received increased hunting pressure from non-local hunters and from loggers in recent years.

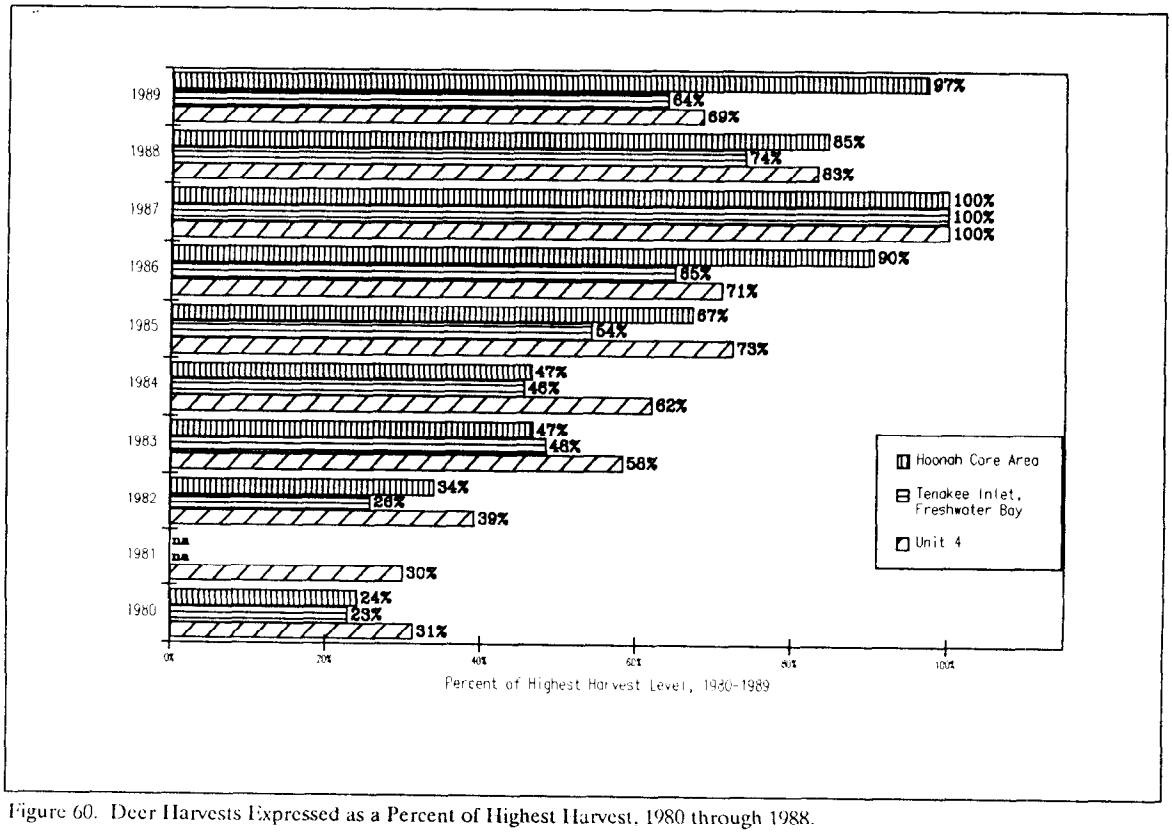

Figure 60. Deer Harvests Expressed as a Percent of Highest Harvest, 1980 through 1988.

Figure 61 shows the portion of the total deer harvest in Unit 4 that is taken from the Hoonah core area. The proportion of all GMU deer taken from this small area (see Figure 47, p. 123 for area boundaries) has increased from about 9 percent in 1980 to between 12 and 16 percent over the last 4 years[93]. This figure provides a further measure of the significant increase in deer hunting in the Hoonah core area which which has occurred since the construction of logging roads. The Hoonah core area has become a "hot spot" for hunters from other communities in the northern portion of southeast Alaska and a heavily used area by the loggers who travel the roads to their work sites.

93. Discussions held with Division of Wildlife Conservation in 1989 and at the Board of Game meetings held in Anchorage in April, 1990 indicated a possible need to reduce deer harvest in this subunit (Young, 1989; Anderson, 1989, 1990).

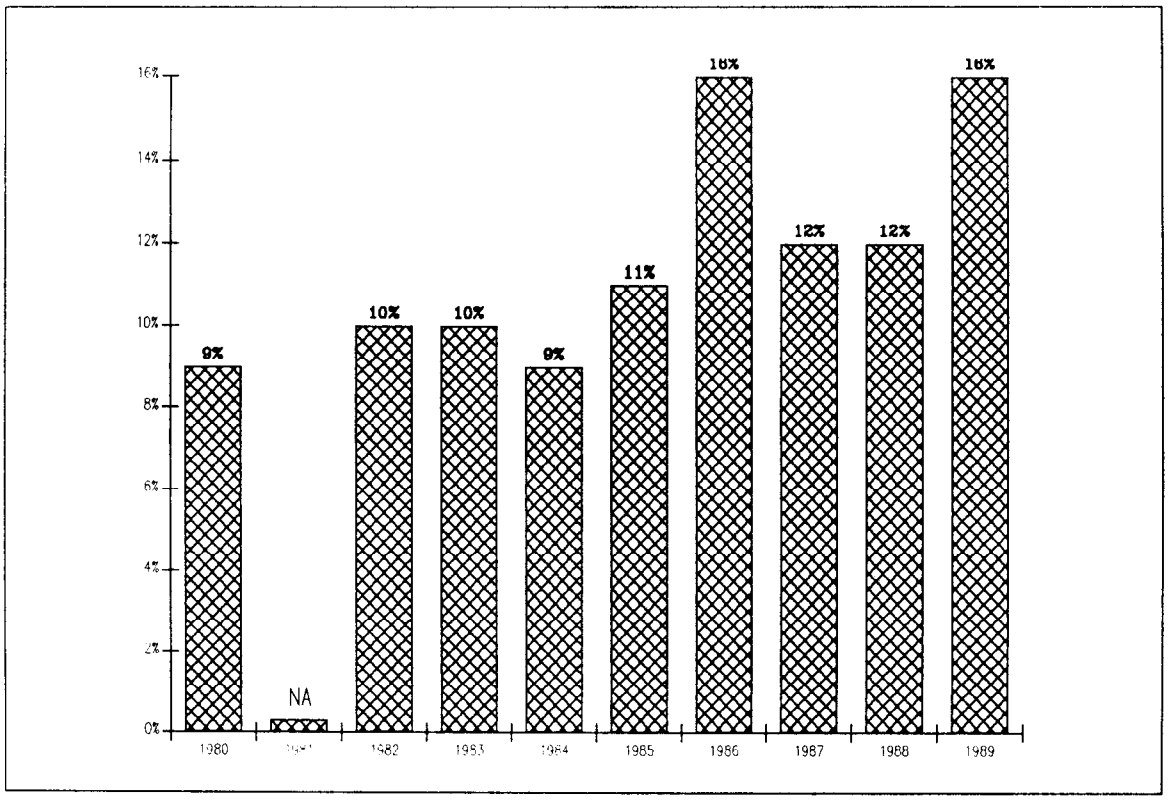

Figure 61. Deer Harvest in the Hoonah Core Area Expressed as a Percent of Total Harvest in Unit 4.

Hoonah residents' total deer harvests for the years 1985-1989 are shown in Table 19. Total deer harvest for Hoonah residents peaked in 1987 with 748 deer taken in that year. The lowest estimated harvest was 530 deer for 1989. The high harvest in 1987 mirrors the overall high deer harvests that took place in that year in all of Unit 4 (Fig. 59, p. 134), in the Hoonah core area (Fig. 52, p. 129) and in the Tenakee Inlet and Freshwater Bay area (Fig. 55, p. 130). The decline in 1989 does not match the trend for the Hoonah core area; a near record number of deer were taken from the Hoonah core area in that year. The 1989 data may signal the beginning of declining subsistence deer harvests for Hoonah residents. Lowered or restricted subsistence harvests are likely to result from the increased use of the Hoonah core area by non-Hoonah hunters and high deer harvests by these hunters coupled with the reduction in the deer population that may have taken place with the cutting of high-volume old-growth winter deer habitat. Examination of further years' harvest data will show whether the 1989 decline is part of a trend in deer harvests for Hoonah residents.

TABLE 19. Hoonah Residents' Total Deer Harvests, 1985-1989.

YEAR[94]	NUMBER OF DEER
1983	647
1984	702
1985	597
1986	542
1987	748
1988	656
1989	530

Habitat Capability Model

Application of a habitat capability model which was jointly developed by the Division of Wildlife Conservation and the Forest Service provides a further basis for understanding the deer population dynamics on north Chichagof Island. This model estimates the carrying capacity, or how many deer can be supported, within each Forest Service Value Comparison Unit (VCU). The model is based on an inventory of forest vegetation type, elevation, aspect, slope, and other factors, and an examination of climate records for southeast Alaska. Of those factors that can be changed by forest or game management practices, the amount of high quality winter deer habitat present in the forest tends to be the major determinant of the deer population over time. The number of deer that a given VCU can support changes and typically decreases with timber harvesting that removes critical deer winter habitat.

94. Data in this table are based on deer harvest ticket mail-out surveys for 1985 to 1989 and on our household survey for 1983 and 1984. Note that these data include a small number of deer taken outside the Hoonah core and the Tenakee Inlet and Freshwater Bay areas.

The State of Alaska management guideline for deer harvests in southeast Alaska aims at a continued sustainable harvest of ten percent of the deer population per year. This means that the deer population should be about ten times the harvest level or management goal in order to support a given hunting level over time. Management guidelines also aim at providing a deer population that would permit a harvest level that would satisfy southeast hunters. Typically, this satisfaction level is higher than actual harvest.

Figure 48 (p. 124) (has shown the division of major harvest unit 35 into four Wildlife Harvest Areas and Tenakee Inlet and Freshwater Bay into six Wildlife Harvest Areas (using 1987 units)[95]. The Hoonah core area is comprised of Harvest Areas 3522, 3523, and 3524; Hoonah deer harvests in Harvest Area 3625, Freshwater Bay, were substantial in 1987, the first year that this Harvest Area could be easily reached using logging roads for access to hunting sites. The bottom line on Figure 62 shows the estimated 1987 carrying capacity for deer for each of these four Wildlife Harvest Areas. The middle line shows the number of deer required to support the actual 1987 harvest level over time, and the top line shows the number of deer required to support the level of harvest that would satisfy southeast hunters as measured by the Division of Wildlife Conservation surveys. As is immediately apparent from this figure, the habitat carrying capacity of each of the four Wildlife Harvest Areas is less than that needed to support the actual or satisfaction level of harvest for 1987. To a large extent, this is due to the amount of recent clear-cutting in these units, coupled with the increased level of deer harvests by non-local hunters along logging roads, as discussed below. The situation is least critical in Wildlife Harvest Area 3522 where the carrying capacity is 83 percent of that needed to support actual harvest and 60 percent of that needed to meet hunter satisfaction. The situation is most critical in Wildlife Harvest Area 3523, immediately surrounding Hoonah, where the carrying capacity is only 29 percent of that needed to meet actual harvest and only 22 percent of that needed to meet hunter satisfaction[96].

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95. Wildlife Harvest Area boundaries coincide where possible with boundaries of Forest Service Value Comparison Units.

96. The actual number of deer present in a Wildlife Harvest Area in a given year could be greater or less than the carrying capacity. Higher deer numbers might result from a succession of mild winters and low hunter and natural predation. Lower deer numbers could result from unusual rates of winter kill, predation, or hunting, or from other factors.

Based on these estimates, the harvest levels recorded in all of these Wildlife Harvest Areas for 1987 probably cannot be maintained over time[97].

The 1987 deer harvests exceed the long term carrying capacity in part due to the recent influx of non-local hunters, who hunt along new logging roads. Figure 63 shows the harvest in each of the four Wildlife Harvest Areas by origin of hunter. As with the Hoonah core area taken as a whole, the majority of deer taken in each Wildlife Harvest Area are harvested by non-Hoonah residents. If harvests by non-Hoonah residents were eliminated, the habitat carrying capacity could have supported Hoonah's actual 1987 for Wildlife Harvest Areas 3522 and 3625. The habitat carrying capacity would not have been able to support Hoonah's actual 1987 harvest in Wildlife Harvest Areas 3523 and 3524[98].

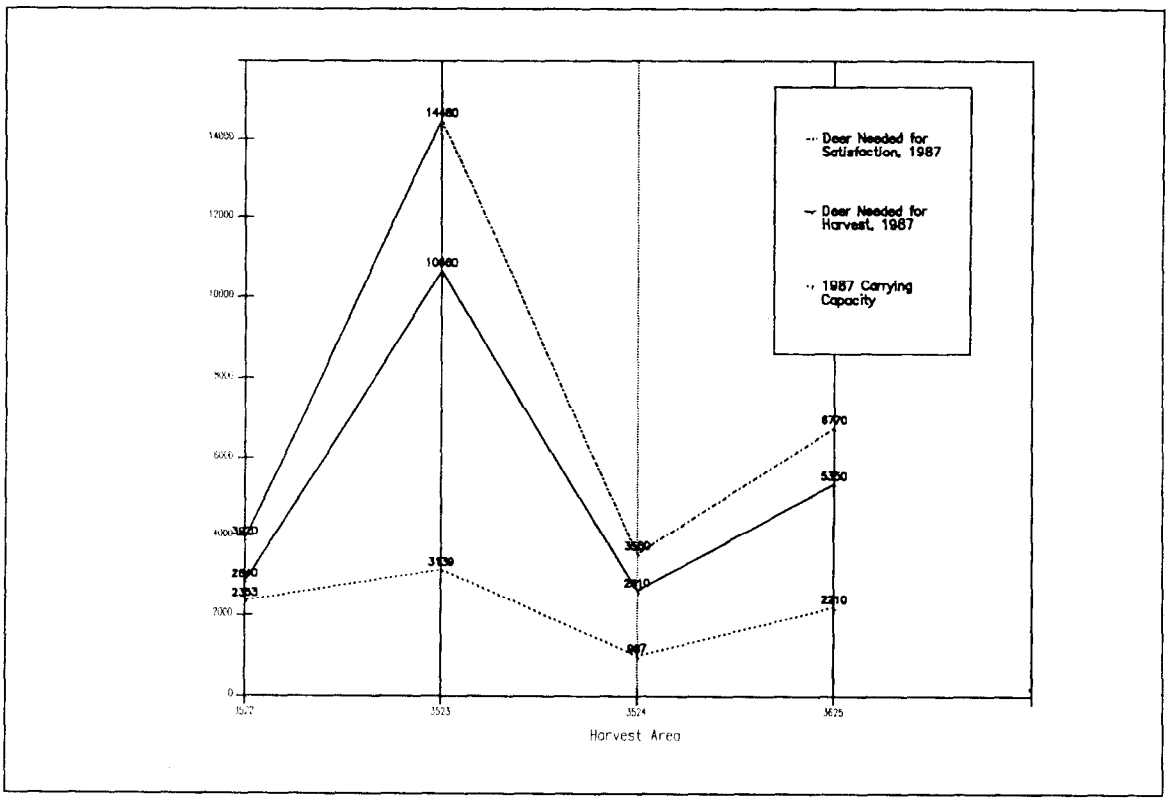


Figure 62. Habitat Carrying Capacity and Deer Population Levels Need for Harvest and Hunter Satisfaction, 1987; 1987 Wildlife Harvest Areas.

97. Similar conclusions were reached by the Forest Service in its most recent impact statement for this area (U. S. Forest Service, 1989).

98. Refer to Figure 52. With the exception of for Juneau, Ketchikan, and some of the Other category, the Board of Game, in 1988, found that residents of rural southeast Alaska communities have subsistence hunting rights in these Wildlife Harvest Areas.

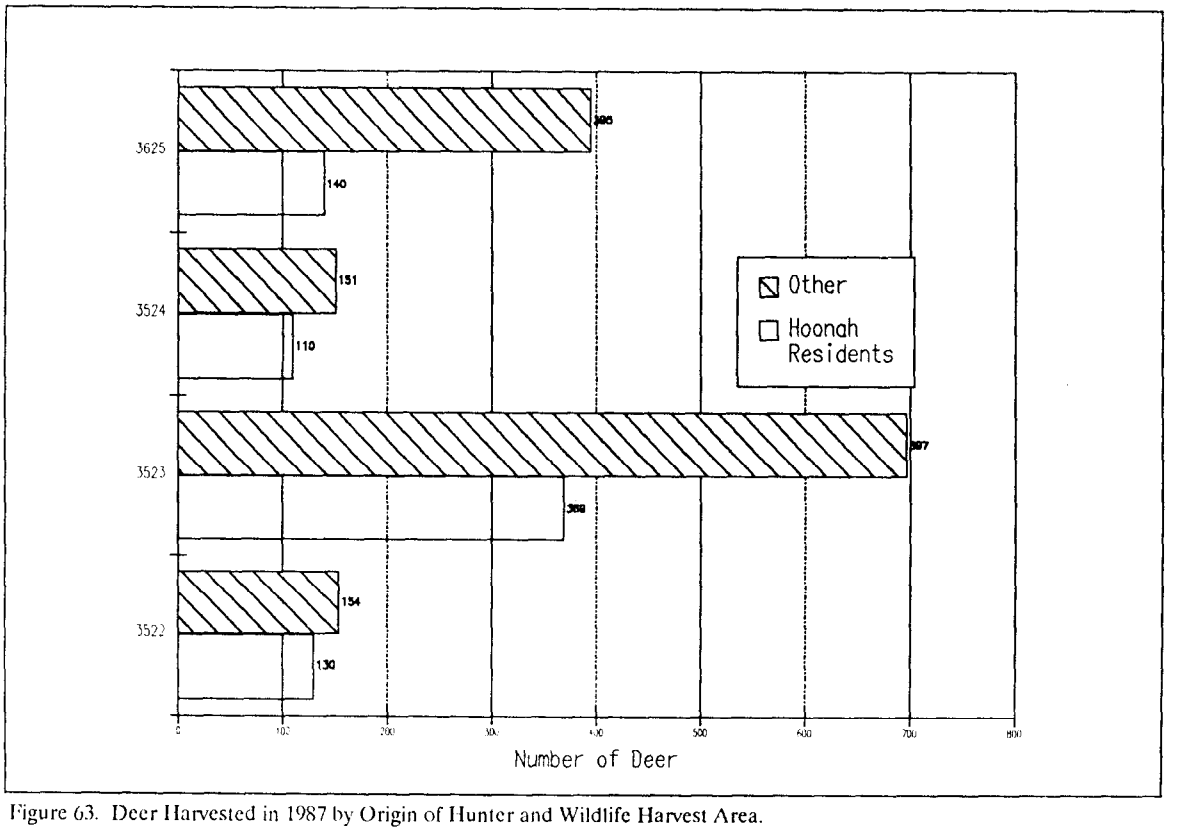


Figure 63. Deer Harvested in 1987 by Origin of Hunter and Wildlife Harvest Area.

Figure 64 shows the estimated habitat carrying capacity for each of the 3 units of the Hoonah core area and for Wildlife Harvest Area 3626, Freshwater Bay, for the years 1961, 1988, and 2080[99]. These years represent the pre-logging, current, and future condition of the forest in these Wildlife Harvest Areas. The habitat carrying capacity decline in the 1961-88 time period shows the effect of clear-cut logging and road building taking place during that time period[100]. Due to cutting of high-volume old-growth forest habitat used for deer winter range, significant reductions in habitat carrying capacity took place in 3523, 3524, and 3625, Wildlife Harvest Areas where logging activity has been extensive in the last six years. Much more significant decreases in habitat carrying capacity are projected to occur in the 1988-2080 time period. Remaining deer habitat in 2080 in Wildlife Harvest Areas 3522, 3523, 3524, and 3625 will support about 61 percent, 66 percent, 66 percent, and 66 percent

99. Data are from Forest Service calculations (1989). The 2080 data assume that planned road building and clear-cut logging will take place.

100. Most of this activity took place in the 1982-88 time period.

respectively of the deer each unit could support in 1961. The 2080 level falls far short of that needed to support 1987 harvest levels for Hoonah alone in Wildlife Harvest Areas 3523 and 3524, and falls short of that needed to meet the 1987 satisfaction level for Hoonah alone in all Wildlife Harvest Areas in the Hoonah core area[101].

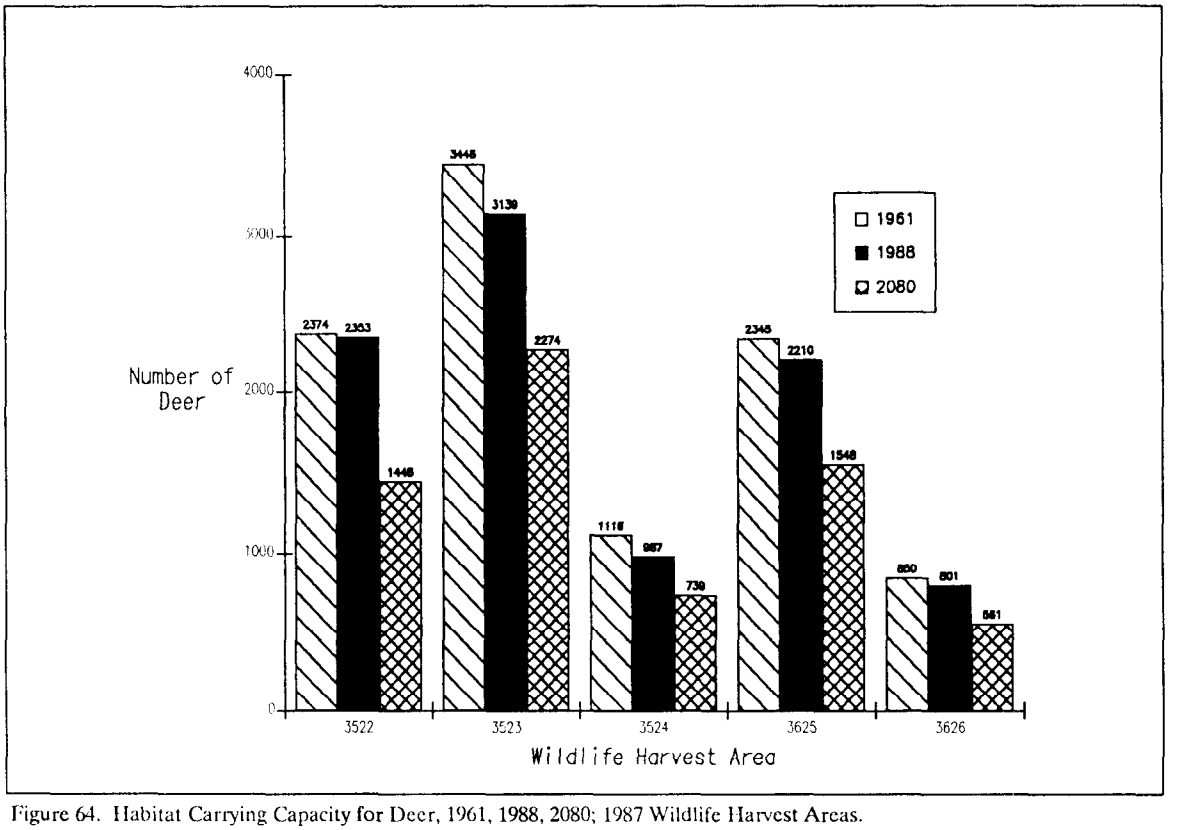


Figure 64. Habitat Carrying Capacity for Deer, 1961, 1988, 2080; 1987 Wildlife Harvest Areas.

Harvest Area boundaries were redrawn in 1989 as shown on Figure 50 (p. 126). These new boundaries were used to analyze 1988 deer ticket harvest data. With these new Wildlife Harvest Area designations, the Hoonah core area is comprised of 7 Wildlife Harvest Areas: 3521, 3522, 3523, 3524, 3531, 3532, 3533; Freshwater Bay is Wildlife Harvest Area 3525. Table 20 lists the correspondence between the Division of Wildlife Conservation Wildlife Harvest Areas reported above and the survey analytic units discussed below. The bottom line on Figure 65 shows the estimated 1988 carrying capac-

101. This assumes unlikely Board of Game decisions to completely eliminate all other subsistence hunters who have recognized rights to hunt in these areas and also to eliminate all sport hunters from these Wildlife Harvest Areas. It also assumes no increase in Hoonah's population or subsistence needs over the next 90 years.

ity for deer for each of the seven Wildlife Harvest Areas within the Hoonah core area and for 3525, Freshwater Bay. Habitat carrying capacity for Wildlife Harvest Areas 3524 and 3532 include Forest Service land only[102]. The middle line shows the number of deer required to support the actual 1988 harvest level over time, and the top line shows the number of deer required to support the level of harvest that would satisfy southeast hunters. Except for Wildlife Harvest Area 3522, the habitat capability of all units is at or below that needed to meet desired harvest levels. Habitat capability is below that needed to maintain existing harvest levels over the long term in units 3521, 3523, 3524, 3525, and 3532.

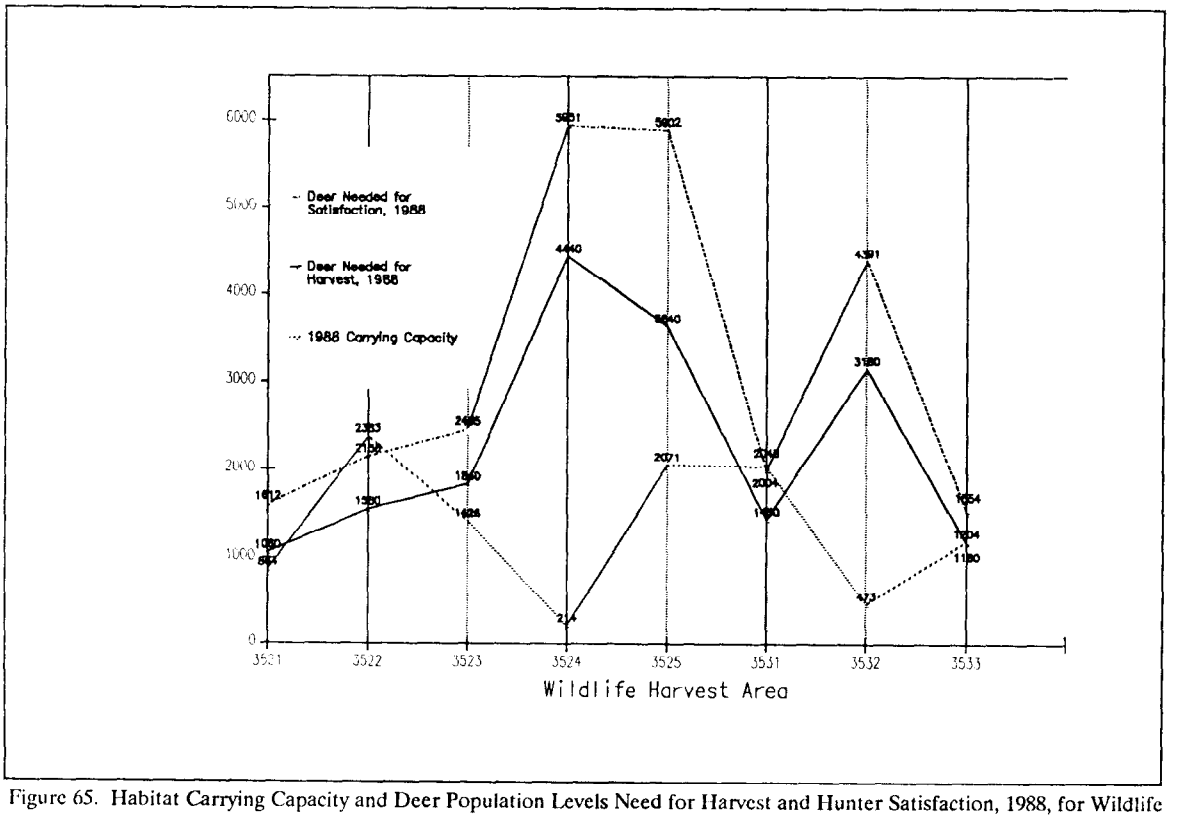


Figure 65. Habitat Carrying Capacity and Deer Population Levels Need for Harvest and Hunter Satisfaction, 1988, for Wildlife Harvest Areas (1989 boundaries).

102. Large portions of these two Wildlife Harvest Areas belong to Huna Totem and Sealaska corporations, extensive logging of old-growth stands and consequent diminution of deer winter habitat have been underway on the holdings of both corporations.

TABLE 20. Correspondence Between These Division of Wildlife Conservation Wildlife Harvest Areas Reported Above and the Survey Analytic Units.

Wildlife Harvest Area	Name	Survey Analytic Units	Name
3521		18, 26	Excursion Inlet and Inian/Lemesurier (part of)
3522	Mud Bay, Point Adolphus	15	Point Adolphus
3523	Port Frederick, south side	6, 7, 8, 9, 10	Upper and lower Game Creek, Seagull Creek, Salt Lake Bay, Head of Port Frederick
3524	Spasski Bay	2, 3, 4, 5	Lower and upper Spasski and Gartina creeks
3525	Freshwater Bay	29	Freshwater Bay (part of)
3531	Whitestone Harbor	1	Whitestone Harbor, Point Augusta
3532	Flynn Cove, Crist Point	13, 14	Humpback Creek, Flynn Cove
3533	Neka Bay, Neka R., upper Port Frederick	11,12	Neka Bay, Neka River

Summary

This extended look at the survey, interview, and harvest ticket data we have available for Hoonah and the Hoonah subsistence use area has identified important characteristics of recent deer harvests by Hoonah residents and others who hunt in their traditional subsistence territory.

From analysis of 1986 household survey and interview data we find that:

a) Overall harvest and use level of deer in the community of Hoonah has been over two deer per household over the 1983 through 1985 hunting seasons.

b) Deer harvests by Hoonah residents were stable or declined slightly over 1983 to 1985, the years covered by the household survey, although deer harvests throughout southeast Alaska and in areas used by Hoonah residents increased significantly during these years.

c) The level of deer use desired by Hoonah residents is much higher than present levels of harvest and use.

d) Survey responses suggest that Hoonah residents are not able to meet their desired subsistence needs for deer.

The failure of Hoonah residents to harvest at desired levels appears to be related to the effort needed to harvest deer, to increasing competition from other hunters, and to changes in the deer populations in areas most accessible to hunters. This is supported by analysis of harvest ticket data, which shows the following:

a) The total yearly deer harvest in Unit 4, the area where Hoonah residents hunt, has been higher in the 1985-89 time period than at any other time in the last 20 years.

b) The Hoonah core area, the area adjacent to Port Frederick, has been by far the most important area for deer hunting for Hoonah residents.

c) Deer harvests in the Hoonah core area increased much more rapidly than harvest in GMU 4 as a whole, from 420 deer per year in 1980 to a peak of 1732 deer in 1987.

d) The increased deer harvest in the Hoonah core area is due both to use of this area by other Port Frederick residents, primarily residents at logging camps, and by non-local hunters from other southeast Alaska communities. Hoonah residents' deer harvests have flucuated during 1983-1989, with highest harvest occurring in 1987 and lowest harvest occurring in 1989. Hoonah residents' share of the total deer harvest in the Hoonah core area has declined over this time period. Hoonah residents' total harvests may be beginning to decline as well.

e) The Hoonah core area accounted for about 9 percent of the deer harvested in GMU 4 in 1980; in 1987, 1988, and 1989, respectively, this area accounted for 12 percent, 12 percent, and 16 percent of all GMU 4.

From examining the harvest data with the habitat suitability model we find that:

a) There has been a decrease in the habitat carrying capacity in Wildlife Harvest Areas used by Hoonah residents over the 1961-88 time period. The decrease has been greatest in the Wildlife Harvest Areas most heavily used by Hoonah residents.

b) Projected logging activity in the Wildlife Harvest Areas used by Hoonah residents will reduce the habitat carrying capacity in 2080 to between 61 and 66 percent of what it was in 1961.

c) The habitat carrying capacity in the Wildlife Harvest Areas used by Hoonah residents is lower than that needed to support 1987 levels of deer harvest or hunter satisfaction levels for all sport and subsistence hunters who hunted in these units in 1987.

d) Continued subsistence harvests at 1987 harvest levels by residents of all southeast communities for whom the Board of Game has recognized subsistence use of deer in Unit 4 cannot be maintained in Wildlife Harvest Areas used by Hoonah residents even with no further loss of deer habitat and habitat carrying capacity. This means that the subsistence harvest cannot be maintained even if the sport harvest of deer was eliminated.

e) Hoonah residents' subsistence deer harvest in two Wildlife Harvest Areas in 1987 was greater than 10 percent of the theoretical habitat carrying capacity for deer and may exceed long term sustainable yield of deer in these units. Harvest level in these two units may not be sustainable, even without considering the deer harvested by subsistence hunters from other communities and by sport hunters and without further decrease in habitat carrying capacity due to planned logging. This means that Hoonah's deer harvest in these two units cannot be maintained even if the sport harvest and other subsistence harvests were eliminated.

f) Loss of critical high-volume old-growth deer winter habitat due to logging, the concomitant lowering of habitat carrying capacity during the 1961-1988 time period, and increased competition from non-local hunters using logging roads for access may have resulted in a sig-

nificant restriction on subsistence harvests in all Wildlife Harvest Areas near Hoonah for all subsistence users[103].

g) Considering only subsistence harvests by Hoonah residents, loss of deer habitat due to logging, concomitant lowering of habitat carrying capacity during the 1961-1988 time period, and increased competition from non-local hunters using logging roads for access has resulted in a restriction on subsistence harvests in two Wildlife Harvest Areas near Hoonah for Hoonah residents.

h) Loss of deer habitat due to logging and concomitant lowering of habitat carrying capacity during the 1988-2080 time period suggest that, over time, subsistence harvests will be restricted or further restricted in all the Wildlife Harvest Areas used by Hoonah residents.

Participation in Harvest and Use of Fish and Wildlife Resources by Hoonah Residents

Table 21 presents the percent of sampled Hoonah households that harvested or used specific subsistence resources in 1985. Highest rates of participation in harvest are for deer, clams, and berries with 52.1 percent, 57.7 percent, and 64.2 percent of Hoonah households, respectively, reporting harvest of these resources. Participation in subsistence use of resources was over 50 percent for 10 resource categories. Participation in use of deer, seal, king salmon, halibut, clams, and berries was notably high with 85.3 percent, 53.5 percent, 60.6 percent, 73.4 percent, 69.0 percent, and 67.6 percent, respectively, reporting the use of these resources. Every sampled household reported both harvesting at least one resource and using at least one resource during the baseline year. The high levels of participation in

103. As we have seen above, the wording may significantly restrict has a specific meaning in ANILCA. Under ANILCA, it is the responsibility of the federal land manager to make determinations that apply this legal criterion. This research summary was provided to Forest Service planners; recent Forest Service ANILCA Sec. 810 evaluations and determinations for the areas discussed agreed with most of the analysis presented in our analysis (U. S. Forest Service, 1989). Decisions in the Tenakee Springs and the Hanlon cases have led Forest Service to conclude that the may significantly restrict criterion is triggered when past, present, or reasonably foreseeable future actions are thought to affect subsistence use. The court decisions do not allow a federal land manager to wait until the effect is fully manifest, for example to wait until deer harvests drop off or subsistence users ability to harvest deer is reduced. Importantly, Forest Service has found that significant restriction of subsistence use has occurred in portions of north Chichagof Island due to past actions, even though the full effect of past logging has yet to occur in some affected Wildlife Analysis Areas and even though actual deer harvest levels has not declined in all areas (U. S. Forest Service, 1989).

subsistence harvest and use of fish and game indicates the active involvement of virtually all Hoonah households in these activities.

The difference between participation rates of harvests and use underscore an integral feature of subsistence harvest and use of fish and wildlife. In Hoonah, as in other rural communities where subsistence continues to be important, active harvesting households distribute a large portion of their harvest to others. The giving households are typically ones with a number of active adults with a wage earning pattern that gives household members both the time needed to harvest natural resources and the cash income to provide them with the skiffs, motors, rifles, nets, and other tools needed for subsistence production. Receiving households are typically households with few active adults available for subsistence harvesting and with limited financial resources. These include the elderly and young families with only small children. Work conflicts may also put households in this category.

To examine the concentration of subsistence harvesting and use, we examined household harvests by food weight. Figure 66 shows the variability of total subsistence harvest by food weight among sampled households. Figure 67 shows similar data for subsistence use. The total subsistence harvest and total subsistence use data show a phenomena similar to the deer harvest and use data presented above. Subsistence harvest is relatively more concentrated, in comparison with subsistence use, which is more evenly distributed between households. Figure 68 graphs these two sets of data and shows that higher harvesting households commonly use less than they harvest while low harvesting households use much more than they harvest.

TABLE 21. Household Participation in Subsistence Harvest and Use of Selected Species, Hoonah, 1985.

SPECIES	HOUSEHOLD HARVEST (Percent)	HOUSEHOLD USE (Percent)
GAME		
Caribou	1.4	1.4
Deer	52.1	85.3
Moose	2.8	7.0
Seal	28.2	53.5
Ducks	11.7	15.5
Canada geese	4.2	8.5
Grouse	1.4	2.8
FISH AND INVERTEBRATES		
Salmon, chum	19.7	38.0
Salmon, coho	23.9	46.5
Salmon, king	32.4	60.6
Salmon, pink	14.1	29.6
Salmon, sockeye	11.3	26.8
Cod, Pacific	7.0	7.0
Cod, black	5.6	25.4
Dolly Varden	25.4	23.9
Halibut	28.2	73.4
Herring	32.4	56.3
Herring eggs	15.5	56.3
Eulachon, hooligan	4.2	8.5
Other rockfish	4.2	2.8
Red snapper	16.9	43.7
Trout, cutthroat	12.7	11.3
Trout, rainbow	19.7	22.5
Clams	57.7	69.0
Cockles	35.2	47.8
Geoduck and mussels	2.8	2.8
Gumboots	22.5	40.8
Octopus	1.4	5.6
Sea cucumbers	2.8	2.8
Shrimp	2.8	8.5
Crab, dungeness	33.8	52.3
Crab, king	11.3	36.6
Crab, Tanner	4.2	12.7

TABLE 21, continued. Household Participation in Subsistence Harvest and Use of Selected Species, Hoonah, 1985.

SPECIES	HOUSEHOLD HARVEST (Percent)	HOUSEHOLD USE (Percent)
PLANTS AND BERRIES		
Black seaweed	40.8	56.3
Red sea ribbon	1.4	1.4
Berries, plants	64.2	67.6
SPECIES COMPOSITES		
Any game	60.6	88.2
Any fish	81.7	100.0
Any invertebrates	76.1	91.5
Any species	100.0	100.0

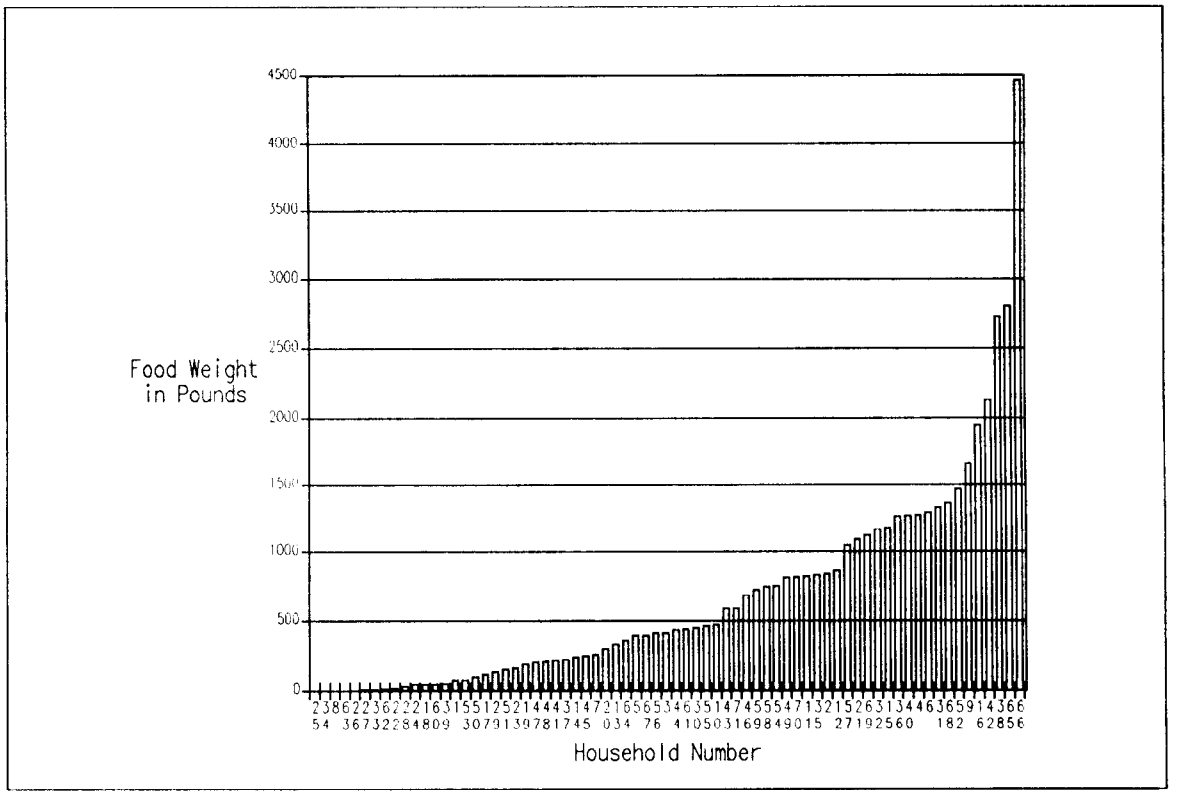


Figure 66. Subsistence Harvest, by Sampled Hoonah Households, 1985.

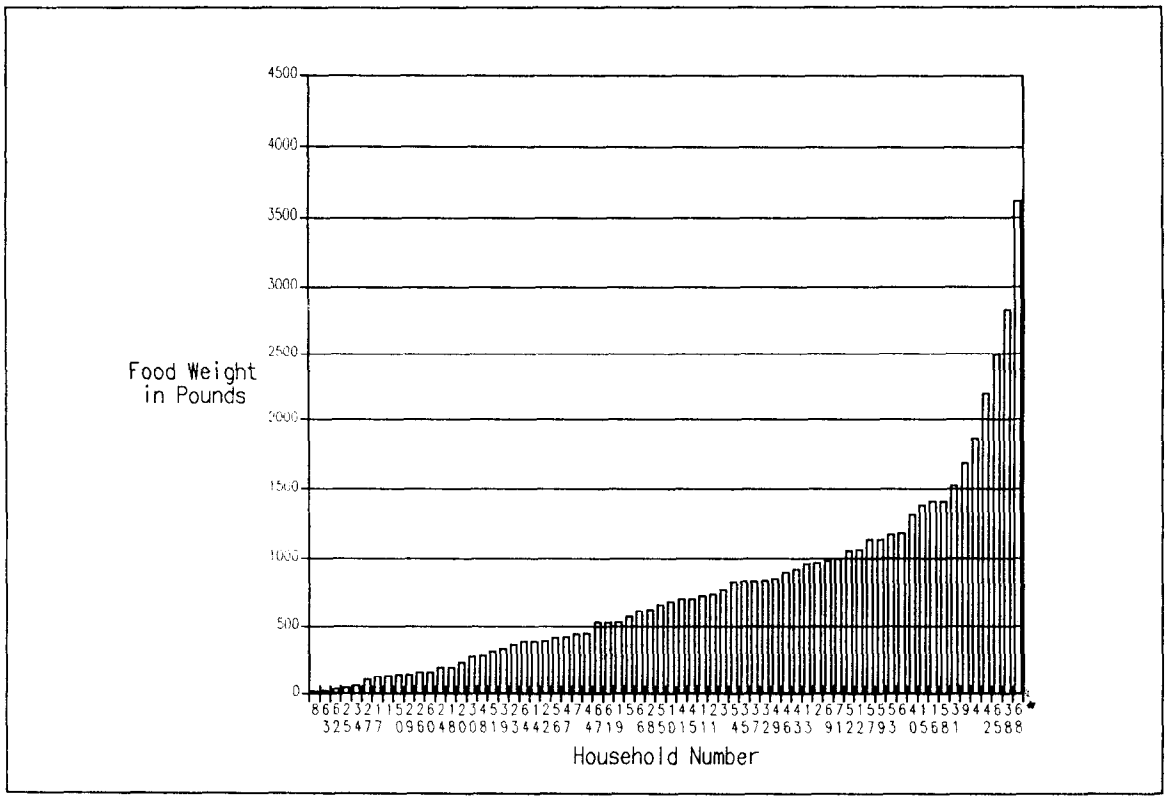


Figure 67. Subsistence Use, by Sampled Hoonah Households, 1985.

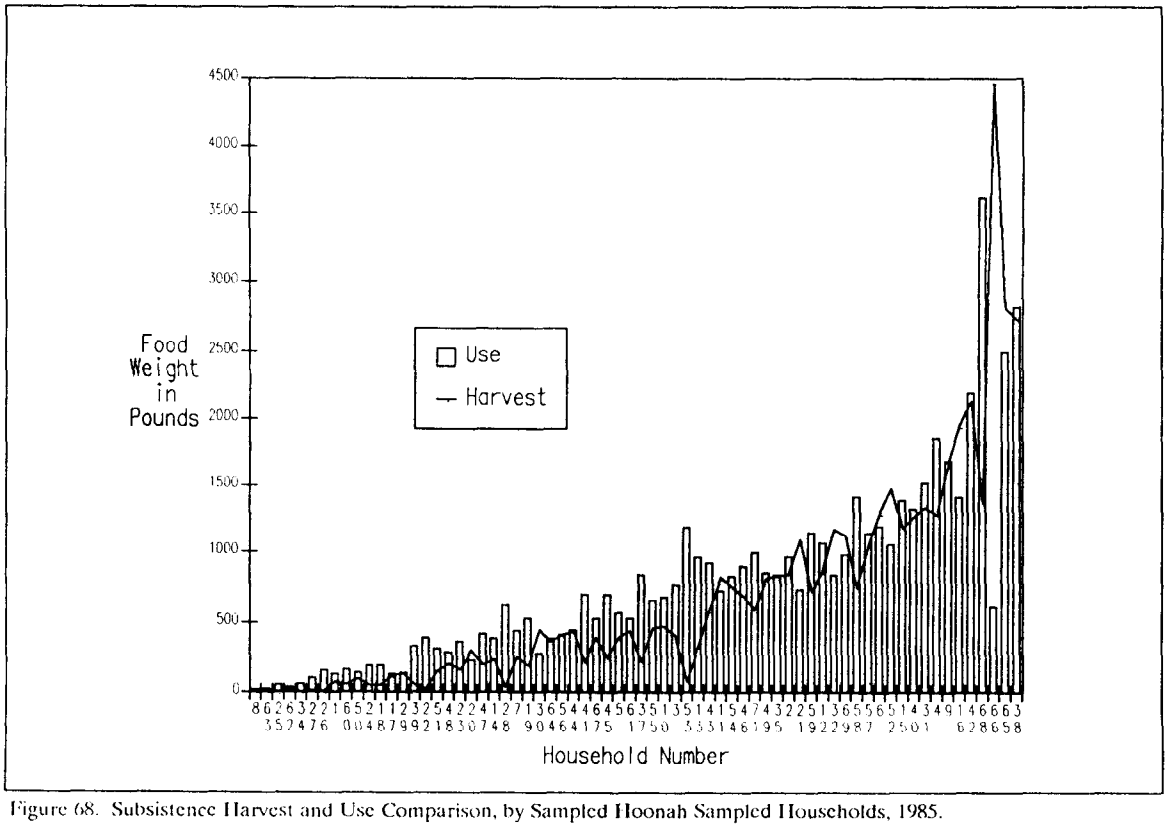


Figure 68. Subsistence Harvest and Use Comparison, by Sampled Hoonah Sampled Households, 1985.

CHAPTER 5

THE HOONAH SUBSISTENCE TERRITORY

Territory Used by Hoonah Residents for Customary and Traditional Harvests

This section describes the territory used by Hoonah residents for their subsistence harvest of fish, wildlife, and other resources. The choice of the word *territory* to describe the subsistence harvest area is a deliberate one and requires a brief discussion. Before coming in contact with Russian and American colonial governments, Tlingits of the clans and clan houses known collectively as the Huna tribe owned and controlled a clearly demarcated territory[104]. Specific salmon streams and lakes, clam beds, and hunting areas were the property of individual Tlingit clans or clan houses[105]. Use of the resources owned and managed by a localized clan or house by a member of another house, clan, or localized tribe was by permission of the elders of the house or clan owning the resource in question. Both the territory of individual houses or localized clans and the territory of the Huna tribe were recognized by neighboring groups. Territories were defended, and territorial disputes were settled through adjudication under customary law or through warfare. Songs, crests, and titles were associated with house, clan, and tribe territory and were also owned. Recognizing and maintaining territorial boundaries and ownership was a key feature potlatch events and traditional oratory[106]. As owned property, territory was occasionally exchanged as a means of settling disputes. For a more complete discussion of traditional land tenure see de Laguna (1960, 1972), Goldschmidt and Haas (1946), Krause (1979), and Oberg (1980).

Recognition by Russian and American governments of this existing system of Tlingit land and resource ownership by colonial governments and by commercial enterprises was variable in early colo-

104. Elders have maintained that petroglyphs were often erected to mark ownership of resource areas. Also see de Laguna, 1960.

105. A single clan may have had more than one named house in a given community; different houses of a single clan may have been made up of separate lineages within the same clan. In this case, each house may have had identified geographical territory and other property.

106. The potlatch and potlatch oratory appears to have functioned as a major venue for customary law and decisions based on customary law as well. See Kan (1989) for a discussion of this and other characteristics of the Tlingit potlatch.

nial days. Ownership of salmon streams was generally recognized in the early era of commercial fishing with fees being paid to clan owners by canneries for the right to harvest from Indian-owned fish streams (Langdon, 1977; Thornton and Schroeder, 1990). This pattern appears to have continued in some areas of southeast Alaska from 1880 into the first decade of this century. After salmon canneries were well-established, however, indigenous ownership rights to fish resources were largely ignored by canneries and non-local commercial fishermen, and the Indian rights to fishery resources were not always supported by the federal government. In a 1959 decision federal court recognized the existence of Tlingit property rights and ordered compensation to be paid for losses due to the creation of Glacier Bay National Monument and Tongass National Forest in *Tlingit and Haida Indians of Alaska v. United States*, 177 Fed. Supp. 452 (Ct. Cl. 1959). See Price (1990) for a discussion of this case and Native fishing rights. ANSCA further recognized Tlingit Native claims in southeast Alaska.

Understanding traditional land tenure concepts is germane because the subsistence harvest use areas documented in this field research are nearly congruent with the older territory of Huna clans and because the *concept* of territory continues to be an important one for Tlingit residents of Hoonah and the non-Native residents who have adopted local harvesting practices. Figure 69 shows the entire area used by Hoonah residents for subsistence harvests. This map and the following resource-specific maps include all territory that has been used while community residents have been living in Hoonah. This area includes all of the waters of Glacier Bay, Icy Strait, Port Frederick, Tenakee Inlet, and parts of Cross Sound and Chatham Strait. The land area includes coastal areas from between Icy Point to Khaz Bay in the west and from between Point Howard and Basket Bay in the east. Funter Bay, Hawk Inlet, and other parts of Admiralty Island are also used. Areas used while a person was living elsewhere are not included.

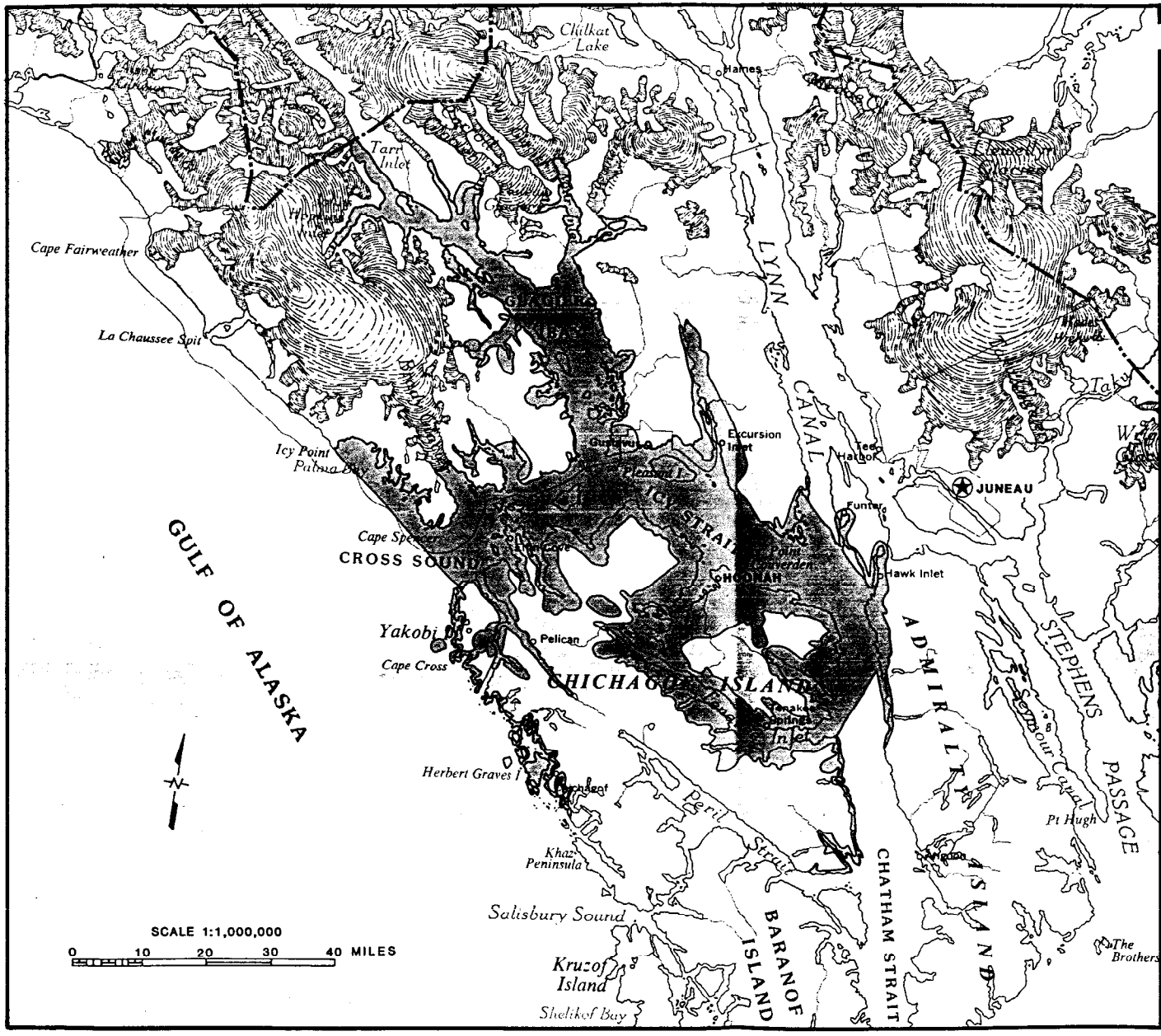


Figure 69. AREA USED BY HOONAH RESIDENTS FOR SUBSISTENCE HARVEST OF FISH, WILDLIFE, AND OTHER NATURAL RESOURCES, 1986.

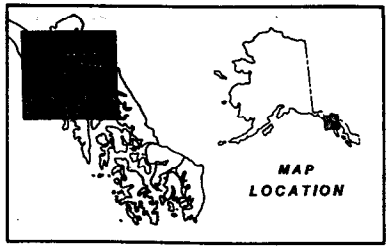
All Resource Categories

This map depicts the area where subsistence harvest of fish, wildlife, and other natural resources by residents of Hoonah has been documented. Those areas shown are known to have been used during the time community residents have been living in Hoonah. Undocumented use of areas other than those depicted may occur, consult with local communities for definitive information. Since subsistence harvest areas are known to change over time, this map should be periodically revised.

Sources: Bob Schroeder and Matt Kookesh, field research 1986, 1987.

Initial draft maps were prepared from key respondent interviews. These draft maps were left on display in Hoonah, and further data were added at two City Council meetings. About 60 community residents, including most knowledgeable elders and active hunters, contributed to the field mapping.

Final maps were reviewed in Hoonah by community residents and approved by the Hoonah City Council on March 17, 1987, through resolution CCR-87-02-26-05.



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This map corresponds closely with Figure 5 (p. 23), drawn in 1946 to depict the traditional territories of Huna clans. The main differences between these two maps are that the 1986 map excludes areas north of Icy Point which have not been recently used, although they are still claimed by and part of traditional territory of the Chukanei Dee clan lineages, and includes areas of Admiralty Island and Tenakee Inlet that formerly were the exclusive territory of Angoon clans[107].

The *concept* of territory came through repeatedly during collection of mapped data. Respondents appeared to have a clear idea of where they should hunt, fish, and gather, and where they would be intruding in the territory of another community. For example, when we asked our respondents if they hunted or fished near St. James Bay or elsewhere in Lynn Canal north of Point Howard, we were uniformly told that this area belonged to Haines/Klukwan and should not be used. Similarly we were told that Khaz Bay was the demarcation line between Sitka and Hoonah territory.

The fact that Hoonah residents have this cultural concept of territory underlies the mapping approach taken. Our research task was basically one of discovering the rather clearly demarcated territorial boundaries observed by Hoonah subsistence hunters, fishers, and gatherers. Point Howard demarcates Hoonah territory from that of Haines and Klukwan on the Chilkat Peninsula[108]. Fishery Point on Admiralty Island and the southern part of Basket Bay divide Hoonah and Angoon territory[109]. Khaz Bay on Chichagof Island separates Hoonah and Sitka territories, and Lituya Bay demarcates Hoonah from Yakutat territories[110]. The concept of territory does not extend to the more recently settled non-Native communities within the Huna territory. Bartlett Cove, Elfin Cove, Funter Bay, Gustavus, Pelican, Tenakee Springs, and the logging camps in the Huna territory do not have territorial boundaries that are known or respected by Hoonah residents[111].

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107. Tenakee Inlet became part of the Huna territory when elders of the clan that owned Tenakee Inlet moved to Hoonah. Some respondents report that the northern part of Admiralty Island became part of the Huna territory in settlement of a dispute between Hoonah and Angoon.

108. The northern part of the Mansfield Peninsula on Admiralty Island was probably once the territory of the Auke tribe, although we have not verified this.

109. This boundary with Angoon has probably changed somewhat over the last 300 years.

110. Although few hunters and fishers from either Hoonah or Yakutat regularly use Lituya Bay, both communities recognize this boundary.

111. Hoonah harvesters may avoid the areas close to these settlements for other reasons.

The size of the total use area for Hoonah is comparable to that documented for Angoon, Kake, Klawock, Tenakee, and Yakutat. Size of subsistence use areas for Hoonah, Angoon, and Kake has been computed by Wolfe and Bosworth (1990). Hoonah's total use area for all resources was found to include 2733 mi.^{2}. Angoon uses about 400 mi.^{2}, and Kake uses about 1882 mi.^{2}. Hoonah uses about 800 mi.^{2} for deer harvests. Angoon uses about 310 mi.^{2}, and Kake uses 1087 mi.^{2} for harvest of this species. The total use area is much smaller than that documented in northern parts of Alaska where up to 20 USGS quads must be used to represent a single community's use area (Schroeder *et al*, 1987). Wolfe and Bosworth found that Fort Yukon residents used 5001 mi.^{2} for subsistence harvests; Arctic Village residents used 13267 mi.^{2}, and Venatie residents used 4738 mi.^{2}. They also computed the density of subsistence use by large geographical area and found that subsistence use areas of the northern Tlingit, the grouping that includes Hoonah, had a use density of .47 subsistence users per mi.^{2}. Density for Kodiak island was .26 subsistence users per mi.^{2}. Much lower densities were found for the Alaska Peninsula with .08 subsistence users per mi.^{2}, southwest Alaska and Lake Illiamna with .07 subsistence users per mi.^{2}, the arctic slope with .03 subsistence users per mi.^{2}, and the Kutchin area with .06 subsistence users per mi.^{2}. These data show that the subsistence use areas of northern Tlingit are relatively small compared with subsistence use areas of other cultural groups in Alaska.

Figure 70 shows the area used by Hoonah residents for subsistence harvest of brown and black bear and of bird eggs. Bear have been taken in areas adjacent to Port Frederick and near Mud Bay, upper Idaho Inlet, upper Port Althorp, and near Lisianski Strait on Chichagof Island. They were also taken in areas near Dundas Bay, Berg Bay, Tyndall Cove, Beartrack Cove, and Excursion Inlet and coastal areas extending to Point Howard[112]. Only brown bear are present on Chichagof Island; both brown and black bear are present and have been hunted the Chilkat Peninsula and within Glacier Bay National Park[113]. Bird eggs have been traditionally harvested at nesting rookeries at the entrance to

112. Some traditional harvesting probably took place in the course of fishing and other subsistence activities at the mapped locations.

113. Not many bears are currently taken; refer to harvest data presented above. Harvesting brown bear may have ceremonial or religious significance to members of certain Hoonah clans.

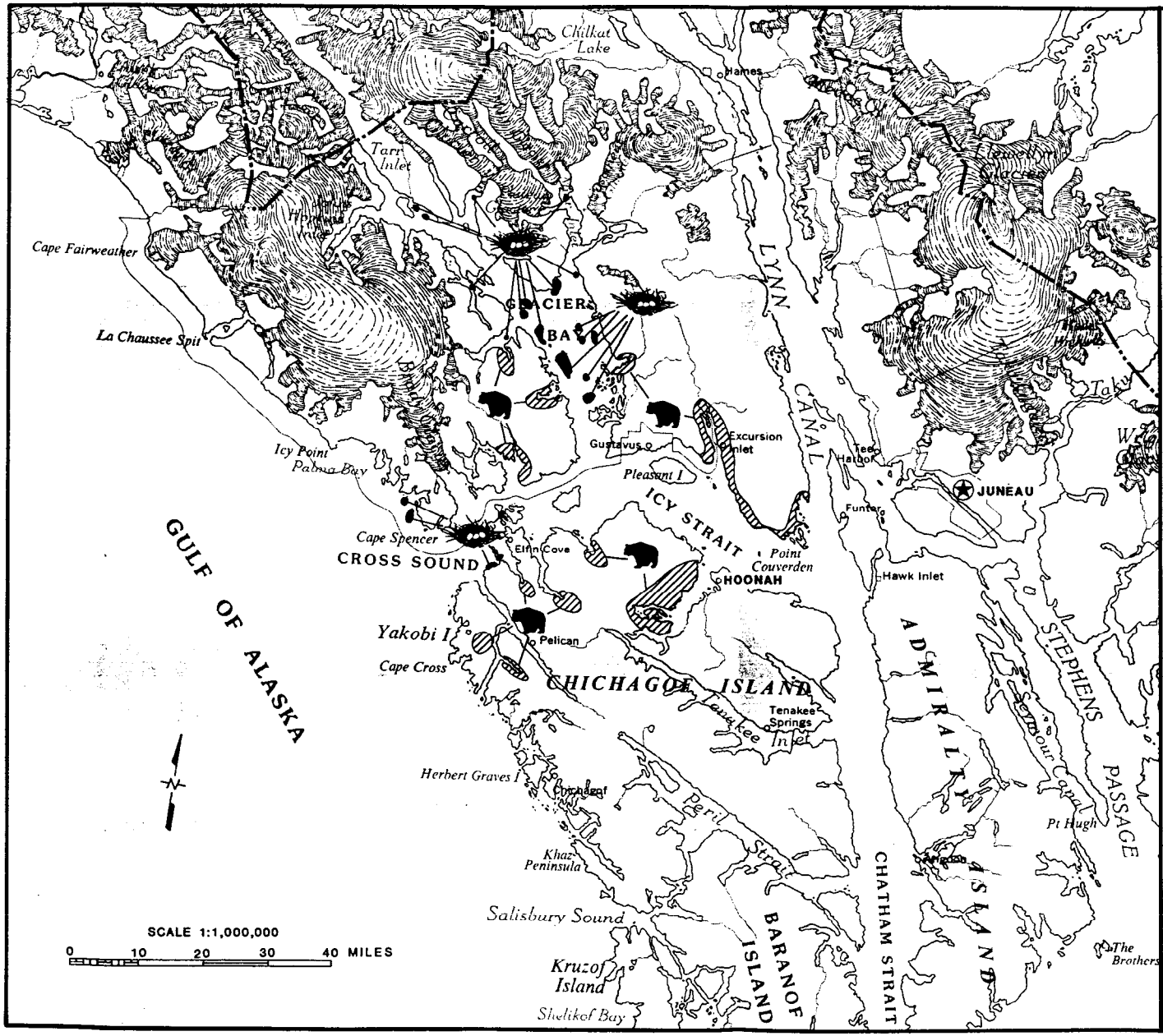

Figure 70. AREA USED BY HOONAH RESIDENTS FOR SUBSISTENCE HARVEST OF BLACK AND BROWN BEAR AND COLLECTION OF BIRD EGGS, 1986.

Bear

Eggs

This map depicts the area where subsistence harvest of black and brown bear and collection of bird eggs by residents of Hoonah has been documented. Those areas shown are known to have been used during the time community residents have been living in Hoonah. Undocumented use of areas other than those depicted may occur, consult with local communities for definitive information. Since subsistence harvest areas are known to change over time, this map should be periodically revised.

Sources: Bob Schroeder and Matt Kookesh, field research 1986, 1987.

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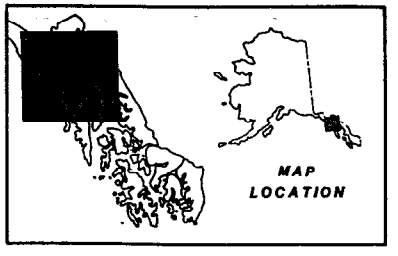

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Cross Sound and within both arms of Glacier Bay. Eggs of glaucous-winged gulls, other gull species, murres, and puffins have been most commonly harvested[114].

Figure 71 shows the area used by Hoonah residents for the subsistence harvest of deer. Deer have traditionally been taken in coastal areas northward from Todd on Peril Straits on the eastern side and northward from Khaz Bay on the western side of Chichagof Island. Deer have traditionally been harvested on the western side of Admiralty from about Marble Bluffs in the south to Funter Bay in the north. Coastal areas of the Chilkat Peninsula from north of Point Howard and eastward to the entrance of Excursion Inlet have also been deer hunting areas. Inian, Lemesurier, Pleasant, Willoughby[115], and smaller islands have also been used for subsistence hunting. Note that interior areas on Chichagof Island are not included within the traditional deer hunting area for Hoonah. In recent years some deer hunting has also taken place in interior areas using the newly constructed logging roads for access[116].

Figure 72 shows the area used by Hoonah residents for subsistence trapping and gathering of plants and berries. Coastal areas of Tenakee Inlet, Freshwater Bay, Whitestone Harbor, Spasski Bay, Port Frederick, Idaho Inlet, and Excursion Inlet, and Inian, Lemesurier, Pleasant, and smaller islands are the areas traditionally trapped[117]. Areas for gathering of plants and berries are found at the head of Tenakee Inlet, locations within Port Frederick, at Point Adolphus and Mud Bay. Many other gathering sites are shown within Dundas and Glacier bays, on Pleasant Island, and within Excursion Inlet[118].

Figure 73 shows the area used by Hoonah residents for subsistence goat and waterfowl hunting. Traditional hunting areas for goat are shown on the east side of Excursion Inlet, at the head of

114. Traditional harvest of bird eggs has decreased in recent years due to closure of Glacier Bay National Park to subsistence uses and legal limitations on this harvest. Because of these legal restrictions, harvesters are reluctant to discuss their contemporary use of bird eggs.

115. Hoonah elders recount how a Hoonah resident captured young deer and released them on Willoughby Island to stock the island. This may have taken place before 1930.

116. Field research to document subsistence use area mapping was completed in 1986 and maps were finally approved in 1987. This was before Hoonah residents made much use of logging roads for hunting.

117. Other areas were used historically. Huna controlled sea otter and fur seal harvest throughout their territory and hunted as far north as Lituya Bay.

118. The gathering sites identify important sites only and do not include all areas where Hoonah residents may have picked berries or collected plant material. Seaweed gathering areas are not shown in this mapped series.

Queen Inlet, and inside Geikie Inlet[119]. Waterfowl are taken primarily from salt chucks, marshes, and shallow bays within Port Frederick, at Whitestone Harbor and Spasski Bay, near Excursion Inlet, and at Mud Bay, Idaho Inlet, and Port Althorp.

Figure 74 shows the area used by Hoonah residents for subsistence harvest of halibut and other marine fish excluding salmon. This area includes the waters of Cross Sound, Glacier Bay, Icy Strait, and portions of Chatham Strait. Tenakee Inlet, Lisianski Inlet, portions of Lisianski Strait, and outside waters north to Icy Point are also part of this harvesting area.

Figure 75 shows the area used by Hoonah residents for subsistence harvest of marine invertebrates, including clams, crabs, chitons, sea cucumbers, sea urchins, and other invertebrates. Areas shown include most of the coastal area of Cross Sound and Icy Strait, Port Frederick, and specific harvesting locations in Freshwater Bay and Tenakee Inlet.

Figure 76 shows the area used by Hoonah residents for subsistence harvest of salmon. Salmon are harvested at locations throughout the Hoonah subsistence use area. The main sites shown include both areas that are productive for trolling for king and coho salmon, (for example, good trolling areas off Point Sophia and Pleasant Island), as well as areas where salmon are netted, (for example, Basket Bay and Neka Bay).

Figure 77 shows the area used by Hoonah residents for subsistence harvest of seal[120]. Seal have traditionally been taken within Port Frederick, Tenakee Inlet, Excursion Inlet, and Glacier Bay, and along the coast throughout the Hoonah subsistence use area[121].

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119. Goats were harvested both for food and for their wool which was made into ceremonial Chilkat blankets. Other areas within Glacier Bay National Park were undoubtedly used for goat hunting before hunting was restricted by National Park Service.

120. In recent years harbor seal or hair seal, Phoca vitulina richardsi, is the only seal species regularly hunted. Fur seals, Callorhinus ussinus, and possible other species of seals were also hunted in the historical period according to respondents and historical reports.

121. Seals are most frequently taken at haul-outs and in shallow bays where retrieval of sinking seals is possible. They are occasionally hunted in open water. This map does not attempt to identify the specific harvest sites for seal.

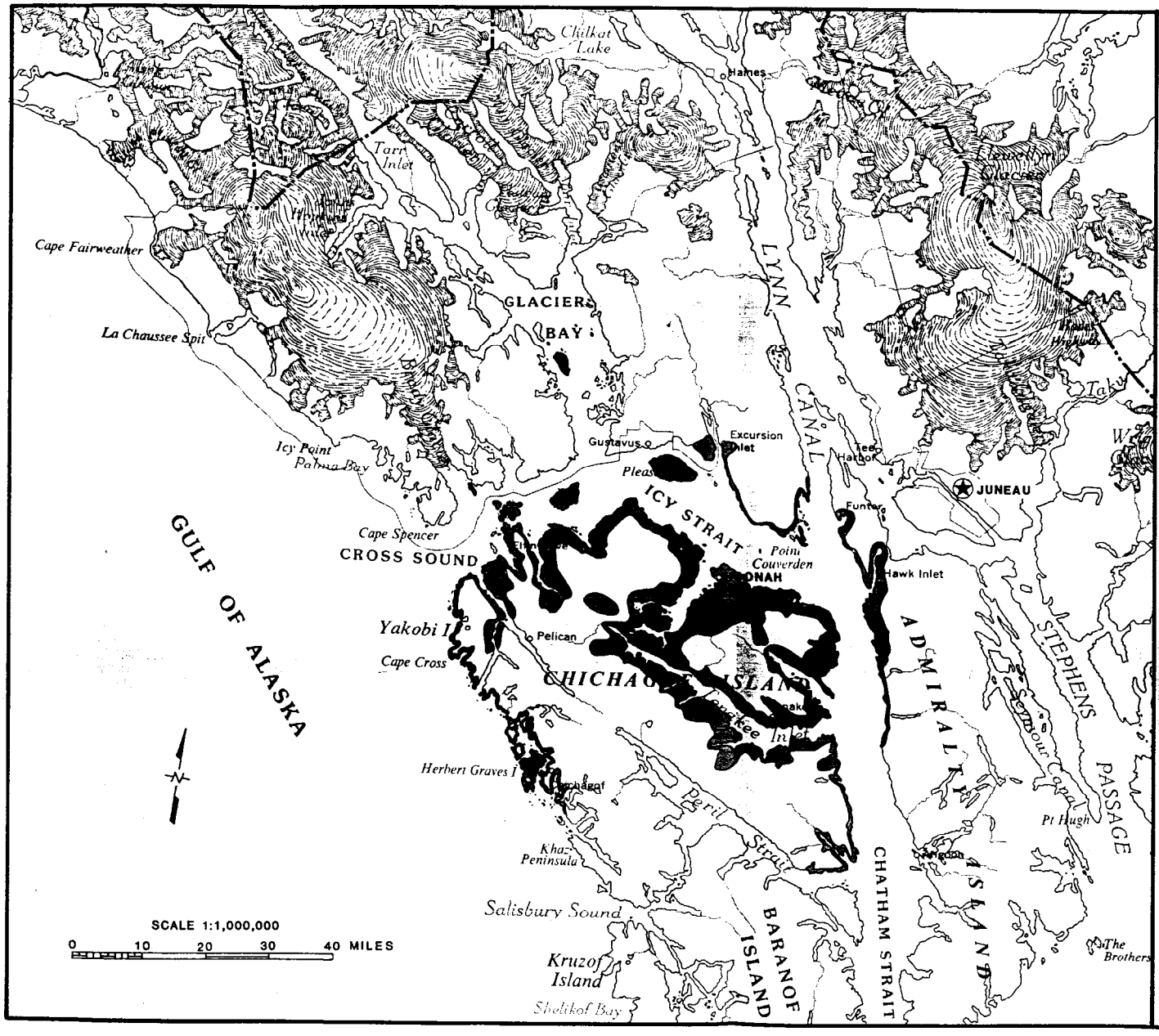

Figure 71. AREA USED BY HOONAH RESIDENTS FOR SUBSISTENCE HARVEST OF DEER, 1986.

Deer

This map depicts the area where subsistence harvest of deer by residents of Hoonah has been documented. Those areas shown are known to have been used during the time community residents have been living in Hoonah. Undocumented use of areas other than those depicted may occur, consult with local communities for definitive information. Since subsistence use areas are known to change over time, this map should be periodically revised.

Sources: Bob Schroeder and Matt Kookesh, field research 1986, 1987.

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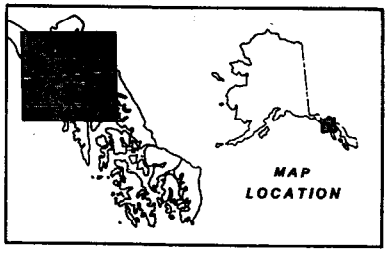

STATE OF ALASKA
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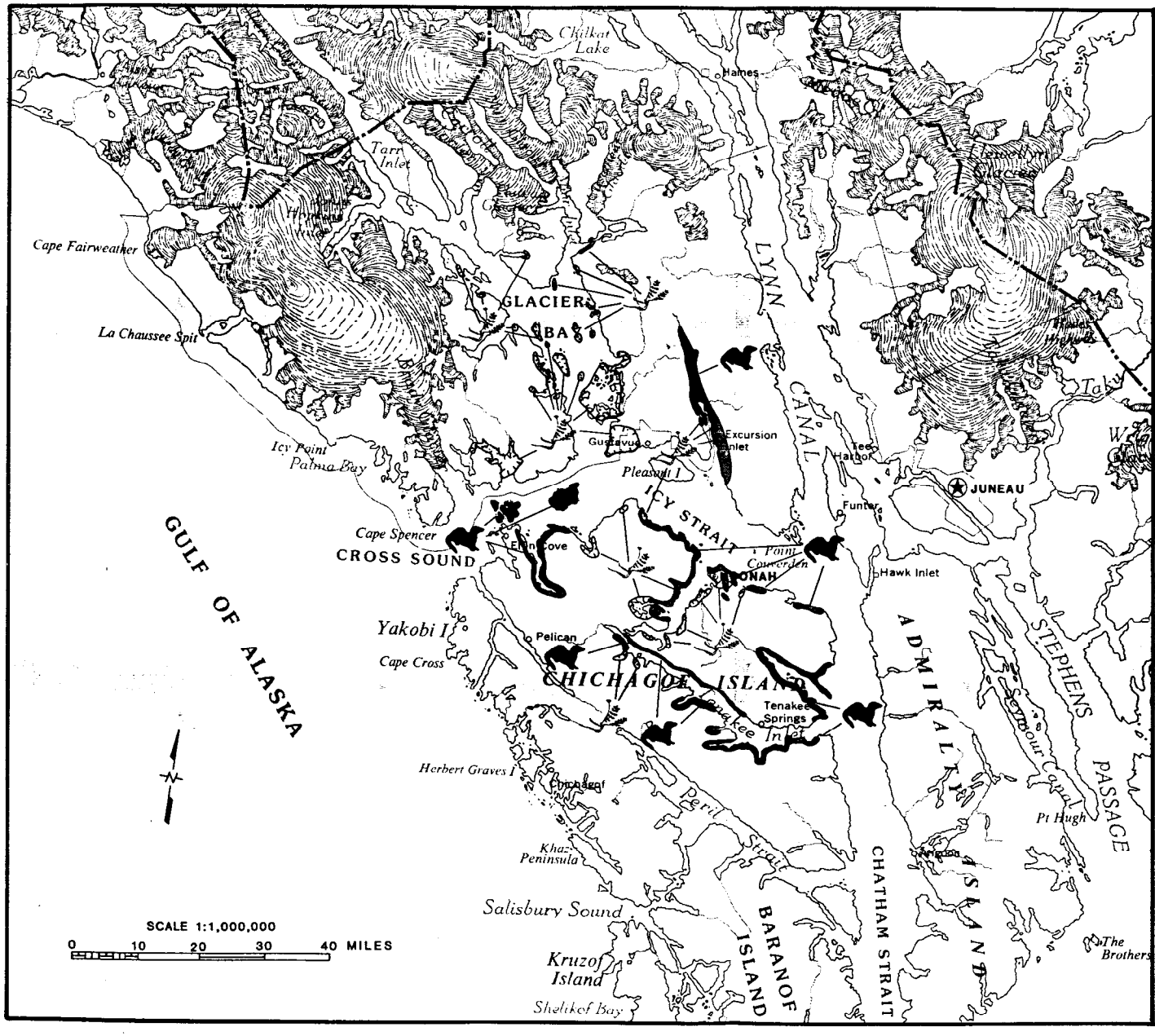

Figure 72. AREA USED BY HOONAH RESIDENTS FOR SUBSISTENCE HARVEST OF FURBEARERS, PLANTS, AND BERRIES, 1986.

Furbearer

Plants/Berries

This map depicts the area where subsistence harvest of furbearers, plants, and berries by residents of Hoonah has been documented. Those areas shown are known to have been used during the time community residents have been living in Hoonah. Undocumented use of areas other than those depicted may occur, consult with local communities for definitive information. Since subsistence use areas are known to change over time, this map should be periodically revised.

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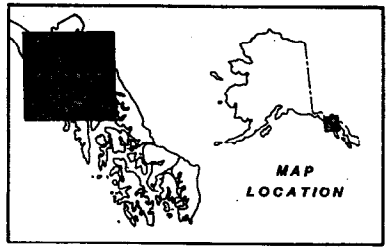

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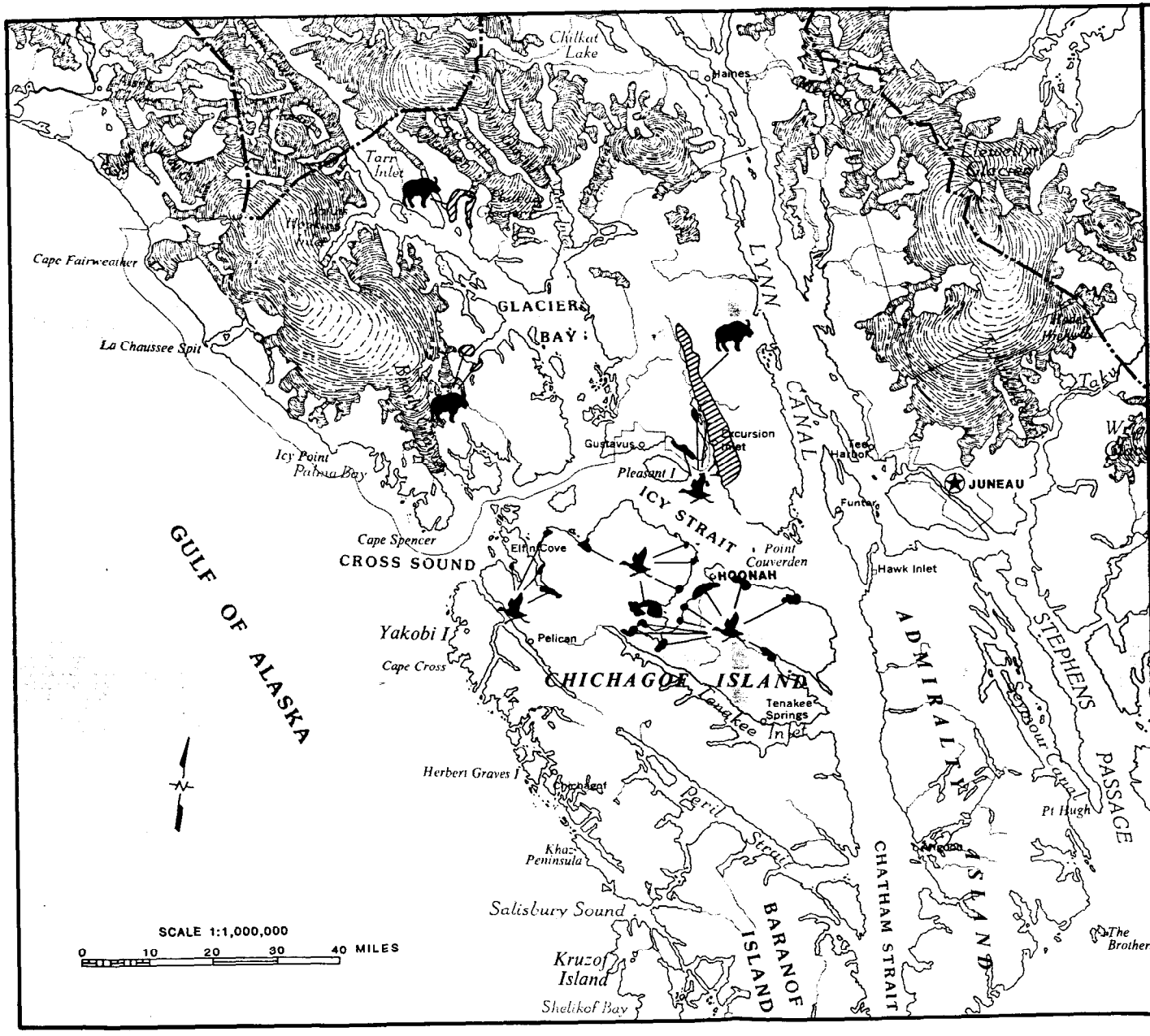

Figure 73. AREA USED BY HOONAH RESIDENTS FOR SUBSISTENCE HARVEST OF GOAT AND WATERFOWL, 1986.

Goat

Waterfowl

This map depicts the area where subsistence harvest of goat and waterfowl by residents of Hoonah has been documented. Those areas shown are known to have been used during the time community residents have been living in Hoonah. Undocumented use of areas other than those depicted may occur, consult with local communities for definitive information. Since subsistence use areas are known to change over time, this map should be periodically revised.

Sources: Bob Schroeder and Matt Kookesh, field research 1986, 1987.

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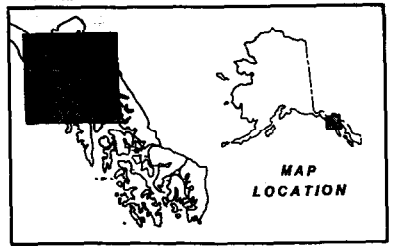

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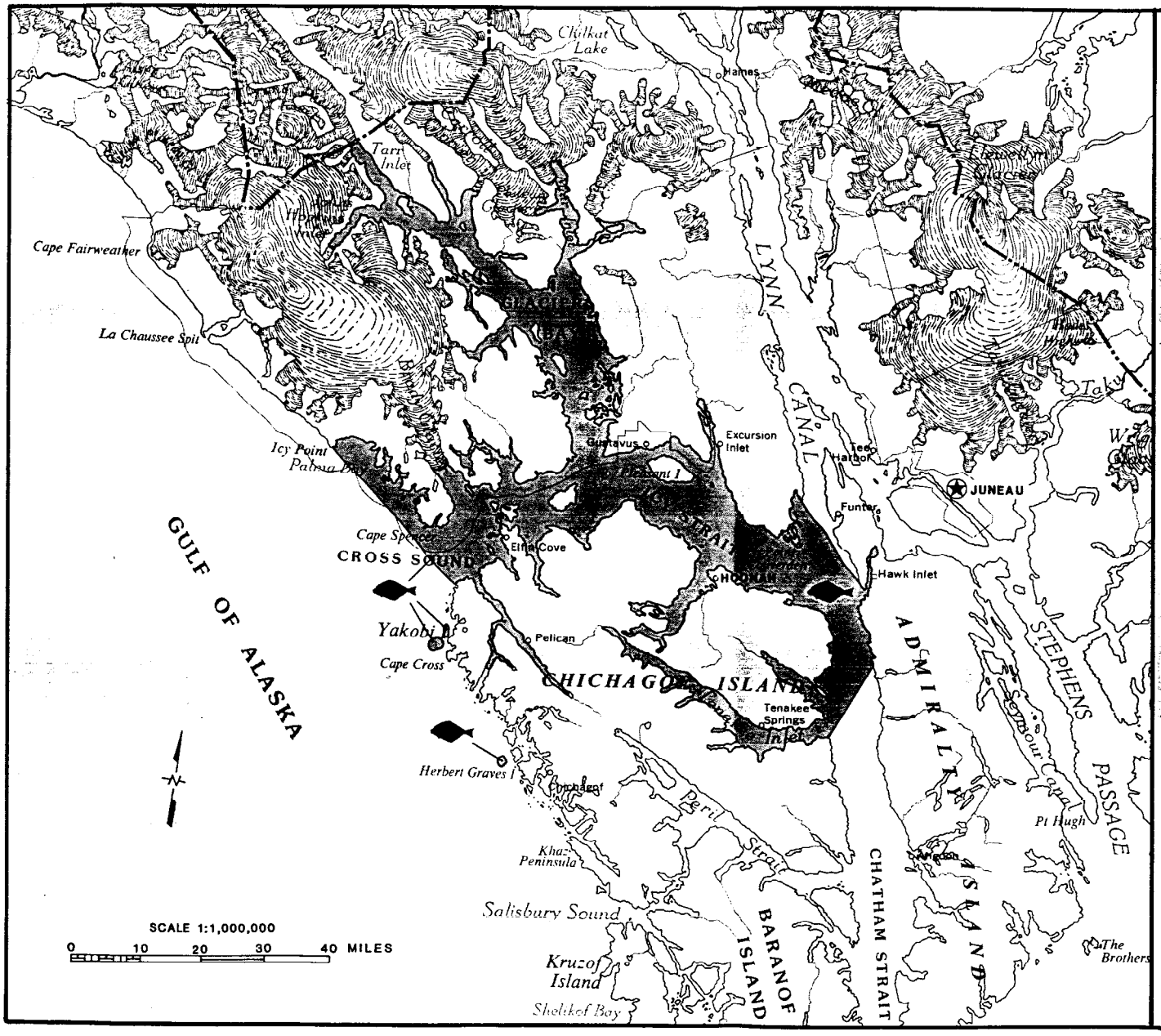

Figure 74. AREA USED BY HOONAH RESIDENTS FOR SUBSISTENCE HARVEST OF HALIBUT AND MARINE FISH, 1986.

Halibut and Marine Fish

This map depicts the area where subsistence use of halibut and marine fish by residents of Hoonah has been documented. Those areas shown are known to have been used during the time community residents have been living in Hoonah. Undocumented use of areas other than those depicted may occur, consult with local communities for definitive information. Since subsistence use areas are known to change over time, this map should be periodically revised.

Sources: Bob Schroeder and Matt Kookesh, field research 1986, 1987.

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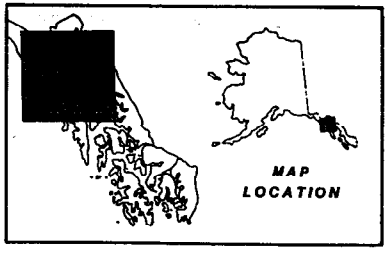

STATE OF ALASKA
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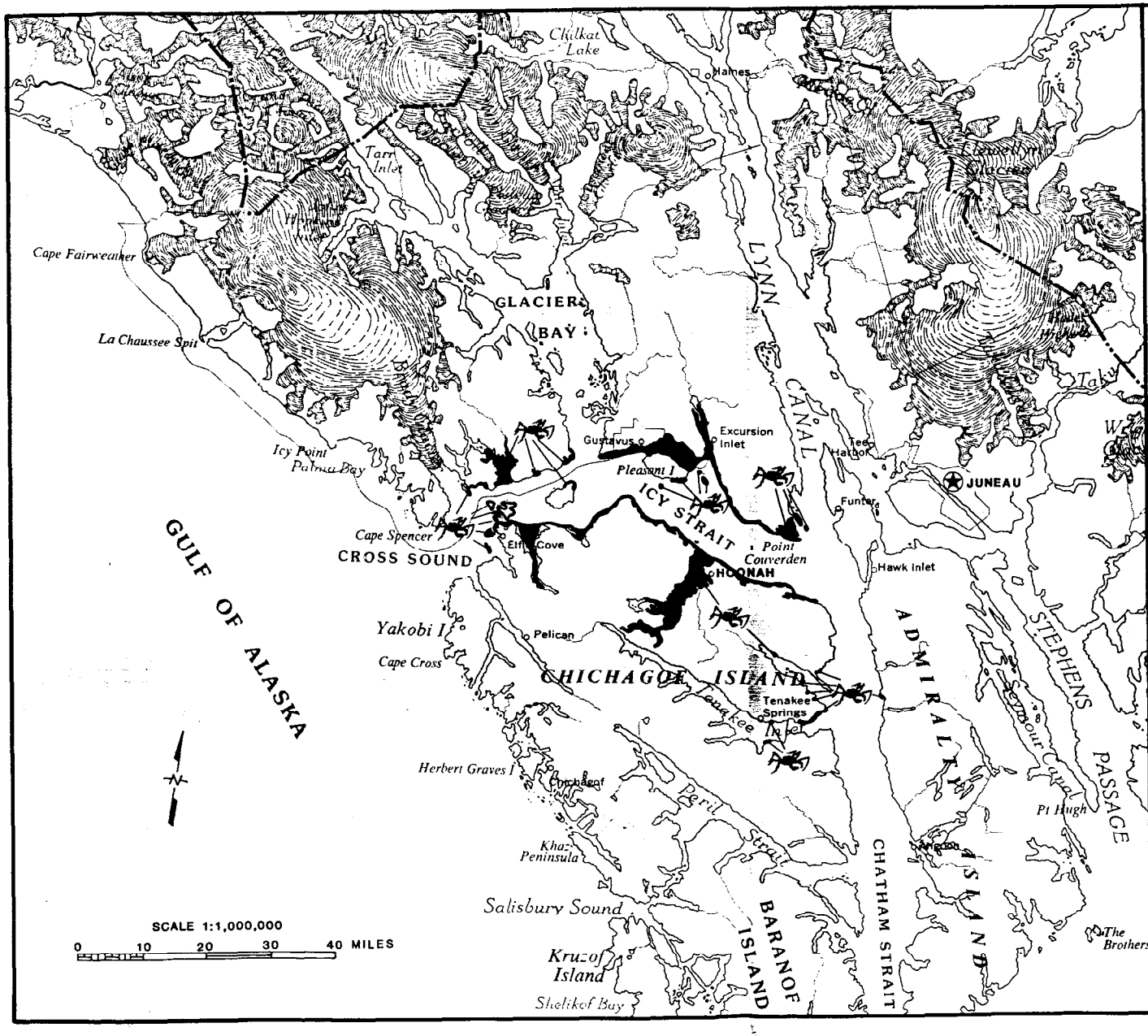

Figure 75. AREA USED BY HOONAH RESIDENTS FOR SUBSISTENCE HARVEST OF MARINE INVERTEBRATES.

Marine Invertebrates

This map depicts the area where subsistence use of marine invertebrates by residents of Hoonah has been documented. Those areas shown are known to have been used during the time community residents have been living in Hoonah. Undocumented use of areas other than those depicted may occur, consult with local communities for definitive information. Since subsistence use areas are known to change over time, this map should be periodically revised.

Sources: Bob Schroeder and Matt Kookesh, field research 1986, 1987.

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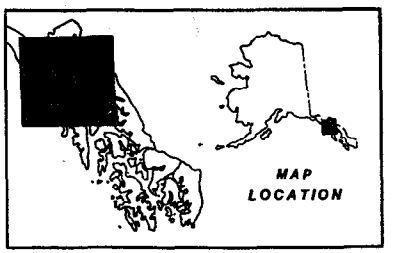

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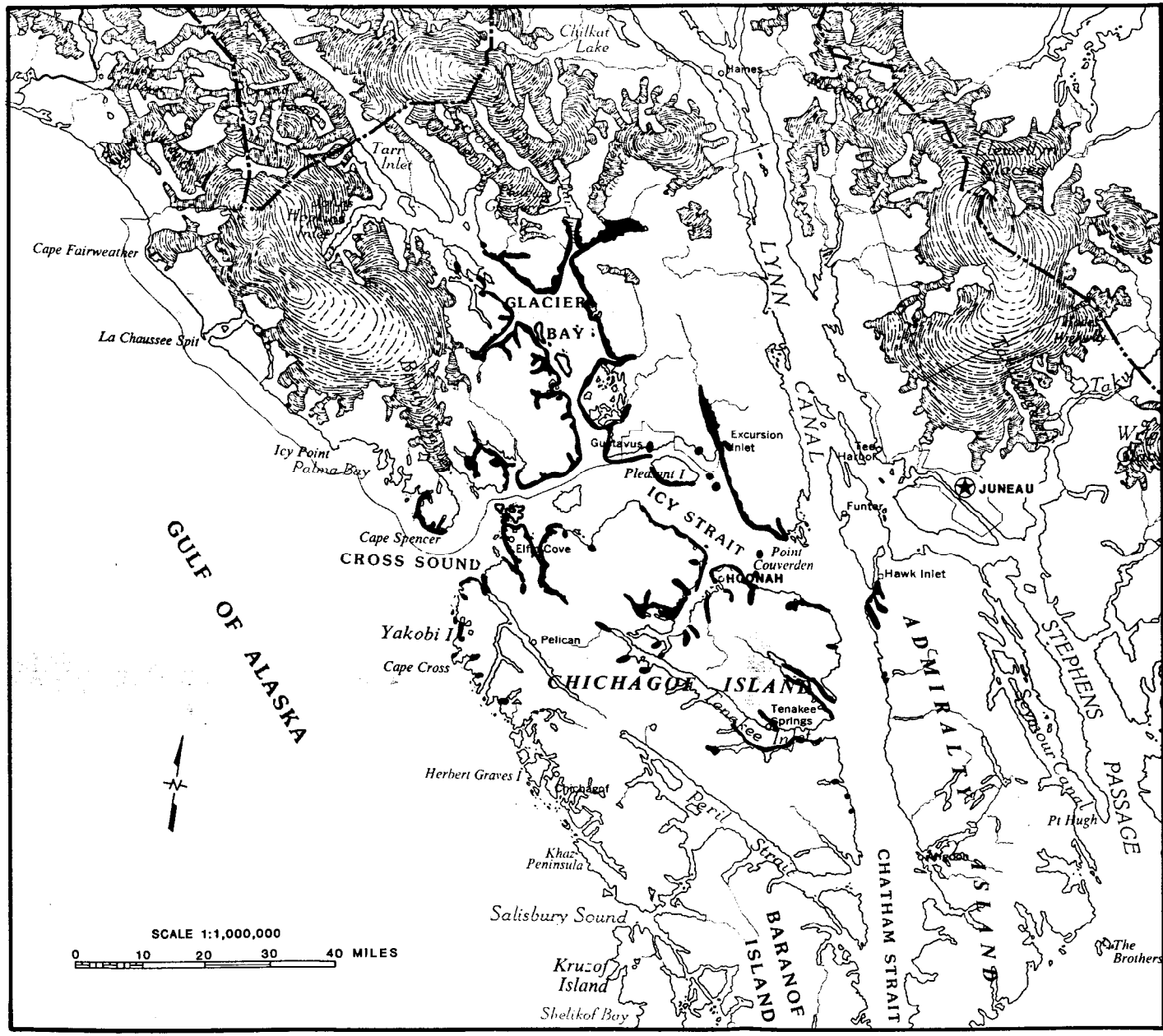

Figure 76. AREA USED BY HOONAH RESIDENTS FOR SUBSISTENCE HARVEST OF SALMON, 1986.

Salmon

This map depicts the area where subsistence use of salmon by residents of Hoonah has been documented. Those areas shown are known to have been used during the time community residents have been living in Hoonah. Undocumented use of areas other than those depicted may occur, consult with local communities for definitive information. Since subsistence use areas are known to change over time, this map should be periodically revised.

Sources: Bob Schroeder and Matt Kookesh, field research 1986, 1987.

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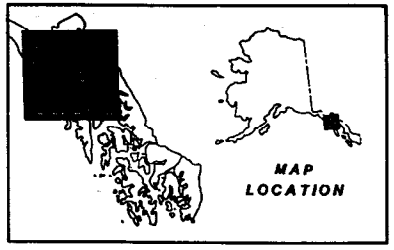

STATE OF ALASKA
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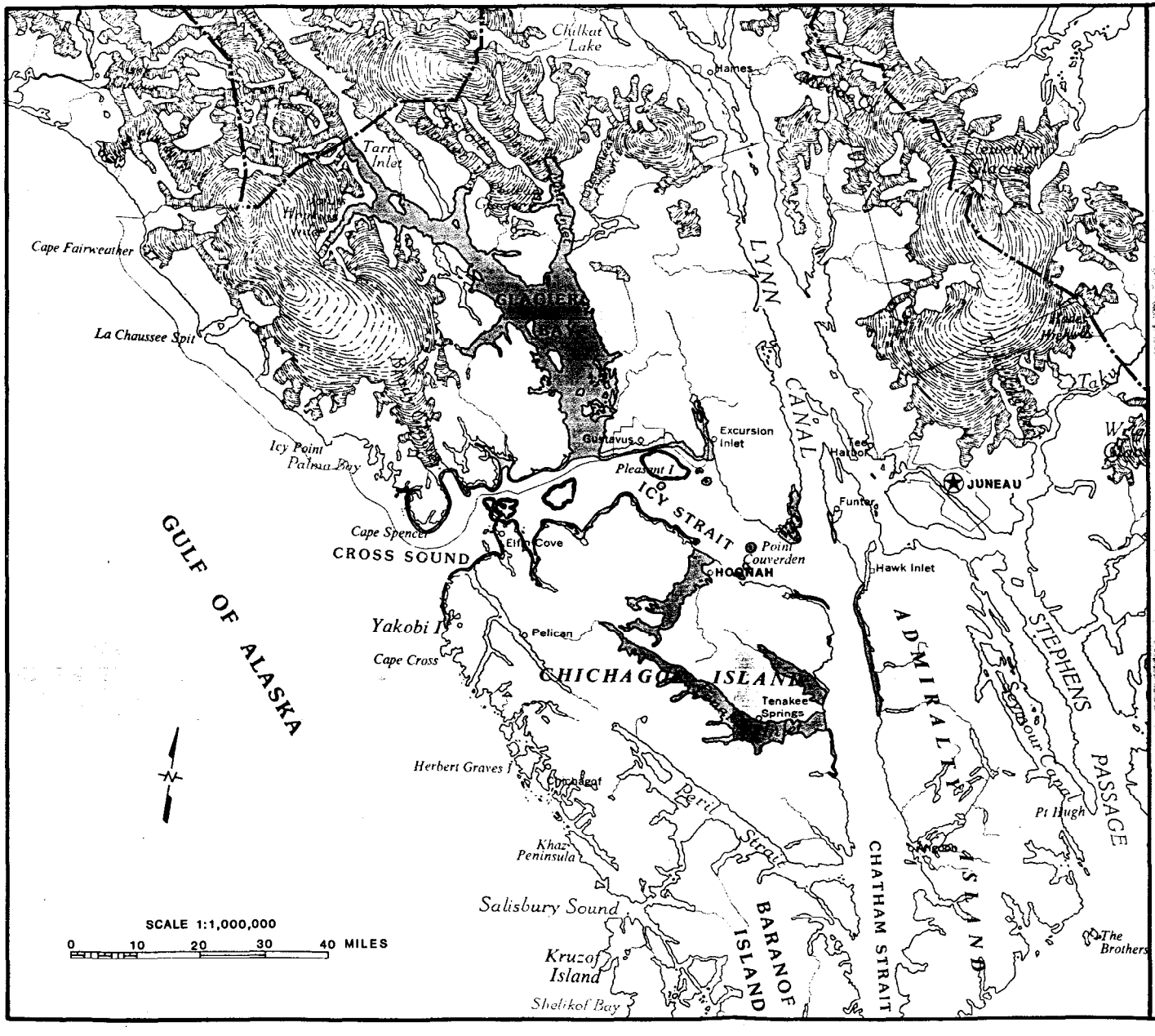

Figure 77. AREA USED BY HOONAH RESIDENTS FOR SUBSISTENCE HARVEST OF SEALS, 1986.

Seal

This map depicts the area where subsistence use of seals by residents of Hoonah has been documented. Those areas shown are known to have been used during the time community residents have been living in Hoonah. Undocumented use of areas other than those depicted may occur, consult with local communities for definitive information. Since subsistence use areas are known to change over time, this map should be periodically revised.

Sources: Bob Schroeder and Matt Kookesh, field research 1986, 1987.

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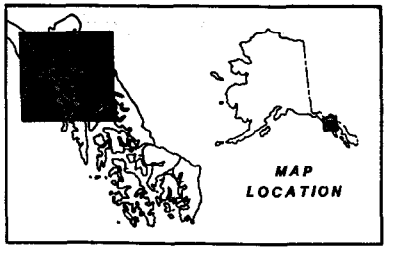

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Land Use Intensity

Figures 69 through 77 provide documentation of the overall use area of Hoonah residents by species. Mapping was also undertaken to measure intensity of use of different parts of the total use area and to measure change in intensity of use over time. Using the outer boundary of the total use area shown in Figure 69, we divided the Hoonah subsistence territory into 30 named units with the help of key respondents. Unit boundaries and names were chosen that they were intelligible to survey respondents. Where possible, boundaries conformed to ADF&G management unit boundaries and with Forest Service Value Comparison Unit (VCU) boundaries. In practice the boundaries suggested by key respondents often coincided with the management and VCU boundaries and followed distinct geomorphological features. We used a deliberately more fine-grained delineation in Port Frederick and in the areas adjacent to Hoonah where subsistence harvesting is concentrated. This area was termed the core area. Figure 79 shows the division into 30 units. Figure 80 provides larger scale view of the 15 units that comprise the Hoonah core area.

As part of the random sample household survey, respondents were asked to indicate what years they had used each unit. This methodology permits an estimate of one type of use intensity, namely a measure of amount of use an area received in any given year and change in use over time. In this context, amount of use means the relative number of harvesters using an area each year; change in use over time means increase or decrease in the proportion of harvesters using an area over time[122].

The measure of intensity of use of each unit is based on the number and the percent of active harvesters using a unit or group of units. Figure 78 shows the number of active users in each year. This set of data is based on surveys with 65 households. Four very elderly respondents were unable to provide us with use information by year because of their advanced age; two other households chose not to respond to the series of historical questions. The highest number of active harvesters was 53 in 1985.

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122. There are clearly many other ways to measure intensity of use. We might wish to consider measures of the productivity of areas, the cultural value people put on areas, the importance of specific areas for harvest of prized species, or other possible measures of intensity. We were not able to develop these other measures in the present research.

We have data for 20 or more active harvesters in all years from 1946 to present. The number of survey respondents who were active harvesters before 1946 decreases substantially. This makes it difficult to analyze use trends in the earlier period. Thus, data are particularly robust and representative for the post World War II period. We have included data from the 1920s and 1930s and caution that the intensity measure for these early years is based on the subsistence use of the relatively few sampled elders who were active during that time period. Their use is representative of general use during these early time periods if the surviving elder harvesters in 1986 are a representative sample of all harvesters in the 1920s and 1930s. With this caution in mind, we believe that our measures provides a good quantified indicator, in fact the only quantified indicator, of subsistence use from 1920 through 1985.

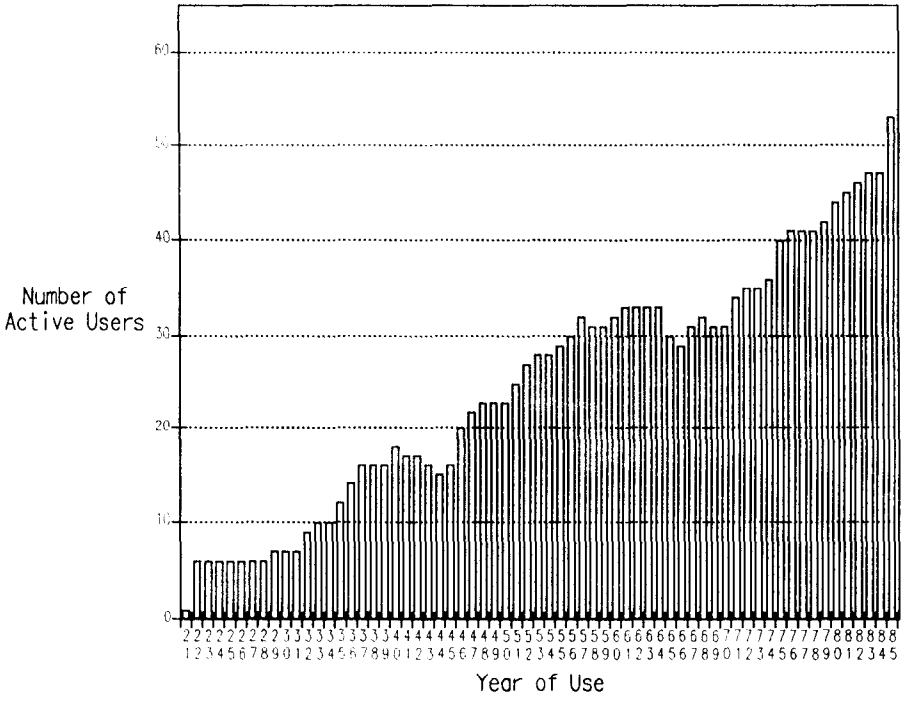


Figure 78. Number of Sampled Individuals Active in Each Year.

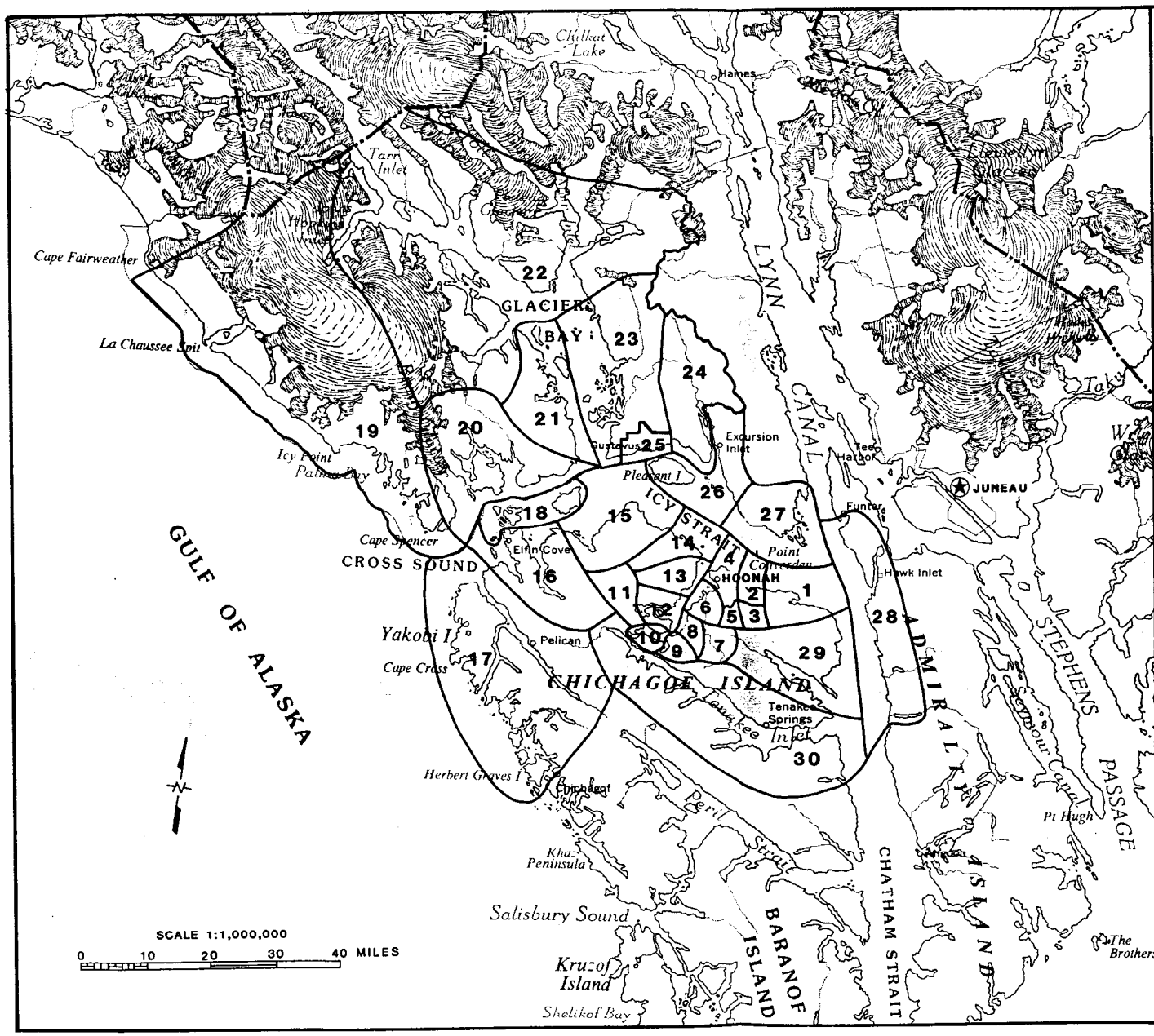


Figure 79.

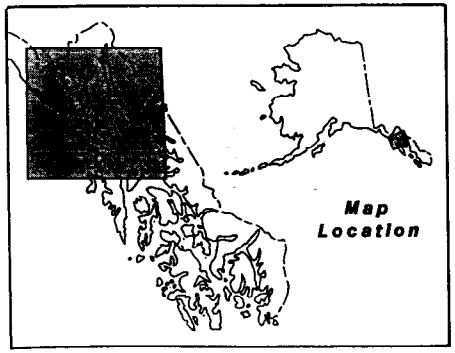
DIVISION OF THE AREA USED BY HOONAH RESIDENTS FOR SUBSISTENCE HARVEST INTO 30 STUDY UNITS.

——— GEOGRAPHICAL UNIT BOUNDARY

This map delineates the 30 geographical units used to analyze frequency of subsistence use over time.

Sources: Bob Schroeder and Matt Kookesh, field research 1986, 1987.

Unit boundaries were developed through key informant interviews with Hoonah residents. Boundaries correspond to Forest Service management units and ADF&G management units where possible.



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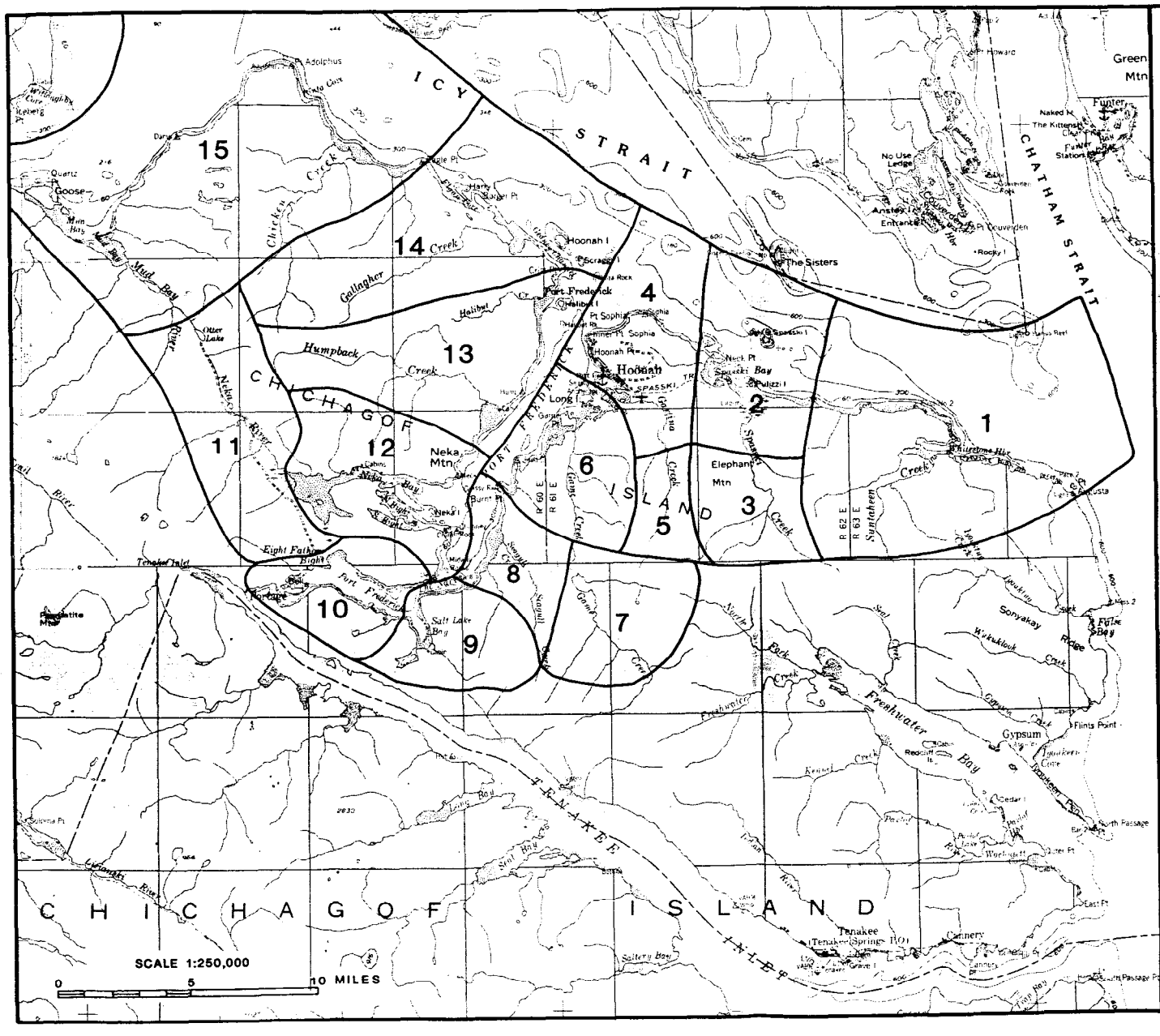


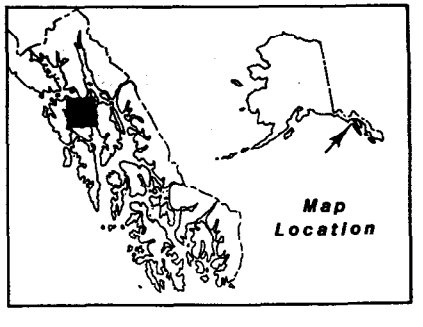
Figure 80.
DIVISION OF THE CORE AREA NEAR HOONAH USED BY RESIDENTS FOR SUBSISTENCE HARVEST INTO 15 STUDY UNITS.

——— GEOGRAPHICAL UNIT BOUNDARY

This map delineates the 15 geographical units that comprise the Hoonah core area, these are used to analyze frequency of subsistence use over time. The same units are found on map 16 at a different scale.

Sources: Bob Schroeder and Matt Kookesh, field research 1986, 1987.

Unit boundaries were developed through key informant interviews with Hoonah residents. Boundaries correspond to Forest Service management units and ADF&G management units where possible.



STATE OF ALASKA
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Subsistence Division

Unit Descriptions and Unit Intensity of Use Graphs

Unit descriptions and intensity of use graphs were prepared for each of the 30 analytical units that comprise the Hoonah subsistence use area. Appendix III provides summary information and graphs of use over time for each unit. Relevant unit graphs are also presented in case studies below.

Composite Use Measures

Figure 81 shows the percent of Hoonah sampled households that ever used each of the 30 analytical units. As expected, units in what we have termed the Hoonah core area received relatively high use. Units 1, 4 to 6, 12, 13, and 15 were the units used by the greater than 50 percent of Hoonah sampled households based on this measure. Units 4 to 6, 12 and 13 units are very close to Hoonah, accessible without long open water crossings, and supply a large number of the subsistence resources harvested[123]. Both Unit 1, Whitestone Harbor, and Unit 15, Point Adolphus, are large units within about 10 nautical miles of Hoonah with safe moorages for small boats and good salmon and deer resources. The other units in the Hoonah core use area, Units 2, 3, 7 to 11 and Unit 14, are also close to Hoonah and were each used by from 34 to 48 percent of sampled households.

Units 19, Cape Spencer and Lituya Bay, and 25, Gustavus town site, not surprisingly, show very low use rates, 15 percent and 11 percent respectively. Unit 19 is composed of distant exposed coastline and is in Glacier Bay National Park, and unit 25 has developed into the town of Gustavus. Even though Hoonah subsistence use has been severely curtailed in recent years in Glacier Bay National Park, unit 20, Dundas Bay and Fern Harbor, shows use rate of 48 percent. Use rates are between 28 percent and 37 percent for units 21 through 24, the other analytic units in Glacier Bay National Park.

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123. Unit descriptions in Appendix III list the resources harvested in each unit.

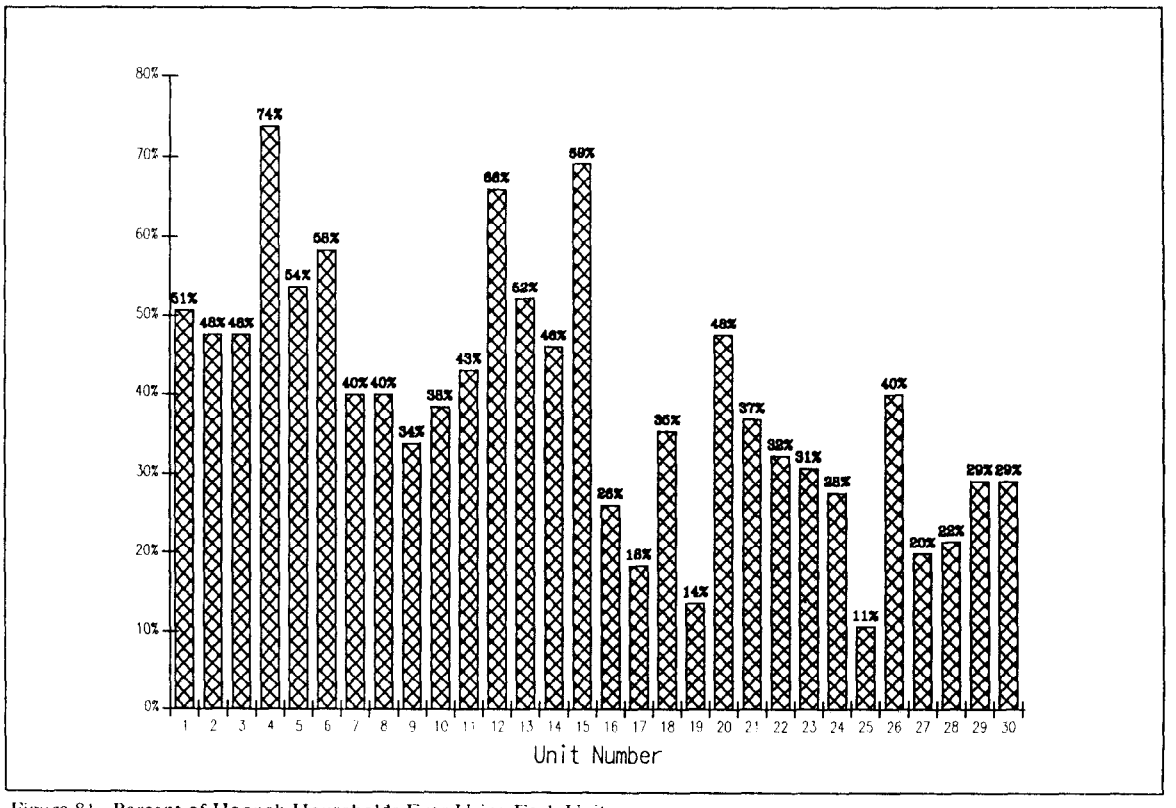

Figure 81. Percent of Hoonah Households Ever Using Each Unit.

Units 16 to 18 on the western side of the Hoonah subsistence use area show variable use. Eighteen percent of households used unit 17, Yakobi Island and Portlock Harbor; harvest of red salmon from the Hoktaheen Lake system accounts for some of this use. Unit 16, Idaho Inlet, and unit 18, Lemesurier and Inian islands, were used by 27 percent and 36 percent of households respectively.

Unit 26, Excursion Inlet and Pleasant Island, were used by 40 percent of households. This high rate of use reflects the ties of Hoonah residents to the *home shore* area[124] and continuing involvement with the Excursion Inlet cannery. Units 27, Point Couverden, and unit 28, Hawk Inlet were among the units with lower use rates at 20 percent and 22 percent respectively. Use rates for unit 29, Freshwater Bay, and for unit 30 Tenakee Inlet were both 29 percent.

Figure 82 shows the total number of units ever used by each sampled household. Two households reported some use of all 30 of the analytical units. Twenty-two reported use of 15 or more units.

124. Ground Hog Bay, the oldest archaeological site in the Huna territory and the site of the village of Kaknau in the historical period is located in the home shore area. Kaknau was inhabitated by Huna Tlingit through much of the 19th century.

Fourteen households used fewer than five units. The number of units a household has ever used is influenced by both traditional clan land use patterns and by the demographic factors of the age of the household and length of residence in Hoonah. Based on interviews with elders, we found that use of an area is related to clan territory. We found that members of the Chukanei Dee clan and others with rights to use their territory, for example, were more likely to use the units in the traditional clan territory, shown on Figure 5, (p. 23) than the territory of another clan. Among the demographic factors we found that younger households used fewer areas than households with elders; households whose members recently moved to Hoonah tended to have used very few units[125].

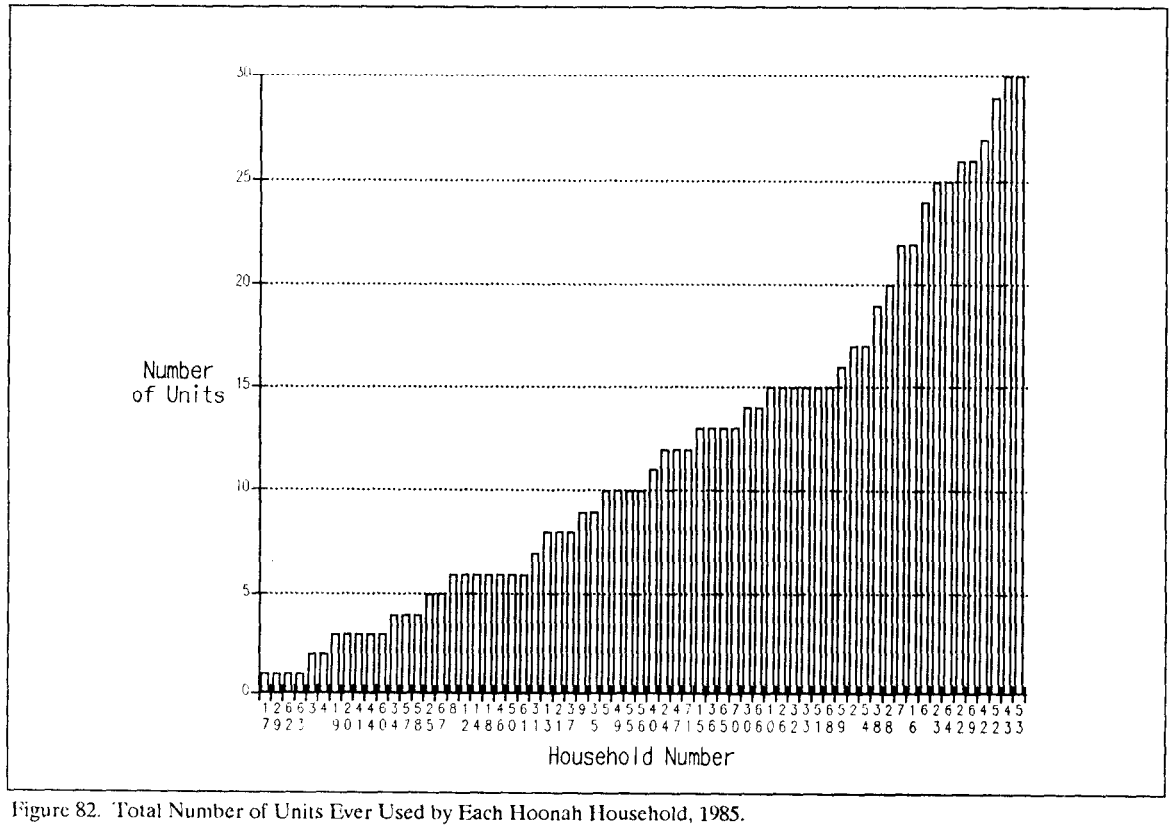

Figure 82. Total Number of Units Ever Used by Each Hoonah Household, 1985.

Intensity data were also analyzed by user-year. For this analysis a user-year was defined as each household's use of each unit in each year. Number of user-years for each unit was calculated by

125. Figure 10, p. 37, shows length of residence data for sampled households. Eight households were comprised of persons who had lived in Hoonah for four years or less. An additional nine households were comprised of persons who had lived in Hoonah for between five and nine years. Most of these 17 short residing households were households of non-Natives.

totaling the number of households that reported using the unit in each of the 65 years from 1921 through 1985[126]. User-years totaled about 17,000 for our sampled households. This intensity measure gives importance to the number of years a unit has been used. Figure 83 presents this intensity measure ordered by unit. This intensity measure based on *user-years* shown in this figure differs significantly from that in Figure 81 which is based on *any use* and may be compared on a unit by unit basis. Using this user-years intensity measure, units 20 and 26 show high levels of use, reflecting the yearly use of unit 20, Dundas Bay, by many Hoonah households until exclusion of subsistence by National Park Service policy, and the importance of unit 26, Excursion Inlet, to a different set of Hoonah households. These two units may have special importance as home areas for the Chukanei Dee and T'akdeintaan Tlingit clans (see Figure 5, p. 23). Figure 84 reorders the user-year data by magnitude. By this measure of intensity, Units 1, 12, 15, 20, and 4 are the most intensely used units of the Hoonah territory. Units 25, 17, 19, 27, and 28 are the least intensely used units. As we have mentioned above, unit 25 is the Gustavus town site; units 17 and 19 are the furthest from the community and require major open water crossings. Competition with other users may be factors in the use levels of units 27 and 28.

Composite Areas

Dividing the Hoonah territory into 30 analytic units permitted a geographically detailed analysis to take place. This division is necessarily rather fine-grained in order to be useful for land use planning and regulatory purposes. This strength is also a drawback, in that some broader patterns of use and patterns of change are obscured by this fine division. The distances we are dealing with in the Hoonah territory are not very great. If someone wished to do so, he or she could visit the coastal areas of almost all of the analytical units in a two or three day trip by boat[127]. In addition, the 30 units are of radically different sizes; other factors being equal, we might expect that larger units receive more use.

126. For each unit: # of users in 1921 + # of users in 1922 + ...# of users in 1984 + # of users in 1985 = number of user-years.

127. Travel time from Lituya Bay to Point Howard is about 16 hours in a 9 knot boat.

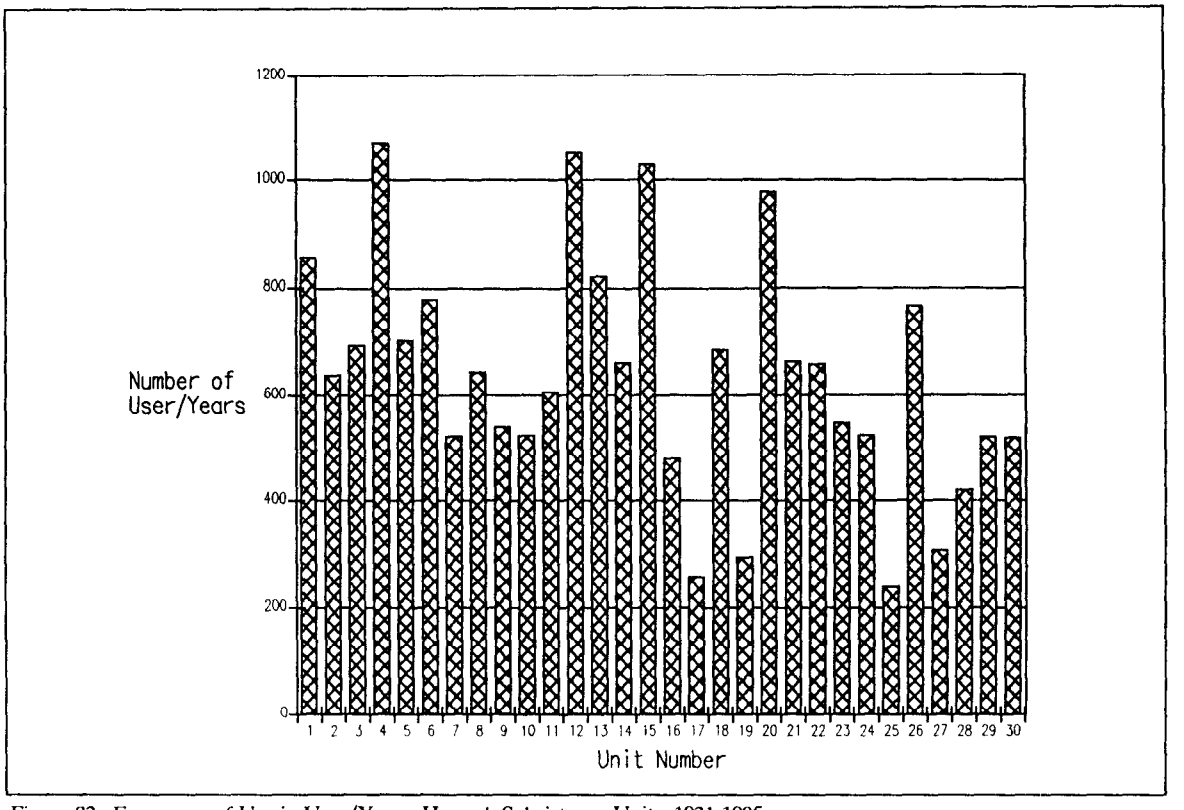

Figure 83. Frequency of Use in User/Years, Hoonah Subsistence Units, 1921-1985.

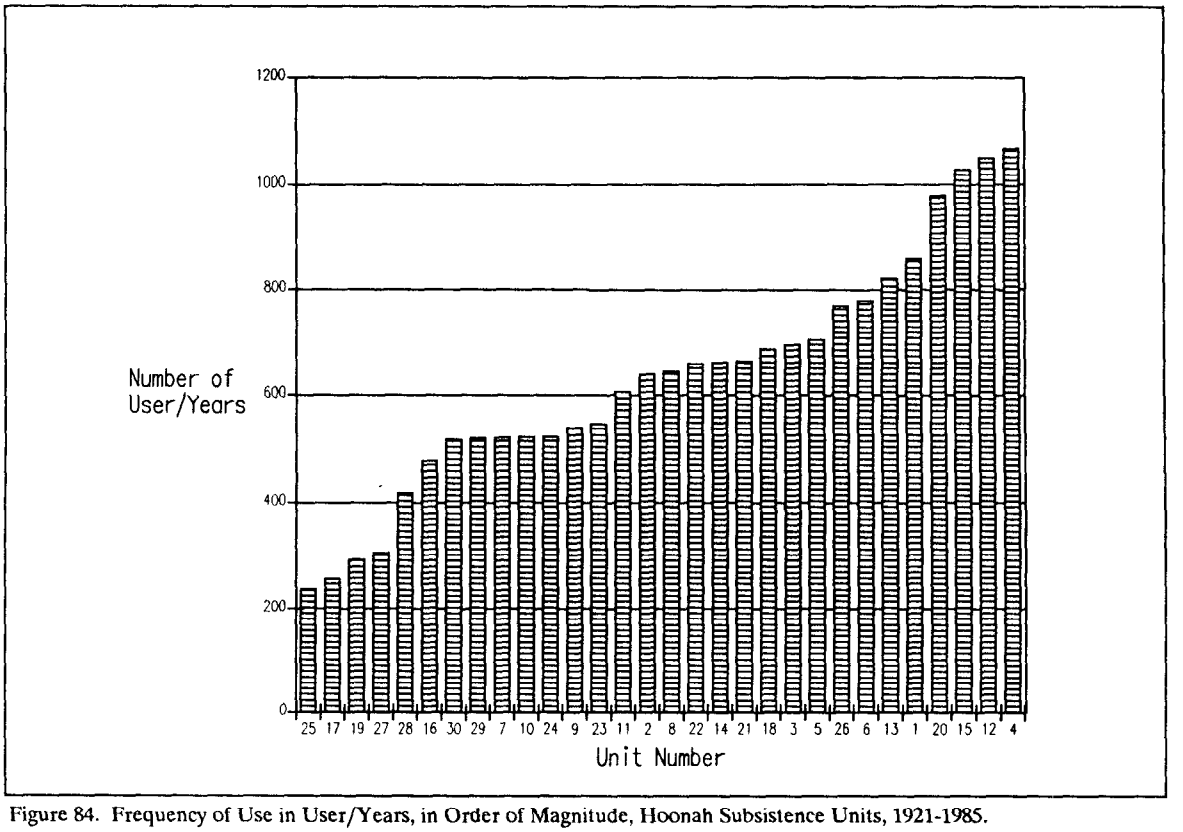

Figure 84. Frequency of Use in User/Years, in Order of Magnitude, Hoonah Subsistence Units, 1921-1985.

We decided to make a more coarse-grained examination of the intensity data and examine the patterns that might emerge. We lumped Units 1 through 15, the geographical areas closest to Hoonah and considered them to be the Hoonah core area (see Figure 80, p. 179). Units 19 through 24 were lumped to comprise Glacier Bay. The remaining units, units 16, 17, 18, and 25 through 30 were combined and are referred to as the periphery. Figures 85, 86, and 87 present percent of active user data for the Hoonah core area, Glacier Bay, and the periphery. As expected, the Hoonah core area shows a high level of use over most of the time span. There is a dip in use during World War II when many Hoonah men were in the armed forces and subsistence harvesting for some families was limited and following the Hoonah fire in 1946 when residents were preoccupied with rebuilding[128]. Since 1950, between about 85 percent and 95 percent of all active users have used some part of the Hoonah core in all years .

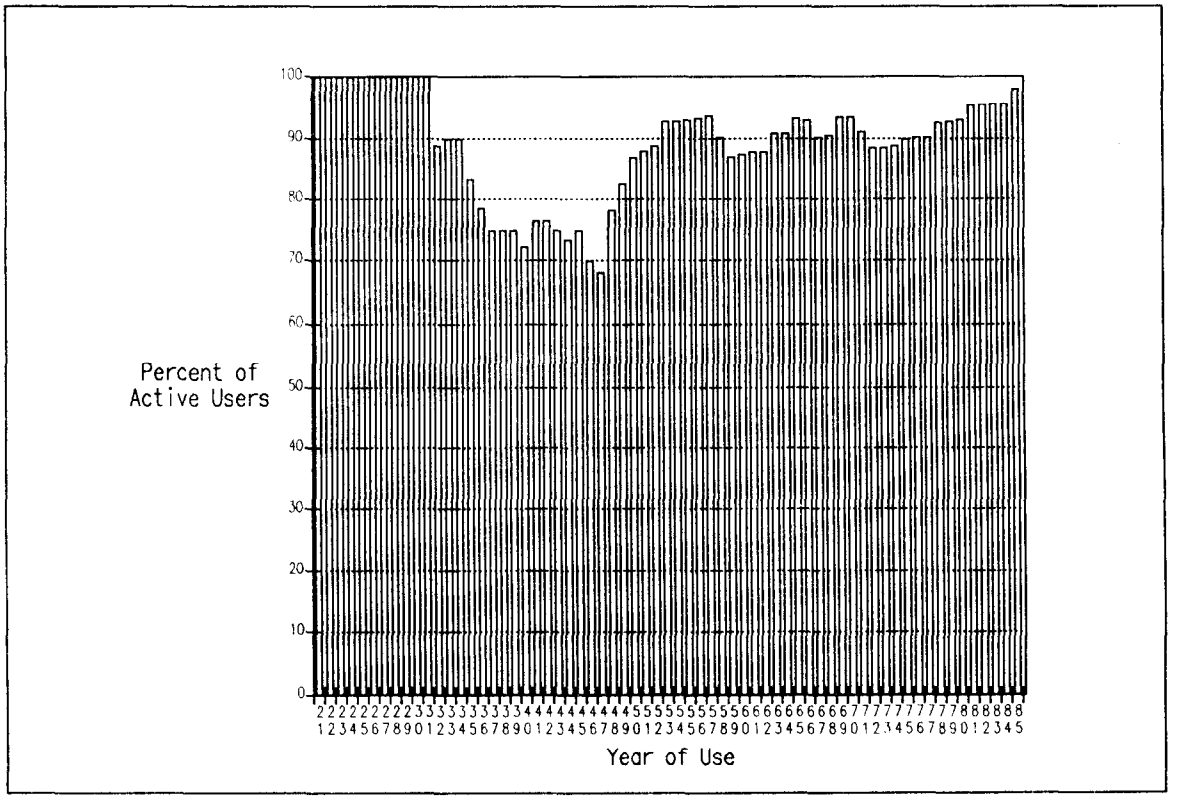

Figure 85. Use of Core Area by Hoonah Residents.

128. We do not have a tight explanation for the apparent dip around 1933, although it may have been due to reduced commercial fishing and reduced mobility of Hoonah residents at that time. Note again that only a small number of sampled households were active in the 1930s.

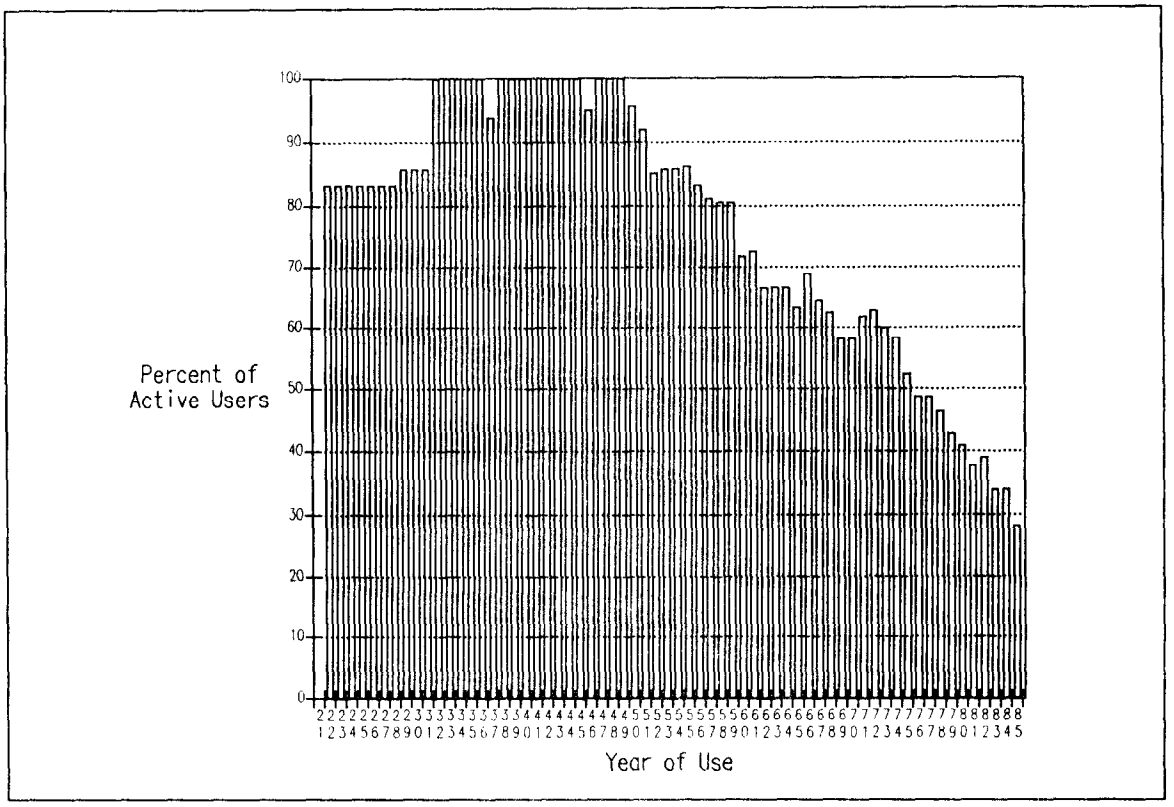

Figure 86. Use of Glacier Bay by Hoonah Residents.

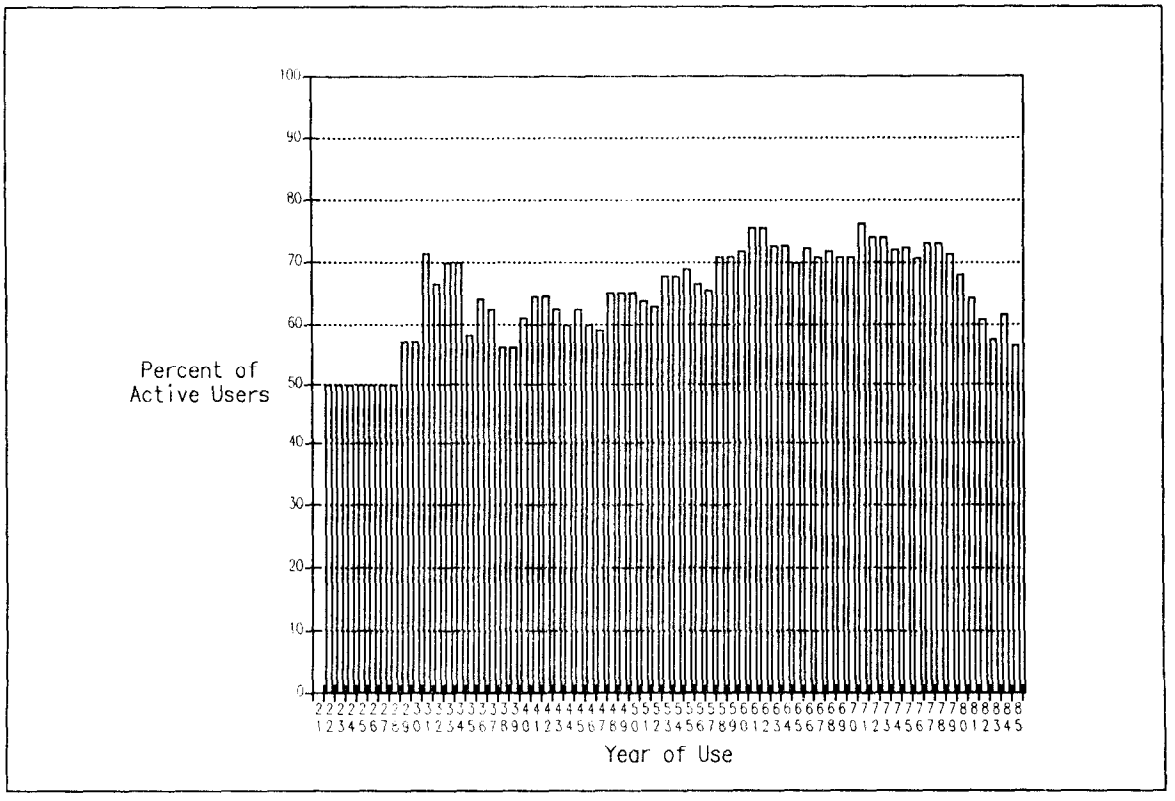

Figure 87. Use of Periphery by Hoonah Residents.

The Glacier Bay composite unit shows a very high use level from 1921 through about 1955 with from 82 percent to 100 percent of active harvesters using some part of what is now Glacier Bay National Park during these years. Use has declined steadily from that time to the present with only about 33 percent of active harvesters reporting use in 1985. This precipitous decline in use follows the imposition of National Park Service policies and regulations that restrict subsistence use of the park. This series of changes are discussed in the Glacier Bay case study below.

The Hoonah periphery shows no clear trend in change in use, perhaps because it lumps such diverse units. From about 50 percent to about 75 percent of active harvesters reported some use in the periphery in all years. Some part of the recent decline may be related to decline in commercial fishing by Hoonah residents in units 16 through 18[129]; commercial boats were often used for transportation to these subsistence areas. Another part of the decline may be related to greatly decreased summer employment at the cannery in Excursion Inlet and correspondingly less travel to units 26 and 27[130].

Spatial Analysis Summary

The traditional Huna territory, the geographical area currently used by Hoonah residents for subsistence harvests, and measures of intensity of use of different parts of the Hoonah subsistence use area have been discussed in this chapter. We have found that:

1. The overall extent of Hoonah's contemporary subsistence use area is very similar to the traditional Huna territory that was occupied at the time of contact with western societies at the beginning of the colonial era.

129. Hoonah's salmon seine boat fleet fished for salmon in the Inian Island, South Inian Pass, South Pass, and Idaho Inlet area until seining in Icy Strait was closed by Board of Fisheries regulations in the 1970s.

130. Note that our sample includes households who moved to Hoonah recently. These households have generally not made use of more distant areas. Some of the decrease may be due to this factor.

2. Hoonah's contemporary subsistence use area does not overlap much with the use areas of Haines and Klukwan, Sitka, Angoon, or Yakutat[131]. Traditional boundaries between Native communities appear to be maintained to the present time for subsistence[132].

3. Boundaries are not maintained with recently settled non-Native communities for subsistence purposes. Hoonah residents do not, for example, recognize an exclusive subsistence use area for Pelican, Gustavus, or the Whitestone logging camp[133].

4. Not all Hoonah households use all of the Hoonah subsistence use area. At least two factors operate here. First, households may continue to rely on traditional clan territories for most of their harvesting and stay clear of the territory of other clans. Second, some households are much more wide ranging than others.

5. Use of different parts of the Hoonah subsistence use area has changed over time. These changes are discussed more fully in the following case studies and in Appendix III.

6. Intensity of use measures provide one indication of the relative importance of different parts of the subsistence use area. Areas in the Hoonah core and in Glacier Bay and Excursion Inlet rank high on the two intensity of measures examined.

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131. Some overlap occurs with Angoon in use areas in Tenakee Springs, Freshwater Bay, Hawk Inlet, and Funter Bay. As discussed, use of these areas by Hoonah residents is the result of movement of people (and their traditional use rights) from Angoon to Hoonah and the settlement of intercommunity disputes.

132. Subsistence areas shown on Division of Subsistence maps and territorial demarcations found in Goldschmidt and Haas (1946) were examined. Tlingit land tenure and subsistence harvest territories divided southeast Alaska into mutually exclusive and jointly exhaustive territories.

133. Non-Native communities do not appear to have subsistence territories as discussed for Hoonah. A description of land use by non-Native communities would be more of a statistical summary of who went where for what resource over a set time period.

CHAPTER 6

CASE STUDIES OF CHANGES IN SUBSISTENCE USE PATTERNS

Introduction

This chapter examines change in subsistence use patterns in the Hoonah territory by focusing on three selected example areas: the Hoonah core area, the Point Couverden and Point Howard area, and Glacier Bay National Park. In this chapter we have concentrated on changes occurring over the last 10 years, the period of active and extensive logging and road building for the Hoonah core area and over the last 65 years for Glacier Bay, since the establishment of the national monument in 1925.

Hoonah Core Area

The Hoonah core area, shown as analytic units 1 through 15 on Figure 80 (p. 179), comprises the portion of north Chichagof Island that has been most heavily utilized for subsistence harvests by Hoonah residents. This case study focuses on factors affecting deer harvest by Hoonah residents within this area. Less data are available for changes in subsistence fishing.

Hoonah was chosen as one of the research sites within the larger Timber Management and Fish and Wildlife Utilization Project as an example of a medium size Tlingit community where large-scale logging was just getting under way in the 1980s and where plans called for extensive harvesting of timber resources on Forest Service and Native corporation lands in areas close to the community. At the initiation of field research and at the time of our community survey in 1986 many of the changes affecting subsistence use of resources were just beginning to occur. In the 1986 through 1989 time period, some of these changes have become more pronounced. Because of this, we are in a much better position to evaluate both the short term and long term effects on subsistence than at the time of the initial field work effort. This case study of the Hoonah core area identifies the major effects of timber management that have occurred and evaluates potential for future effects. The general effects of tim-

ber management in the Hoonah core area are discussed first, followed by more detailed examination of the Spasski Creek drainage and the Neka Bay and Neka River area, two locations within the core area.

Extent of Logging and Road Building in the Hoonah Core Area

The extent of area logged on Forest Service and Huna Totem Corporation land through 1985 is shown in Figures 14 (p. 49), in Tables 2 and 3 (pp. 51, 55), and in Figures 15, 16, and 17 (pp. 53, 56, 57). The logged area amounted to about 6,300 acres at the end of 1985, with approximately 3,000 acres of that total on Forest Service land. The most recent Forest Service summary reported 11,820 acres of timber yarded from Forest Service lands as of October 6, 1989 in VCUs in the Hoonah core area (Hille, 1989)[134]. Additional logging has taken place on Sealaska Corporation land in the core area. In total then, about 15,000 acres, or almost 25 square miles, of old-growth forest have been clear-cut; almost all of this cutting in the Hoonah core area has taken place within the last 10 years..

The network of logging roads throughout much of the Hoonah core area circa 1985 is shown on Figure 13 (p. 45) and listed in Table 1 (p. 47). This amounted to 108.6 miles of road in 1985. The road system has expanded significantly in the 1986-1989 time period, and the Hoonah Ranger District contained 273.2 miles of road on October 16, 1989 (Peterson, 1989)[135,136].

Effect of Habitat Changes on Deer Population

The results of the joint ADF&G and Forest Service modeling of habitat carrying capacity for deer have been presented above and shown in Figures 62, 64, and 65 (pp. 139, 141, and 142). These data show that 1988 harvests of deer in the Wildlife Harvest Areas that comprise the Hoonah core area

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134. This total includes some logging that took place on Forest Service lands prior to 1980. We are not able to provide more recent data for Native Corporation land. Both Huna Totem and Sealaska corporations have logged in the 1985 through 1989 time period.

135. Forest Service recently published a road map of this area.

136. Refer to Figure 13 and note that roads are not all interconnected. The 273.2 miles of road may not include all logging spurs and temporary roads.

already have exceeded the long-term sustainable harvest level for deer. Planned future logging over the life of the contract with Alaska Pulp Corporation and over the life of the planned timber rotation will further reduce deer population levels.

Because of the importance of this model and findings based on it, background is provided below. Schoen *et al* (1985) summarizes available data on the relationship between Sitka black-tailed deer and forest habitat using literature sources and the findings of research conducted in cooperation with the U.S. Forest Service Forest Science Laboratory over the 1978 through 1984 time period. The availability of winter forage and shelter in severe winters were found to be the main long term biological limitation on the deer population in the subsistence hunting areas used by Hoonah residents. In severe winters, deer rely on forage and shelter found in high density old-growth forest, usually at low elevation. In the long run, the size and health of the deer population in a given area is proportional to the amount of old-growth forest. Unfortunately for deer and deer hunters, the best commercial timber in terms of yield and ease of harvesting is also found high-density old-growth forest.

Schoen *et al* found that deer used high-volume stands extensively during periods of deep snow, showing a high preference for this habitat type. During periods of low snowfall, high-volume stands are still preferred by deer, though not as strongly. Schoen *et al* found that habitat loss in a watershed does not result in significant dispersal of deer into adjacent watersheds. Winter carrying capacity, therefore, is a function of the quality and quantity of winter habitat within each watershed. Because deer populations are highly localized, analysis of impacts on deer due to loss of habitat must be site-specific.

Although the effect of the progressive elimination of old-growth habitat is cumulative, total expected decline in the deer population in the Hoonah subsistence use territory due to clear-cutting of old-growth forest may not have taken place to date. Deer populations throughout Game Management Unit 4 and in areas of this unit used by Hoonah residents increased in most of the 1980s, primarily as a result of a series of mild winters[137].

The general effect of habitat disruption on the deer population is cumulative. As more old-growth forest is eliminated, less critical winter habitat is available for deer. Since all of the Hoonah

137. Deer populations may have peaked in most north Chichagof Islands in 1987 or 1988 (Young, 1989).

core area and most of the deer harvesting area shown on Figure 71 (p. 161) is Forest Service LUD IV land to be managed for logging, virtually all of the deer winter habitat and virtually all of the local deer populations used by Hoonah residents are potentially affected. Table 22 shows the reduction in old-growth habitat due to logging over the next 100 years in VCUs used by Hoonah residents. After 100 years of logging have taken place, the Hoonah core area will be able to support a deer population less than one third as large as in the pre-logging era. This decline will be due to the cumulative loss of critical high-volume old-growth forest winter habitat. Note that no clear effect of the elimination of old-growth critical habitat on deer may be noted until the northern portion of southeast Alaska again experiences a series of severe winters. When severe winters occur, there may be a sharp decline in the deer population from starvation and exposure. The surviving deer population will be proportionate in size to the amount of remaining old-growth habitat.

Effect on Salmon

Literature and research documenting the effects of clear-cut logging on fisheries resources in southeast Alaska have been summarized by Schwan *et al* (1985). Schwan *et al* found that clear-cut logging affected stream flow, water temperature, sedimentation, light levels and nutrients, and stream habitat structures. Although the relationships between these variables and salmon production is a complex one, many of the changes that occur due to logging in stream habitat used by salmon tend to decrease salmon production in affected drainages. Since virtually all of the area in the Hoonah core area is either Native Corporation land scheduled for logging or Forest Service LUD IV land managed for logging, all of the salmon streams used by Hoonah residents in this area are potentially affected. Some less-frequently used streams in across Icy Strait in units 26 and 27 may also be affected.

TABLE 22. Predicted Changes in Deer Populations Over 100 Years as a Result of Logging in Southeast Alaska Watersheds.

VCU NAME	VCU #	PERCENT CFL[1] ALREADY HARVESTED[2]	PERCENT CFL SCHEDULED FOR HARVEST[3]	PERCENT DEER REMAINING AFTER 100 YEARS
Gull Cove	191	0.0	74.5	34.4
Goose Island	192	0.0	59.2	44.1
Mud Bay	193	0.0	57.6	35.2
Loon Lakes	194	0.0	65.9	9.0
Pt. Adolphus	195	0.0	73.4	13.3
Chicken Creek	196	0.0	64.4	32.6
Eagle Point	197	0.0	57.3	28.5
Flynn Cove	198	3.3	64.4	23.8
Humpback Creek	200	1.3	58.5	23.8
Neka Bay	201	2.6	65.2	29.8
Port Frederick	202	2.4	47.0	37.7
Seagull Creek	203	0.0	67.1	35.9
Game Creek	204	4.7	64.6	30.4
Gartina Creek	205	4.5	66.3	34.8
Spasski Creek	207	0.0	62.4	18.8
First No.2	208	0.0	58.4	39.4
Suntaheen Creek	209	0.0	52.7	36.9
False Bay	210	0.0	83.3	16.6
Pt. Augusta	211	0.0	54.6	29.4
Gypsum Creek	212	1.6	60.6	27.9
Iyoukeen Pen.	213	4.4	42.4	38.2
Seal Creek	214	3.3	49.2	35.0
Freshwater Bay	215	1.9	57.2	29.1
Freshwater Creek	216	0.0	72.5	18.8
Kennel Creek	217	4.7	63.6	16.0
Pavlof River	218	4.4	73.4	22.4
Point Cannery	219	6.1	69.1	25.5
MEAN[4]			62.4	28.4

Source: Schoen et al. 1985.

1. CFL = Commercial Forest Lands.
2. Percent already harvested uses 1978 data.
3. Percent scheduled for harvest uses Forest Service TLMP data in Rideout et al, 1984.
4. Mean percent CFL scheduled for harvest and mean percent deer remaining after 100 years are averages of VCU data without weighting for size of VCU.

Schwan *et al* noted that extensive clear-cutting may change drainage patterns and shading of steams. Changed stream flow and temperature may affect salmonid species and cause a decline in salmon spawning in affected drainages and a decline in salmon return to affected drainages. Key respondents have noted very quick run off with higher water levels after heavy rains and lower level during dry periods in the Gartina and Spasski Creek drainages where there has been extensive logging on Huna Totem Corporation land. Interview data also suggest that fewer salmon are available in these drainages than before logging took place[138].

Since many of the effects of clear-cutting documented by Schwan *et al* are long lasting, we would expect to see a cumulative effect on the salmon resources used by Hoonah residents for subsistence in coming years. Planned logging on Native Corporation old-growth forest surrounding Humpback and Seagull creeks and continuing logging in Neka River and Seagull and Game creeks and smaller drainages on Forest Service land in the Hoonah core area (see Figure 80, p. 179) may potentially affect subsistence harvest of salmon species. Even with good logging practices, logging in the Hoonah core area may have a serious long-range cumulative effect on the salmon resources available for subsistence uses[139,140]. The effect is likely to be gradual and proportional to the amount of alteration of salmonoid habitat that take place.

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138. We rarely have the time-series data on salmon runs and the careful monitoring of changes in stream productivity for salmon post-logging that permit accurate assessment of impact on salmon for most drainages. Because of the weakness of other data sources, the reports of residents who use specific streams and of commercial fishers who rely on stream productivity are of particular importance.

139. Increasing the size of buffer stips, or areas bordering streams where logging will not be permitted, to National Marine Fisheries Service levels has been under both discussion in U. S. Congress and the subject of litigation. Increased size of buffer strips has taken place in the Ketchikan Pulp Corporation contract area, in part because of legal challenges ongoing in 1989-90, and in the Alaska Forest Practice Act revision completed in 1990. Whether all salmon streams will have protective buffers, including class 2 and class 3 streams, and whether buffers will, in fact, provide adequate protection for anadromous fish streams in the ecological conditions found in southeast Alaska are subject to controversy.

140. Without careful monitoring of effects on salmon streams, all but the most severe degradation of salmon habitat may go unnoticed.

Introduced Population

The population of Hoonah proper, shown in Figure 7, p. 33, has gradually increased in recent years and is now close to the estimated population of the Huna tribe at time of contact with Russian explorers. Establishment of a Forest Service district office in Hoonah and initiation of large scale logging and road building in the Hoonah subsistence area has brought large numbers of new residents to the north Chichagof Island area. At the time of field research in 1986, we estimated that the area population, including 400 loggers and their families in camps outside of Hoonah proper, was about 56 percent Native. A relatively small increase in the logging related population, would result in a majority of non-Native residents in the north and northwest Chichagof Island area. The Huna Native population may well be a minority within its traditional territory within a few years.

Increased Competition

The loggers, road builders, Forest Service staff, and others who are presently living in north Chichagof Island because of work in timber harvesting also use fish and wildlife resources. In 1986 survey research, we found that this population harvested deer, salmon, halibut, and some other natural resources at a rate comparable to Hoonah's[141]. Deer harvests of logging camp residents are shown for 1987 and 1988 in Figures 52 through 57 (pp. 129 to 132). This same set of figures also show the increased proportion of the total deer harvest that is harvested from the Hoonah core area by non-Hoonah residents. In 1989, Hoonah residents harvested about 32 percent of the deer that were taken in the core area; this was down from 44 percent in 1984, see Figure 54, p. 130[142]. The Hoonah Fish and Game Advisory Committee proposed a change in hunting regulations for their area to the Board of

141. Residents of the Whitestone logging camp were interviewed in the course of research.

142. Hoonah 1985 harvest figures are from our survey. Based on interview data, a much higher proportion of the total deer harvest was taken by Hoonah residents before the road access brought non-local hunters to the area in 1984 and before the logging related population began to increase in about 1981.

Game in 1987 to alleviate some of the hunting pressure caused by outside hunters coming into the area. The board responded by reducing the bag limit for non-subsistence hunters to three deer.

Use of Roads for Hunting Access

Two important changes took place in the 1982 to present time period with the expansion of the network of logging roads from Hoonah to Game Creek, Spasski Bay, Whitestone Harbor, and Freshwater Bay. One change has to do with Hoonah residents' use of roads for access to subsistence hunting areas; the second with the use of these same roads for hunting by members of other communities.

Before roads were constructed, access to hunting areas for Hoonah residents was almost exclusively by foot or by skiff or boat. Hoonah hunters now sometimes use the road system for some of their hunting. This change has by no means been uniform. While some Hoonah hunters reported using the road system for access to deer hunting as early as 1985, more productive hunters have often abandoned the roaded areas as competition from other hunters increased. Based on our interview data, the Hoonah residents who rely on the road system for hunting appear to be the elderly and infirm who no longer can use other means of access, early season hunters who get close to mountainous or alpine terrain by road and then hike, and less committed hunters who combine hunting with a drive in the country[143].

Very significantly 54 percent of the deer Hoonah residents harvested in the Hoonah core area in 1988 came from Wildlife Harvest Areas 3521, 3522, 3532, and 3533, WHAs that do not have roads connecting with the Hoonah road system (see Figure 49, p. 125 for WHA boundaries used for 1988 data). The other 46 percent of deer taken came from WHAs 3523, 3524, and 3531, units that can be reached by road. In the 1989 season, 45 percent of deer harvested by Hoonah residents in the Hoonah core area were taken in WHAs 4222, 4252, 4253, and 4256, all WHAs without connection to the Hoonah road system; the other 55 percent of deer harvested were taken from WHAs 3523, 3524, and 3551, WHAs that can be reached by road (see Figure 50, p. 126) for WHA boundaries used for 1988

143. A few cases of spot-light hunting have come to the department's attention in 1988 and 1989 (Young, 1989).

data)[144]. Some Hoonah hunters harvesting deer from WHAs that have roads undoubtedly used logging roads for access to hunting sites. Based on our interview data, however, we believe that the majority of the deer harvested in WHAs with roads in 1988 by Hoonah residents were taken by hunters using skiffs and boats for water access and walking for land access.

The 1988 and 1989 harvest data and our interviews with hunters suggest that use of logging roads for hunting is variable. Hoonah residents may be abandoning parts of the Hoonah core area in which logging roads have been constructed and clear-cutting has taken place where they face competition from non-local hunters. Analysis of deer hunting over the next years will be needed to see if this hypothesis is correct. In any case, we estimate that the large majority of deer taken by Hoonah residents in the core hunting area continue to be hunted from skiffs and boats and on foot away from the road system. We have not found that hunting from logging roads by Hoonah residents has replaced the more traditional, and usually more productive, means of hunting[145].

As we have seen, the development of a road network opened up has resulted in increased numbers of non-local hunters coming to the Hoonah area over the 1984 to present. Before the road system was established hunting in the Hoonah area by non-locals was limited. The Hoonah road system quickly gained the reputation of being a relatively inexpensive, productive, and easy place to hunt. Cars trucks, three-wheelers, and other recreational vehicles reach the Hoonah road system via the Alaska Marine Highway system which usually has four dockings per week at Hoonah during the hunting season. Figures 52, 53, and 54 (pp. 129, 129, 130) show the increase in non-local hunting over the 1985 through 1988 time period; Figures 88, 89, and 90 show the 1987, 1988, and 1989 deer harvest by origin of hunter[146]. The large majority of deer taken by non-local residents are hunted from the road system.

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144. Hoonah residents traditionally hunt Wildlife Harvest Areas roadless units (3522, 3532, and 3533 in 1988; 4222, 4252, 4253, and 4256 in 1989) from skiffs and on foot. Wildlife Harvest Areas that have roads (3523, 3524, and 3531 in 1987; 3523, 3524, and 3551 in 1989)in the Hoonah core area are hunted from skiffs, on foot, and by road. We can not statistically separate harvest success by access mode for these Wildlife Harvest Areas which could be reached by road..

145. Hoonah hunters interviewed by Schroeder and Kookesh in the 1989-90 season reported that most deer were harvested by hunters using skiffs and boats for access to coastal stands of old-growth forest. Hunters saw this as their normal way of hunting.

146. Data for 1987 has also been presented in Figure 63, p. 140 above.

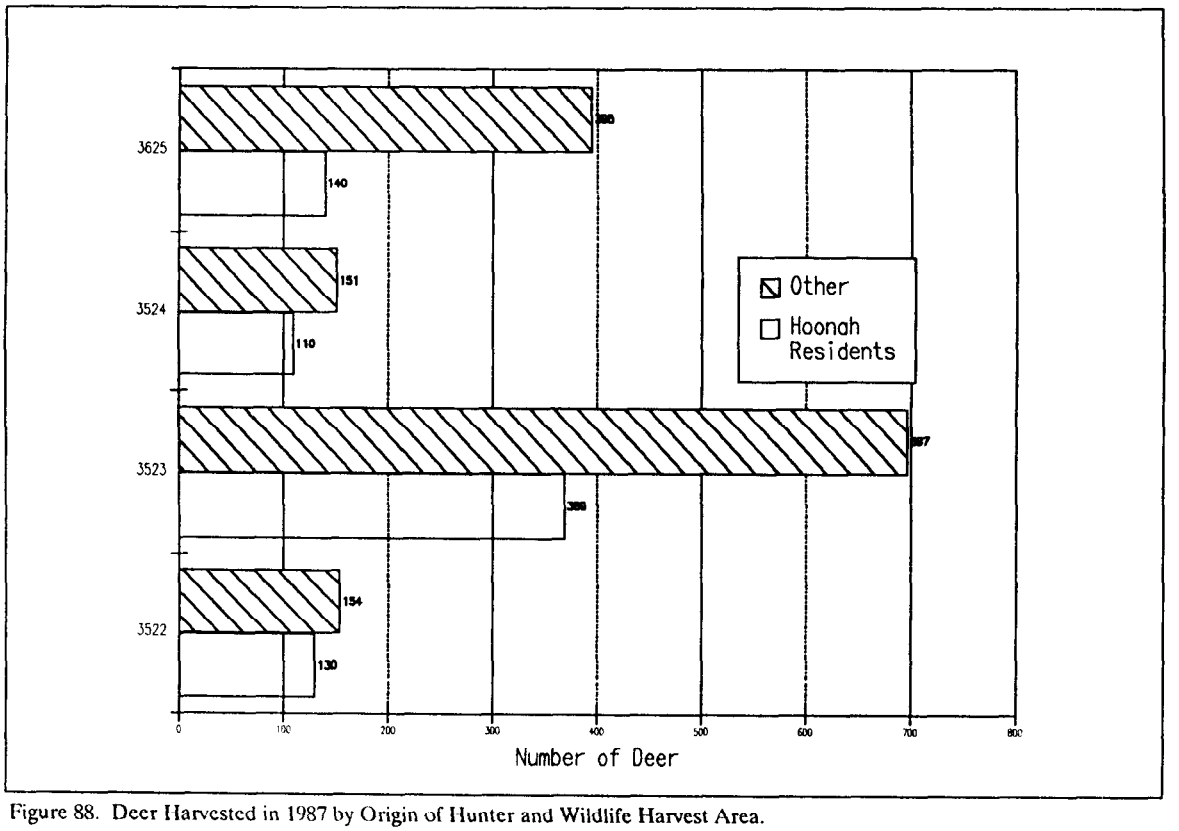

Figure 88. Deer Harvested in 1987 by Origin of Hunter and Wildlife Harvest Area.

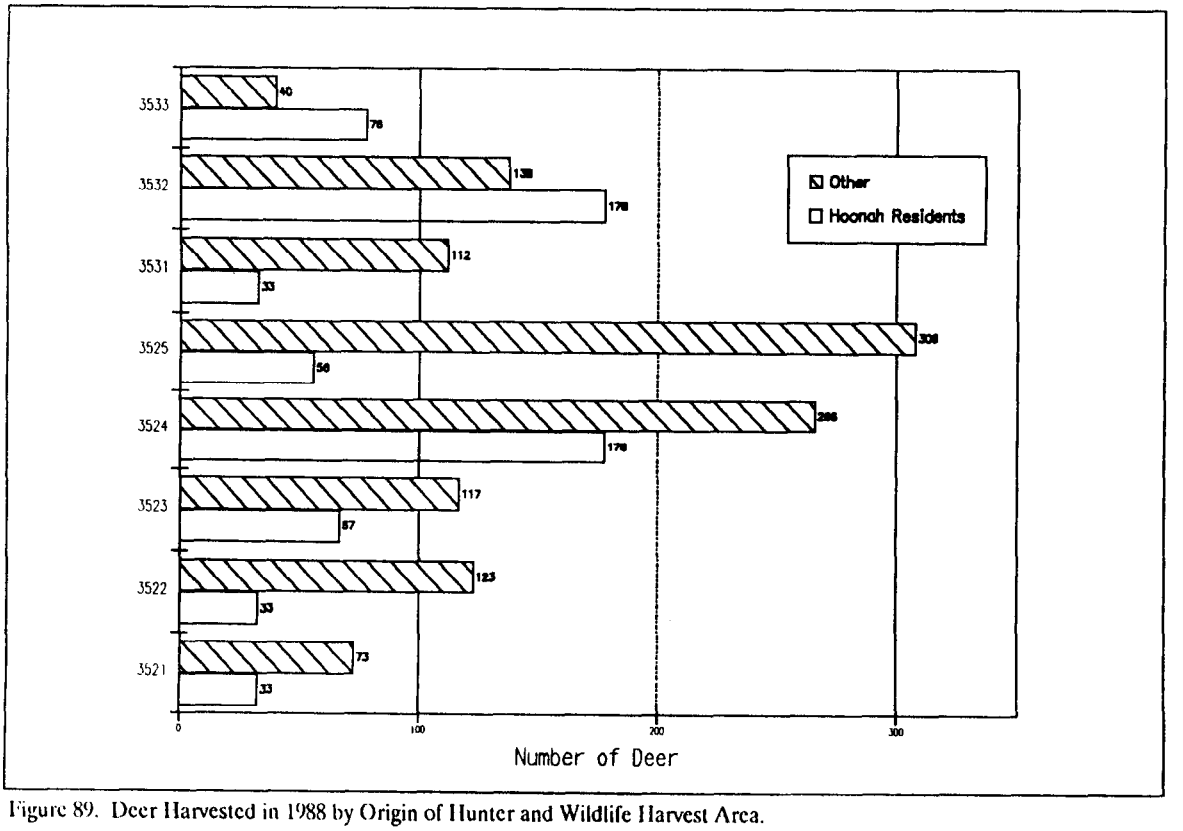

Figure 89. Deer Harvested in 1988 by Origin of Hunter and Wildlife Harvest Area.

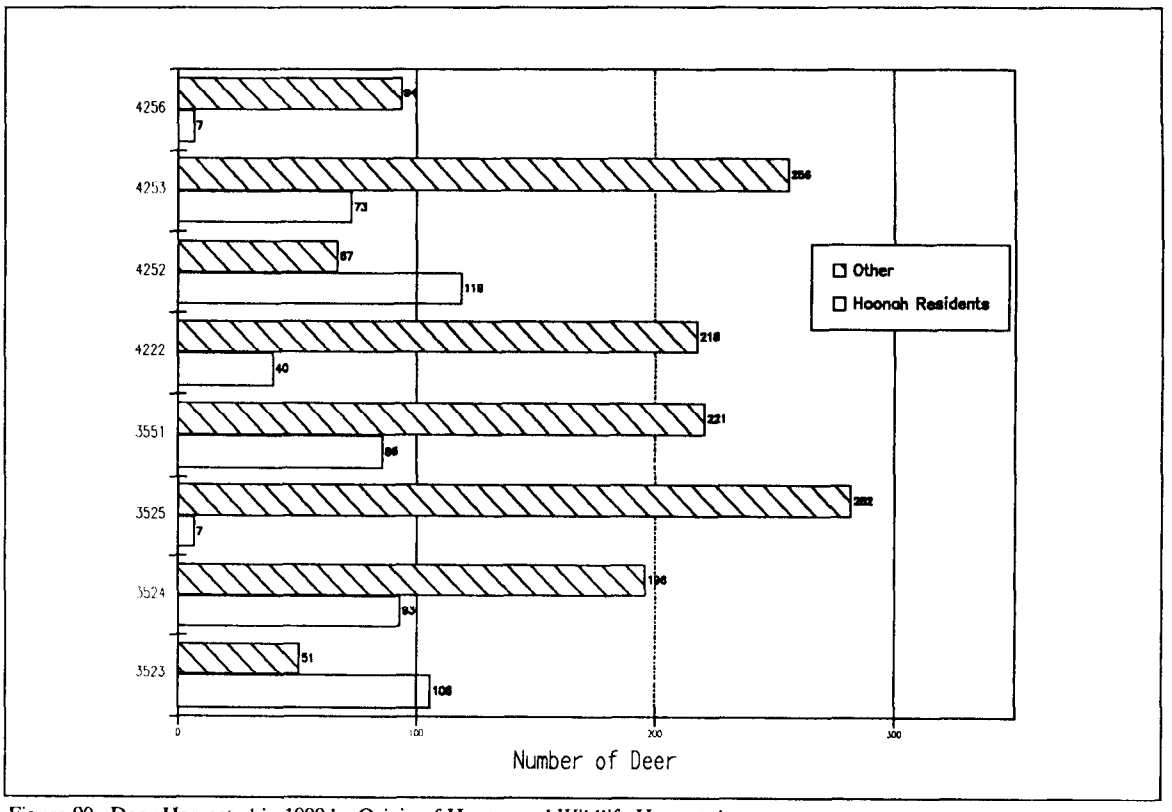

Figure 90. Deer Harvested in 1989 by Origin of Hunter and Wildlife Harvest Area.

Specific Areas

Spasski Creek Drainage and Adjacent Shoreline

This analytic unit provides an example of changes taking place in a heavily used area close to Hoonah where significant logging and road building activity has taken place in recent years. Located near Hoonah by water or land, the Spasski Creek drainage has been one of the most heavily used subsistence harvest areas in the Hoonah core area. For analytical purposes this drainage has been divided into Units 2, Lower Spasski, and 3, Upper Spasski, on Figure 80 (p. 179) with Unit 2 made up of the lower part of the drainage and the intertidal and coastal area and Unit 3 composed of the upper drainage and ridge areas. Elephant Mountain is in Unit 3.

Excluding mainland land mammals, virtually all species used by Hoonah residents for subsistence are harvested from this drainage or the intertidal area formed by material carried by Spasski

Creek (see Figures 70 to 77, pp. 157, 161, 163, 165, 167 169, 171, 173). The area has been particularly important for salmon, which were harvested both at the mouth of the creek and upstream, and for deer. Prior to logging, the broad lowland bordering the creek and coastal area was covered with thick old-growth forest and was prime winter habitat for deer. Because it provided excellent undisturbed winter deer habitat, this lowland area was very productive for deer in late fall and early winter. Elephant Mountain and other ridges and alpine habitat in the area have been important hunting areas early in the season before deer have been forced into lowlands by weather. Because of the high resource productivity of this area, it was consistently used by about 40 to 50 percent of Hoonah households since 1950, despite fairly arduous access over land or exposure to potentially rough water for water access (refer to Unit Descriptions in Appendix III).

The homestead site and cabins in the bay date from before 1970. Some Hoonah families previously lived all or part of the year in the coastal area around Spasski Bay and the bay has continued to the present to be used by Hoonah residents for extended camping trips. A trail from Hoonah to Spasski Bay was built by the Civil Conservation Corps in the 1930s. Access to this area was either by foot or by skiff or small boat; moorages in the bay provide protection from weather under most conditions. In 1983 and 1984 this area was connected by road to Hoonah and was interlaced with logging roads, as shown on Figure 13, p. 45. Extensive logging has taken place throughout the area on Huna Totem Corporation lands. Most of the saleable timber from this area had been harvested by the time of the 1986 field research. The remainder was cut in 1986. Very little old-growth forest remains in valley bottoms in this area at the present time.

Figures 91 and 92 show the percent of active harvesters using the Spasski Creek drainage analytical units. According to this measure of intensity, there has been no dramatic change in use of this area in recent years. The low point of use of lower Spasski, recorded in 1979 and 1980, may reflect early logging activity in this drainage. The increase in use in the last few years reflects the ease with which the area can now be reached by car or truck. This measure of intensity, however, masks some very real changes that have been taking place in subsistence use of this area. Although Hoonah resi-

dents continue to *use* this area, defined as *any* subsistence harvesting activity in the course of the baseline year, they believe that the character of that use and the productivity of the area have been reduced.

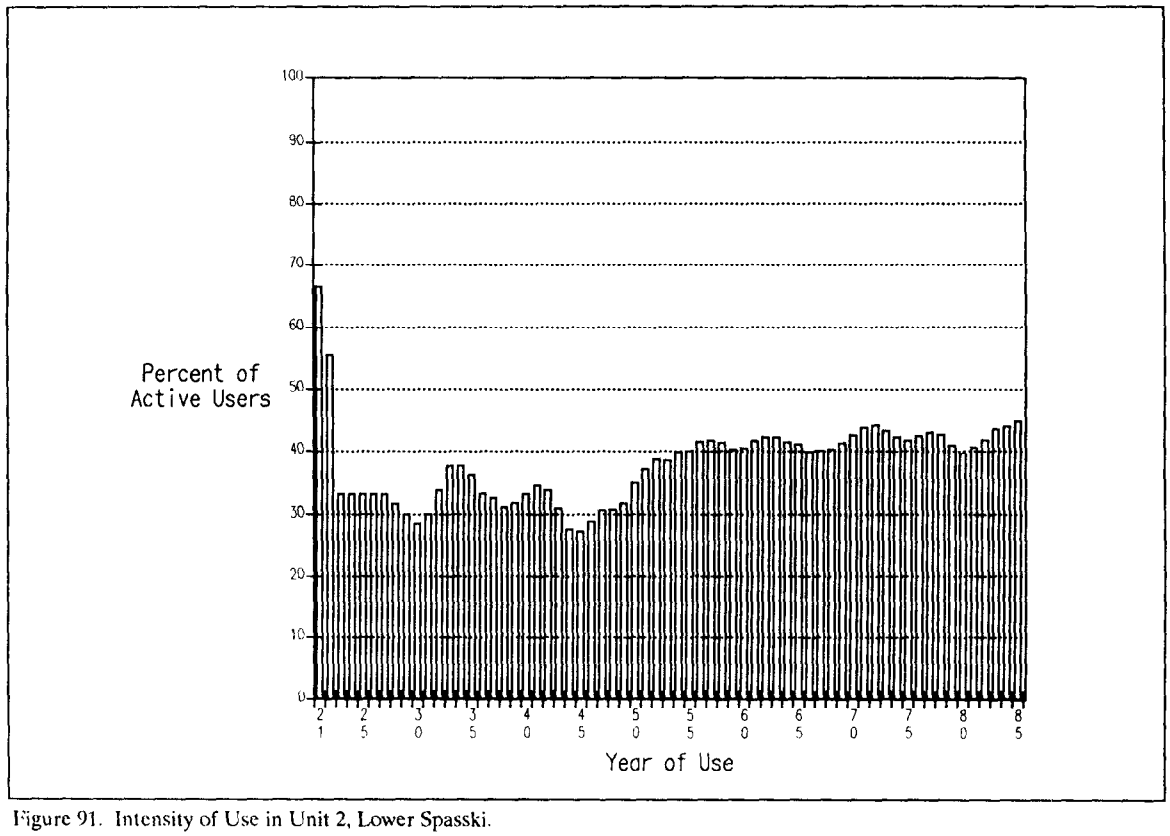

Figure 91. Intensity of Use in Unit 2, Lower Spasski.

At the time of field survey research in 1986, the Spasski trail had essentially been abandoned since it now goes through clear-cut areas and reaches areas that are more easily accessible by road. While some residents continue to hunt and harvest along the coast of this area by skiff or boat, almost all activity on land now uses the logging roads for initial access. A good deal of the use in the 1983 through 1985 time period consists of people driving the road network looking for deer or visiting a berry patch. All of the previous use took place on foot. Change in early deer season use of Elephant Mountain and other alpine habitat is unclear. On the one hand, roads make it easier to reach these hunting areas. On the other hand, interview data indicated that the most active hunters in the community appear to have abandoned these areas because of the clear-cutting and road building that has taken place.

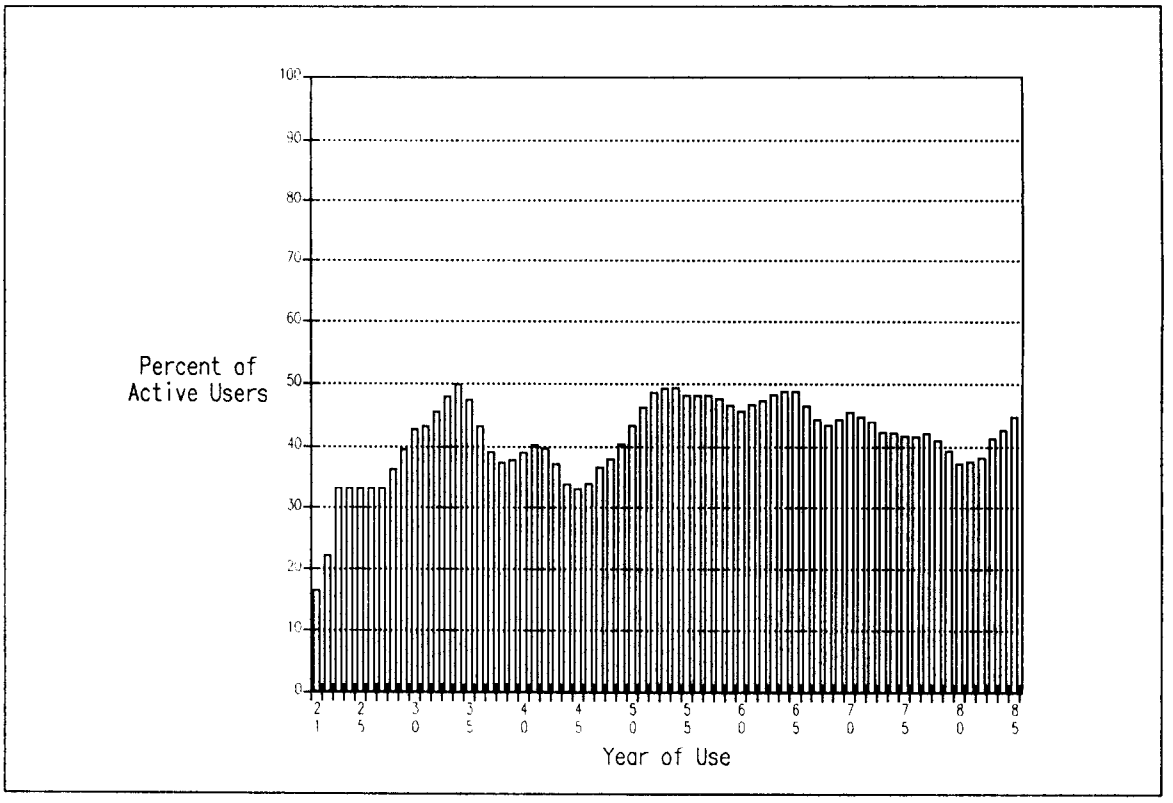

Figure 92 Intensity of Use in Unit 3, Upper Spasski.

Other changes include growing competition for resources with non-local hunters and a perceived decline in availability of salmon and deer resources as a result of logging activity. Fluctuations in the water level in Spasski Creek are believed by Hoonah residents to have adversely affected salmon runs in the drainage and the availability of these fish for subsistence. Key respondents report lowered salmon harvests in this drainage since road construction and logging have taken place. While road hunting for deer is a developing activity in these first years after logging has taken place, hunters who have used this area for many years report a sharp decline in the number of deer present later in the season after snow has fallen, due to the removal of almost all of the deer winter habitat that formerly characterized this area. Based on our knowledge of the relationship between deer populations and forest succession, some hunter success in clear-cut areas could continue for a number of years. About ten years after clear-cutting, or in about 1994, the area will be covered with dense brush, berries, and alder. The relatively few deer present will be difficult to hunt. The value of the area for deer hunting will

continue to be low through the period of biological succession into second growth forest. The change in deer carrying capacity of this area for deer is shown in Figure 64 (p. 141). This area is within Wildlife Harvest Area 3524 in Figure 64.

In summary, this area shows a long period of apparently consistent use, and it contributed importantly to Hoonah's overall subsistence harvest, particularly of salmon species and deer. Both the means of reaching the area and harvest activities have changed. Roads have become the main means of access, and subsistence harvest levels by Hoonah residents appear to have dropped. Competition from non-local hunters has become an important factor. Salmon harvests reportedly have declined due to side effects of logging. In a few years, due to removal of winter old-growth habitat and the low productivity of second growth stages of the forest habitat succession, this area will be much less productive for subsistence harvest of deer.

Neka Bay and Neka River

These analytic units provide an example of changes in subsistence taking place in a frequently used area within the Hoonah core area where significant logging activity and road construction has taken place in recent years. For analytical purposes this area has been divided into units 11, Neka River, and 12, Neka Bay and Neka Mountain, on Figure 80 (p. 179). Unit 11 includes the land surrounding the Neka River, adjacent tributaries, and some nearby alpine areas. Unit 12 includes the Neka Bay estuary, nearby bights and coast, and some inland areas.

As with the Spasski Creek drainage, almost all the subsistence species harvested by Hoonah residents have been taken within this area. All five Alaskan species of salmon are found in the Neka River drainage; other streams in this area have runs of chum salmon. High density old-growth forest predominated in the lowlands of this area, providing prime habitat for deer. Hoonah residents can reach this area within a hour's travel time by skiff or small boat through the protected waters of Port Frederick. Waterfowl were frequently hunted in the large estuarial mud flat at the head of Neka Bay and the mouth of the river. The Neka River unit was used by about 40 percent or more of active har-

vesters from 1950 through 1979. Deer hunting and salmon fishing were the most important uses during this time period. The Neka Bay unit was used by from 63 to 76 percent of active harvesters over the same period. The large mud flats and expanse of marsh in this area attracted a large population of migratory and resident waterfowl, making this unit the best waterfowl hunting area easily accessible to Hoonah residents. Deer were also taken in lowland habitat and some fishing for chum salmon also took place. There may also have been a small herring run that was utilized for prized herring spawn (refer to Unit Descriptions in Appendix III).

Construction of logging roads and the LTF at Eight Fathom Bight was underway in the late 1970s and logs harvested on Forest Service land began to be taken from this area in 1979. In the past years this area has accounted for a large proportion of the logged area on Forest Service land that has taken place in the Hoonah core area (see Table 2 and Figure 14, pp. 51, 49). Logs from clear-cuts in this area and from clear-cuts near Salt Lake Bay are often rafted and temporarily stored in the waters of the Neka Bay unit.

The intensity of use data shown in Figures 93 and 94 show a steep rate of decline in use of this area, most of which is contemporary with the expansion of logging. Use of the Neka River unit has declined from around 42 percent of active users in 1978 to about 28 percent in 1985. Use of Neka Bay declined from a high of about 76 percent in 1970 to about 55 percent in 1985.

The factors influencing Hoonah residents' subsistence use of the Neka River unit include the following:

a) Active logging is taking place during much of the deer hunting season; active logging tends to be avoided by subsistence harvesters.

b) Deer are becoming relatively less abundant in this area because of the progressive decrease in quality winter habitat. Change in habitat carrying capacity for deer is shown in Figure 64 (p. 141). This area is within Wildlife Harvest Area 3523 in this figure.

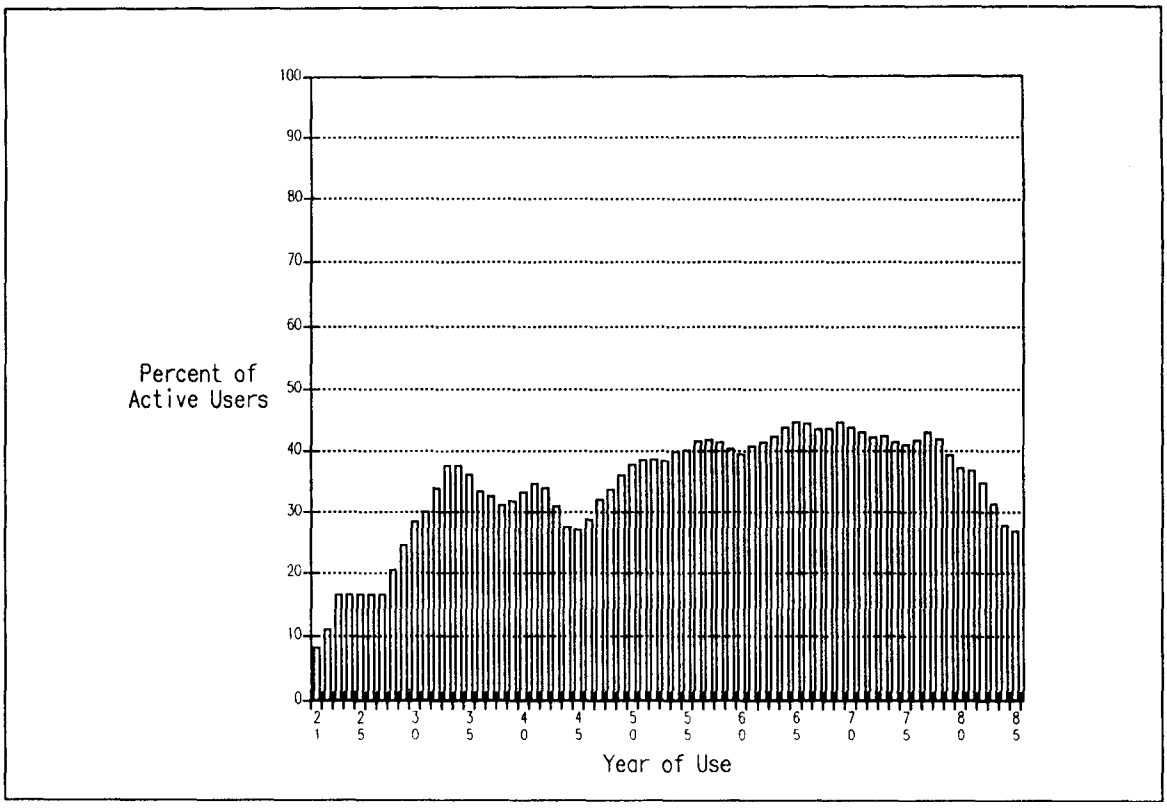

Figure 93. Intensity of Use in Unit 11, Neka River.

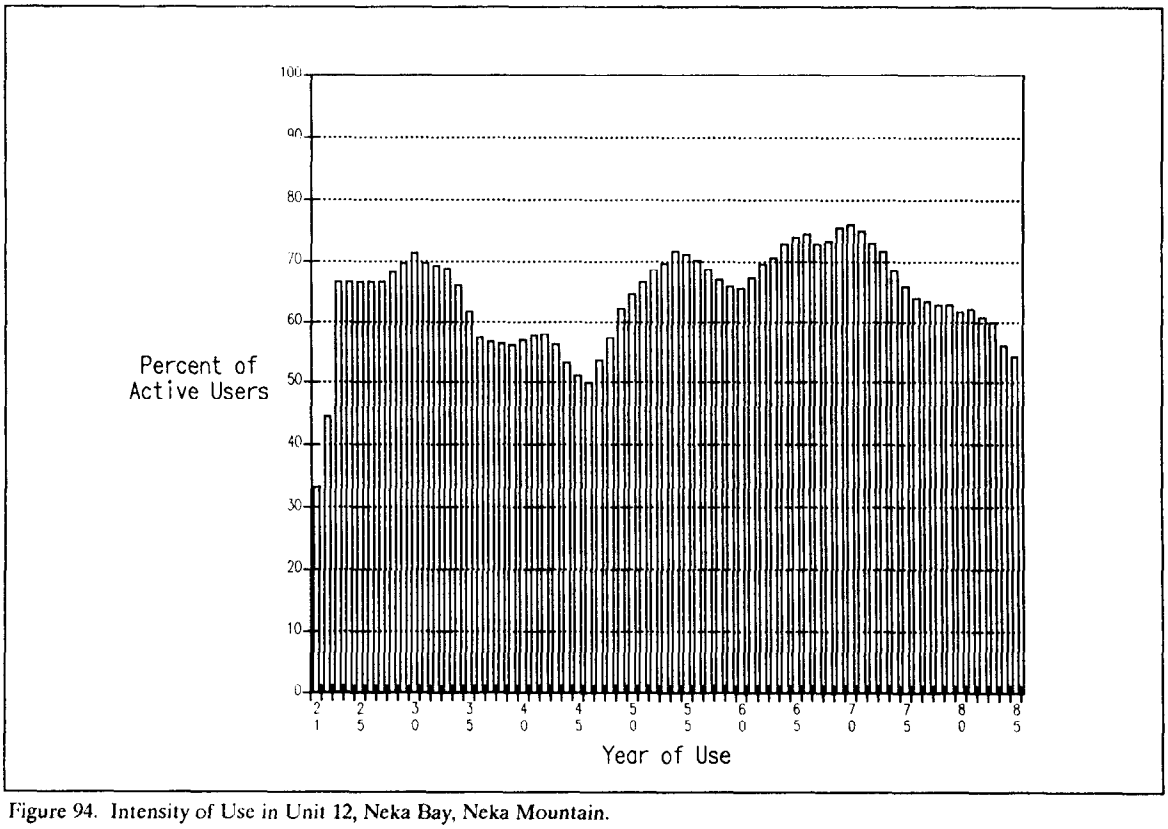

Figure 94. Intensity of Use in Unit 12, Neka Bay, Neka Mountain.

c) Harvesters who have wanted to hunt in a pristine hunting area previously used this area; these hunters may have abandoned the unit to avoid hunting in clear-cuts.

d) There may be harvest competition for Hoonah residents from logging company employees hunting in this unit.

The situation in the Neka Bay unit is somewhat different since no active logging or road construction had taken place in the unit at the time research was conducted. Key respondents have noted that both waterfowl and marine mammal populations appear to be down in this portion of Port Frederick from what they were previously[147]. They attribute this to the frequent presence of log rafts and disturbance caused by the increased level of boat, skiff, barge, and other logging associated activity in this unit. Competition from logging company employees may also be a factor.

Since more logging activity is planned in the Neka Bay and Neka River area, we would expect that the trends in use that have been noted would continue. Roads have been planned but not constructed for much of the Neka Bay unit. Should this trend continue, long-term use of this area for subsistence by Hoonah residents will probably continue to decline, apace with the logging activity itself and its ecological impact on the species that are harvested. Deer population will decline in inverse relationship to the amount of critical habitat that is altered. The lower deer productivity of second growth forests will combine with lower deer carrying capacity in harsh winters. If they are in fact side effects of logging activity, reported decreases in marine mammal and waterfowl will continue. Overall, this area will be able to provide a smaller subsistence harvest of all species for Hoonah residents over time. The level of competition from logging company employees depends on the size of the work force using upper Port Frederick. A logging camp in upper Port Frederick could develop into a long term community under some logging scenarios; this eventuality would severely limit Hoonah residents' subsistence use of this area.

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147. Key respondents were referring to the pre-logging period in the late 1970s.

Summary for Hoonah Core Area

This examination of the Hoonah Core Area shows important changes in subsistence harvesting of fish and wildlife, with changes in deer harvesting being most pronounced. We have noted greatly increased use of the core area for deer hunting by non-Hoonah residents using logging roads for access. The overall harvesting pattern has changed due to direct and indirect effects of logging activities from one where Hoonah hunters took most of the deer taken in the core area to a pattern where most deer are taken by non-Hoonah residents. Competition for deer with both the introduced population of loggers and with hunters coming from other communities has become an important factor for Hoonah residents. We have noted some shift to roads for access to hunting areas by Hoonah residents and a counter-vailing abandonment of heavily used roaded areas by other Hoonah residents. Based on deer harvests and deer habitat carrying capacity models, many of the hunting areas within the Hoonah core area were found to be unable support the levels of harvest that have occurred in recent years on a sustained yield basis over time. In some parts of the Hoonah core area, subsistence deer hunting may have been significantly restricted by logging in the 1980 through present time period. Projected declines in the deer population due to cumulative effects of planned logging on Forest Service and Native corporation lands may significantly restrict subsistence harvests in other portions of the Hoonah core area as well[148].

Point Couverden, Point Howard

This case study provides an example of changed use taking place in an area somewhat distant from Hoonah where little logging activity has taken place. The Point Couverden, Point Howard area is located on the mainland across Icy Strait from Hoonah. This area is identified as unit 27 on Figure 79

148. In its most recent examination of the impact of logging activities in the north Chichagof Island area, Forest Service concluded that its activities do present a significant possibility of a significant restriction (U S Forest Service, 1989). This wording appears to be equivalent to the ANILCA wording may significantly restrict subsistence uses that directs Forest Service Sec. 810 procedures. Data and analysis on the impact of logging on Hoonah subsistence deer harvest from an earlier draft of this report were used in this Forest Service determination.

(p. 177). Because of relatively low overall use levels, this unit with other similar units make up what we have referred to as the Hoonah periphery. The unit is literally on the periphery of the traditional territory of Hoonah Tlingit clans and is at the border with the traditional territories of Auke and Haines/Klukwan Tlingit clans. Given the large size of this unit and the range of habitat present, it is not surprising that most of the subsistence resources harvested by Hoonah residents are found in this unit. The streams in this unit support mainly chum and pink salmon runs, although local residents have reported seeing spawning king salmon as well. The unit continues to provide particularly good halibut fishing and black bear hunting.

Both the oral history of the unit and the archaeological record (Ackerman, 1968) identify numerous harvest camps and residence locations along the coastline of this unit. Hoonah residents maintained fishing and hunting camps and seasonal residences in this unit until very recently. Until the development of Hoonah in the late 1800s as the main central place for the Huna tribe, this unit was the main residence and subsistence use area for members of the Woosh Ki Taan clan, with small settlements located in coastal areas at Swanson Harbor and near salmon streams. Most of the unit west of Swanson Harbor has seen road construction in anticipation of pending timber sales and logging. The network of logging roads connects with the LTF located in unit 26. A public float for small boats has been placed in Swanson Harbor by the State of Alaska.

The relatively low overall rate of use that this unit has received is related to its position on the border of Huna clan territory, clan ownership, and to somewhat difficult access. As a border area this unit was potentially a place of contention in prehistoric times and was much less secure than the territory located more in the Huna tribe heartland. The relatively small size of the Woosh Ki Tan clan may also have influenced the use rate. Clan territories have continued to be observed to the present time. Since Hoonah and our random sample of households do not contain large numbers of Woosh Ki Taan, it is not surprising that use of this overall use of this unit might be low. Lastly, although the unit has safe moorages at Swanson Harbor and elsewhere in the Point Couverden and Point Harbor area, access to the area requires crossing Icy Strait. Adverse weather conditions can make the crossing rough and dangerous.

Figure 95 shows the percent of active harvesters using the Point Couverden, Point Howard unit over time. This measure of intensity shows a peak of use during the 1940s. This may be related to use of hand-trolling camps along the coast of this unit during those years or to some other unknown factor. Use fluctuated downward in the late 1960s. This may be due to a decline in seal harvests or to some other factor. Use level has declined from over 20 percent in 1975 to less than 10 percent in 1985. Interview data suggest that two causal factors seem to be responsible for this recent decline: greatly increased use of this unit by Juneau sport fishers and hunters and the preparations for timber harvesting in the vicinity that have been underway.

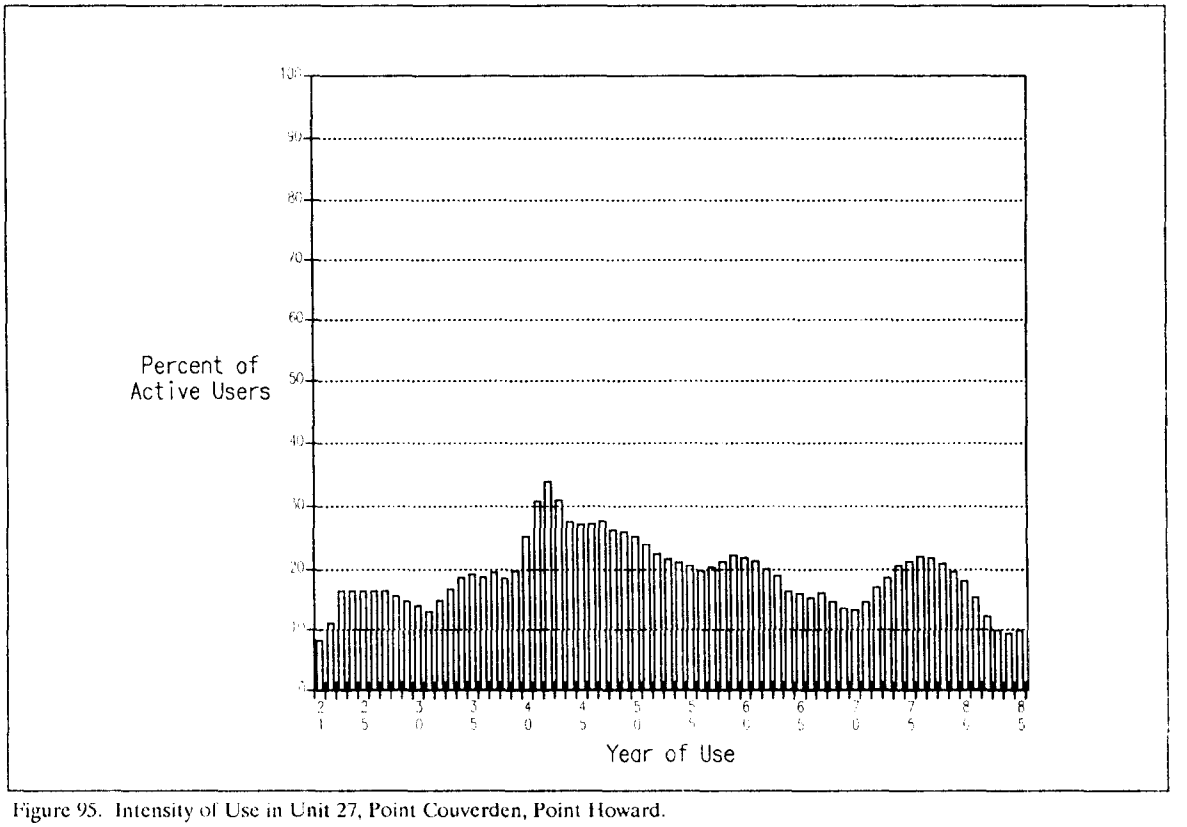

Figure 95. Intensity of Use in Unit 27, Point Couverden, Point Howard.

Juneau's pleasure boat fleet grew rapidly with the growth of state government spending in the early 1980s, and the Point Couverden, Point Howard area has become a popular destination for Juneau boaters, fishers, and hunters. The unit can be reached from Auke Bay marinas in one to four hours, depending on boat speed. Swanson Harbor and the state maintained float there provide safe anchor-

age or moorage. From May through September the unit receives heavy recreational use, particularly over weekends and holidays. Juneau users come to the unit for sport fishing for halibut and hunting for black bear. This increase in use has changed the character and possibly the productivity of the unit for subsistence harvesters. Since part of the ethos of subsistence involves quiet camp life surrounded by relatives, this may be a significant change. Hoonah residents can no longer plan to hunt, fish, or camp by themselves at traditional sites in this unit. Competition with sport fishers and hunters for halibut and black bear may have decreased Hoonah resident's ability to harvest these species from this unit. Road construction and other work preparing this unit for logging may have changed hunting patterns in this unit. We expect that use of this unit will remain low or drop to still lower levels if non-local recreational use of the unit continues or increases and if planned timber harvest in this unit proceeds.

Glacier Bay

This case study shows how a sharp decrease in subsistence use of an area can be due to changes in federal land use policy and regulation, absent of any habitat change. Because of its vital importance to Hoonah residents for subsistence use, we will sketch changes in this area in some detail. In this discussion Glacier Bay refers to all the Hoonah subsistence territory currently encompassed within National Park boundaries. Interviews with elders and other key respondents in Hoonah and with National Park Service staff in Gustavus provided important information for this section.

For analytical purposes we have divided the Hoonah subsistence territory that is now Glacier Bay National Park into units 19 through 24 shown on Figure 79 (p. 177). Unit 19 includes the outer coast, bays, and littoral areas from Cape Spencer northwest to Cape Fairweather. Unit 20 includes Taylor and Dundas bays and associated river systems. Berg and Fingers bays, Drake and Willoughby islands, and adjacent areas make up Unit 21. Unit 22 comprises all of the upper portions of Glacier bay. The Beardslee, Marble and other islands, along with the flat lowland around the Bartlett and Salmon rivers, and adjacent land make up unit 23. The Excursion River drainage and Sawmill Bay are important features of unit 24.

Historical Notes

Huna Tlingit see Glacier Bay as their original home land and frequently call the bay the *Hoonah icebox* in reference to abundant subsistence resources they formerly harvested in the bay. Huna Tlingit believe that their ancestors have consistently used the portions of Glacier Bay that have been free of ice. Oral history about very early use of the bay refer to a large lake that may have existed a number of glaciations ago[149]. Other oral history speaks of a time when Icy Strait was completely closed with ice. Given that later glaciations have scoured this area, no habitation sites have been found that correspond to this very early era in what is now the national park.

Oral history merges with glaciology and with written historical records in the Tlingit accounts of leaving the bay during the last glacial advance. According to these accounts, ice was advancing down the bay. In Susie James' history of Glacier Bay translated by Dauenhauer and Dauenhauer (1987) Huna people were living near the entrance to Glacier Bay, possibly near the Bartlett River, in five clan houses. A young women broke her menstrual seclusion and called the glacier ice toward the village.

It was said you could clearly see up the bay.
Through the mountains there you could see
the glacier waaaaay up the bay;
it was only a tiny piece
It was hanging up the bay.
It couldn't be seen much from the river;
it could only
be seen from way out.
But she knew the glacier was there.
That is why she called the glacier
like a dog,
"Glacier,
here,
here."
With that dryfish she had eaten,
the bones from the sides;

149. The lake was formed at a time when glaciers in the West Arm filled much of Glacier Bay and Muir Inlet in the East Arm was relatively free of ice. This condition is thought to have existed for centuries and to have ended in approximately 1200-1400 AD. Hoonah informants thought that this lake might well have had an important red salmon run, as well as having been a focal point for other subsistence harvests. This supposition would explain why Huna Tlingit oral history has remembered the lake. (Source: oral discussions at the Second Glacier Bay Science Symposium, Bartlett Cove, Sept. 1988).

The way you call a dog she was spitting on it;
she called it like a dog with it.

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Suddenly the people said,
"What's wrong with the glacier? It's growing so much!"
They used to see it w-a-a-a-a-ay
up the bay.
But now it was near, getting closer,
the way it was moving,

The story continues and describes how everyone had to leave the bay and escape the ice. An elderly Chukanei Dee woman, Kasteen, takes the place of her granddaughter, the girl who called the ice, and stays behind when the village is evacuated. The Tlingit who leave Glacier Bay settle at Hoonah and at other locations. Amy Marvin's rendition of the same story (in Dauenhauer and Dauenhauer, 1987) and briefer renditions by Liv Gray, George Dalton, and Sam Hanlon, told to us in the course of this research, reaffirm the main points of this story, namely, that there was a major settlement of Huna Tlingit in Glacier bay with at least five clan houses and that the village was forced to relocate because of ice advances.

This event probably took place sometime at the beginning of the last post-Wisconsin ice advance, generally thought to have commenced before 1700. Huna Tlingit were present in Lituya Bay when La Perouse visited in the late 1700s and appear to have continued to use non-glaciated areas coastal areas for subsistence harvests. When Vancouver sailed by in 1794, the entrance to the bay was a wall of ice and waters were filled with icebergs, hence the name *Icy Strait*. We have included this brief oral history because Huna Tlingit believe that they have had long standing occupancy of Glacier Bay and that it is a central part of their territory. Dauenhauer and Dauenhauer (1987) also provide an informative discussion of Tlingit concepts of ownership and show how Glacier Bay is *at.o'ow*, literally *an owned or purchased thing* according to traditional Tlingit law. "Thus the name Kasteen, the land of Glacier Bay, the story and the songs, and the visual image of the Woman in the Ice are the property or *at.o'ow* of the Chookaneidi clan. These *at.o'ow* were purchased with the life of an ancestor" (Dauenhauer and Dauenhauer, 1987, pg. 25).

The archaeology of the bay reviewed above (Ackerman 1968) and virtually all accounts of explorers of the area from LaPerouse (1796) to John Muir (1915) document the presence of Huna Tlingit

subsistence activity in Glacier Bay and confirm the basic facts of the Huna oral history[150]. In the historic period, Huna Tlingit reestablished their residence in Glacier Bay proper following the glacial retreat. Fishing camps with smoke houses, drying racks, and living quarters, and hunting camps were established throughout Glacier Bay. All subsistence resources used were present in the different ecozones of the bay, including mountain goats whose meat was used for food and fleece for weaving. As discussed above, during the early 1800s, when Hoonah was more of a winter village than a year round settlement, these camps were the main summer residences of many Huna Tlingit and the year round residences for some people. Harvest and residence sites in Dundas Bay on the Dundas River, in Berg and Fingers bays, at Barlett River and elsewhere in the Beardslee Islands, and at Beartrack Cove were particularly important, due to sockeye salmon runs at these locations[151].

Areas close to glacial faces are particularly productive biologically and have always been excellent sites for hunting harbor seals. Tlingit hunting camps were located near these areas[152]. Seals haul out on ice flows for pupping where they are safe from all but human predators[153]. Salmon species quickly colonized drainages after the retreat of glacial ice. At the turn of the century the Dundas and Bartlett rivers and drainages in Berg Bay and elsewhere in the ice free area had runs large enough to support major subsistence harvesting. Based on estimates of descendants of the Bartlett River cannery, the Bartlett River had a sockeye salmon run of about 100,000 fish in 1890.

Commercial fishing for salmon in Glacier Bay was established in the late 1800s and by 1930 most of the sockeye salmon runs were severely depleted. Use of rivers in Glacier Bay for subsistence salmon fishing may have decreased in the late 1930s because of poor runs. Hand troll camps were set up at locations inside the park boundaries during the pre-1950 commercial fishing era to target on king and coho salmon. Subsistence harvesting and food processing took place at these camps.

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150. For example the Harriman Expedition took photographs of Tlingit sealing camps in Glacier Bay in 1899 (Burroughs et al, 1910, reprinted in Goetzmann and Sloan, 1989).

151. Lituya Bay, Palma Bay, Graves Harbor, Fern Harbor, and other Cross Sound and outer coast locations that are now part of Glacier Bay National Park were probably important harvest locations during the historical period as well. Use of these areas by Hoonah Tlingit will be explored in future research.

152. Before the advent and wide use of powered skiffs and boats, Huna Tlingits processed seals near kill sites. Skins were stretched and scraped; meat was dried; and, most importantly, seal fat was rendered into oil.

153. Orcas or killer whales appear to avoid ice choked pupping grounds. Shrimp and crab are found near active tidewater glaciers; they and other species may provide feed for seals.

Plans to make Glacier Bay a National Monument began early in this century following John Muir's discovery of the grandeur of this area. Glacier Bay National Monument was created in 1925 and other lands were put under consideration for inclusion. The 1925 monument boundaries are shown on Figure 96. These boundaries included areas that still had a great deal of ice. The southern part of Geikie Inlet, Drake Island, South Marble Island, the Beardslee Islands, and all of Dundas Bay were not put in the monument at this time. The creation of the monument had little effect on subsistence uses of Glacier Bay. For one thing, almost all of the salmon streams used by Hoonah residents for subsistence were outside monument boundaries, but more importantly, no monument staff were present to regularly observe much less regulate subsistence harvests (Bosworth, 1988).

Restrictions and Exclusions

The era of restrictions and exclusions began when monument boundaries were greatly expanded in 1939 to include all the Hoonah subsistence territory within Glacier Bay. Some fishing areas were closed by the U.S. Fish and Wildlife Service to fishing with traps or nets because salmon runs had been depleted by commercial fish traps. Since red salmon runs were very poor at this time, Hoonah families' use of nets for catching salmon from Glacier Bay proper was probably not very great; subsistence net fishing for salmon appears to have continued in Dundas Bay, Excursion Inlet, and other locations. Seal hunting was allowed to continue for Hoonah Natives, and other hunting and resource harvesting continued as well. Salmon continued to be caught with troll gear. Goats, migratory and resident waterfowl, bird eggs, halibut and other fish, plants and berries continued to be harvested and used for food, medicine, and crafts. Fishing and hunting camps continued to be used in the early years after monument expansion.

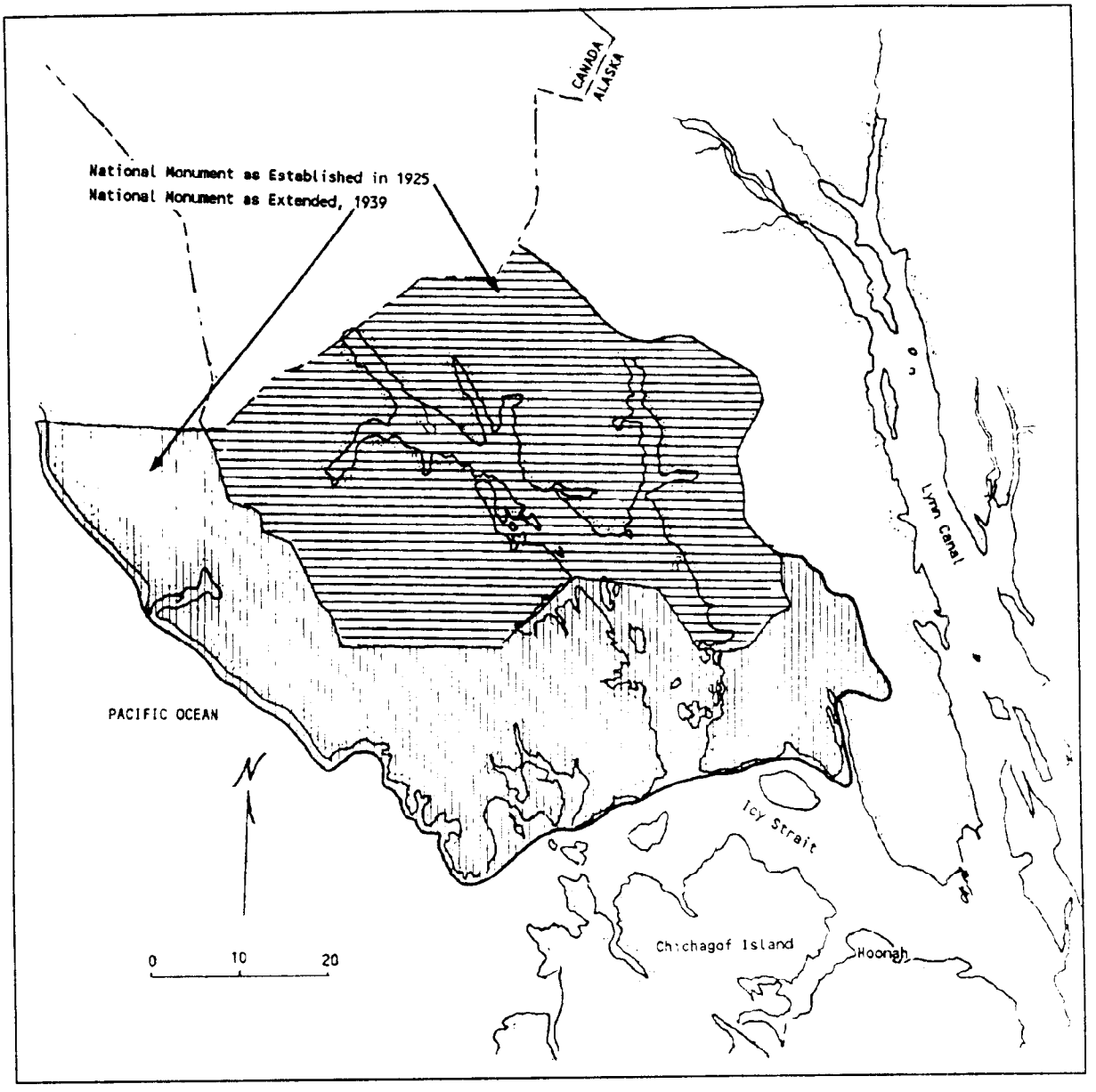

Figure 96. Boundaries of Glacier Bay National Monument, Glacier Bay National Park, 1925, 1939.

Seal hunting permits began to be issued in 1953 by Glacier Bay National Monument staff, and greater management and supervision of this traditional hunt began to take place. National monument rangers began to be stationed at Bartlett Cove in about 1953, and, after this, boarding sealing boats and checking sealing camps became more common. Administrative policies eliminating subsistence fishing began to be enforced at this time, and Hoonah residents were gradually excluded from their traditional fishing areas. According to key respondents, most camps and fish racks were burned down or removed by the early 1970s[154]. Sites used in this century are often marked by thick alder regrowth.

Seal hunting continued in Glacier Bay until the early 1970s. For a brief time in the early 1960s there was a good commercial market for harbor seal pelts. This market, combined with the $3.00 State of Alaska bounty paid for seal scalps[155], raised hunting pressure considerably. What had been a subsistence hunt in which seals were harvested primarily for their meat and fat with skins being used for craft purposes increasingly began to look like a commercial harvest. Total kill under permits issued by monument staff went from 340 seal in 1961 to 1440 seals in 1964 (Bosworth, 1988; National Park Service, Nd.). Although no deleterious impact on the seal population was ever demonstrated, monument staff believed that the seal population could not sustain this heavy harvest level and that this type of commercialized hunting was not appropriate in a national monument. They pressed vigorously to eliminate seal hunting and did so by administrative policy in the late 1960s. The boarding of Mr. Willie Marks' boat, the *New Annie*, in Glacier Bay in about 1966 or 1967, signaled the close of this era of subsistence use of the bay.

Glacier Bay National Monument became Glacier Bay National Park with the passage of the Alaska National Interest Land Conservation Act in 1980. Park staff has increased over the years. As park managers have become more able to know what is happening throughout the park, further tight-

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154. George Dalton Sr.' camp in Dundas bay was in use well into the 1970s. Park Service rented use of a building in his camp for use by wilderness rangers in the late 1970s (Mills, 1987). We are not sure that there was ever a Park Service policy of burning subsistence use sites, although Hoonah residents believe this to be the case. Other cabins, fish racks, and hunting camps appear to have been allowed to become overgrown and to decompose more gradually.

155. During both territorial and statehood times bounties were paid for killing seals and eagles because they were thought to compete with human salmon harvests. Bounties were also placed and on wolves because they were thought to compete with humans for wildlife species.

ening of enforcement of administrative policies eliminating subsistence use has taken place[156]. Glacier Bay has become an increasingly popular tourist destination in the last ten years and has become a major attraction for cruise ship passengers visiting southeast Alaska. Hundreds of thousands of visitors pass through park waters each year. This type of visitor use of the park has been encouraged and facilitated by the National Park Service.

Intensity of Use

Figures 97 through 102 show the percent of active harvesters using the Glacier Bay analytical units 19 through 24 respectively. Figure 79 (p. 177) shows the location of these units. Among these five units, unit 20, Dundas Bay/Fern Harbor shows the highest overall use level. Use levels for Berg Bay, Finger Bay, unit 21, and for upper Glacier Bay, Unit 22 are similar. Use of the outer coast, unit 19 is, not surprisingly, less than for other Glacier Bay units. All of these units show an extremely sharp rate of decline since the enlargement of the monument in 1939 and the beginning of active management of the monument in about 1950. Use of the Dundas Bay, Taylor Bay, and Fern Harbor declined from about 85 percent of active harvesters in 1950 to about 26 percent in 1985. Similar declines are shown in figures for units 21 through 24 in which use has declined from a high level to 12 to 16 percent in 1985. Use of Berg Bay, Willoughby Island unit and the upper Glacier Bay unit declined from about 70 percent to less than 15 percent over the 1950 to 1985 time period.

Figure 86 (p. 187) presented above represents any use of any unit of Glacier Bay. This pattern is similar to that observed in the Figure 97 through 101, namely a sharp decline in use following imposition of restrictive management policies.

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156. Subsistence hunting, fishing, and gathering has been restricted in Glacier Bay Monument and Park much more by administrative policy set by National Park Service superintendents and regional staff rather than by regulation. Establishing regulations for a National Park requires a thorough public review, including meaningful local public involvement of people and groups affected by proposed regulatory changes and national review through publication of proposed regulations in the congressional record. Huna Tlingits' ability to visit and to use their traditional territory has been limited without a thorough review or examination of the social and cultural impacts likely to result from this limitation on their subsistence hunting and fishing and from restricted access to Huna Tlingit cultural and/or religious sites.

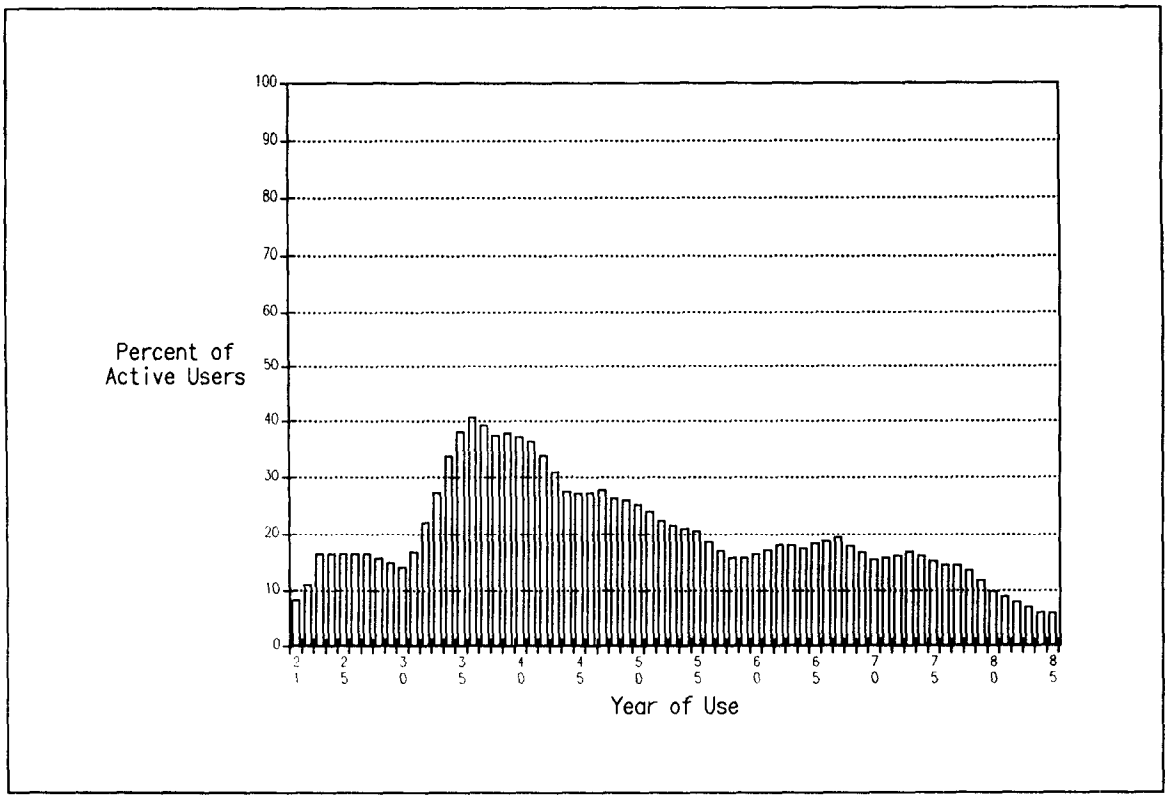

Figure 97. Intensity of Use in Unit 19, Cape Spencer/Lituya Bay.

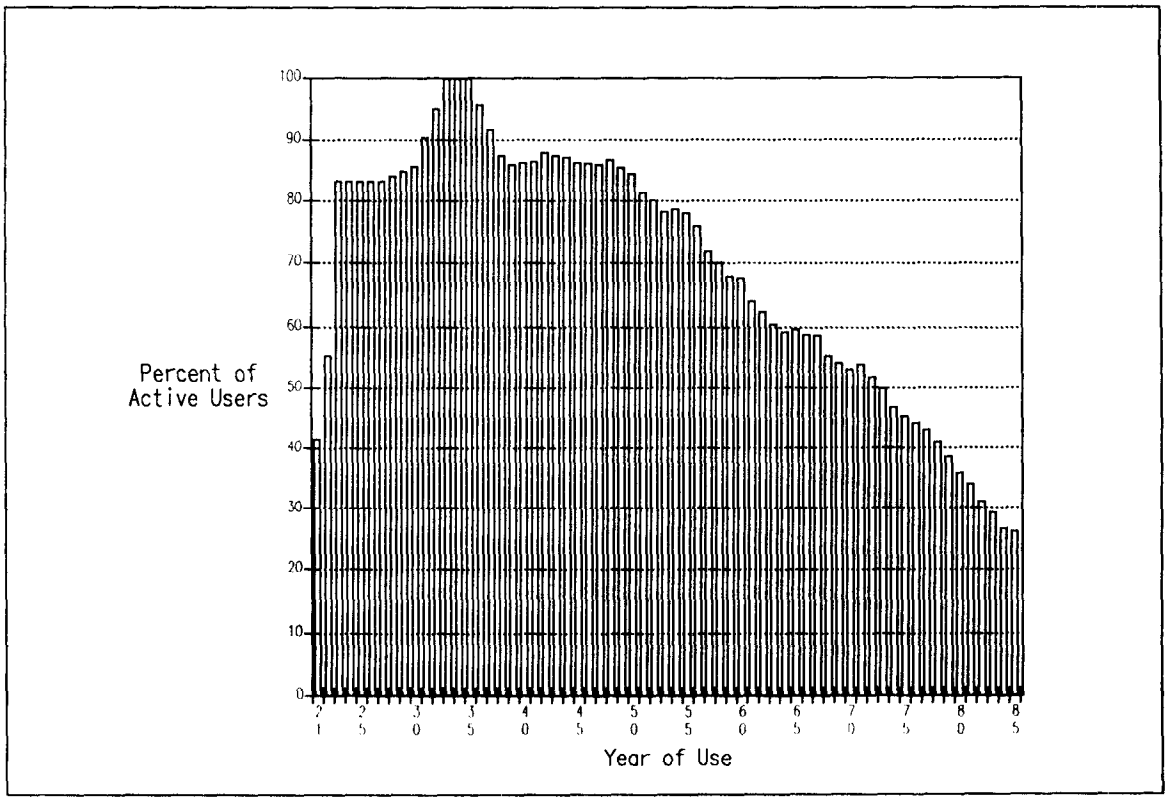

Figure 98. Intensity of Use in Unit 20, Dundas Bay/Fern Harbor.

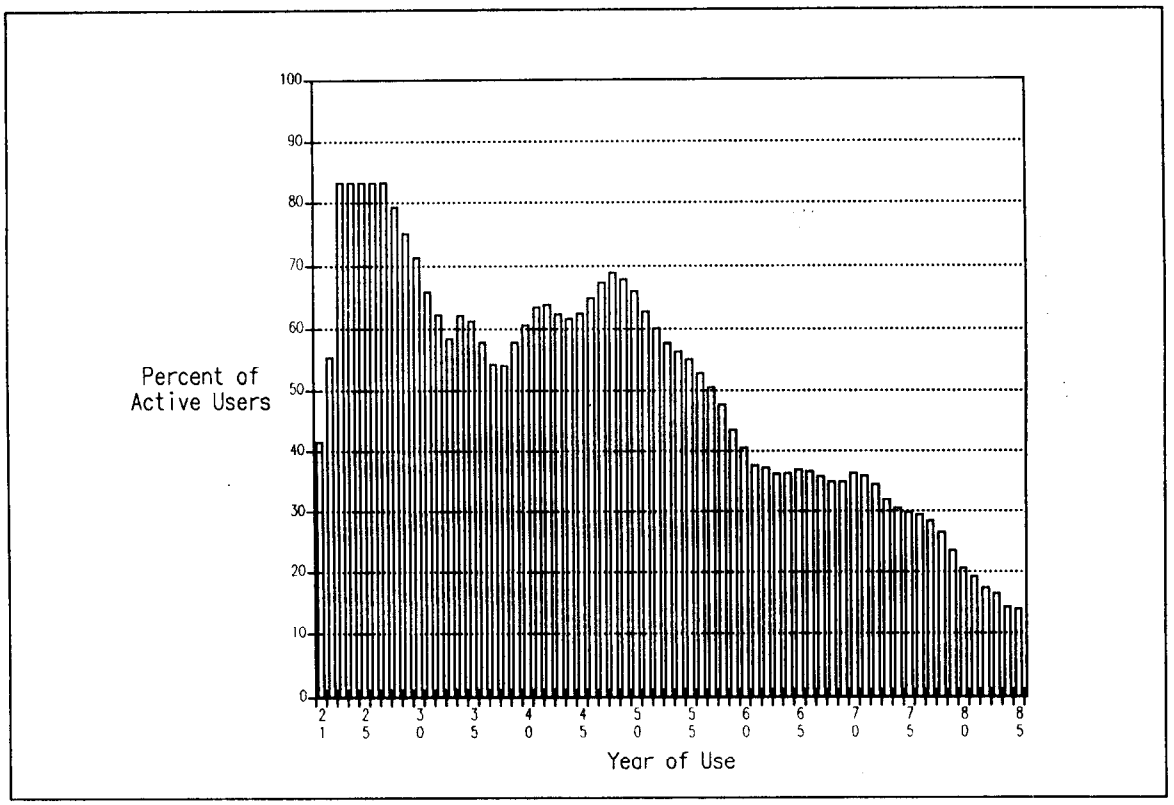

Figure 99. Intensity of Use in Unit 21, Berg Bay/Willoughby Island.

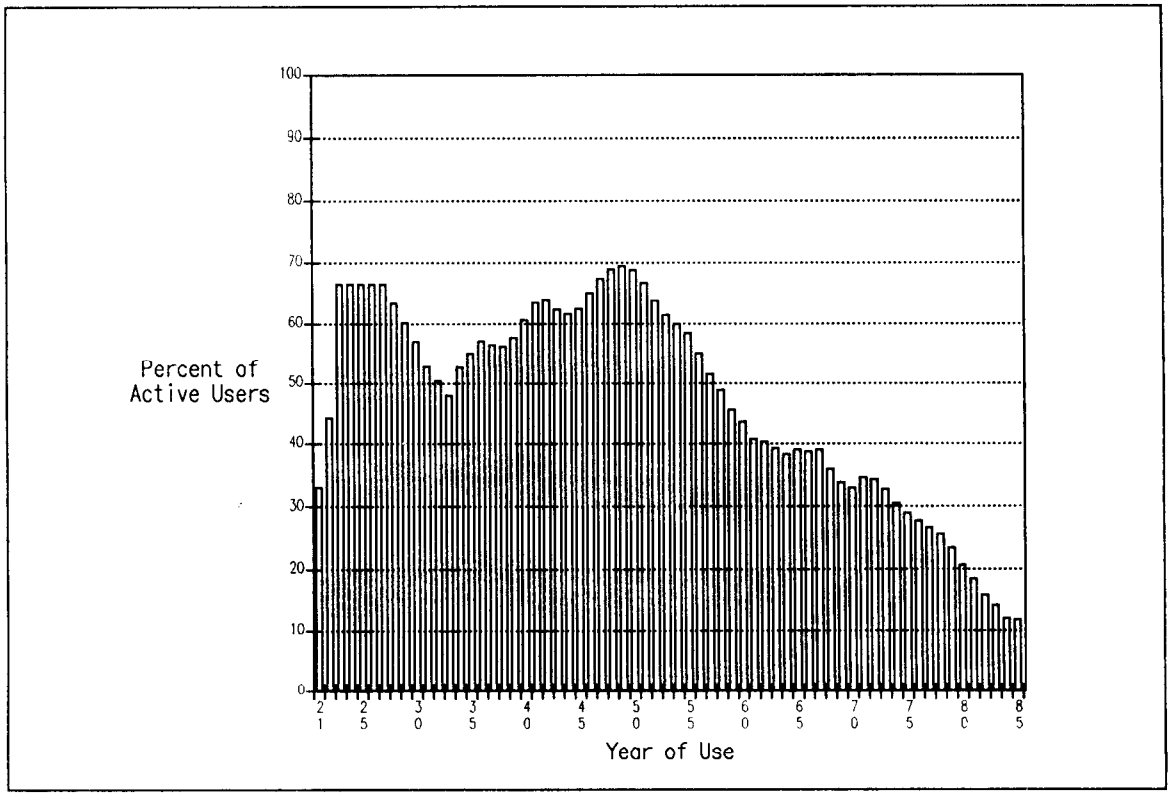

Figure 100. Intensity of Use in Unit 22, Upper Glacier Bay.

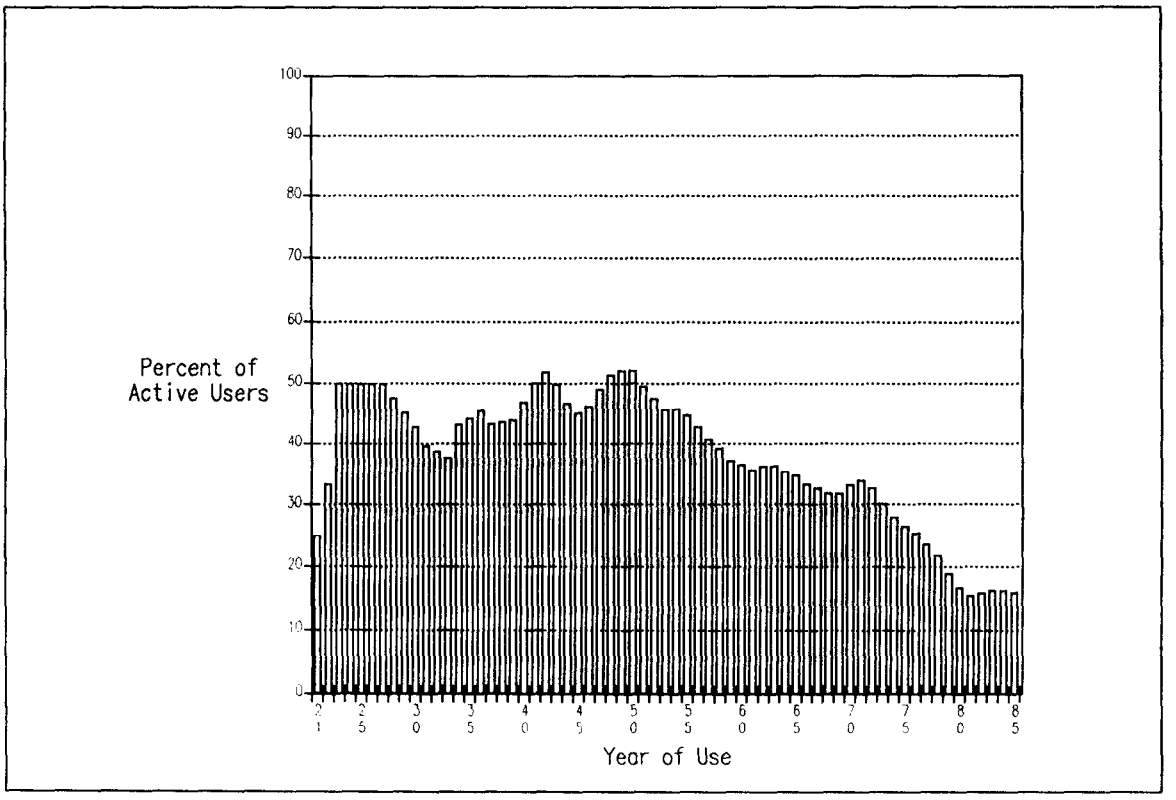

Figure 101. Intensity of Use in Unit 23, Beardslee Islands.

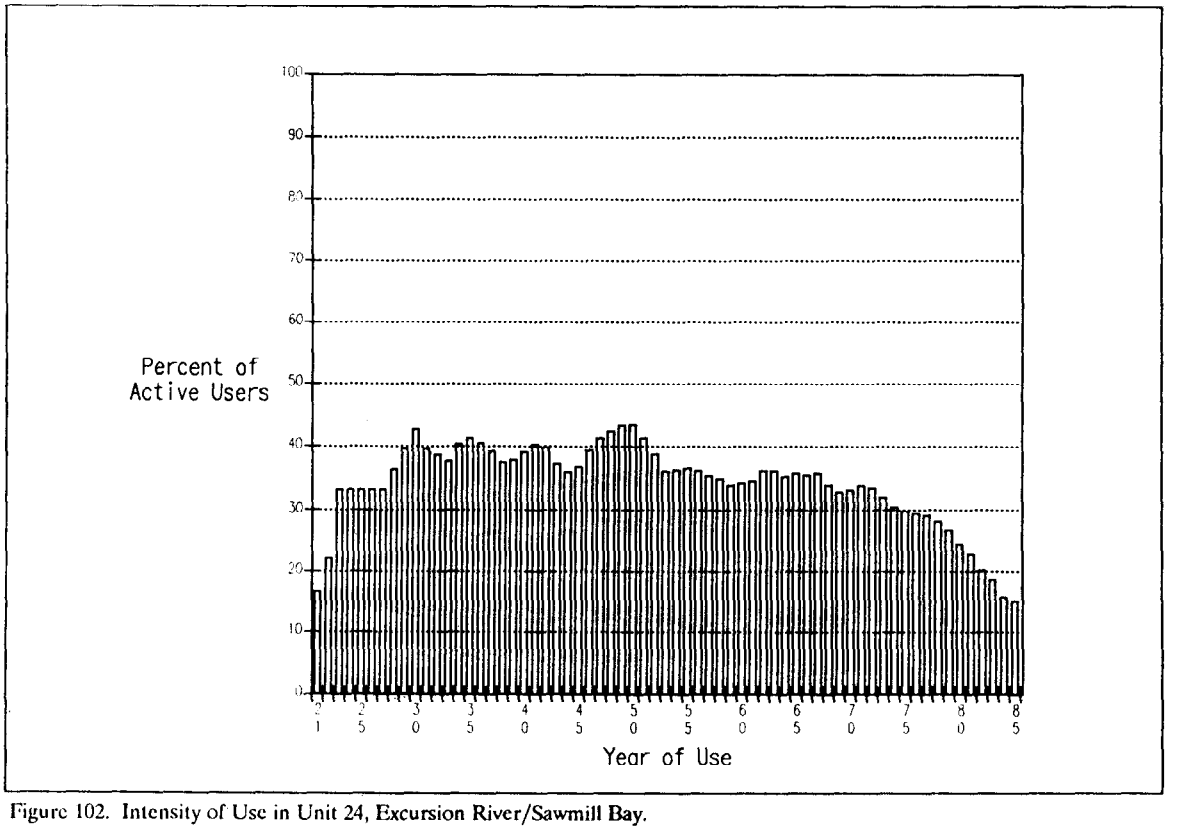

Figure 102. Intensity of Use in Unit 24, Excursion River/Sawmill Bay.

The recent history and current management situation concerning subsistence fishing salmon within Glacier Bay National Park boundaries is both complicated and unresolved. Some subsistence fishing with beach seines and purse seines for chum salmon in Excursion Inlet by Hoonah residents has regularly taken place in recent years, and this fishing appears to occur both within and outside the park boundary, which runs down the middle of the inlet. Fishing frequently takes place in Sawmill Bay, within park boundaries. Hoonah residents have been very firm in their belief that they should be allowed to harvest for subsistence within park boundaries. The National Park Service has stated that this use of resources, and commercial fishing as well, are incompatible with the purpose of the park and has suggested a phasing out of commercial harvests and preferred a continuation of the ban on subsistence fishing; sport fishing has not been seen as an incompatible resource use[157]. The National Park Service considers all waters within the three mile limit, or the state boundary, to be subject to its management. The State of Alaska may have jurisdiction over navigable waters in the national park and has an interest in maintaining its management of fisheries that take place in these waters[158].

In spring of 1989, the Alaska Board of Fisheries heard public testimony and staff reports and determined that residents of Hoonah had customary and traditional subsistence use of salmon and other finfish in the waters of Glacier Bay proper as well as in other waters that have been designated as part of the park[159]. A number of Hoonah residents requested and received subsistence fishing permits from the Alaska Department of Fish and Game for the waters of Glacier Bay National Park for the 1989 season. Permits specifically authorized subsistence fishing for red salmon in Berg Bay. The park superintendent eventually agreed to honor the 1989 permits, but no Hoonah resident was known to have fished in that year.

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157. Anthropologists studying the history and prehistory of human occupation of southeast Alaska have found that hunters and fishers have been part of the ecology of what are now park lands for up to 10,000 years and argue that subsistence hunters and fishers are a normal part of the park ecosystem (Richard Nelson, 1988).

158. The state may have jurisdiction and management authority over all navigable waters that have not been specifically removed from state control. The enabling act that created Glacier Bay National Monument refers only to the land areas. This jurisdictional question has yet to be adjudicated for this or similar Alaskan cases.

159. Prior to this finding by the Board of Fisheries, residents of most rural southeast Alaska communities were permitted to fish in Glacier Bay under State of Alaska regulations. No subsistence permits to do so, however, had been requested of or issued by the Department of Fish and Game. The 1989 Board of Fisheries finding was very specific and limited subsistence fishing in the waters of Glacier Bay to Hoonah residents.

Attempts were made by the Alaska congressional delegation during the 1989-1990 session to amend ANILCA so that Hoonah residents could fish within the park[160]. The proposed changes in ANILCA were not enacted during that session. However, the National Park Service, with encouragement from congressional oversight committees, agreed to permit subsistence fishing during the 1990 season. At public meetings held in the spring of 1990, the National Park Service presented its view that both subsistence and commercial fishing within park boundaries were illegal activities. Both types of fishing would continue to be allowed during the 1990 season, with the anticipation that legislative action by U. S. Congress or regulatory action by the National Park Service would resolve the situation before the 1991 fishing season. Permits to subsistence fish in park waters were issued by the Alaska Department of Fish and Game to Hoonah residents for the 1990 season, and preliminary reports indicate that some subsistence fishing took place at traditional subsistence harvest locations. As in the previous year, Hoonah residents were primarily interested in net fishing for red salmon within Glacier Bay proper and for chum salmon in park waters in Excursion Inlet.

Commercial fishermen continue to be allowed to fish in Glacier Bay for crab, halibut, and salmon. A great deal of the current subsistence use of this area is use by commercial fishermen who retain some of their commercial salmon harvest for subsistence use. Hoonah residents also continue to fish under State of Alaska sport fishing regulations with sport fishing gear in park waters for salmon, halibut, and other species[161].

Retrospective Harvest Levels and Use

The contribution of fish and wildlife from Glacier Bay to overall harvest levels of Hoonah households is quite low at the present time. No land or marine mammals, birds, or bird eggs are

160. Subsistence harvest in the main body of Glacier Bay National Park was not covered by ANILCA. Draft legislation specifically recognized Hoonah residents' tie to the area and their right to continued customary and traditional subsistence harvests.

161. Since there are no special seasons, bag limits, or fishing gear for subsistence fishing for king salmon, silver salmon, halibut, rockfish, and many other species, this is the usual way Hoonah residents harvest these species. Regulations aside, these species are important components of the overall subsistence harvest.

known to be taken[162]. Some salmon and marine invertebrates may be removed from commercial catches and used for subsistence; small numbers of fish may be caught under State of Alaska sport fishing regulations. Hoonah fishermen report that they are not allowed to go ashore in Glacier Bay when they are there on commercial boats (although this fear may not reflect Park Service policy). Hoonah residents, like any other users of the park waters, need a permit to enter the Glacier Bay proper by motorized boat during summer months if they are not engaged in commercial fishing[163]. In part because of the permit and other access restrictions, little plant and berry gathering, or use of intertidal resources, takes place.

In our household survey we asked a number of questions to gather retrospective data on harvest and use of Glacier Bay resources. We found that:

1) About 54 percent of our sampled households had used Glacier Bay for subsistence at some time. This figure is quite high given that Huna Tlingits' access to resources in the park has been difficult for many years.

2) For households that had used Glacier Bay the mean first year of use was 1942. Only 7 of our sampled households reported beginning to use the bay after 1960. Most of the households that have never used the bay for subsistence began being active harvesting households after National Park Service policy had closed the bay to most subsistence uses.

3) Concerning resources harvested, 53 percent of Glacier Bay users reported harvesting chum, 65 percent coho salmon, 90 percent king salmon, 48 percent pink salmon, and 53 percent sockeye salmon from Glacier Bay waters during their lifetimes. Sixty-six percent of users harvested halibut, 45 percent crab, 69 percent seals, 32 percent mountain goat, 77 percent bird eggs, and 90 percent berries from Glacier Bay.

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162. Since harvest of these species is presently illegal, Hoonah residents may not have wished to report harvest from within Glacier Bay National Park.

163. Permits for recreational boats have been required since the mid 1980s when it appeared to park managers that the number of humpback whales in the park were declining. Permits allow a stay of 7 days in Glacier Bay and must be requested before entry into park waters. About 30 recreational boats are allowed in the park at a time. Heaviest recreational use occurs in the end of June and early July, the peak time for sockeye salmon harvesting.

4) We also asked survey respondents what proportion of their total subsistence harvest came from the bay when they had traditional access to the bay's resources. The mean household harvest from the bay comprised 55 percent of the household's annual subsistence take.

These survey data confirm statements made repeatedly by Hoonah residents during the course of the field research that Glacier Bay has traditionally supplied a major portion of the fish, wildlife, and plants harvested for subsistence by Hoonah residents.

Summary

The area now under National Park Service administration has been part of the Huna Tlingit subsistence territory since prehistoric times. Early subsistence use of the area and the presence of harvesting camps and seasonal residences are well documented. Moreover, Hoonah Tlingit trace their tribal origins to sites in Glacier Bay.

Glacier Bay National Monument was created in 1925, and the monument was expanded to include Hoonah's subsistence use areas in 1939. From Hoonah's perspective, the creation of the monument, its expansion, and its later incorporation into the National Park system had little effect in themselves. Changing monument and park management policy, however, has had much more serious effects. The gradual adoption of progressively restrictive administrative policies governing use of Glacier Bay lands and waters by Huna Tlingits, particularly since the late 1950s, has restricted much of the subsistence use of this area by Hoonah residents and limited Huna Tlingits' access to traditional cultural sites that have been integral parts of Huna tribal heritage. Huna Tlingits are actively working to reverse the progressive exclusion from Glacier Bay National Park that has taken place. Unless a new approach to management of resources present in the park is taken, the restriction of Hoonah's customary and traditional subsistence use of the lands and waters Glacier Bay may become permanent. The present generation of older subsistence harvesters in Hoonah who have used Glacier Bay are advancing into old age with little opportunity to pass on their knowledge of the cultural sites located in the park and of subsistence harvesting of species found in the park to the coming generations.

CHAPTER 7

SUMMARY AND CONCLUSIONS

The research upon which this report is based was designed to a) collect and analyze baseline data on subsistence use of fish and wildlife in Hoonah, b) measure or estimate change in use over time of the areas used for subsistence harvests, and c) examine the impacts of logging on subsistence. To set the context for the findings of this research, we have presented background community profile and economic data for Hoonah in chapters Two and Three. Baseline subsistence harvest and use data and territorial or geographic use data have been presented in chapters Four and Five.

As we recognized when we chose Hoonah for a community study, extensive timber harvesting has been under way in the Hoonah subsistence territory for only a few years. Because of this, we have been able to examine the effects of timber harvesting in their early or beginning stages. As logging proceeds on the northern portion of Chichagof Island, much greater effects are likely to occur than those observed or documented at the time of field research. This study has investigated the economic, social, and cultural aspects of subsistence, not the biology of prey species. However, since some of the impacts on subsistence in Hoonah will take place because of the impact of logging on the distribution and abundance of species used, we have discussed some of the biological effects on salmon and deer. Themes of change and example case studies were presented in chapter Six.

Although this research was specifically designed to examine the relationship between logging and subsistence, we found that state and federal resource management policies and regulations have also had a significant effect on Hoonah's subsistence harvest and use of fish and wildlife in recent years. Some of these have been outlined as well. Factors affecting use of specific parts of the Hoonah subsistence territory have been discussed in case studies; unit descriptions in Appendix III provide an outline of subsistence use and a measure of intensity of use of each of 30 geographic areas in the Huna Tlingit territory.

Perspective on Hoonah's Subsistence Economy

Hoonah continues to be a predominantly Alaska Native community and is the locus of the Huna Tlingit Indians who have lived in the Cross Sound, Glacier Bay, and Icy Strait area since at least the last major glaciation[164]. Present community size, 960 persons in 1986, is comparable to the size of the Huna tribe in the late 1800s, 908 persons in 1880.

Commercial fishing, work on government funded programs and services, and, in the last years, logging-related employment formed the basis of Hoonah's cash economy during the early 1980s. In comparison with urban Alaskan communities, income levels were low in the community, although income has risen in recent years. An estimated 26 percent of all income came from logging or timber management related jobs in the 1985 baseline year.

Hoonah residents harvested an estimated 209 lbs per capita and used 234 lbs per capita of subsistence foods in 1985. These harvest levels were comparable to levels in other southeast Alaska rural communities, although lower than those of predominantly Alaska Native communities in northern parts of the state (Wolfe and Walker, 1987). These levels of harvest and use are greater by a factor of ten than those in urban Alaska. Replacement value of the subsistence foods used in Hoonah was estimated to be between about $879,558 and $1,539,227 for the base year.

The desired level of use among sampled households in Hoonah was significantly less than actual harvest for most key species. Reasons for this difference were discussed. Substantial home consumption of fish taken from commercial salmon harvests takes place. Also, much of the halibut, salmon, and rockfish used for subsistence are harvested under sport fishing regulations. The procurement of subsistence foods under commercial and sport fishing regulations is due, in part, to restrictive subsistence regulations which do not provide adequate opportunities for traditional subsistence fishing or the use of traditional means of harvesting fish.

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164. The Hoonah Tlingits' belief that their ancestors were in the Cross Sound and Icy Strait area from before the last glaciation may well be correct. This would place their occupancy before the earliest cultural layers at the Ground Hog Bay archaeological site, dated 9000 years before present. See Moss (1989) for a review of area archeological data.

Participation in harvest and use of subsistence fish and wildlife was high in Hoonah, with almost all sampled households using key resources. As in other subsistence communities, a small number of very productive households were found to account for a large proportion of the fish and wildlife harvested. This harvest was widely shared with less productive households.

The current subsistence use area of Hoonah was delineated and found, not surprisingly, to closely coincide with the territories owned by Huna Tlingits earlier in this century. The subsistence use area was broken into 30 units for analytical study of change of use over time. Graphs of intensity of use over time were prepared for each unit and other analysis of change in use performed as well.

These baseline data indicate that Hoonah continues to have what has been described in the literature as a *mixed subsistence-based economy* (Wolfe and Ellanna, 1983). These same data were considered by the Joint Boards of Fisheries and Game in 1987 when they classified Hoonah as a rural community for subsistence regulation purposes.

Hoonah Deer Harvests

Deer is the main land mammal species harvested by Hoonah subsistence hunters. Using the 1986 household survey and deer harvest ticket records, harvest levels were presented for the 1980s. Overall subsistence harvest of deer by Hoonah residents appears to have fluctuated from 1983 to 1989, but has not shown any trends of increasing. The low harvest level in 1989 may be the beginning of a trend of declining subsistence harvests. By contrast, the total harvest of deer in the Hoonah core area and the Tenakee Inlet and Freshwater Bay area rose rapidly during the 1980s because of increased hunting activity from new Port Frederick residents and from non-local hunters.

Effects of Road Development and Logging

Hoonah residents and Roads

Hoonah residents reached hunting and fishing areas either on foot or by skiff or boat prior to the construction of the logging road network. As roads have been extended into new areas, some Hoonah residents have used them for access to harvesting areas immediately following road construction. In 1985, about 60 percent of sampled households reported using a car or truck for hunting access at some time during the previous year. Some use of roads, particularly for deer hunting, may increase in coming years if more miles of roads are built in wilderness areas, should more Hoonah residents acquire cars and trucks.

Roads have changed the character of use in some parts of the Hoonah territory. Areas in upper Spasski Creek, upper Gartina Creek, Game Creek and elsewhere in the road-connected area have become more accessible. Reaching some hunting areas no longer requires potentially risky travel by skiff or boat and long hiking on foot. This makes access easier for Hoonah residents and others. However, areas where roads have been constructed no longer afford the possibility of hunting in wilderness or relatively undisturbed areas, and roads are increasingly crowded with non-local hunters during the deer hunting season.

Some change in areas used for hunting by Hoonah residents appears to be taking place because of these changes in access. Key respondent and interview data indicate that inland areas that were rarely hunted before roads were constructed appear to be getting more heavy use by Hoonah hunters. On the other hand, key respondents also believe that the most productive Hoonah hunters have recently abandoned areas they formerly hunted after roads have been constructed and after these areas became heavily used by non-local hunters. We have shown that a large portion of deer taken for subsistence by Hoonah residents in 1988 and 1989 were taken from Wildlife Harvest Areas that have no roads; we concluded that the majority of deer taken for subsistence continued to be taken using traditional means of access, despite the growth of the road network in the Hoonah core area.

Use of Roads by Other Hunters

Before road construction and logging began to take place in the Hoonah core area, use of the area by non-local harvesters was more limited. With the expansion of the road network, the area has been receiving rapidly increasing use by hunters from Juneau and other southeast communities. Non-local hunters are able to bring trucks and all terrain vehicles to Hoonah on the Alaska State ferries and hunt from logging roads. Based on harvest ticket records, about 68 percent of the deer taken in the Port Frederick area were harvested by non-local hunters in 1989. Continued use of the Hoonah core area by non-local hunters will continue and may increase in coming years[165]. This increased use of road-connected areas close to Hoonah by non-local hunters has been a main early effect of roading and logging.

Longer Term Effects on Deer Population

As described in the text, the long-term size of the deer population in the Hoonah subsistence territory is dependent on the amount and distribution of high density old-growth forest used by deer for winter forage and for shelter during severe winters. Winters have been mild in recent years, and the deer population has increased from 1980 to 1986 or 1987, despite the increased, progressive loss of old-growth habitat in the area. Most of the Tongass National Forest land in the Hoonah core area has been designated LUD IV, to be managed for timber harvest. Timber management plans often call for three entries into an area over a 100 year period. According to an accepted deer population model the deer population is expected to decline over that time period (Schoen *et al*, 1985). The decline in the deer population used by Hoonah residents for subsistence will be a long-term, cumulative effect of logging of old-growth on Native corporation land and on Tongass National Forest Land near Hoonah.

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165. Forest Service management policy could close roads to hunters limiting access, and the Alaska Board of Game could limit non-local hunting by regulation. These actions could limit the take of hunters from other communities.

From 42.4 percent to 83.3 percent of the commercial forest lands in each VCU, or a mean of 62.4 percent across VCU, are cut or scheduled to be cut under TLMP. According to the modeled relationship between the deer population and various types of forest composition, the remaining deer population in each VCU will decrease to between 9 percent and 44.1 percent, or a mean of 28.4 percent across VCU, of the levels found before timber harvest. The resulting deer population in the Hoonah core area will not be sufficient to support subsistence harvesting by Hoonah residents at current levels, much less to permit harvesting at the reported desired level of take by Hoonah households. We also have noted that residents of other communities have been found to have subsistence harvest of deer in the Hoonah core area. Our conclusions agree with recent Forest Service analysis which found that significant restrictions for subsistence hunting had occurred due to logging in parts of the Hoonah core area. Forest Service also determined that its preferred logging alternative may significantly restrict subsistence harvests of deer in the Hoonah core area Wildlife Harvest Areas should this alternative be followed (1989)[166].

Restricted hunting seasons, bag limits, or other regulations to protect remaining deer will probably be necessary before the 28.4 percent deer population level is reached. In the future, Hoonah subsistence hunters will probably have to spend greater amounts of time and effort deer hunting and achieve an overall lower rate of hunting success.

Effects of Population Change and Competition

Increasing Population using the Hoonah Core Area

Timber management and logging activity in the Port Frederick area has been found to result in an influx of new people into the area used by Hoonah residents. There are two components to this increase: a relatively small increase in population of Hoonah proper and a much larger increase in the

166. Pending legistlation, on going cases in federal courts, and other factors may alter the location and extent of logging and road construction in the Hoonah core area from what has been presented as Forest Service's preferred alternative.

number of persons living at Whitestone and Eight Fathom Bight logging camps and other more temporary locations in the Hoonah core area. In 1986, we estimated that, in addition to Hoonah residents, about 400 persons were living in the Port Frederick area during the seasonal logging activity. The new residents competed with Hoonah residents for deer in the Hoonah subsistence area. Harvest levels of the permanent residents at the Whitestone camp were found to be comparable in magnitude to those of Hoonah residents, particularly for deer and halibut.

With continued logging and road building on north Chichagof Island at the rate projected by TLMP, the size of the introduced population may increase in the next few years. Depending on how development of timber resources takes place, the existing camps or new camps established in the area may gradually evolve into permanent communities. From 1985 through 1989 the introduced population was found to account for a substantial number of the total deer harvested; these other Port Frederick residents harvested most other resources used for subsistence as well. The effect of this increased competition on subsistence harvesting has been examined in this report.

Competition

The number of people using the limited fish and wildlife resources of the Hoonah core area has increased substantially during these early years of logging activity. We have examined two components of this increase: an influx of non-local hunters during the deer season on the road-connected area and the migration of loggers and their families into the Port Frederick area.

Competition for resources between Hoonah residents and these new hunters and fishers has been found to be an important early effect of logging and road construction in the Hoonah core area[167]. Although this competition is relatively recent in the Hoonah area, we have found that the customary and traditional patterns of subsistence use by Hoonah residents already have been affected, particularly in areas where logging roads have been constructed. Competition appears to have de-

167. Decreases in deer and fish populations used for subsistence are effects observed in a longer time frame.

creased or limited subsistence harvest for Hoonah residents in some parts of their subsistence use territory and to have displaced subsistence hunting effort to areas less accessible to non-local hunters.

Competition appears to have resulted in a decrease in use of some geographical areas by Hoonah residents. In the Hoonah core area, for example, use of Neka Bay, Neka River, and other areas at the head of Port Frederick has declined. Some of this decline, particularly in the Neka River area may be due to competition for harvest with hunters from Eight Fathom Bight. Since much of the increased hunting pressure has occurred in the road-connected area, we anticipate that competition for resources will continue to be most acute in these areas, with subsistence harvest of deer most affected. Deer harvest by Hoonah residents has fluctuated from 1984 to 1989, with 1989 a low year for Hoonah subsistence harvests, while the total deer harvest in the Port Frederick area has increased substantially. Competition may be one of the reasons why actual harvest and use levels are lower than desired levels for Hoonah residents.

Effects of National Park Service Policy

National Park Service administration of Glacier Bay National Park has progressively restricted traditional subsistence uses of park areas by Hoonah residents. Prior to expansion of park boundaries in 1939 and to the beginning of more hands-on management in the 1950s, Glacier Bay supplied a major portion of the subsistence food used by many Hoonah households and was an area that was intensively used by Huna Tlingit. National Park Service policy was found to severely limit traditional subsistence activities and access to cultural sites within the boundaries of Glacier Bay National Park.

Directions for Future Research

This community study and other available data for the community of Hoonah provide baseline information on most aspects of subsistence harvest and use of fish and game, including harvest and use levels, areas used for harvest, and participation in harvest. Possible future changes in subsistence

harvest and use in this community and potential additional restrictions on this use may be measured against this baseline.

This report identifies specific changes in subsistence harvest and use taking place in Hoonah due to timber harvesting in the Hoonah subsistence territory. Analysis of deer harvest information has shown areas where a significant restriction on subsistence harvests may be taking place. Since timber harvesting in the Hoonah core area is still in its early stages, many of the changes taking place that will eventually affect subsistence uses were not fully manifest at the time research took place. As with the effects of logging on species used for subsistence, many of these changes will be progressive and cumulative[168]. We anticipate that more pronounced impacts on subsistence uses of fish and game and resulting significant restrictions on these uses will occur in coming decades if current timber harvesting plans are followed.

The following additional or continuing research needs to be conducted to more fully understand subsistence harvest and use of fish, wildlife, and other natural resources by Hoonah residents and to more fully assess the level of impact of current timber management practices in the Hoonah subsistence territory over time. Further research is also needed to better identify areas within the Hoonah core area that are most important or most critical for subsistence harvests.

a) Yearly or biennial studies of deer harvest by Hoonah residents need to be conducted to accurately document changes in harvest level, areas used for hunting, and other factors. Deer are the most important indicator species for estimating the effect of timber harvest on subsistence.

b) Further and more fine-grained subsistence mapping of the Hoonah deer harvest needs to take place to examine how many deer are taken in the Hoonah core area, where they are taken, and what changes in subsistence productivity for deer are taking place.

168. Not all changes are progressive and cumulative. A crash in the deer population following a hard winter, elimination of subsistence use of an intertidal area, decline in the salmon run in a particular drainage, and the establishment of near-permanent logging camps within the Hoonah core territory are examples of changes that could occur all-at-once or in a short period of time.

c) Research needs to be done to measure the overall subsistence productivity of different parts of the Hoonah territory for all species harvested, but particularly for deer and salmon species. Periodic measurement of overall subsistence productivity for major species needs to be undertaken to assess long term trends in subsistence harvest and use. Simplified random sample biennial harvest surveys would provide these data.

d) A continuing close look needs to be taken at logging communities located in the Hoonah core area both to assess the level of use of fish and wildlife by their residents and to monitor the growth of these communities and their possible metamorphosis into permanent communities.

e) Continued research is needed to better document the changes to salmon habitat and run strength due to timber harvesting need to take place. Without good data for anadromous streams in the Port Frederick area and other parts of the Hoonah core area the changes in salmon distribution and abundance that may take place due to logging and road construction will not be documented.

f) The excellent modeling work reported by Schoen *et al* (1985) for the effects of timber harvesting on deer needs further empirical testing. Logging in the Hoonah subsistence territory provides a good laboratory for future research.

g) Further analytic and field research are needed to examine the human ecology of Hoonah subsistence, particularly to examine the differential use and differential productivity of parts of the subsistence territory. This research will permit better understanding of the impact of timber extraction and better mitigation of effects of logging and road construction on subsistence activities.

h) Additional documentation of Tlingit cultural heritage needs to take place while these traditions are remembered by older Hoonah residents. Tlingit place names and oral history concerning all of the Huna territory needs to be recorded before it is forever lost.

i) Further qualitative research examining Tlingit occupancy and use of areas within Glacier Bay National Park needs to take place so that public policy may be better informed.

Tlingit experience in Glacier Bay encapsulated in place names and oral history needs attention, both to preserve this heritage and also to provide clues concerning the natural history of the park.

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APPENDIX I: CONVERSION FACTORS FOR DETERMINING USABLE WEIGHTS

Major species harvested and used by Hoonah residents, 1986.

COMMON NAME	BINOMIAL	USABLE WEIGHT
Broad kelp	Irtadaea flaccida	20.0 lbs/5 gallon bucket[3]
Sea Ribbon	Rhodymenia pacmata	20.0 lbs/5 gallon bucket[3]
Giant kelp	Nereocystis	20.0 lbs/5 gallon bucket[3]
Hair grass	Obelia sp.	20.0 lbs/5 gallon bucket[3]
Rockweed	Pelvettiopsis limitata	20.0 lbs/5 gallon bucket[3]
Black Seaweed	Porhyra laciniata	20.0 lbs/5 gallon bucket[3]
Yellow seaweed	Fucus distichus	20.0 lbs/5 gallon bucket[3]
FISH		
Blackbass	Sebastes melanops	2.0 lbs[3]
Cod, black	Anopiopoma fimbria	6.0 lbs[3]
Cod, grey	Gadus macrocephalus tilesius	4.0 lbs[3]
Cod, ling	Ophiodom elongatus	5.0 lbs[3]
Cod, tom	Microgadus proximus	2.0 lbs[3]
Cutthroat	Salmo clarki	1.5 lbs[3]
Dolly Varden	Salvelinus malma	1.4 lbs[3]
Flounder	Plattichthys stellatus	4.0 lbs[3]
Halibut	Hippoglossus stenolepis	Recorded in Pounds
Herring	Culpea harengus pallasi	Recorded in Pounds
Herring eggs (collected on kelp and hemlock branches)	valenciennes	Recorded in pounds
Red snapper	Sebastes alutus	3.0 lbs[3]
Salmon, chum	Keta oncorhynchus	7.3 lbs[2]
Salmon, coho	Kisutch oncorhynchus	8.0 lbs[2]
Salmon, king	Tshawytscha oncorhynchus	14.3 lbs[2]
Salmon, pink	Gorbuscha oncorhynchus	2.6 lbs[2]
Salmon, sockeye	Nerka oncorhynchus	5.6 lbs[2]
Sculpin	Myoxocephalus	1.0 lbs[4]
Steelhead	Salmo gairdneri	6.0 lbs[3]
MARINE INVERTEBRATES		
Abalone	Haliotis kamtschatkana	20.0 lbs/5 gallon buckets[3]
Clams, butter	Saxidomus giganteus	8.0 lbs/5 gallon buckets[1]
Cockles	Clinocardium nuttalli	9.0 lbs/5 gallon buckets[1]
Gumboots	Katherina tunicata	20.0 lbs/5 gallon buckets[3]
Octopus	Octupus dofleini	10.0 lbs[3]
Sea cucumbers	Parastichopus californicus	2.0 lbs/5 gallon bucket[1]
Sea urchins	Strongylocentrotus purpartus	5.0 lbs/5 gallon bucket[3]
Dungeness crab	Cancer magister	2.5 lbs[5]
King crab	Parilithodes camtschatica	7.0 lbs[5]
Tanner crab	Chionocoetes bairdi	2.2 lbs[5]

COMMON NAME	BINOMIAL	USABLE WEIGHT
MARINE MAMMALS		
Harbor seal	Phoca vitulina	90 lbs[1]
LAND MAMMALS		
Bear	Urus arctos	150 lbs[3]
Deer	Odocoileus heminonus sitkens	80 lbs[6]
Mountain goat	Oreamnos americanus	120 lbs[7]
BIRDS AND BIRD EGGS		
Bufflehead	Bucephala albeola	1.5 lbs[3]
Canada goose	Branta canadensis	5.0 lbs[1]
Golden eye	Bucephala clangula	1.5 lbs[3]
Grouse	Canachites canadensis	.7 lbs[4]
Harlequin	Histrionicus histrionicus	1.5 lbs[3]
Heron	Ardea herodias	8.0 lbs[1]
Mallard	Anas platyrhynchos	1.5 lbs[3]
Old squaw	Clangula hyemalis	1.5 lbs[3]
Ptarmigan	Lagopus mutus	7 lbs[4]
Sandhill crane	Grus canadensis	8.0 lbs[3]
Scooter	Melanitta deglandi	1.5 lbs[3]
Pintail	Anas acuta	1.5 lbs[3]
Swan, whistling	Olor Colubianus	15.0 lbs[1]

1. Kookesh, Matt, 1987 Unpublished field data, Div. of Subsistence, ADF&G.
2. From 1985 commercial fish harvest data, Div. of Comm. Fish, ADF&G.
3. Researcher Estimate
4. Technical Paper # 95, Mills et al, 1985.
5. Koneman, Timothy, 1985 ADF&G, personal communication.
6. L. Johnson, 1985 ADF&G, personal communication.
7. Wildlife Notebook Series, ADF&G.

APPENDIX II: SURVEY INSTRUMENT

Timber Management and Subsistence Fish and Wildlife Utilization
General Household Survey

Community _____
Household Id # _____
Interviewer _____
Date _____

Name household head_____

*All questions concerning harvest and use of fish, game, and other natural resources refer to the previous 12 month period, from about May 1, 1985, to Apr. 30, 1986.

1. Persons in Household (indicate household head with +):

ID#	Gender	Birth Year	Place of Birth (residence)	# Years in Community	Tribe (Eagle/Raven)	Clan/Ethnicity or non-Native	Education (adults, in years)
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							

1b. Indicate which household members participated in hunting or fishing for subsistence (home) use in the past year (use ID# from above)

Hunting_____ Fishing_____

2. Equipment used for hunting, fishing or gathering:

Type of Equipment	Use for Household Hunting, Fishing, and Gathering (check)
Automobile or truck	_____
Skiff	_____
Purse seiner	_____
Troller	_____
Cabin cruiser	_____
ATV	_____
Snowmachine	_____
Airplane	_____
Freezer	_____
Smokehouse	_____
Beach seine	_____

3. Employment of household members (cash employment): (May 1985 - April 1986)
(job to be coded by researcher)

Person Id.	Job titles	Number of months Worked last year	Number of hours worked per week when working

4. Do any members of your household hold commercial fishing permits? yes no

4b. How many permits of each type are in the household?

Purse seine	____
Power troll	____
Hand troll	____
Gill net	____
Crab	____
Halibut	____
Black cod	____
Bottom fishing	____
Herring	____

5. Did you or a household member commercial fish in the last 12 months? yes no

In type of fishery? (indicate # from household who fished in last year)

Purse seine ____
Power troll ____
Hand troll ____
Gill net ____
Crab ____
Halibut ____
Black cod ____
Bottom fishing ____
Herring ____

6. Non-commercial use of commercial catch:
(If answer to question 5 is no, go to question 7.)

Species	Comm. Fish?	Number removed from commercial catch: Seine	P-troll	H-troll	Gill net	# used at home	# gave away
King							
Chum							
Pink							
Sockeye							
Coho							

Species	Number/amount removed from commercial catch	# used at home	# gave away
Halibut	#		
Crab	#		
Shrimp	lbs.		

7. Non-commercial salmon harvest and use (in numbers of fish):

Species	Total Harvest	Harvest gear type: P-seine	B-seine	rod/reel	gillnet	gaff/spear	Number Given to Others (from non-comm)	Number Received from others (from all sources)	Total Use (inc. all fish used)
King									
Chum									
Pink									
Sockeye									
Coho									

8. Non-commercial harvest and use of freshwater fish (in numbers of fish);

Species	Attempt (yes/no)	Total Harvest	Total Use
Cutthroat			
Dolly Varden			
Rainbow trout			
Steelhead			

9. Non-commercial harvest and use of marine fish (in numbers of fish);

Species	Attempt (yes/no)	Total Harvest	Total Use
Candle fish (capelin)	xxxxxxxxx		lbs.
Hooligan (eulachon)			lbs.
Pacific herring			lbs.
Herring eggs, on kelp (on branches)			lbs.
Eels	xxxxxxxxx		lbs.
Flounder, sole	xxxxxxxxx		#
Halibut #		xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	
Halibut lbs.			lbs.
Sablefish (black cod)	xxxxxxxxx		lbs.
Cod	xxxxxxxxx		lbs.
Red snapper	xxxxxxxxx		#
Other rockfish	xxxxxxxxx		lbs.
Shark	xxxxxxxxx		lbs.
Sculpin, Irish lord, bullhead	xxxxxxxxx		#
Other marine fish (lbs.)	xxxxxxxxx		lbs.

Gave to others (from non-com.) Received from others (from all sources)

10. Non-commercial harvest and use of marine invertebrates:

Species	Attempt (yes/no)	Total Harvest	Total Use	
Cockles	xxxxxxxxx	_____		(in 5 gal. buckets)
Clams	xxxxxxxxx	_____		(in 5 gal. buckets)
Geoduck, mussels, other	xxxxxxxxx	_____		(in 5 gal. buckets)
Dungeness crab		_____		(in numbers of crab)
King crab		_____		(in numbers of crab)
Tanner crab		_____		(in numbers of crab)
Other crab, (lbs.)	xxxxxxxxx	_____		(in numbers of crab)
Abalone		_____		(in 5 gal. buckets)
Black and red gumboot	xxxxxxxxx	_____		(in 5 gal. buckets)
Neets (sea urchin)	xxxxxxxxx	_____		(in 5 gal. buckets)
Rock oyster (rock scallop)	xxxxxxxxx	_____		(in 5 gal. buckets)
Octopus (devil fish)	xxxxxxxxx	_____		(in 5 gal. buckets)
Sea cucumber (yen)	xxxxxxxxx	_____		(in 5 gal. buckets)
Shrimp		_____		(in pounds)
Other	xxxxxxxxx	_____		(in pounds)

11. Harvest and use of marine plants (in 5 gal. buckets):

Species	Total Harvest	Total Use
Black seaweed	_____	
Red seaweed (sea ribbons)	_____	
Bull kelp	_____	
Other seaweed	_____	

12. Harvest and use of deer:

12a. Did any household member hunt deer in the last year? yes no

12b. How many days were spent hunting deer in the last year by each hunter?
(refer to question 1b for hunter number)

Hunter #___,_____days.
Hunter #___,_____days.
Hunter #___,_____days.
Hunter #___,_____days.
Hunter #___,_____days.

12c. How many deer were taken by your household during the last year, the 1985 season?_____

12d. Indicate access used, hunting, and harvest areas (enter number of deer taken, 0 = tried with no success, blank = did not try):

Habitat Type

	Beach	Muskeg	Alpine	Forest	Road	Clearcut 0-12	Clearcut 13-30	Clearcut 31-200
# Deer								
Access								

12e. Did you receive any deer from another household? yes no How many?_____

12f. Did you give any deer to other households? yes no How many?_____

12g. Did you use or give deer for a potlatch, party, or other traditional celebration? yes no How many?_____

List number of parties by type:
12g.1._____
12g.2._____
12g.3._____
12g.4._____
12g.5._____

12h. How many deer were taken by your household during the 1984 season?_____

12i. How many deer were taken by your household during the 1983 season?_____

13. Harvest and use of other land mammals (in numbers):

Species	Harvest Attempt (yes/no)	Total Harvest	Of Harvest Use for Food	Of Harvest Use for Fur/Craft	Total Use for Food (inc. received from others)
Black bear					
Brown bear					
Mountain goat					
Moose					
Hare	xxxxxxxxxxxxxx				
Marmot	xxxxxxxxxxxxxx				
Porcupine	xxxxxxxxxxxxxx				
Squirrel	xxxxxxxxxxxxxx				
Other	xxxxxxxxxxxxxx				
Beaver	xxxxxxxxxxxxxx				
Coyote	xxxxxxxxxxxxxx				
Red fox	xxxxxxxxxxxxxx				
Lynx	xxxxxxxxxxxxxx				
Land otter	xxxxxxxxxxxxxx				
Marten	xxxxxxxxxxxxxx				
Mink	xxxxxxxxxxxxxx				
Muskrat	xxxxxxxxxxxxxx				
Weasel	xxxxxxxxxxxxxx				
Wolf	xxxxxxxxxxxxxx				
Wolverine	xxxxxxxxxxxxxx				
Other furbearer	xxxxxxxxxxxxxx				

14. Harvest and use of marine mammals (in numbers):

Species	Harvest Attempt (yes/no)	Total Harvest	Of Harvest Use for Food	Of Harvest Use for Fur/Craft	Total Use for Food (inc. received from others)
Harbor seal					
Porpoise, harbor and Dall					
Sealion					
Sea otter					

15. Non-commercial harvest and use of birds and bird eggs:

Species	Harvest Attempt (yes/no)	Total Harvest	Total Use
Grouse, spruce	xxxxxxxxx		
Ptarmigan	xxxxxxxxx		
Black brant			
Canada goose			
Emperor goose			
Snow goose			
White fronted goose			
Swan	xxxxxxxxx		
Sandhill crane	xxxxxxxxx		
Ducks			
Sea birds, sea ducks			
Seagull, tern eggs	xxxxxxxxx		

16. Harvest and use of plants and berries:

16a. How many quarts of berries did you harvest in the past year?_____

16b. How many quarts of berries did you use in the past year?_____

16c. Which of the following species of berries did you harvest? (in quarts)

Species	
Highbush blueberries	
Lowbush blueberries	
Cranberries	
Red huckleberries	
Black huckleberries	
Nagoonberries	
Salmonberries	
Soapberries	
Grey currants	
Goose berries	
Jacob berries	
Elder berry	
Raspberry	
Strawberry	
Thimble berry	

16d. How many quarts of food plants did you harvest in the past year?_____

16e. How many quarts of food plants did you use in the past year?_____

16f. Which of the following species of food plants did you harvest? (in quarts)

Beach asparagus _____
Wild celery _____
Devil's club _____
Wild Parsley _____
Sourdock _____
Goose tongue _____
Fiddlehead ferns _____
Indian rice _____
Wild sweet potatoe _____
Hudson bay tea _____
Hemlock bark _____
Mint _____

17. Firewood, houselogs.

17a. Harvest and use of wood (not purchased):

Firewood _____cords.
Houselogs_____board feet

17b. Number of cords of wood purchased _____.

17c. Number of cords of wood sold_____.

18. Household gross income from all sources (after deducting commercial fishing or other business expenses):

_____

19. Approximately what percent of your total household income in 1985 came from each of the following categories (should total 100%):

Commercial fishing_____
Logging_____
Longshoring_____
Government service_____
Retail business_____
Construction_____
Transfer payments_____
Investments, retirement income_____
Other_____

20. Between May 1, 1985, and April 30, 1986, what proportion of the meat, fish, intertidal resources, fowl, and eggs that your family uses come from hunting, fishing, and gathering?
(include resources received from comm. catches without payment)

Meat_____%
Fish_____%
Intertidal resources_____%
Fowl_____%
Eggs_____%

21. How much of the following traditional foods did your family use in the past year?

25a. Seal oil_____qts.
25b. Hooligan oil_____qts
25c. Deer fat_____lbs
25d. Fermented fish heads _____#
25e. Dried salmon_____lbs
25f. Dried halibut_____lbs
25g. Smoked deer_____lbs
25h. Fish eggs, caviar_____qts
25i. Sealion flippers _____#

22. If fish and game regulations allowed, what would be the right amount of each of the following species for your household for one year?

Deer #_____
Halibut _____lbs.
King salmon #_____
Sockeye #_____
Coho salmon #_____
Chum salmon #_____
Pink salmon #_____
Crab #_____
Harbor seals #_____
Steelhead #_____

23. What is the overall importance of subsistence to you and your family?

_____

_____

_____

_____

_____

_____

_____

24. Give to other households matrix (enter <u>number</u> of households in each place that <u>received X from you</u>):

	Hoonah	Angoon	Tenakee	Haines	Skagway	Juneau	Sitka	Other AK.	Other non-AK
Salmon									
Halibut									
Seals									
Deer									
Clams,cockles,mi									
Herring eggs									
Berries/plants									

25. Receive from other households matrix (enter <u>number</u> of households in each place that <u>gave X to you</u>):

	Hoonah	Angoon	Tenakee	Haines	Skagway	Juneau	Sitka	Other AK.	Other non-AK
Salmon									
Halibut									
Seals									
Deer									
Clams,cockles,mi									
Herring eggs									
Berries/plants									

26. Did your household have a subsistence salmon permit or permits last year? yes no

How many fish did you catch on this permit (these permits)?

chum_____
pink_____
red _____
coho _____

27. Subsistence use of Glacier Bay National Park (including Excursion Inlet Park area):

27a. Did you ever use the area that is now Glacier Bay National Park for subsistence? yes no
27b. In what year did you <u>first</u> use this area?_____
27c. In what year did you <u>last</u> use this area?_____

27d. What resources have you ever harvested in Glacier Bay National Park:

King salmon _____
Silver salmon _____
Chum salmon _____
Pink salmon _____
Red salmon _____

Halibut _____

Herring _____
Herring eggs _____

Crab _____

Seals _____
Sealions _____

Seaweed _____

Mountain goat _____

Bird eggs _____

Berries _____

27d. Where did your customary and traditional use take place?
refer to numbered areas on map_____

27e. Where did you maintain camps or smokehouses?
refer to numbered areas on map_____

27f. When you (family/household) had access to the Glacier Bay National Park area, what proportion of your total subsistence harvest came from that area in an average year?_____%

Note. A further section of the survey presented maps at a larger scale than those shown in Figures 79 and 80 (pp. 177, 179) above. Respondents were asked to record in a matrix recording form the years they had used each of the 30 analytic units.

APPENDIX III: UNIT DESCRIPTIONS AND UNIT INTENSITY OF USE GRAPHS

This lengthy appendix presents basic information on each of the 30 units subject to intensity of use estimation. Information covering the location of the unit, land status, habitat type and anadromous streams listing, subsistence species harvested, main access, logging activity[1], permanent structures, and presence of historical sites is presented for each unit. Figures 103 through Figure 132 present graphs of use intensity for each unit.

The major changes in use that have occurred in each unit are identified. This use trend is briefly discussed, and the causes for change in use are noted where they are known. When it is possible to do so, anticipated changes are indicated as well. We have also provided other comments for some units which record other features of the unit we evaluated in the course of research. *Historical sites* refer to historical and cultural sites listed in the Alaska Heritage Resources Survey (AHRS) and other sites known to Hoonah residents[2].

The graph of use shows the percent of active users who used each unit in each year. The following example shows how these graphs were computed and drawn. In 1968, 32 households in our sample showed some harvesting activity (Figure 78, p. 176). Twenty or about 62 percent of these 32 active harvesters used unit 1, Whitestone Harbor, in 1968. The 62 percent for 1968 for unit 1 is shown on Figure 103. Similar computations were done for all 1950 other unit/year combinations[3].

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1. The unit descriptions were completed in 1987 and do not include more recent logging and road building activity.
2. The AHRS material includes all sites reported and included in the survey as of August, 1990. Note that 1) very little of the Tongass National Forest has been inventoried for cultural or archaeological sites, 2) sites may well be located at inland or in elevated areas where they are difficult to identify due to isostatic rebound, and 3) likely archaeological sites within Glacier Bay proper have been scoured of human remains by recent glaciations. We expect that the a great many more sites will be discovered when proper inventorying work is completed. Rachel Joan Dale provided AHRS site information.
3. Intensity of use graphs for Units 1, 2, 11, 12, 19-24, and 27 have appeared in the text of the report on pages 204, 203, 207, 207, 220, 220, 221, 221, 222, 222, 211 respectively. We have reproduced these graphs in this appendix for ease of reference.

Unit 1, Whitestone Harbor/Pt. Augusta.

1. *Unit name and no.:* Whitestone Harbor/Pt. Augusta, No. 1.

2. *Location:* Juneau quad, coastal area on Icy Strait and Chatham Strait from Point Augusta to south of Spasski Creek and inland areas.

3. *Land status:* Tongass National Forest.

4. *Habitat types:* Ecological continuum with extensive wetlands from coastal beach fringe, muskeg, old-growth forest, to alpine in undisturbed areas; recent clear-cuts in logged areas.

Four salmon streams (10120, 10150, 10180, and 10260 ADF&G Anadromous Stream Atlas (ASA) and two tributaries (2009 and 2011 ASA) drain into this unit. The species documented in these streams are chum, coho, and pink salmon and Dolly Varden.

5. *Subsistence harvest area for:*

Deer
Small game
Waterfowl
Salmon
Marine fish
Marine invertebrates
Marine mammals
Plants and berries

6. *Access (incl. anchorages):* Main access is by skiff or boat. Area has local logging roads in place that may be used for land travel; local logging roads will probably be connected with Hoonah in 1986. There is a good anchorage for small boats from southeast and west winds.

7. *Logging or logging potential, logging roads:* Contemporary logging of this area began in 1985 on Forest Service land; a log transfer facility is planned for Whitestone Harbor and may become operational in 1987. Proposed logging roads will connect to Spasski road system and to False Bay and Freshwater Bay on Chatham Strait side.

8. *Permanent structures:* Log transfer facility, floating bunk house and logging roads.

9. *Historical sites:* Three grave sites and marker stones of Hoonah residents. Three AHRS sites are within this unit, including a petroglyph and a burial site.

10. *Graph of use through time:* Figure 103 shows change in intensity of use over time for this unit. Use of this unit appears to have increased in the 1960s as transportation available to Hoonah residents improved. About 60 percent of active harvesters used the area from 1967 through 1980. Use of this unit has dropped off in the 1980 to 1985 time period.

11. *Use trend, change in use over time:* According to key respondents who have used the area, some of the recent decrease may be due to roading and logging activity in the area which has made it less attractive to deer hunters. Easier access to other areas may have reduced use of Whitestone Harbor area. Recent boating deaths due to accidents in bad weather may be a factor in reducing use in unit.

Use of this unit by Hoonah residents, as well as by non-local hunters, may have increased with the completion of the road connection between Whitestone Harbor and Hoonah.

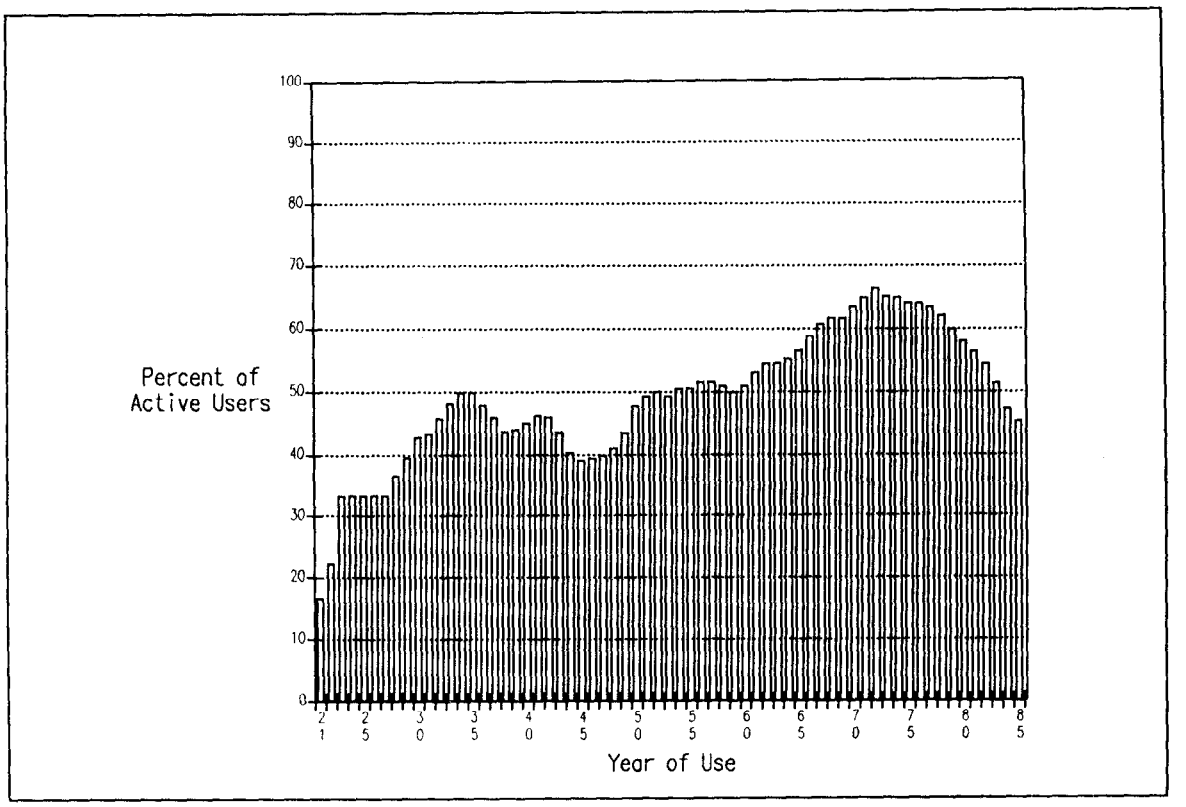

Figure 103. Intensity of Use in Unit. 1, Whitestone Harbor/Pt. Augusta.

Unit 2, Lower Spasski.

1. *Unit name and no.:* Lower Spasski, No. 2.

2. *Location:* Juneau quad, coastal area on Icy Strait from Neck Point to Whitestone Harbor and inland to Elephant Mountain

3. *Land status:* Tongass National Forest, Huna Totem Corporation, and private property in the unit.

4. *Habitat types:* Ecological continuum with extensive wetlands from coastal beach fringe, muskeg, old-growth forest, to alpine in undisturbed areas; extensive recent clear-cuts in logged areas.

Two salmon streams (10300 and 10350 ASA) and two tributaries (2005 and 2008 ASA) drain into the unit. The species documented in the streams are coho, chum, pink salmon and Dolly Varden. According to local residents, steelhead trout are present in Spasski River.

5. *Subsistence harvest area for:*

Bear
Deer
Small game
Waterfowl
Freshwater fish
Salmon
Marine fish
Marine invertebrates
Marine mammals
Marine plants
Plants and berries

6. *Access (incl. anchorages):* Until 1983 or 1984 the main access was by skiff or boat; the area now has logging roads in place that are extensively used for land travel. There is a good anchorage for small boats from west winds. A foot trail leads from Hoonah to this unit. The original Spasski trail was built by Greenwald family and later rebuilt by Civil Conservation Corps and by U.S. Forest Service Youth Activities Conservation Corps crew.

7. *Logging or logging potential, logging roads:* Logging of this area began in 1985, primarily on Huna Totem Corporation land. Large logging roads connect this unit with Hoonah, and roads scheduled for completion in 1987 will run to Whitestone Harbor, False Bay, and Freshwater Bay. Smaller feeder logging roads network this unit. Most available timber will be logged out of this area by 1987.

8. *Permanent structures:* Logging roads, home stead site and cabins.

9. *Historical sites:* One site is listed in the AHRS.

10. *Graph of use through time:* Figure 104 shows change in intensity of use over time for this unit. The use of this unit is fairly consistent over time with about 40 percent of active harvesters reporting use from 1950 to 1985. Use is up slightly in the last few years.

11. *Use trend, change in use over time:* Because of the road connection, this area has become more accessible to Hoonah residents and may be visited more frequently. Road hunting by both Hoonah residents and by non-local hunters has become the predominant hunting pattern. According to the model presented in the text (Schoen 1985), the deer population will decrease with over time in clear-cut areas during periods of heavy snowfall and harsh winters. Based on interviews in other southeast communi-

ties, clear-cut areas become difficult to hunt and are often abandoned about 15 years after logging has taken place.

Key respondents stated that the use of Spasski Creek for harvesting of late salmon may have declined due to logging-related variable stream levels and stream degradation affecting target species.

12. *Other comments:* Spruce roots traditional basket weaving and other crafts were harvested at specific sites in this area; these sites have been logged.

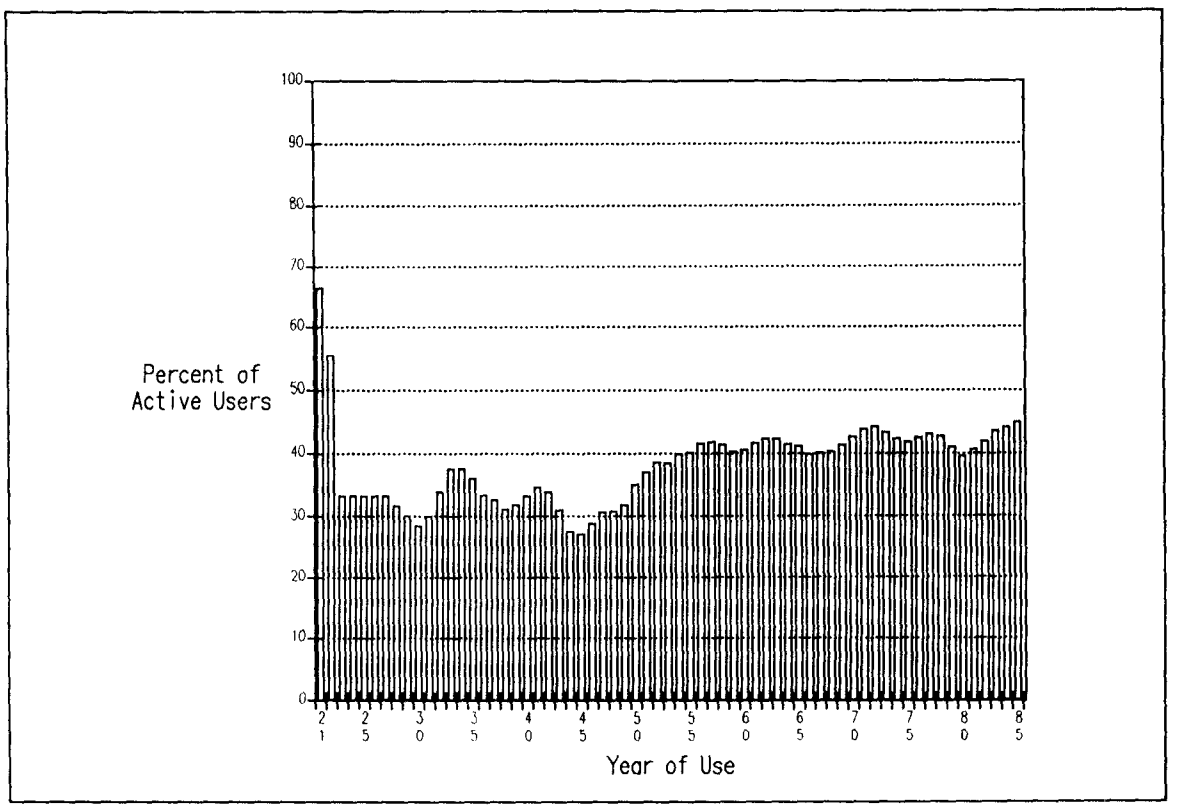

Figure 104. Intensity of Use in Unit 2, Lower Spasski.

Unit 3, Upper Spasski.

1. *Unit name and no.:* Upper Spasski, No. 3.

2. *Location:* Juneau quad, headwaters and drainage of upper Spasski Creek.

3. *Land status:* Tongass National Forest and Huna Totem Corporation.

4. *Habitat types:* Ecological continuum from muskeg, old-growth forest, to alpine in undisturbed areas; extensive recent clear-cuts in logged areas.

One salmon stream (10300 ASA) and one tributary (2008 ASA) drain into the unit. The species documented in this drainage are pink and chum salmon. According to local residents, steelhead trout are present in Spasski River.

5. *Subsistence harvest area for:*

Deer
Freshwater fish
Salmon
Plants and berries

6. *Access (incl. anchorages):* Until 1983 or 1984 the main access was either by skiff or boat to Spasski Bay where there is a good anchorage for small boats from west winds or by foot. A foot trail leads from Hoonah to this unit. The original Spasski trail was built by Greenwald family and later rebuilt by Civil Conservation Corps and by U.S. Forest Service Youth Activities Conservation Corps crew. The area now has logging roads in place that are extensively used for land travel.

7. *Logging or logging potential, logging roads:* Logging of this area began in 1986 by the Huna Native Corp. and is continuing. Logging roads extend from Hoonah to Whitestone Proposed logging roads will connect to Spasski road system and to False Bay and Freshwater Bay on Chatham Strait side. Logging of harvestable timber may be completed in 1987.

8. *Permanent structures:* Logging roads.

9. *Historical sites:* No sites are listed in the AHRS.

10. *Graph of use through time:* Figure 105 shows change in intensity of use over time for this unit. Over the past 40 years, between about 35 and 50 percent of Hoonah residents have used this area which has been a main deer hunting area. Some increase in overall use has taken place in the last three years following completion of a road to this area in 1983.

11. *Use trend, change in use over time:* Because of the road connection, this area has become more accessible to Hoonah residents and may be visited more frequently. Road hunting by both Hoonah residents and by non-local hunters has become the predominant hunting pattern. According to the model presented in the text (Schoen 1985), the deer population will decrease with over time in clear-cut areas during periods of heavy snowfall and harsh winters. Based on interviews in other southeast communities, clear-cut areas become difficult to hunt and are often abandoned about 15 years after logging has taken place.

12. *Other comments:* Key respondents stated that the Elephant Mountain area has been a traditional hunting area for deer hunting by Hoonah residents in August and September. Because of the access provided by logging roads, more local and non-local hunters may use this area in the early part of the

season. Key respondents believe that hunters wishing to hunt in an undisturbed area will not use this area and that fewer deer may be present in the Elephant Mountain alpine areas as extensive logging of surrounding areas takes place.

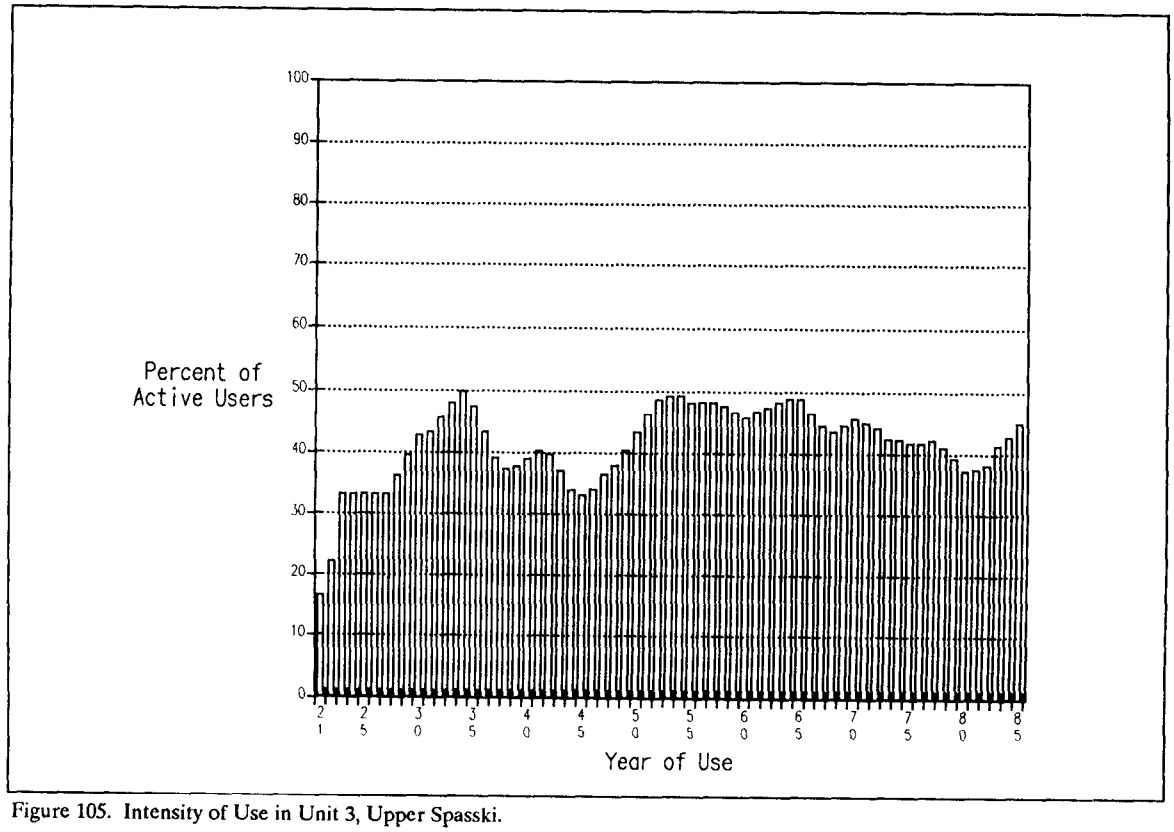

Figure 105. Intensity of Use in Unit 3, Upper Spasski.

Unit 4, Lower Gartina.

1. *Unit name and no.:* Lower Gartina, No. 4.

2. *Location:* Juneau quad, coastal area on Icy Strait and Port Frederick from Neck Point to False Point and inland along Gartina Creek.

3. *Land status:* Tongass National Forest, Huna Totem Corporation, Sealaska Corporation, and City of Hoonah.

4. *Habitat types:* Ecological continuum with extensive wetlands from coastal beach fringe, muskeg, old-growth forest, to alpine in undisturbed areas; extensive recent clear-cuts in logged areas.

Two salmon streams (10080 and 10090 ASA) drain into the unit. The salmon documented in these streams are chum, coho, and pink salmon and Dolly Varden.

5. *Subsistence harvest area for:*

Deer
Small game
Waterfowl
Freshwater fish
Salmon
Marine fish
Marine invertebrates
Plants and berries

6. *Access (incl. anchorages):* This unit includes the Hoonah town site. Skiffs and boats use Hoonah's harbors and provide access to coastal areas for hunting and intertidal gathering. City roads and recently completed logging roads provide most of the land access. Previously hunting took place on foot. A foot trail leads through this unit to Spasski Creek. The original Spasski trail was built by Greenwald family and later rebuilt by Civil Conservation Corp and by Forest Service Youth Activities Conservation Corp crew.

7. *Logging or logging potential, logging roads:* Logging of this area began in 1984 by the Huna Native Corporation and is continuing with most harvestable timber to be logged by the end of 1987. An extensive system of large logging roads and feeder roads network the area.

8. *Permanent structures:* The area includes all the facilities of Hoonah City, the airport, two boat harbors, the city garbage dump, an inoperative cannery, logging roads and other structures and facilities.

9. *Historical sites:* There are numerous sites in this unit. Original town site was by the bluff facing towards south and original cannery site was a fish camp. Eleven sites are listed in the AHRS, including archaeologically significant middens, cemeteries, and at least one pictograph.

10. *Graph of use through time:* Figure 106 shows change in intensity of use over time for this unit. As expected, this is the unit most frequently used by active Hoonah harvesters. In recent years from about 6 to 70 percent of all active harvesters have used this unit.

11. *Use trend, change in use over time:* This is a consistently and heavily used area. Access by city and logging road has become particularly important for deer hunting and intertidal gathering in this area. According to the model presented in the text (Schoen 1985), both the deer population and deer hunting effort and success will decrease with succession in clear-cut areas.

12. *Other comments:* It should be noted that not all Hoonah active households use their immediate area for subsistence harvesting. A number of active harvesters report no use of this unit in any given year.

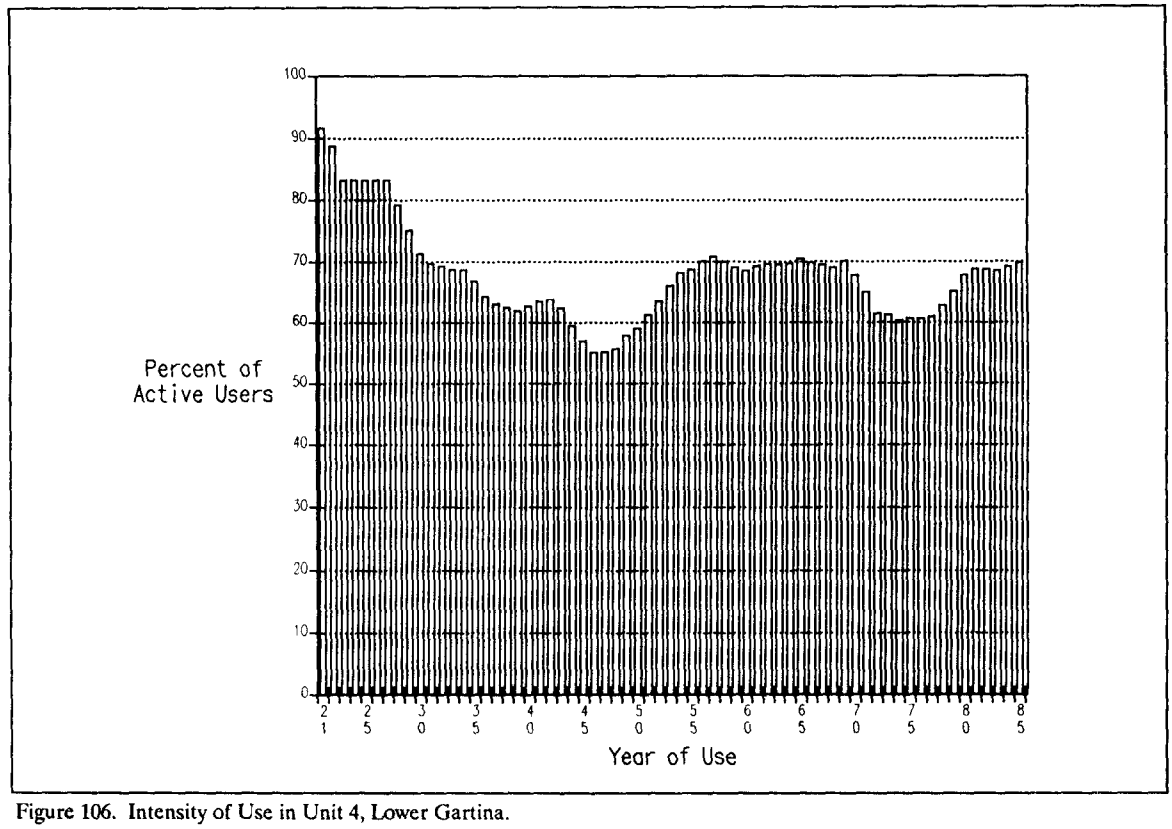

Figure 106. Intensity of Use in Unit 4, Lower Gartina.

Unit 5, Upper Gartina.

1. *Unit name and no.:* Upper Gartina, No. 5.

2. *Location:* Juneau quad, inland area along upper Gartina Creek drainage.

3. *Land status:* Sealaska and City of Hoonah.

4. *Habitat types:* Ecological continuum from muskeg, old-growth forest, to alpine in undisturbed areas; extensive recent clear-cuts in logged areas.

One salmon stream (10090 ASA) drains into the unit. This stream is documented to have chum, coho, and pink salmon and Dolly Varden.

5. *Subsistence harvest area for:*

Deer
Freshwater fish
Salmon
Plants and berries

6. *Access (incl. anchorages):* Main access at present is by logging roads in place that may be used for land travel. Hunting takes place along roads and on foot from roads.

7. *Logging or logging potential, logging roads:* Logging of this area by the Huna Native Corp. began in 1985 and is continuing.

8. *Permanent structures:* Logging roads.

9. *Historical sites:* No sites are listed in the AHRS.

10. *Graph of use through time:* Figure 107 shows change in intensity of use over time for this unit. This unit has ben consistently used by from 40 to over 50 percent of active households over the past 35 years. The recent increase in use is related to road building in this unit and in unit 4 that has made access less arduous. Road 8502 was completed in 1981.

11. *Use trend, change in use over time:* Previous access was by foot. Road hunting by both Hoonah residents and by non-local hunters has become the predominant hunting pattern. Hunting success and effort will decline with growth of thick cover in clear-cut areas.

12. *Other comments:* This was formerly a prime area for wilderness hunting by Hoonah residents.

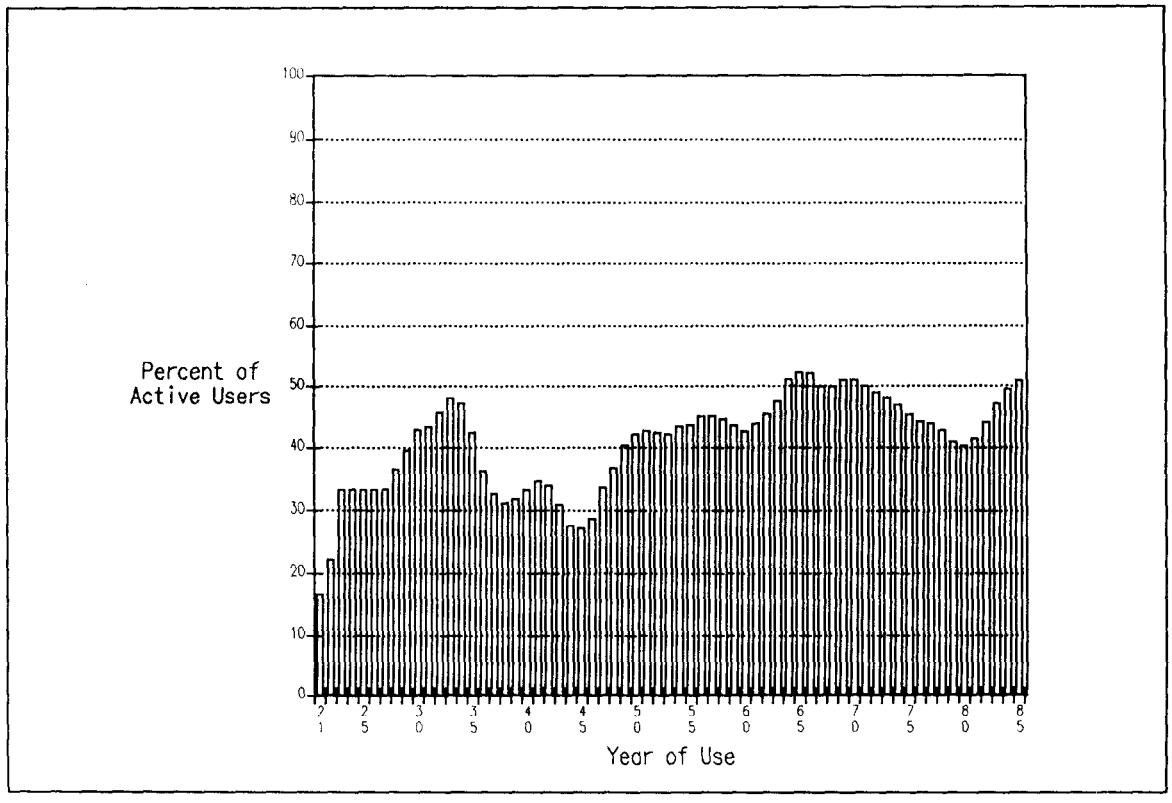

Figure 107. Intensity of Use in Unit 5, Upper Gartina.

Unit 6, Lower Game Creek.

1. *Unit name and no.:* Lower Game Creek, No. 6.

2. *Location:* Juneau quad, coastal area on Port Frederick from False Point to Burnt Point and inland to Game Creek Ridge.

3. *Land status:* Sealaska Corporation and private church group.

4. *Habitat types:* Ecological continuum from coastal beach fringe with extensive wetlands, small islands and large mud flats, muskeg, old-growth forest, to alpine in undisturbed areas; recent clear-cuts in logged areas..

Two salmon streams (10100 and 10130 ASA) and 5 tributaries (2002, 2008, 2003, 2005, and 2007 ASA) drain into the unit. The species documented in these two streams are chum, coho, and pink salmon and Dolly Varden.

5. *Subsistence harvest area for:*

Bear
Deer
Small game
Waterfowl
Freshwater fish
Salmon
Marine fish
Marine invertebrates
Marine mammals
Marine plants
Plants and berries

6. *Access (incl. anchorages):* Main access is presently by logging roads in place that may be used for land travel. Hunting takes place from roads and on foot. Shallow draft skiffs provide beach access, and there are numerous good anchorages.

7. *Logging or logging potential, logging roads:* Logging of this area began in 1985; logging is continuing by Sealaska Native Corp.

8. *Permanent structures:* Logging roads, religious community, log transfer site, logging camp, and cabins.

9. *Historical sites:* Game Point is a historical fish camp. No sites are listed in the AHRS.

10. *Graph of use through time:* Figure 108 shows change in intensity of use over time for this unit. About 50 percent of Hoonah's active harvesters have consistently used this unit over the past 30 years.

11. *Use trend, change in use over time:* Road access has become more important. Hoonah residents have ceased to use the area near the religious community and the area near the log transfer facility and logging camp for most subsistence activities.

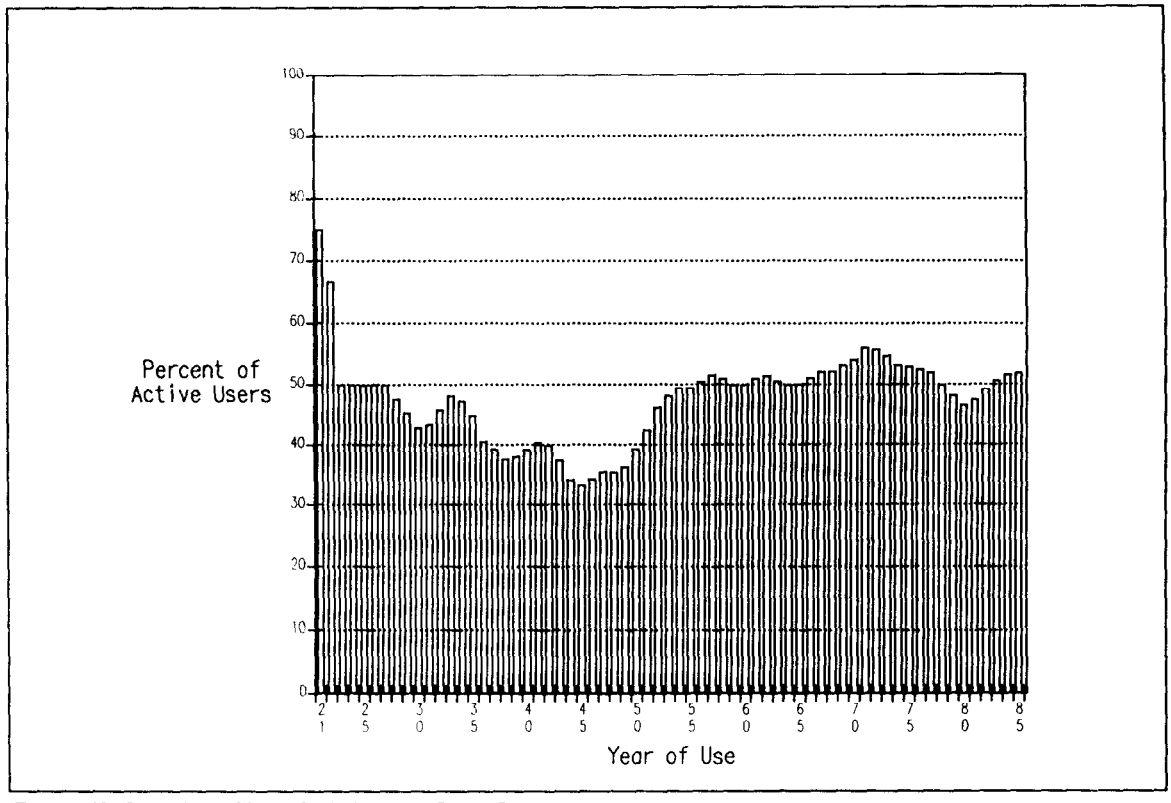

Figure 108. Intensity of Use in Unit 6, Lower Game Creek.

Unit 7, Upper Game Creek.

1. *Unit name and no.:* Upper Game Creek, No. 7.

2. *Location:* Sitka quad, located inland along Game Creek to Redwing Mountain.

3. *Land status:* Sealaska Corporation and Tongass National Forest.

4. *Habitat types:* Ecological continuum from muskeg, old-growth forest, to alpine in undisturbed areas; recent clear-cuts in logged areas.

One salmon stream (10130 ASA) and four tributaries (2011, 2012, 3003, and 4006 ASA) drain into the unit. These streams and tributaries are presently shown to have chum, coho, and pink salmon, and trout.

5. *Subsistence harvest area for:*

Deer
Freshwater fish
Salmon
Plants and berries

6. *Access (incl. anchorages):* Logging roads provide the main access at the present time. Previous access for hunting was on foot up either the Game or Seagull creek drainages.

7. *Logging or logging potential, logging roads:* Logging of this area on Forest Service land began in 1985 and is continuing.

8. *Permanent structures:* Logging roads.

9. *Historical sites:* No sites are listed in the AHRS.

10. *Graph of use through time:* Figure 109 shows change in intensity of use over time for this unit. Access to this area was arduous; about 30 to 40 percent of Hoonah active households per year used this unit over the last 35 years.

11. *Use trend, change in use over time:* Because of the road access, use frequency by Hoonah residents and by non-locals will increase. Road hunting by both Hoonah residents and by non-local hunters has become the predominant hunting pattern. According to the model presented in the text (Schoen 1985), both the deer population and deer hunting effort and success will decrease with succession in clear-cut areas.

12. *Other comments:* This was formerly a prime area for hunting in wilderness by Hoonah residents.

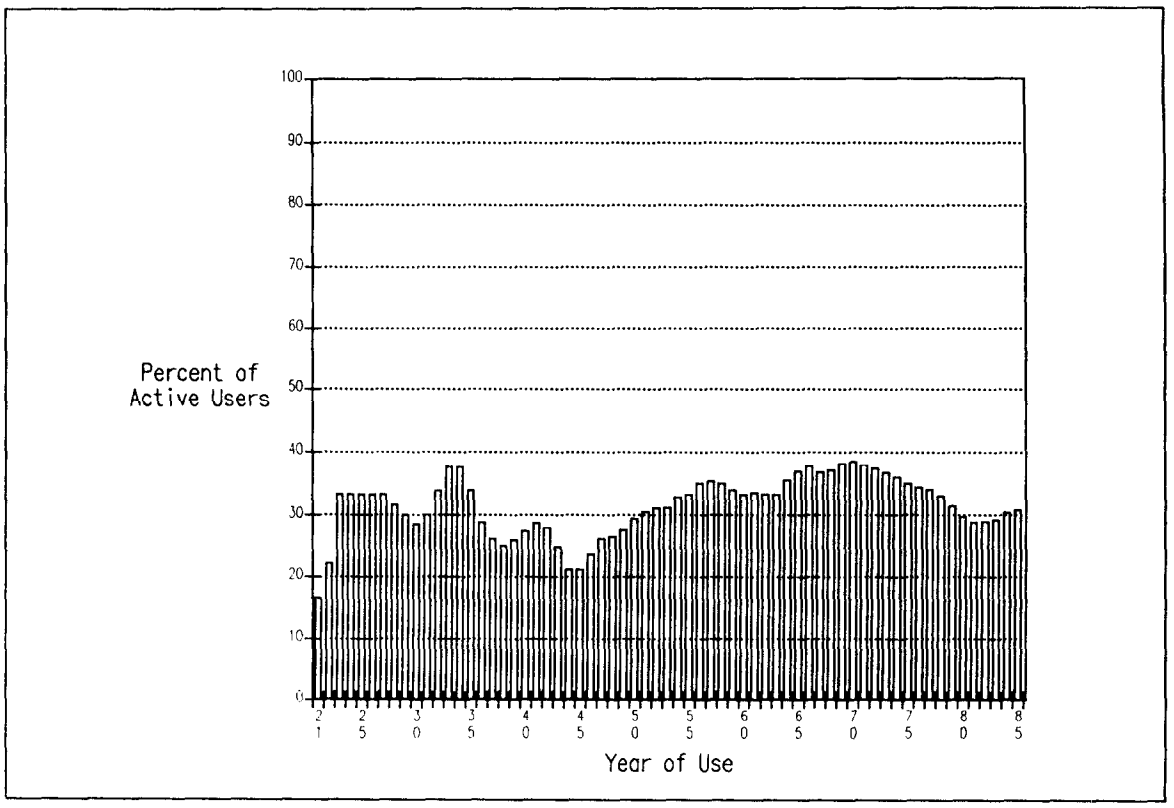

Figure 109. Intensity of Use in Unit 7, Upper Game Creek.

Unit 8, Seagull Creek.

1. *Unit name and no.:* Seagull Creek, No. 8.

2. *Location:* Sitka/Juneau quad, coastal area on Port Frederick from Burnt Point to Midway Island and inland along Seagull Creek.

3. *Land status:* Sealaska Corporation and Tongass National Forest.

4. *Habitat types:* Ecological continuum from coastal beach fringe with extensive wetlands and large mud flats, muskeg, old-growth forest, to alpine.

Two salmon streams (10040 and 10060 ASA) drain into the unit. Both chum and chum pink salmon spawn in these streams which are also rearing streams for coho salmon.

5. *Subsistence harvest area for:*

Deer
Small game
Waterfowl
Freshwater fish
Salmon
Marine fish
Marine invertebrates
Marine mammals
Marine plants
Plants and berries

6. *Access (incl. anchorages):* Main access is by foot and skiff.

7. *Logging or logging potential, logging roads:* Logging in this area has not yet began. Proposed logging is planned by both Huna Native Corp. and Forest Service. Two roads will eventually run into Seagull Creek unit.

8. *permanent structures:* None.

9. *Historical sites:* A historic village site is listed in the AHRS.

10. *Graph of use through time:* Figure 110 shows change in intensity of use over time for this unit. This unit shows a use level of from about 35 to 50 percent of active Hoonah harvesters from 1950 to 1980 and a clear decline to about 30 percent in 1985.

11. *Use trend, change in use over time:* Access to this area has not changed. Logging activity in the upper Port Frederick area, the log transfer facility at Eight Fathom Bight, the presence of log rafts, and skiff and boat traffic associated with logging may have caused a decline in use of this unit. This decline is also associated with increased use of other units.

12. *Other comments:* Use of this unit by Hoonah residents and non-locals will increase when logging roads are open for use by the general public. Subsistence deer hunting in this unit may be down more than the use level graph indicates.

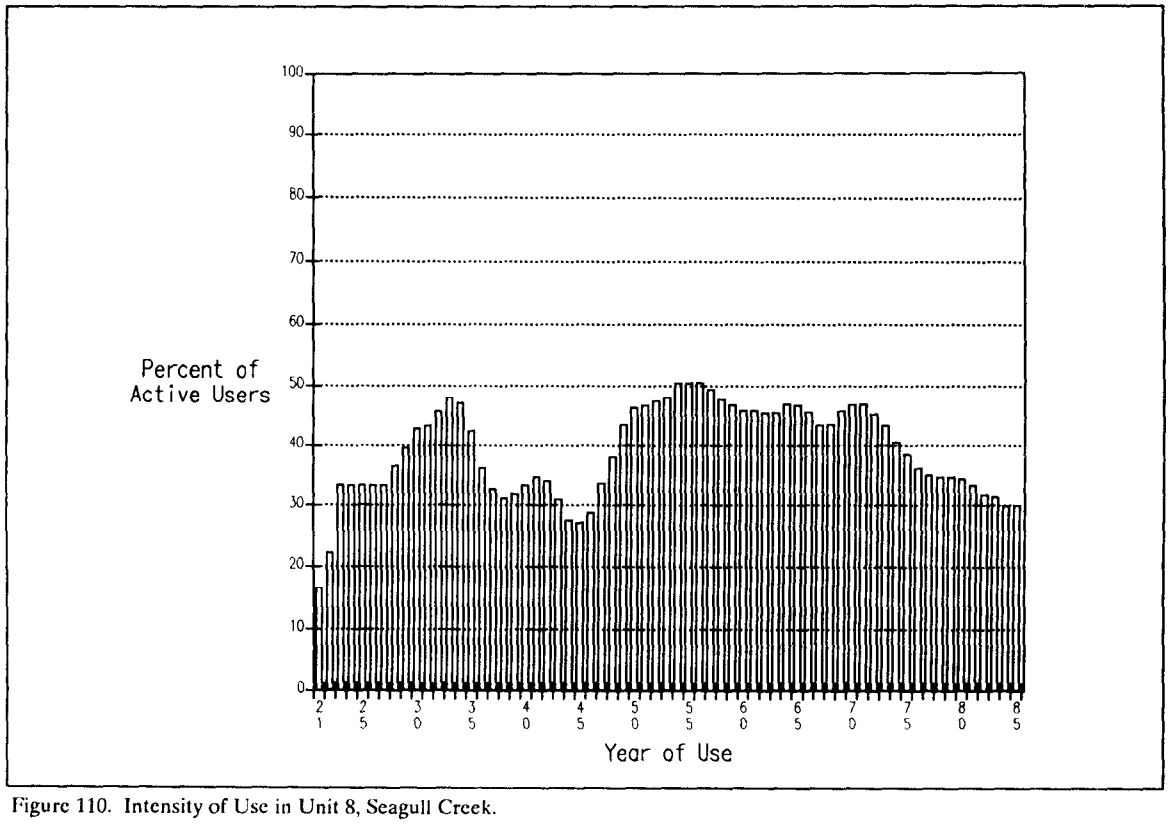

Figure 110. Intensity of Use in Unit 8, Seagull Creek.

Unit 9, Salt Lake Bay.

1. *Unit name and no.:* Salt Lake Bay, No. 9.

2. *Location:* Sitka quad, coastal area on Port Frederick from Midway Island to south point of Salt Lake Bay and inland to head of Saltlake Bay and Seagull Creek Mt..

3. *Land status:* Forest Service Tongass National Forest.

4. *Habitat types:* Coastal beach fringe with extensive wetlands and large mud flats, muskeg, old-growth forest, to alpine.

Two salmon streams (10160 and 10500 ASA) and two tributaries (2003 and 2006) drain into the unit. Both streams are documented to contain chum and pink salmon.

5. *Subsistence harvest area for:*

Deer
Small game
Waterfowl
Freshwater fish
Salmon
Marine fish
Marine mammals
Marine plants
Plants and berries

6. *Access (incl. anchorages):* Main access is by logging roads in place that may be used for land travel. Hunting on foot. Access is changed by the road system and existing log transfer site. good anchorage in the bay.

7. *Logging or logging potential, logging roads:* Logging of this area began in 1967 and is continuing on Forest Service land. A logging road runs to Tenakee Inlet and proposed logging roads will connect to Game Creek.

Logging road 8578 was built in 1982.

8. *Permanent structures:* Logging roads and a log transfer site.

9. *Historical sites:* No sites are listed in the AHRS.

10. *Graph of use through time:* Figure 111 shows change in intensity of use over time for this unit. This unit shows a use level of from about 30 to 40 percent from 1950 through 1980; use has been declining to about 26 percent in recent years.

11. *Use trend, change in use over time:* Access to this area for Hoonah residents has not changed. Logging activity in the upper Port Frederick area, the log transfer facility at Eight Fathom Bight, the presence of log rafts, and skiff and boat traffic associated with logging may have caused a decline in use of this unit. Some competition from hunters coming from Tenakee Inlet may occur in this unit. This decline is also associated with increased use of other units.

12. *Other comments:* Use of this unit by Hoonah residents and non-locals will increase when logging roads connecting with Hoonah are open for use by the general public. Subsistence deer hunting in this unit may be down more than the use level graph indicates.

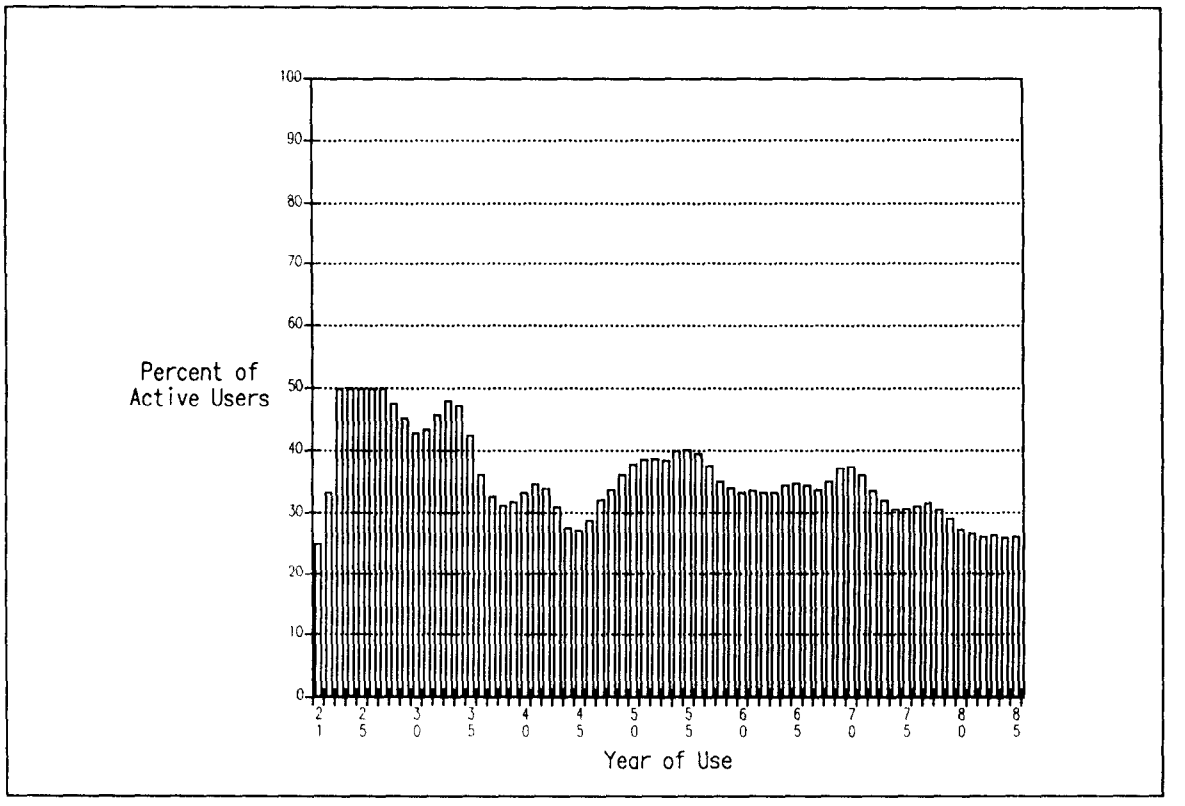

Figure 111. Intensity of Use in Unit 9, Salt Lake Bay.

Unit 10, Head of Port Frederick.

1. *Unit name and no.:* Head of Port Frederick, No. 10.

2. *Location:* Sitka quad, coastal area on inner Port Frederick, includes the portage to Tenakee Inlet from Salt lake Bay to the Narrows.

3. *Land status:* Sealaska Corporation and Tongass National Forest.

4. *Habitat types:* Coastal beach fringe with extensive wetlands and large mud flats, muskeg, and old-growth forest in undisturbed areas; both recent and old clear-cuts in logged areas.

Two salmon streams (10240 and 10360 ASA) drain into the unit. Both streams are documented to have coho salmon and stream number 10360 is shown to have chum salmon.

5. *Subsistence harvest area for:*

Deer
Small game
Waterfowl
Freshwater fish
Salmon
Marine fish
Marine invertebrates
Marine mammals
Marine plants
Plants and berries

6. *Access (incl. anchorages):* Main access is by skiff. Most hunting takes place on foot. Some access has changed due to the logging road system; skiffs are used to haul three wheel ATVs to log transfer sites for use on the roads.

7. *Logging or logging potential, logging roads:* Some logging of this area took place as early as 1967; logging is continuing on Forest Service lands. A logging road runs to Neka River and Mud Bay. Proposed logging roads may connect to Neka Mountain road system and to Native corporation land as far north as Flynn Cove.

8. *Permanent structures:* Logging roads. Log transfer site and logging camp.

9. *Historical sites:* One site is listed in the AHRS.

10. *Graph of use through time:* Figure 112 shows change in intensity of use over time for this unit. From 30 to 40 percent of Hoonah active hunters used this unit in any of the last 35 years. Use of this unit has declined in recent years to about 32 percent.

11. *Use trend, change in use over time:* Access to this area for Hoonah residents has not changed. Logging activity in the upper Port Frederick area, the log transfer facility at Eight Fathom Bight, the presence of log rafts, and skiff and boat traffic associated with logging may have caused a decline in use of this unit. This decline is also associated with increased use of other units.

12. *Other comments:* Subsistence deer hunting in this unit may be down more than the use level graph indicates.

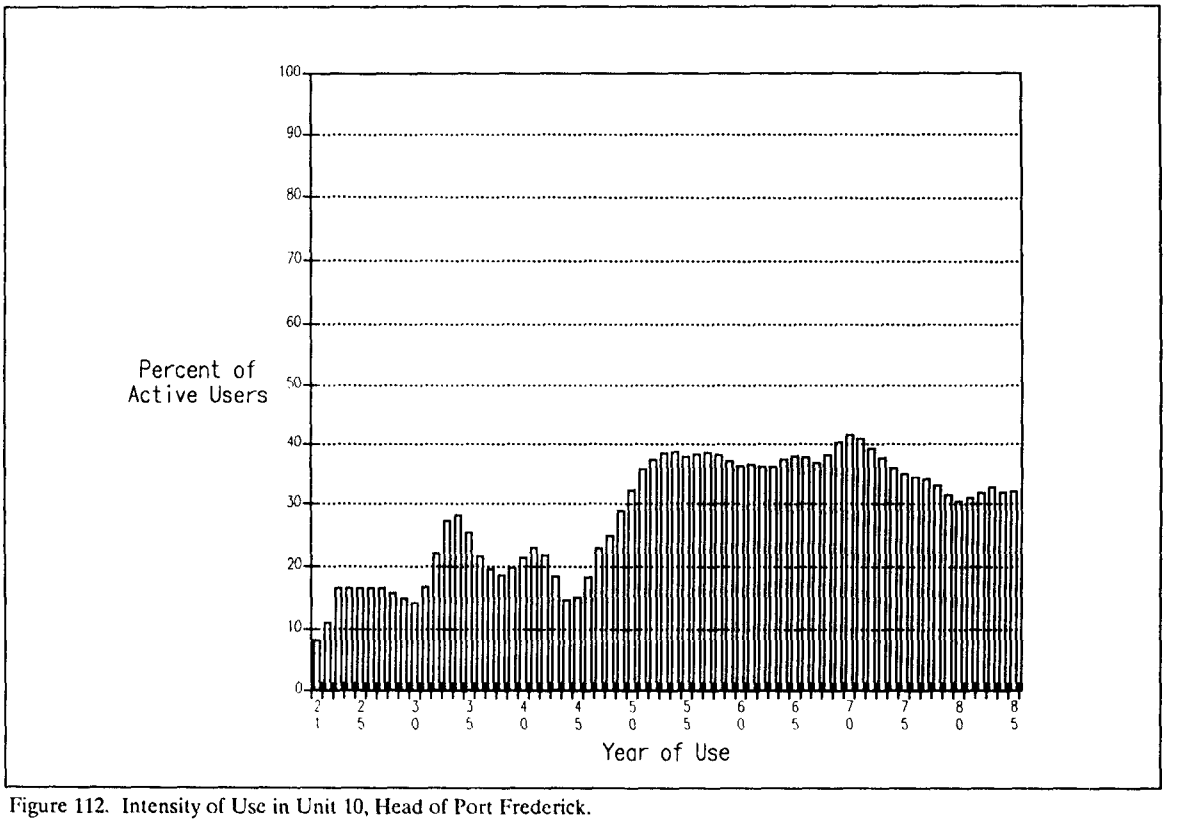

Figure 112. Intensity of Use in Unit 10, Head of Port Frederick.

Unit 11, Neka River.

1. *Unit name and no.* Neka River, No. 11.

2. *Location:* Juneau quad, located at the head of Neka Bay in Port Frederick and inland along Neka River as far to Otter Lake .

3. *Land status:* Sealaska Corporation and Tongass National Forest.

4. *Habitat types:* Muskeg, old-growth forest, with some alpine.

One salmon stream (10230 ASA) and one tributary (2005 ASA) drain into the unit. This salmon stream is the only salmon stream in the vicinity of Hoonah that has 5 species of salmon present.

5. *Subsistence harvest area for:*

Deer
Freshwater fish
Salmon
Plants and berries

6. *Access (incl. anchorages):* Main access is by skiff or boat to the log transfer facility at Eight Fathom Bight and to the system of logging roads. Some Hoonah residents may carry three wheeler ATVs on skiffs to log transfer sites for use on the roads. Other hunting takes place on foot. Before the logging roads access to this area was by skiff through Neka Bay.

7. *Logging or logging potential, logging roads:* Intensive logging of this area began on Forest Service land in 1979 and is continuing. Logging roads extend from the LTF site to Otter lake and Mud Bay river. Approximately 32 cutting units and 17 miles of road are existing in the unit. Proposed logging roads may connect to Neka Mountain road system and to Huna Totem Corporation land which is as far north as Flynn Cove.

8. *Permanent structures:* Logging roads, log transfer site.

9. *Historical sites:* No sites are listed in the AHRS.

10. *Graph of use through time:* Figure 113 shows change in intensity of use over time for this unit. From 39 to 45 percent of Hoonah active harvesters used this unit from 1950 to the early 1970s. Use has dropped off to about 32 percent,

11. *Use trend, change in use over time:* Logging roads have made this unit more easily accessible to Hoonah residents although the relatively intensive logging activity and the extensive clear cutting in this unit have made it less desirable.

12. *Other comments:* This was formerly a prime wilderness area for hunting by Hoonah residents. Hunters who wish to hunt in an undisturbed area will no longer use this area. According to the model presented in the text (Schoen 1985), both the deer population and deer hunting effort and success will decrease with succession in clear-cut areas.

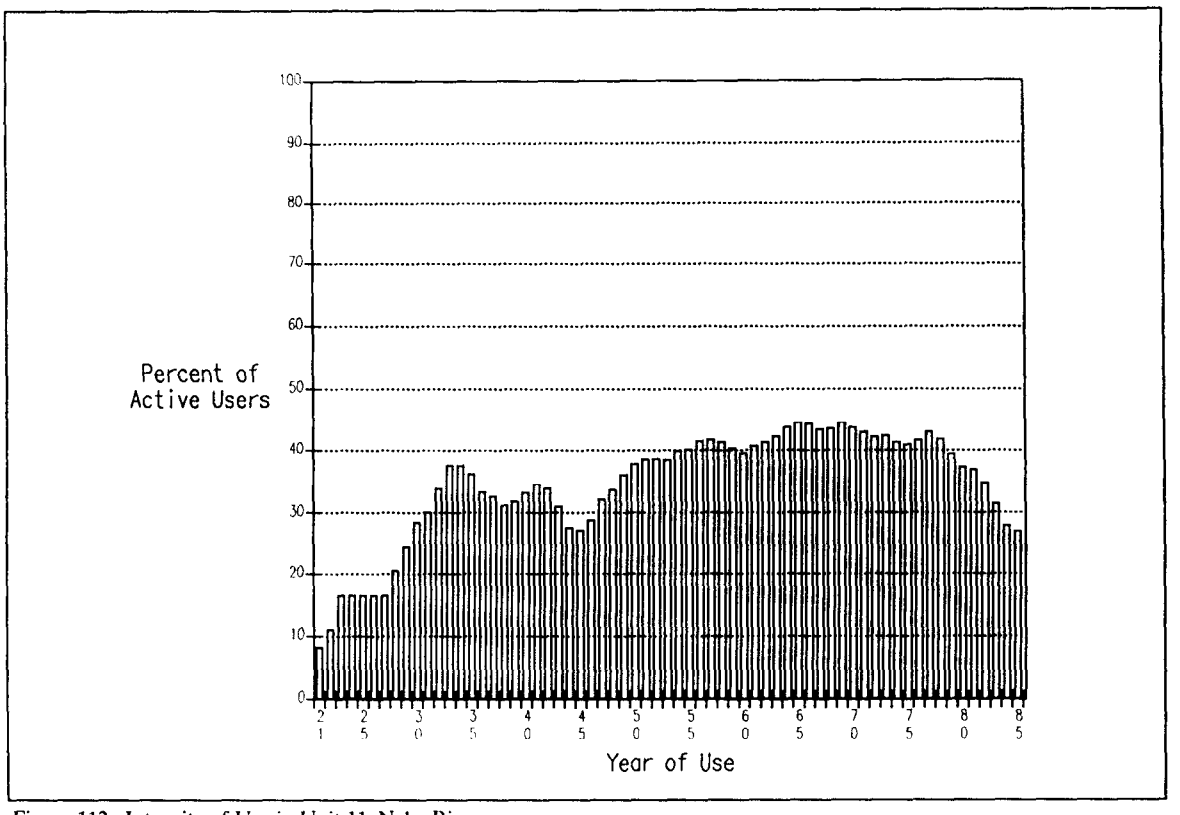

Figure 113. Intensity of Use in Unit 11, Neka River.

Unit 12, Neka Bay, Neka Mountain.

1. *Unit name and no.:* Neka Bay, Neka Mountain, No. 12.

2. *Location:* Juneau quad, coastal area from Port Frederick narrows to Neck Point and inland as far as Neck Mountain Range

3. *Land status:* Sealaska Corporation and Tongass National Forest.

4. *Habitat types:* Beach fringe with extensive wetlands including the giant mud flat in Neka Bay, muskeg, old-growth forest, alpine.

Five salmon streams (10290, 10250, 10120, 10190, and 10130 ASA)
flow into Neka Bay. These 5 streams are have chum salmon only.

5. *Subsistence harvest area for:*

Bear
Deer
Small game
Waterfowl
Freshwater fish
Salmon
Marine fish
Marine invertebrates
Marine mammals
Marine plants
Plants and berries

6. *Access (incl. anchorages):* Skiffs provide the main access into Neka Bay; other access is from the LTF at Eight Fathom Bight and the logging roads along the Neka River.

7. *Logging or logging potential, logging roads:* No logging has began in this area, however, proposed logging roads will connect to Neka Mountain road system and to Huna Native Corporation land as far north as Flynn Cove.

8. *Permanent structures:* Not known.

9. *Historical sites:* The AHRS lists a historic and prehistoric village and fort in this unit.

10. *Graph of use through time:* Figure 114 shows change in intensity of use over time for this unit. From 65 to 75 percent of Hoonah active harvesters used this unit over the 1950 to 1973 time period; this unit had one of the highest use levels of all units. Use has dropped to about 55 percent in 1985.

11. *Use trend, change in use over time:* The frequent presence of log rafts in Neka Bay, other logging activity in the upper Port Frederick area, the log transfer facility at Eight Fathom Bight, and skiff and boat traffic associated with logging may be associated with an overall decline in use of this unit.

12. *Other comments:* This was formerly a prime wilderness area for hunting by Hoonah residents, and an area where most of the species used by Hoonah residents could be harvested. Perceived decline in waterfowl and marine mammal abundance and change in their distribution may have caused a decline in hunting for these species in this unit. Hunters who wish to hunt in an undisturbed area will no longer use this area.

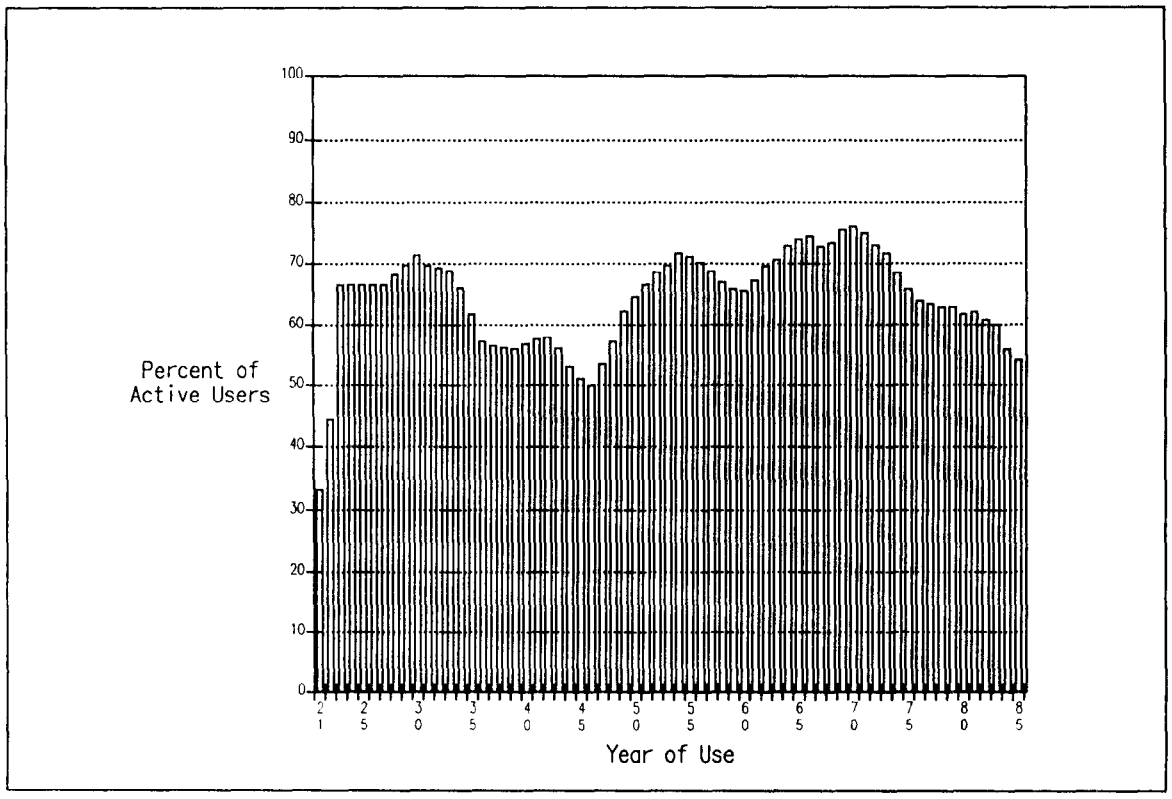

Figure 114. Intensity of Use in Unit 12, Neka Bay, Neka Mountain.

Unit 13, Humpback Creek.

1. *Unit name and no.:* Humpback Creek, No. 13.

2. *Location:* Juneau quad, coastal area on Port Frederick includes from Neck Point to Crist Point at the mouth of Port Frederick and Icy Strait and drainages of Humpback and Halibut creeks.

3. *Land status:* Huna Totem Corporation, Sealaska Corporation and Tongass National Forest.

4. *Habitat types:* Beach fringe with extensive wetlands at the mouth of Humpback and Halibut creeks, muskeg, old-growth forest, alpine.

Two salmon streams (10100 and 10200 ASA) and two tributaries (2005 and 2001) drain into the unit. Chum, coho, and pink salmon and Dolly Varden are present in both streams and tributaries.

5. *Subsistence harvest area for:*

Bear
Deer
Small game
Waterfowl
Freshwater fish
Salmon
Marine fish
Marine invertebrates
Marine mammals
Marine plants
Plants and berries

6. *Access (incl. anchorages):* Main access is by skiff; there are some logging roads in the area.

7. *Logging or logging potential, logging roads:* Proposed logging roads will connect to Neka Mountain road system and to Huna Native Corp land which is as far north as Flynn Cove. Road building was started in 1981 by Sealaska Native Corporation. Some logging took place in 1985 with extensive logging scheduled for subsequent years.

8. *Permanent structures:* Logging roads.

9. *Historical sites:* The AHRS lists two sites, including an historic village in this unit.

10. *Graph of use through time:* Figure 115 shows change in intensity of use over time for this unit. This unit shows a decline in use from about 62 percent in 1969 to about 38 percent in 1985.

11. *Use trend, change in use over time:* The decline in use may be associated with roading and logging activities in this unit which have made harvesting activities on land less desirable or less productive for Hoonah residents.

12. *Other comments:* This was formerly a prime wilderness area for hunting by Hoonah residents, and an area where most of the species used by Hoonah residents could be harvested. The unit includes clam and cockle beds used. Hunters who wish to hunt in an undisturbed area will no longer use this area. There may be some increase in deer hunting using the road system, when logging is completed. According to the model presented in the text (Schoen 1985), both the deer population and deer hunting effort and success will decrease with succession in clear-cut areas.

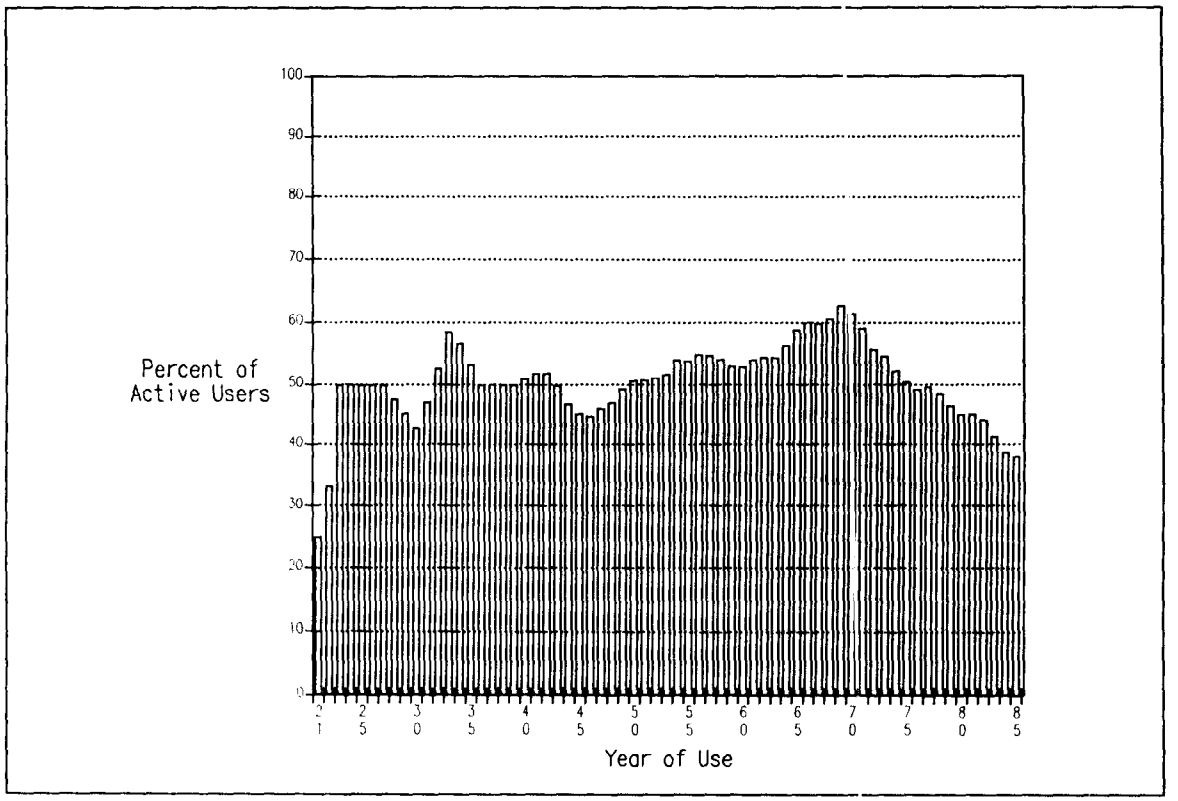

Figure 115. Intensity of Use in Unit 13, Humpback Creek.

Unit 14, Flynn Cove.

1. *Unit name and no.:* Flynn Cove, No. 14.

2. *Location:* Juneau quad, coastal area on Port Frederick and Icy Strait from Crist Point to Eagle Point and inland about eleven miles to unnamed mountain range.

3. *Land status:* Huna Totem, Sealaska Corporation, and Tongass National Forest.

4. *Habitat types:* Beach fringe with extensive wetlands, mud flats at the mouth of Gallagher Creek, muskeg, old-growth forest, alpine; small islands.

Two salmon streams (10300 and 10550 ASA) drain into the unit. Both streams have chum, coho, and pink salmon and Dolly Varden.

5. *Subsistence harvest area for:*

Bear
Deer
Small game
Waterfowl
Freshwater fish
Salmon
Marine fish
Marine invertebrates
Marine mammals
Marine plants

6. *Access (incl. anchorages):* Skiff or boat access only; one fair anchorage in Flynn Cove.

7. *Logging or logging potential, logging roads:* No logging has started in this area. Proposed logging roads may connect to Neka Mountain road system.

8. *Permanent structures:* None.

9. *Historical sites:* No sites are listed in the AHRS.

10. *Graph of use through time:* Figure 116 shows change in intensity of use over time for this unit. The unit shows a decline in use from about 55 percent in 1970 to about 35 percent in 1985.

11. *Use trend, change in use over time:* The decline in use is largely unexplained but may be related to improved deer populations in other areas hunted by Hoonah residents. Hoonah hunters may have switched their use to areas easier to reach.

12. *Comments:* Because the coast of this area is exposed with only one anchorage, access may limit use.

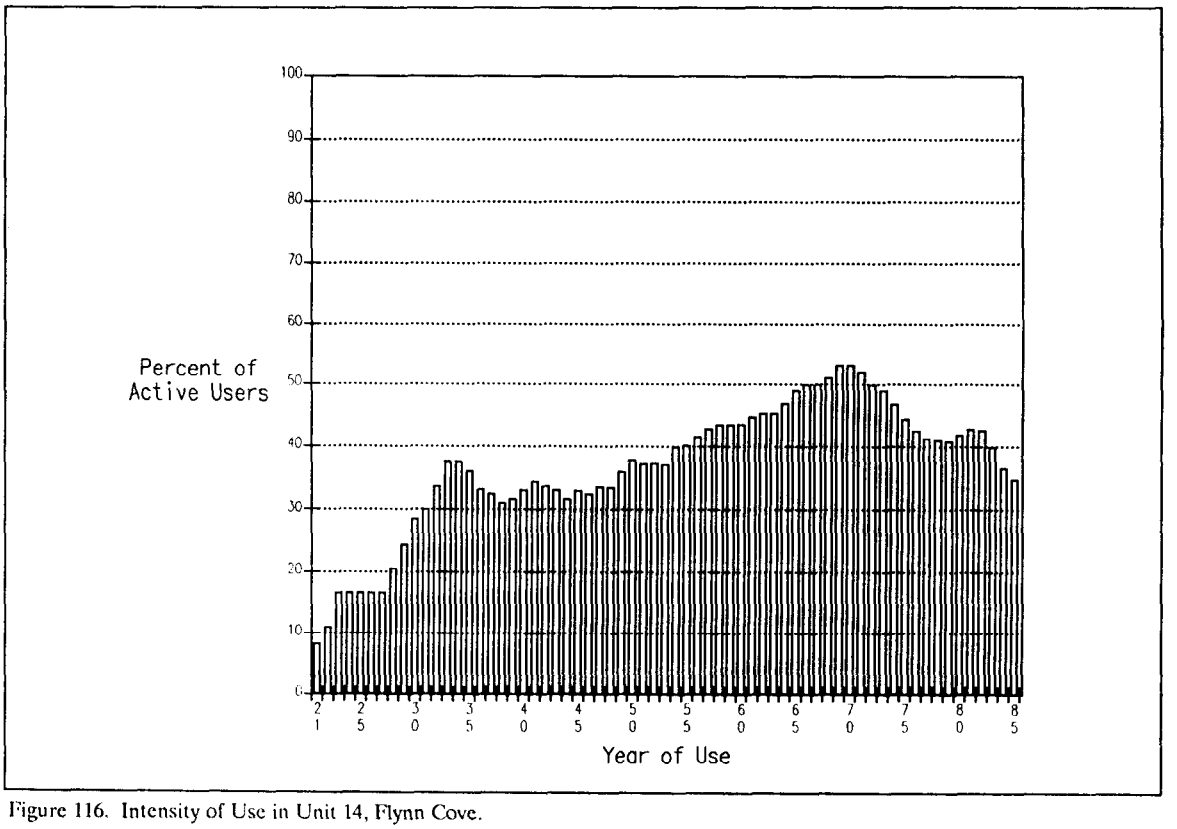

Figure 116. Intensity of Use in Unit 14, Flynn Cove.

Unit 15, Pt. Adolphous .

1. *Unit name and no.:* Pt. Adolphous No. 15.

2. *Location:* Juneau quad, located on Icy Strait from Eagle Point east toward Gull Cove and inland areas.

3. *Land status:* Sealaska Corporation, Tongass National Forest, and private land.

4. *Habitat types:* This large unit contains most of the habitat types found in the area including particularly large wetlands, mud flats, and intertidal areas at Mud Bay and near the mouth of Chicken Creek.

Eight salmon streams (10350, 10370, 10600, 10660, 10700, 10730, 10680, and 10800 ASA) drain into the unit. Chum, coho, pink, and sockeye salmon and Dolly Varden are found in all eight streams.
5. *Subsistence harvest area for:*

Bear
Deer
Small game
Freshwater fish
Salmon
Marine fish
Marine invertebrates
Marine mammals
Marine plants
Plants and berries

6. *Access (incl. anchorages):* Skiff and boat access only. Pinta Cove and Mud Bay are well known anchorages.

7. *Logging or logging potential, logging roads:* A small amount of logging road is completed in this unit and more roading is proposed. Logging has not taken place but may occur in the near future in the Mud Bay River drainage.

8. *Permanent structures:* Logging roads.

9. *Historical sites:* No sites are listed in the AHRS.

10. *Graph of use through time:* Figure 117 shows change in intensity of use over time for this unit. The unit showed a use level of from 70 to 75 percent over much of the last 30 years. Use has declined to about 58 percent in 1985.

11. *Use trend, change in use over time:* The decline in use is largely unexplained but may be related to improved deer populations in other areas hunted by Hoonah residents. Hoonah hunters may have switched their use to areas easier to reach.

12. *Other comments:* The relatively high use level of this unit is related to the units large size and the good anchorages available. Hoonah residents frequently use this unit for overnight or longer trips.

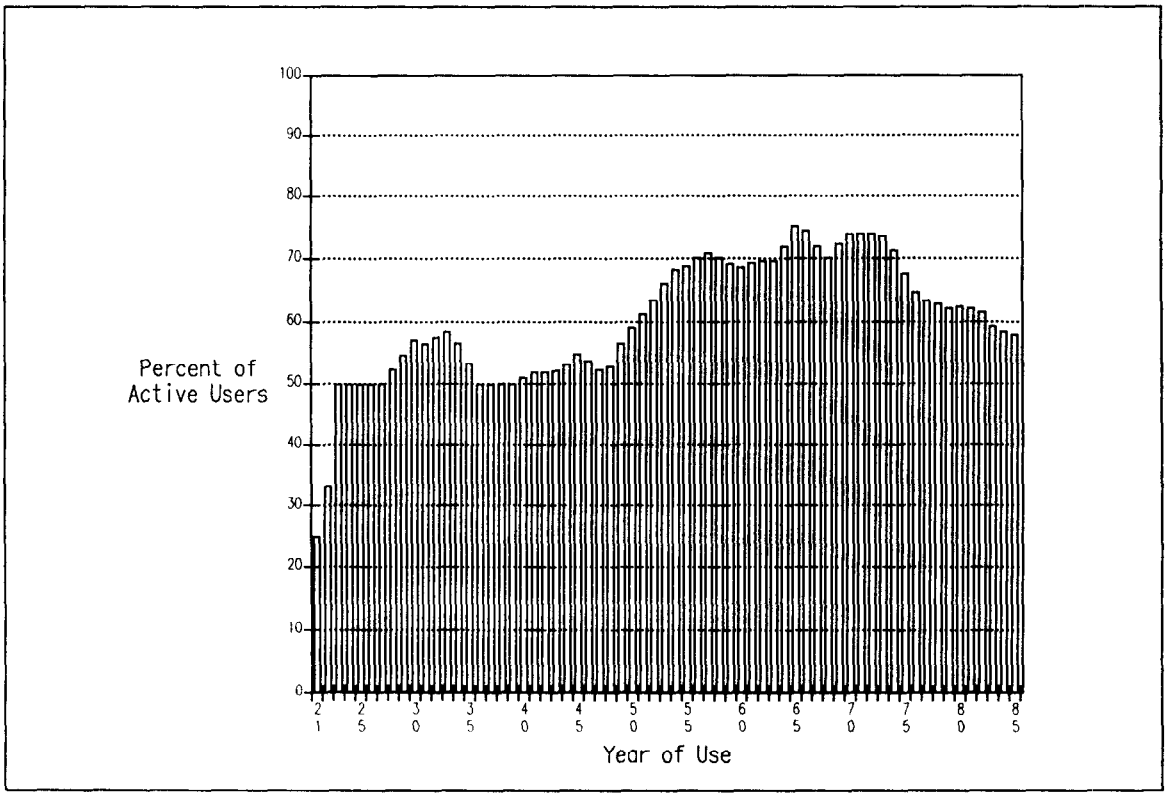

Figure 117. Intensity of Use in Unit 15, Pt. Adolphous.

Unit 16, Port Althorp, Idaho Inlet.

1. *Unit name and no.*: Port Althrop, Idaho Inlet, No. 16.

2. *Location:* Mt. Fairweather quad, coastal area from Gull Cove to Point Lucan on Icy Strait and Cross Sound and inland areas.

3. *Land status:* Tongass National Forest, state land selection, and City of Elfin Cove.

4. *Habitat types:* Coastal beach fringe, including large estuarial mud flats, muskeg, old-growth forest to alpine. There are 13 salmon streams in this unit. Chum, coho and pink salmon are documented in all 13 streams (ASA).

5. *Subsistence harvest area for:*

Deer
Freshwater fish
Salmon
Marine fish
Marine invertebrates
Marine mammals
Marine plants

6. *Access (incl. anchorages):* Main access is by boat; there are numerous anchorages and two boat harbors

7. *Logging or logging potential, logging roads:* State land selection is pending in Idaho Inlet. Some logging and roading has taken place; more is scheduled.

8. *Permanent structures:* City of Elfin Cove, two boat harbors, airplane facility, and private cabins; logging roads.

9. *Historical sites:* One site is listed in the AHRS.

10. *Graph of use through time:* Figure 118 shows change in intensity of use over time for this unit. The use level of Hoonah residents varied from about 30 to 38 percent over the 1950 to 1978 time period and has decreased to about 21 percent in 1985.

11. *Use trend, change in use over time:* Fewer Hoonah residents have gone to this unit after the elimination of seining for salmon in Icy Strait; the closure of Glacier Bay to subsistence means that this area is no longer a stopping point for residents en route to Dundas Bay, Graves Harbor, or other parts of the park; there may be increased competition from harvesters from Elfin Cove. In addition, deer have become more available in areas closer to Hoonah.

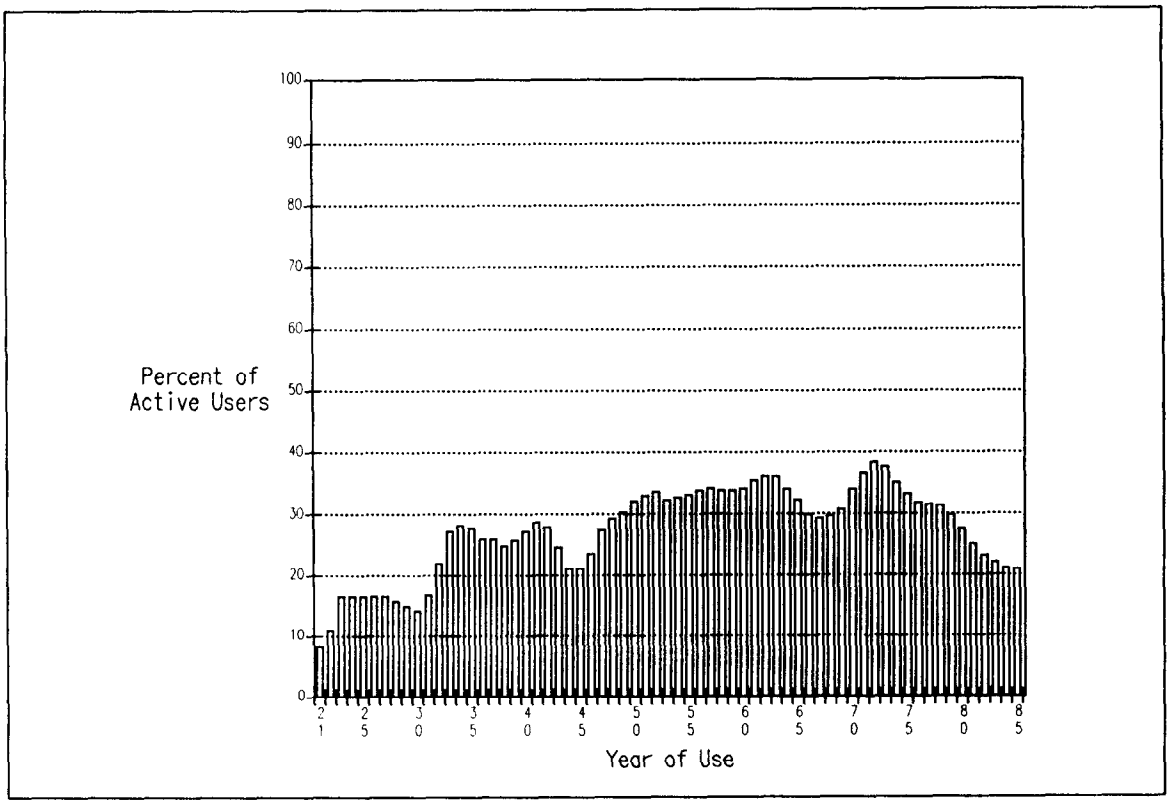

Figure 118. Intensity of Use in Unit 16, Port Althorp, Idaho Inlet.

Unit 17, Yakobi Is./Portlock Harbor.

1. *Unit name and no.*: Yakobi Is./Portlock Harbor. No. 17.

2. *Location:* .Mt. Fairweather quad, coastal fringe from Point lucan to Graves Island in Cross Sound and the Pacific Ocean. also included is two bodies of water(Lisianski Strait and lisianski Inlet) where the community of Pelican is located.

3. *Land status:* Forest Service and City of Pelican.

4. *Habitat types:* This large unit includes most of the habitat types found in the area including numerous small islands.

Forty salmon streams are present in this large unit (ASA). Chum, coho, pink, and sockeye salmon are present in these streams.

5. *Subsistence harvest area for:*

Deer
Waterfowl
Freshwater fish
Salmon
Marine fish
Marine invertebrates
Marine mammals
Marine plants

6. *Access (incl. anchorages):* Access is by boat; there are numerous anchorages in the unit.

7. *Logging or logging potential, logging roads:* Logging and roading have taken place in this unit.

8. *Permanent structures:* Logging roads, log transfer site, and logging camp.

9. *Historical sites:* People from village sites near Haktaheen Lake resettled in Hoonah. The AHRS lists 13 sites in this unit, including village sites and a pictograph.

10. *Graph of use through time:* Figure 119 shows change in intensity of use over time for this unit. The use level has declined from between 15 and 19 percent to about 10 percent at the present time.

11. *Use trend, change in use over time:* This unit is some distance from Hoonah. Fewer Hoonah residents have gone to this unit after the elimination of seining for salmon in Icy Strait; the closure of Glacier Bay to subsistence means that this area is no longer a stopping point for residents using park areas. In addition, deer have become more available in areas closer to Hoonah.

12. *Other comments:* The southern boundary of this unit marks the division between the traditional territories of the Hoonah Tlingit clans and the territory of the Sitka Tlingit clans.

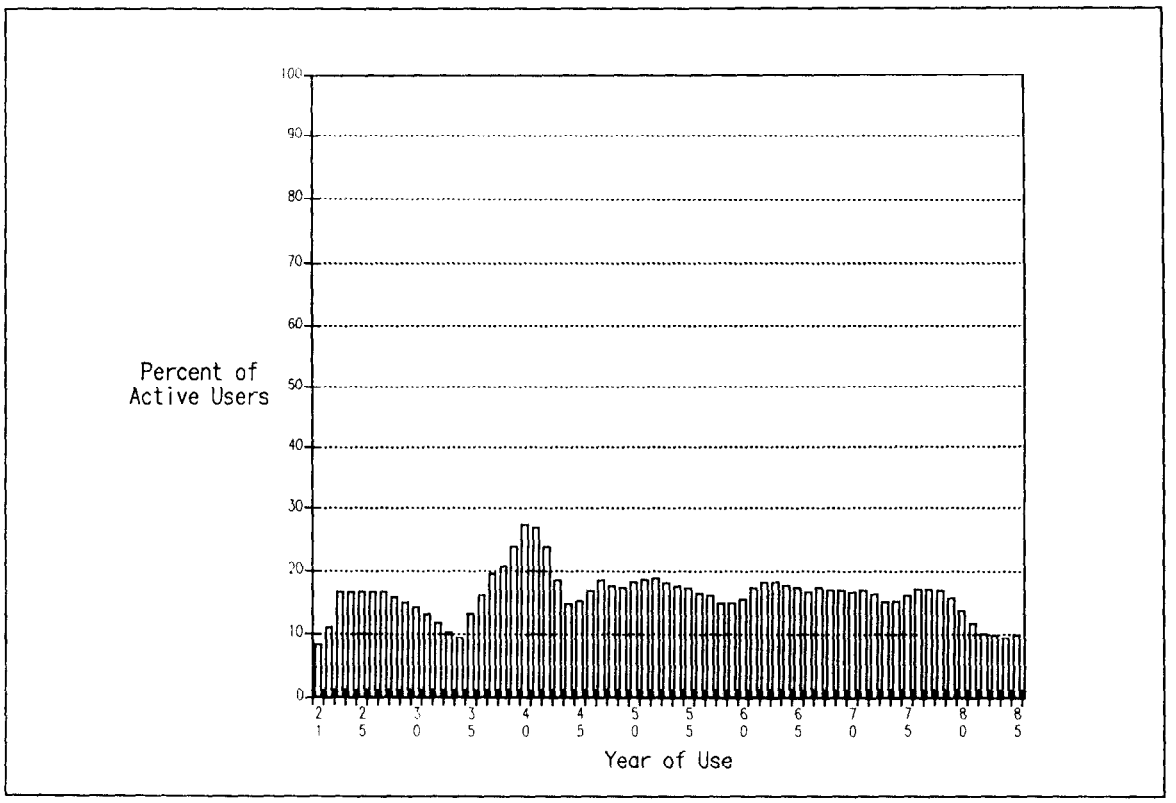

Figure 119. Intensity of Use in Unit 17, Yakobi Is./Portlock Harbor.

Unit 18, Inian Island/Lemesurier Island.

1. *Unit name and no.*: Inian Island/Lemesurier Island, No. 18.

2. *Location:* Mt. Fairweather quad, two main islands and smaller islands in Icy Strait and Cross Sound both located at the mouth of Cross Sound. Lemesurier Island is at the entrance of Idaho Inlet, and Inian Island at the south entrance of Dundas Bay.

3. *Land status:* Tongass National Forest and 1 homestead.

4. *Habitat types:* Mainly high energy coasts, muskegs, and old-growth forest.

5. *Subsistence harvest area for:*

Deer
Waterfowl
Salmon
Marine fish
Marine invertebrates
Marine mammals
Marine plants

6. *Access (incl. anchorages):* Boat and skiff access only. Inian and Earl cove are good anchorages.

7. *Logging or logging potential, logging roads:* None.

8. *Permanent structures:* Cabins.

9. *Historical sites:* The AHRS lists three sites in this unit, including a pictograph.

10. *Graph of use through time:* Figure 120 shows change in intensity of use over time for this unit. Use level declined from a consistent 45 to 52 percent to about 27 percent in 1985.

11. *Use trend, change in use over time:* Fewer Hoonah residents have gone to this unit after the elimination of seining for salmon in Icy Strait; the closure of Glacier Bay to subsistence means that this area is no longer a stopping point for residents en route to Dundas Bay, Graves Harbor, or other parts of the park; there may be increased competition from harvesters from Elfin Cove. In addition, deer have become more available in areas closer to Hoonah.

12. *Other comments:* This area contains some well know seaweed harvesting sites.

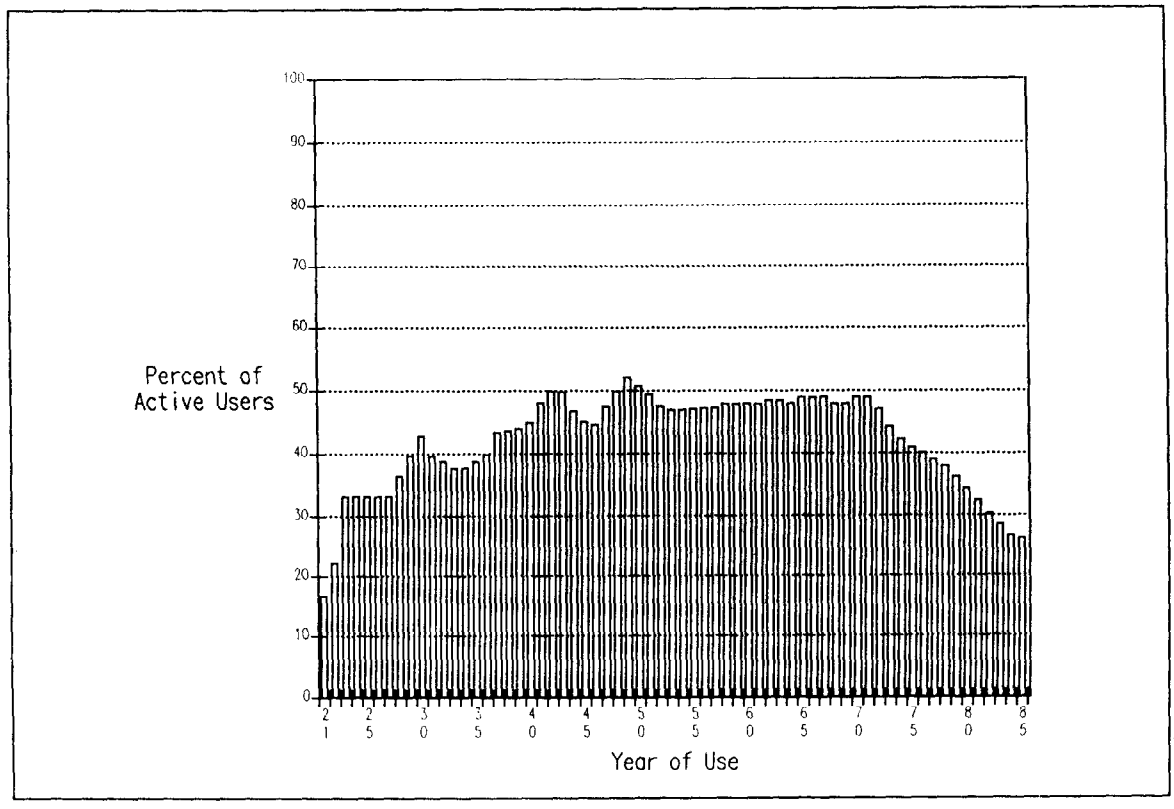

Figure 120. Intensity of Use in Unit 18, Inian Island/Lemesurier Island.

Unit 19, Cape Spencer/Lituya Bay.

1. *Unit name and no.* Cape Spencer/Lituya Bay, No. 19.

2. *Location:* .Mt. Fairweather quad, coastal area from Cape spencer to Lituya Bay and inland.

3. *Land status:* Glacier Bay National Park.

4. *Habitat types:* Coastal areas are comprised of different types of beaches from fine sand to very rocky near Cape Spencer. There are muskegs, old-growth forests, and some alpine reaching to glaciers.

Nine salmon streams are present in this unit. Chum, coho, pink, and sockeye salmon are documented in these streams(ASA).

5. *Subsistence harvest area for:*

Goat
Waterfowl
Salmon
Marine fish
Marine invertebrates
Marine mammals
Marine plants

6. *Access (incl. anchorages):* Boat access only.

7. *Logging or logging potential, logging roads:* None.

8. *Permanent structures:* None.

9. *Historical sites:* A fish camp was located near Cape Spencer. Archaeological sites documenting Tlingit habitation are found at Lituya Bay and elsewhere. The AHRS lists 15 sites, including prehistoric and historic village sites.

10. *Graph of use through time:* Figure 121 shows change in intensity of use over time for this unit. Use of this unit declined from a high of about 40 percent in the 1930s to a current level of about 6 percent.

11. *Use trend, change in use over time:* The early high level may be related to summer camps set up near important fishing grounds and to marine mammal harvesting. This unit became part of Glacier Bay National Park in 1939. Park policies gradually eliminated subsistence use.

12. *Other comments:* The northern boundary of this unit marks the division between the traditional territories of the Hoonah Tlingit clans and the territory of the Yakutat Tlingit clans. Many of the descendants of people who moved the old village site in Lituya Bay after the landslide and wave in the mid 1800s now live in Hoonah.

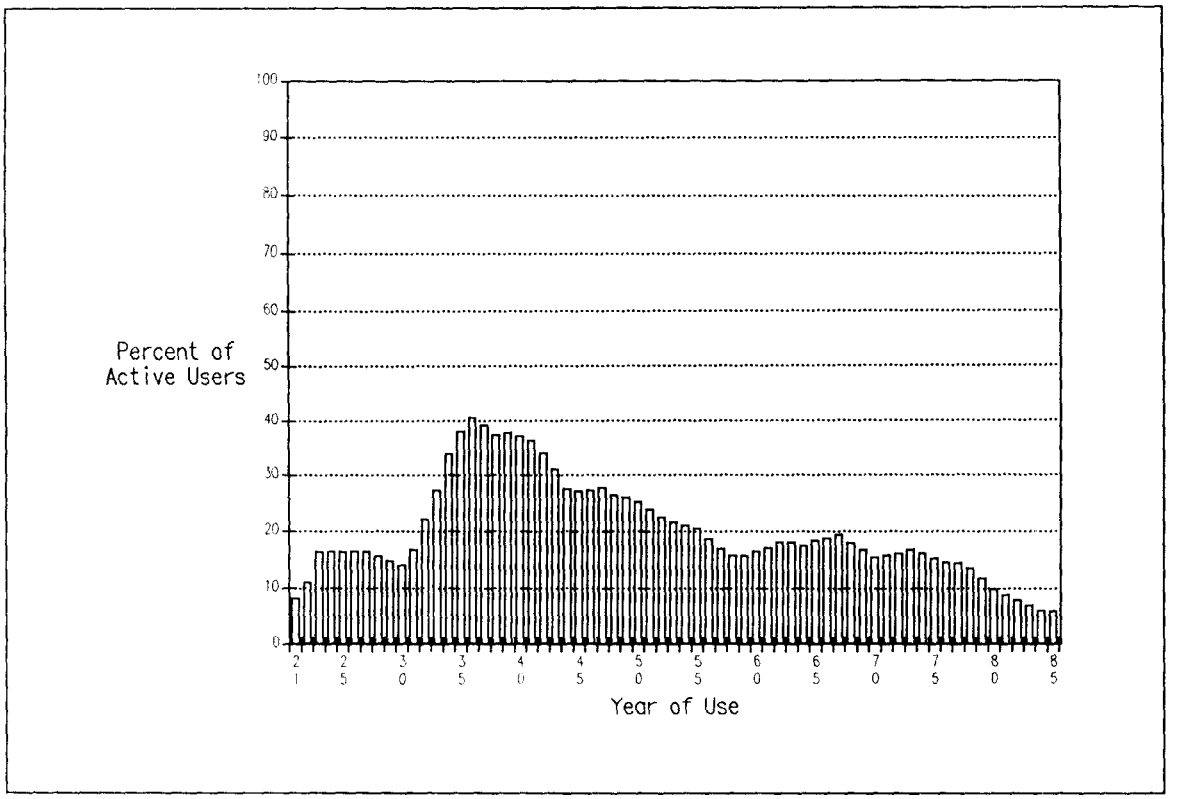

Figure 121. Intensity of Use in Unit 19, Cape Spencer/Lituya Bay.

Unit 20, Dundas Bay/Fern Harbor.

1. *Unit name and no.* Dundas Bay/Fern Harbor, No. 20.

2. *Location:* .
Mt. Fairweather quad, coastal area from Cape Spencer east to Point Carolus, including Taylor and Dundas bays on Icy Strait and Cross Sound and inland areas.

3. *Land status:* National Park Service.

4. *Habitat types:* Coastal beach usually of fine sand, muskeg, old-growth forest, some alpine, and glaciers.

Dundas River system and 12 salmon streams present in this unit. Chum, coho, pink, and sockeye salmon are found in these salmon streams (ASA).

5. *Subsistence harvest area for:*

Bear
Goat
Waterfowl
Freshwater fish
Salmon
Marine fish
Marine invertebrates
Marine mammals
Marine plants
Plants and berries

6. *Access (incl. anchorages):* Boat access only; good anchorage can be found in Fern Harbor and inside Dundas Bay.

7. *Logging or logging potential, logging roads:* None.

8. *Permanent structures:* George Dalton's cabin, other old cabins.

9. *Historical sites:* Numerous fish camps were found in this unit. The AHRS lists 25 sites in this unit including numerous prehistoric and historic habitation sites.

10. *Graph of use through time:* Figure 122 shows change in intensity of use over time for this unit. Use declined from about 86 percent to a current level of about 27 percent.

11. *Use trend, change in use over time:* Camps were set up in summer months near important fishing grounds to process fish. Dundas Bay was a major harvesting area for many of the species used by Hoonah residents.

12. *Other comments:* Since sockeye salmon are not available from many drainages in the Hoonah use area, harvest from Dundas Bay was particularly important.

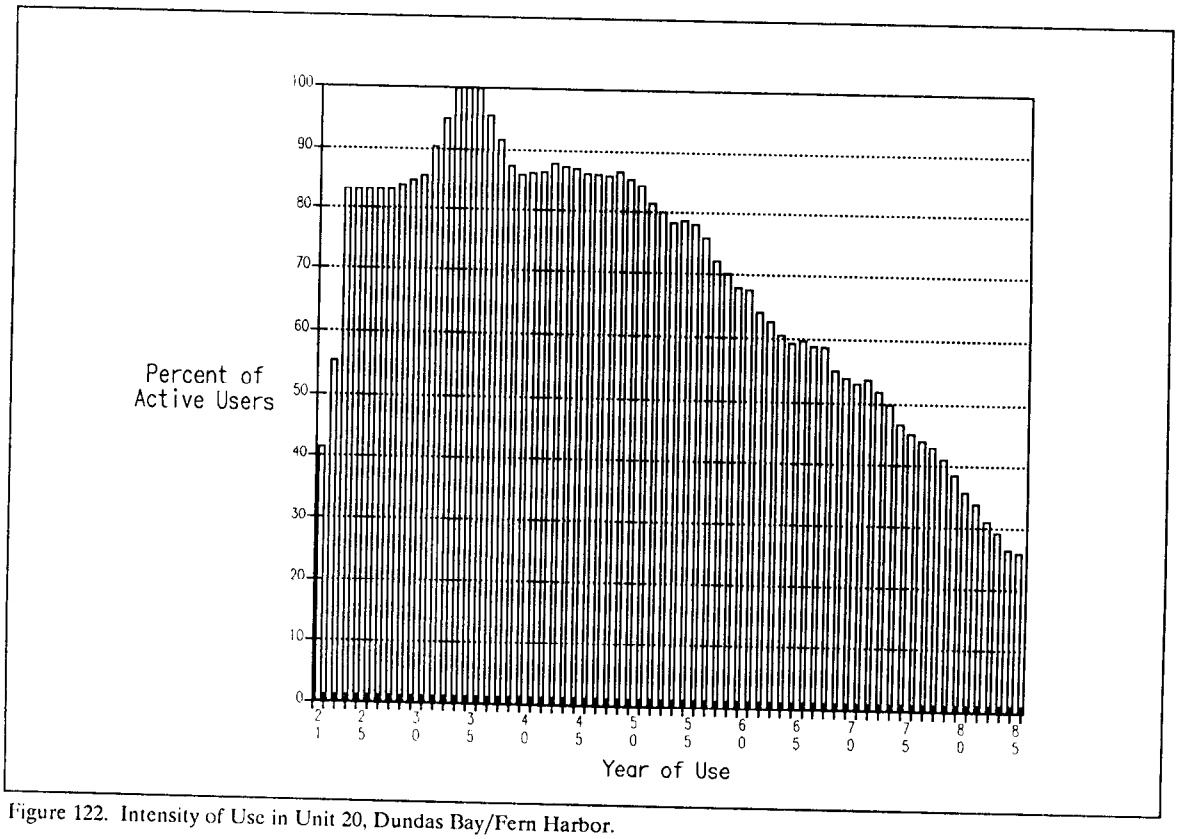

Figure 122. Intensity of Use in Unit 20, Dundas Bay/Fern Harbor.

Unit 21, Berg Bay/Willoughby Island.

1. *Unit name and no.* Berg Bay/Willoughby Island, No. 21.

2. *Location:* Mt. Fairweather quad, coastal area from Point Carolus to Geikie Inlet Point including both Drake and Willoughby islands. Unit boundary goes inland about 7 miles.

3. *Land status:* Glacier Bay National Park.

4. *Habitat types:* Coastal beach fringe, muskeg, old-growth forest, and alpine habitat.

Seven salmon streams (10140, 10120, 10170, 10130, 10320, 10240, and 10030 ASA) drain into the unit. Chum, coho, pink, and sockeye salmon Dolly Varden occur in these streams.

5. *Subsistence harvest area for:*

Deer
Goat
Waterfowl
Salmon
Marine fish
Marine mammals
Plants and berries

6. *Access (incl. anchorages):* Fingers Bay and Berg Bay provide safe anchorages. Access is by boat and skiff only.

7. *Logging or logging potential, logging roads:* None.

8. *Permanent structures:* None

9. *Historical sites:* Numerous fish camps were present in Berg Bay. One site is listed in the AHRS.

10. *Graph of use through time:* Figure 123 shows change in intensity of use over time for this unit. Between 60 and 70 percent of Hoonah active harvesters used this unit before establishment of Park Service policies eliminating subsistence harvests. At present use level is about 15 percent.

11. *Use trend, change in use over time:* Camps were set up in this unit in summer months near important fishing grounds to process fish. This unit became part of Glacier Bay National Park in 1939. The decline in use is the result of Park Service regulation. The continued harvest in this area consists of berry picking and fishing under sport and commercial fishing regulations.

12. *Other comments:* Since sockeye salmon are not available from many drainages in the Hoonah use area, harvest from runs in this unit was particularly important.

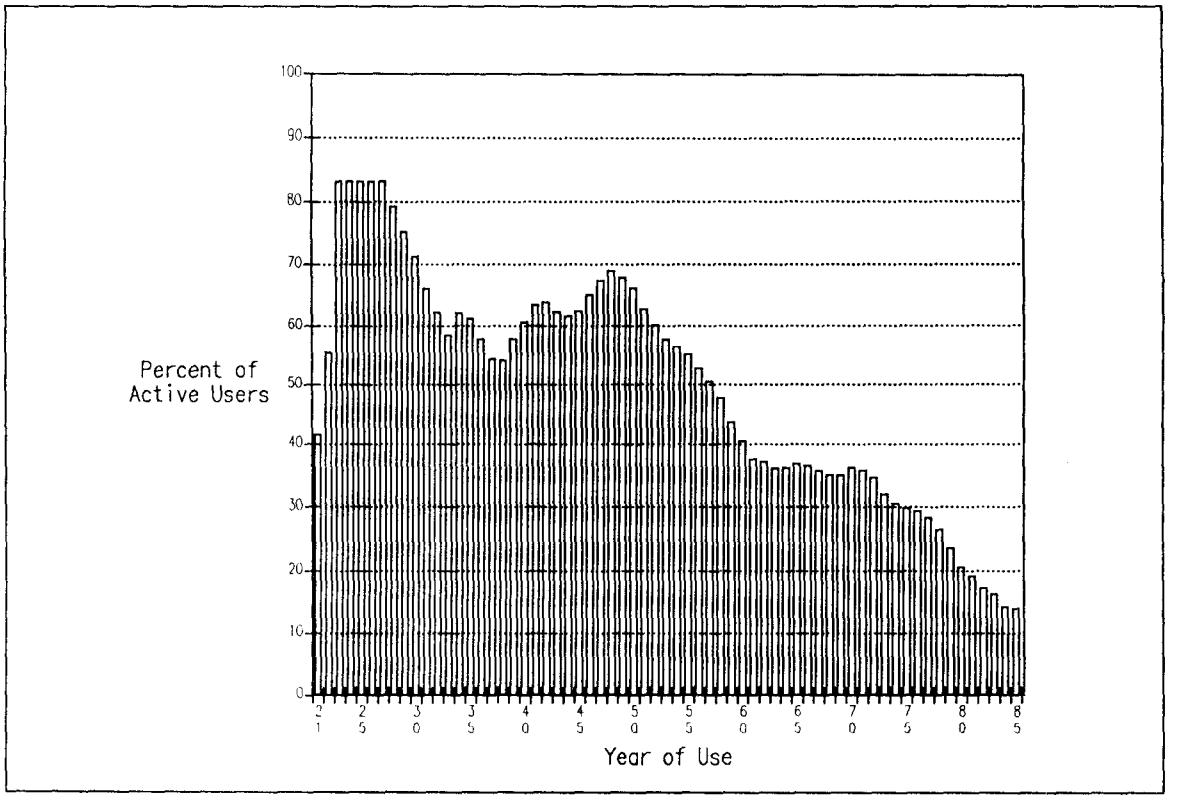

Figure 123. Intensity of Use in Unit 21, Berg Bay/Willoughby Island.

Unit 22, Upper Glacier Bay.

1. *Unit name and no.* Upper Glacier Bay, No. 22.

2. *Location:* Mt. Fairweather quad, coastal area from Geikie Inlet to Sandy Cove including all the bays and inlets in the upper part of Glacier Bay. The unit boundary is adjacent to the Canadian border and to the U.S.Tongass Forest boundary on Lynn Canal side.

3. *Land status:* Glacier Bay National Park.

4. *Habitat types:* This unit consists of mostly glacier ice, some muskeg and very little forest.

Three salmon streams (10150, 10190, and 10480 ASA) drain into this unit. Chum, pink, and sockeye salmon are found in these streams.

5. *Subsistence harvest area for:*

Goat
Waterfowl
Salmon
Marine fish
Marine mammals
Plants and berries

6. *Access (incl. anchorages):* Boat access only; there are numerous anchorages.

7. *Logging or logging potential, logging roads:* None.

8. *Permanent structures:* Some old cabins at Reid Inlet, Garforth Island, and elsewhere.

9. *Historical sites:* No sites are listed in the AHRS.

10. *Graph of use through time:* Figure 124 shows change in intensity of use over time for this unit. Between 60 and 70 percent of Hoonah active harvesters used this unit before establishment of Park Service policies eliminating subsistence harvests. At present use level is about 15 percent.

11. *Use trend, change in use over time:* Sealing camps were set up by hunting parties in this unit, and some goat hunting took place as well. Most of this unit became part of Glacier Bay National Park in 1925. Park policies gradually eliminated subsistence use. The continued harvest in this area consists of berry picking and fishing under sport and commercial fishing regulations.

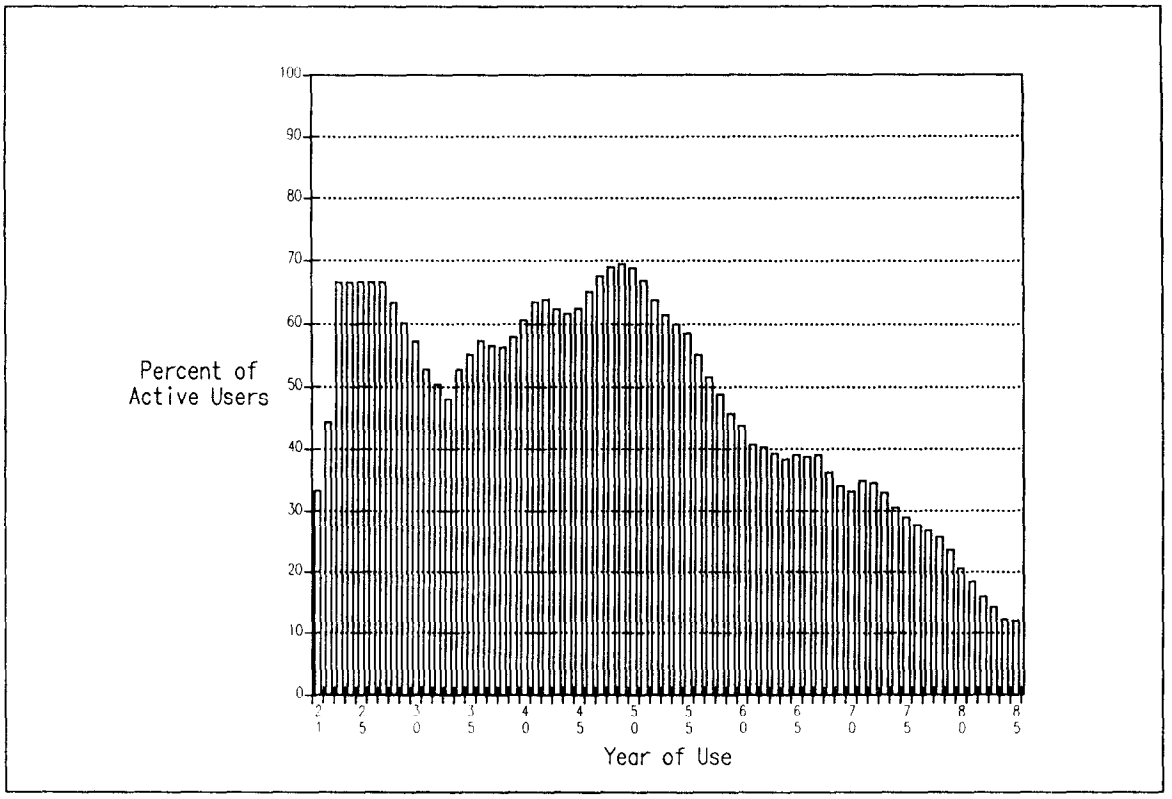

Figure 124. Intensity of Use in Unit 22, Upper Glacier Bay.

Unit 23, Beardslee Islands.

1. *Unit name and no.* Beardslee Islands, No. 23.

2. *Location:* .Mt. Fairweather quad, coastal area from Sandy Cove to Point Gustavus inland about 6 miles to the Tongass National Forest boundary line.

3. *Land status:* Glacier Bay National Park.

4. *Habitat types:* This unit includes extensive coastline and intertidal areas, numerous small islands, some muskeg and successional forest.

Seven salmon streams (10780, 10800, 10900, 10100, 10050, 10070 and 10080 ASA) and 5 tributaries (2009, 3005, 2031, 2003, and 2024 ASA) are located in this unit. The species found in these streams are chum, coho, pink, and sockeye salmon and Dolly Varden and steelhead.

5. *Subsistence harvest area for:*

Goat
Waterfowl
Salmon
Marine fish
Marine mammals
Plants and berries

6. *Access (incl. anchorages):* Boat and skiff access; Beartrack Cove and Bartlett Cove and boat harbor are the most often used anchorages. Bartlett Cove is connected by road to Gustavus.

7. *Logging or logging potential, logging roads:* None

8. *Permanent structures:* Boat harbor, seaplane facility, private cabins, tourist facilities, and Park Service buildings.

9. *Historical sites:* Old clan house sites and fish camps are located in Bartlett cove; other harvesting sites are found throughout the unit. Three sites are listed in the AHRS, including a clan house and a village site.

10. *Graph of use through time:* Figure 125 shows change in intensity of use over time for this unit. Use level varied between 44 and 52 percent in the 20 years prior to establishment of permanent park headquarters at Bartlett Cove in 1953. Use has declined from that time to a current 17 percent level.

11. *Use trend, change in use over time:* Most of this unit became part of Glacier Bay National Park in 1939. The unit was extensively used for salmon fishing and processing and as a camping area for sealing and goat hunting parties. Park Service policies gradually eliminated subsistence harvests in this unit. The continued harvest in this area consists of berry picking and fishing under sport and commercial fishing regulations.

12. *Other comments:* The history of some Hoonah Tlingit clans is intimately connected with village sites in this unit. Main clan houses were moved from this unit to Hoonah after the ice advance of the last glaciation in the 1700s.

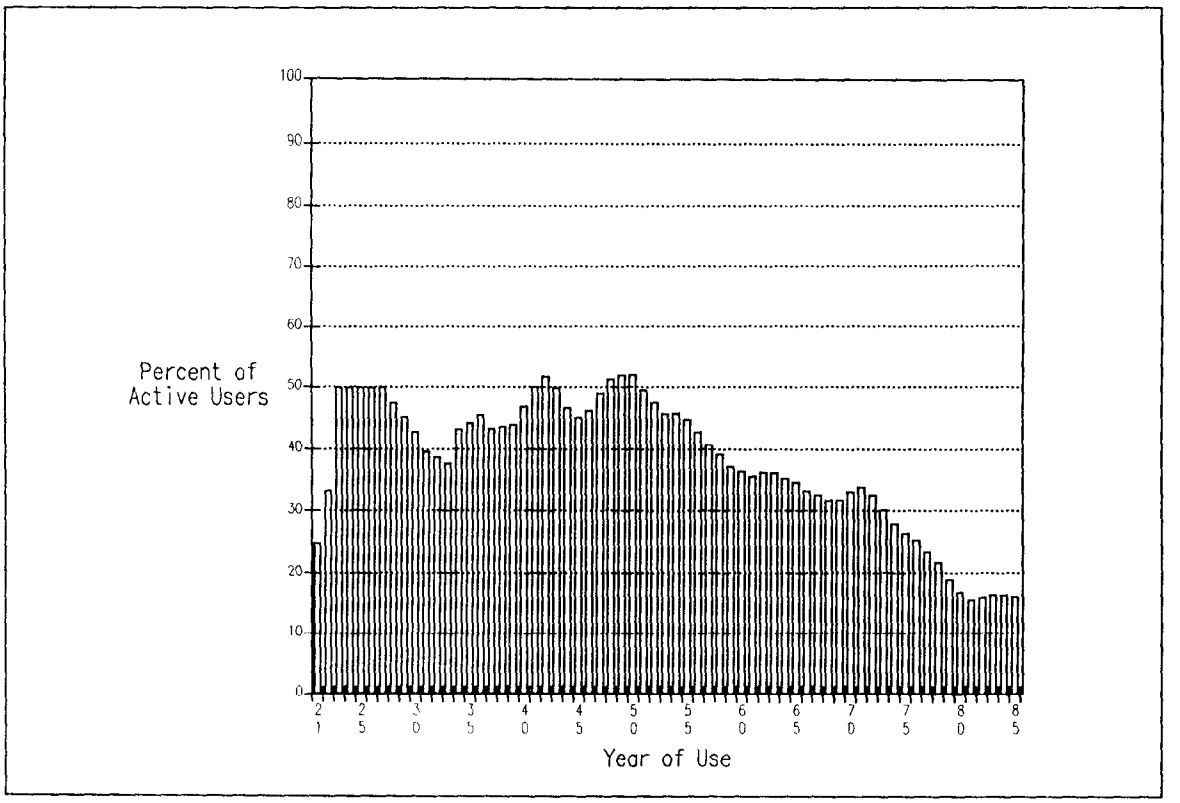

Figure 125. Intensity of Use in Unit 23, Beardslee Islands.

Unit 24, Excursion River/Sawmill Bay.

1. *Unit name and no.* Excursion River/Sawmill Bay, No. 24.

2. *Location:* Juneau quad, located at the head of Excursion Inlet and including the coastal area from Icy Passage to Sawmill Bay and inland to Nun Mt., the Chilkat Mountain Range and Tongass National Forest boundary on Lynn Canal side.

3. *Land status:* Glacier Bay National Park

4. *Habitat types:* This unit contains rocky beaches, muskegs, old-growth forest and alpine areas.

Three salmon streams (10220, 10240, and 10200 ASA) drain into the unit. Pink salmon is the only documented species in these 3 streams.

5. *Subsistence harvest area for:*

Bear
Goat
Small game
Waterfowl
Freshwater fish
Salmon
Marine fish
Marine invertebrates
Marine mammals
Plants and berries

6. *Access (incl. anchorages):* Access is by boat and skiff, good anchorages are found at Sawmill Bay and at the head of Excursion Inlet.

7. *Logging or logging potential, logging roads:* None.

8. *Permanent structures:* None.

9. *Historical sites:* Seven sites are listed in the AHRS, including habitation sites, fish camps, smokehouses, and burial sites.

10. *Graph of use through time:* Figure 126 shows change in intensity of use over time for this unit. Us level varied between 35 and 44 percent until the early 1970s; use has declined to about 16 percent in 1985 following the extension of Park Service regulation and patrolling in this unit.

11. *Use trend, change in use over time:* Although this unit became part of Glacier Bay National Park in 1939 subsistence use was not affected until the early 1970s. The unit was extensively used for salmon fishing and processing and as a camping area for hunting parties. Most of the decline in use is the result of Park Service regulation. The continued harvest in this area consists of berry picking and fishing under sport fishing. Subsistence salmon are still occasionally taken in Sawmill Bay.

Part of the decline may also be due to employment of fewer Hoonah residents at the Excursion Inlet cannery.

12. *Other comments:* This unit is part of a larger clan area extending to Point Couverden and Point Howard, used for hunting, summer fish camps, and berry and plant gathering. Before establishing year round residences in Hoonah, some families lived in this larger unit.

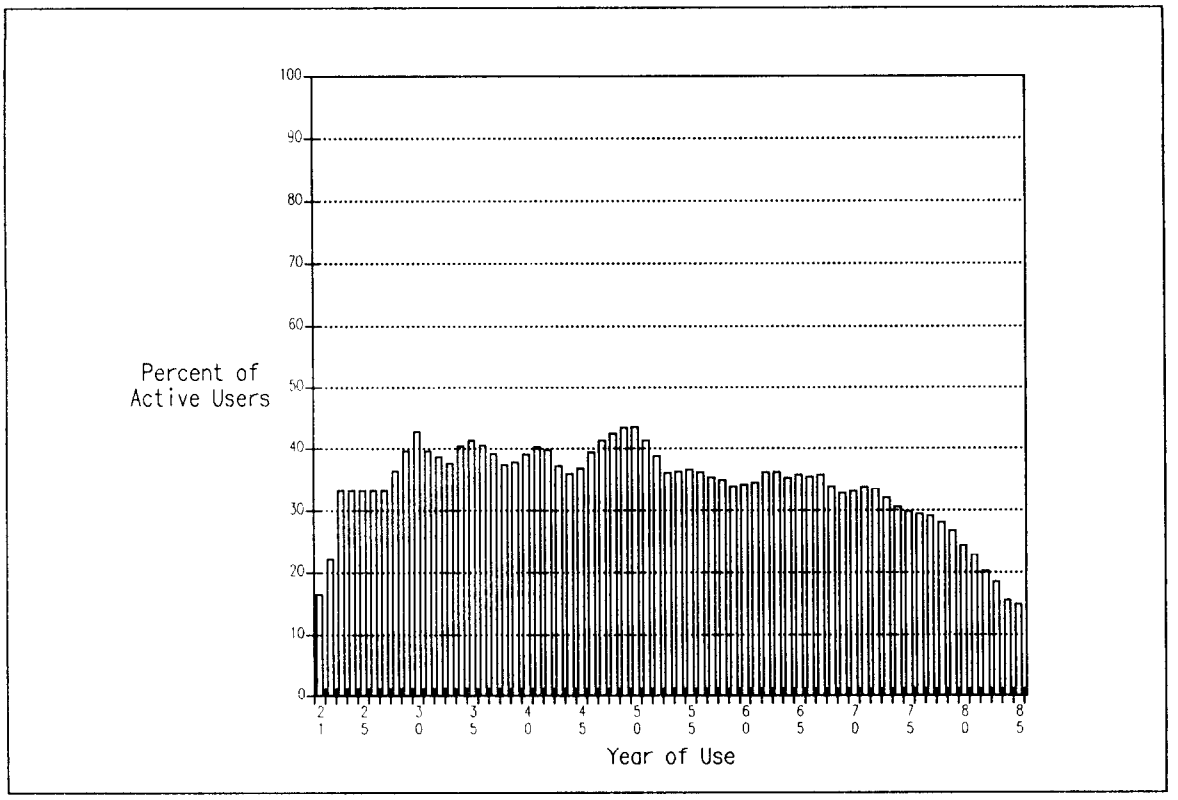

Figure 126. Intensity of Use in Unit 24, Excursion River/Sawmill Bay.

Unit 25, Gustavus Townsite.

1. *Unit name and no.* Gustavus Townsite, No. 25.

2. *Location:* Juneau quad, Gustavus is located in Icy Strait and at the mouth of Glacier Bay.

3. *Land status:* City of Gustavus and private property.

4. *Habitat types:* Flat sandy grass habitat, muskeg, large mud flats, successional forest.

Three salmon streams (10050, 10070, and 10080 ASA) and four tributaries (3005, 2024, 2031, and 2003 ASA) are in the Gustavus unit. Chum and coho salmon, Dolly Varden, and steelhead are the species identified in these streams.

5. *Subsistence harvest area for:*

Waterfowl
Salmon
Marine invertebrates
Marine mammals
Plants and berries

6. *Access (incl. anchorages):* Skiff and boat access; anchorage in rivers.

7. *Logging or logging potential, logging roads:* Not developed.

8. *Permanent structures:* City of Gustavus, airport, dock, and community facilities.

9. *Historical sites:* A Tlingit village was located at Point Gustavus. No sites are listed in the AHRS.

10. *Graph of use through time:* Figure 127 shows change in intensity of use over time for this unit. Use declined from almost 30 percent in 1941 to about 2 percent in 1985.

11. *Use trend, change in use over time:* The development and growth of Gustavus as a community with a sizeable year round and vacation population has displaced subsistence use by Hoonah residents.

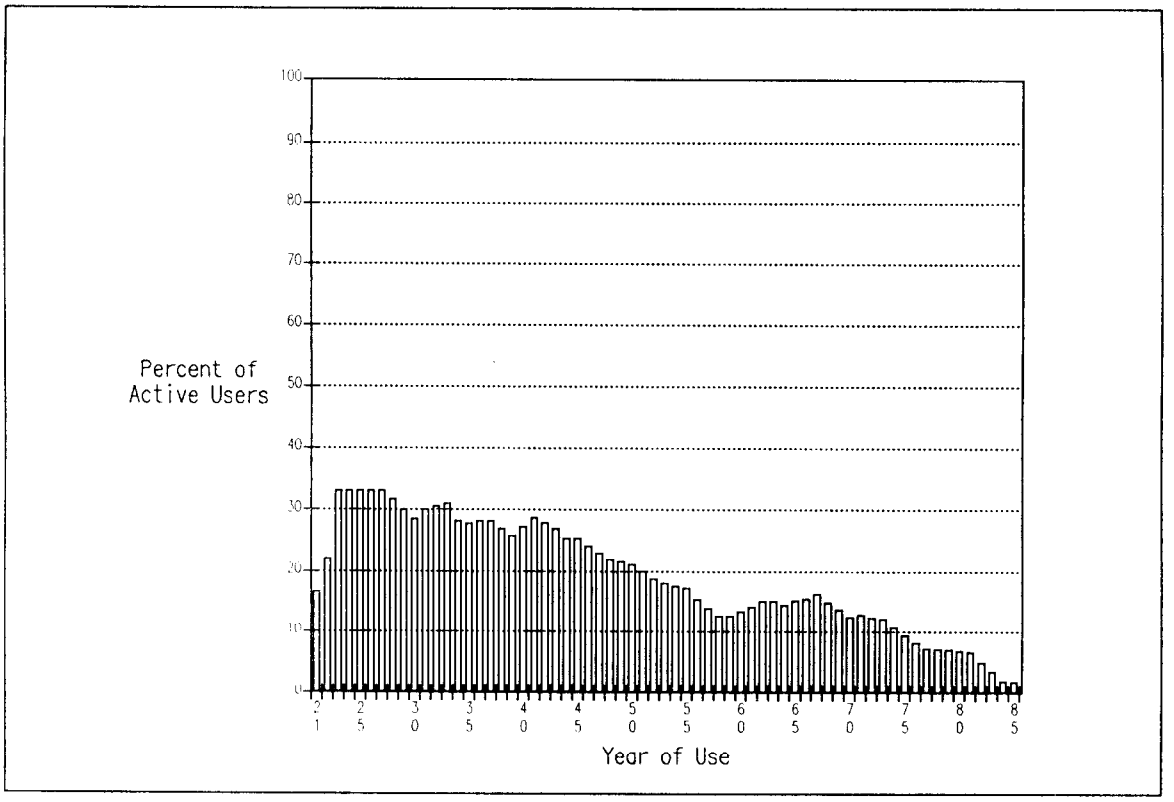

Figure 127. Intensity of Use in Unit 25, Gustavus Townsite.

Unit 26, Excursion Inlet/Pleasant Island.

1. *Unit name and no.* Excursion Inlet/Pleasant Island, No. 26.

2. *Location:* Juneau quad, located on Icy Strait from Pleasant Island to Humpy Creek and to the head of Excursion Inlet; the unit runs inland to Nun Mountain about 5 miles.

3. *Land status:* state land selection, Excursion Inlet cannery, private property and cabins, and Tongass National Forest.

4. *Habitat types:* Unit includes the rocky coast, some old-growth and alpine areas and the Excursion River.

Eight salmon streams (10200, 10210, 10400, 10500, 10050, 10100, and 10120 ASA), one tributary (2004 ASA), and one lake (0100 ASA) are present in this unit. The species present are chum, coho, pink, and sockeye salmon and Dolly Varden.

5. *Subsistence harvest area for:*

Bear
Deer
Goat
Small game
Waterfowl
Freshwater fish
Salmon
Marine fish
Marine invertebrates
Marine mammals

6. *Access (incl. anchorages):* Skiff and boat access. Anchorages are found at the head of the inlet and at the harbor at the cannery.

7. *Logging or logging potential, logging roads:* Areas were logged in 1960's by Department of Natural Resources. State land selection and private land holders were logged. A log transfer facility is present.

8. *Permanent structures:* Tribal houses, cannery, cabins, airport, log transfer facility.

9. *Historical sites:* A Woosh Ki Taan village was located at Village Point or at the mouth of Excursion Inlet. The AHRS lists seven sites in this unit, including habitation, burial, and lineage house sites, as well as a prehistoric midden.

10. *Graph of use through time:* Figure 128 shows change in intensity of use over time for this unit. From about 50 percent to about 60 percent of active harvesters used this area in the 1940 to 1975 time period. About 30 percent of active harvesters use this unit at the present time.

11. *Use trend, change in use over time:* Use has declined with reduced employment of Hoonah residents at the Excursion Inlet cannery and restrictions on the taking of red salmon in the Neka Lake system.

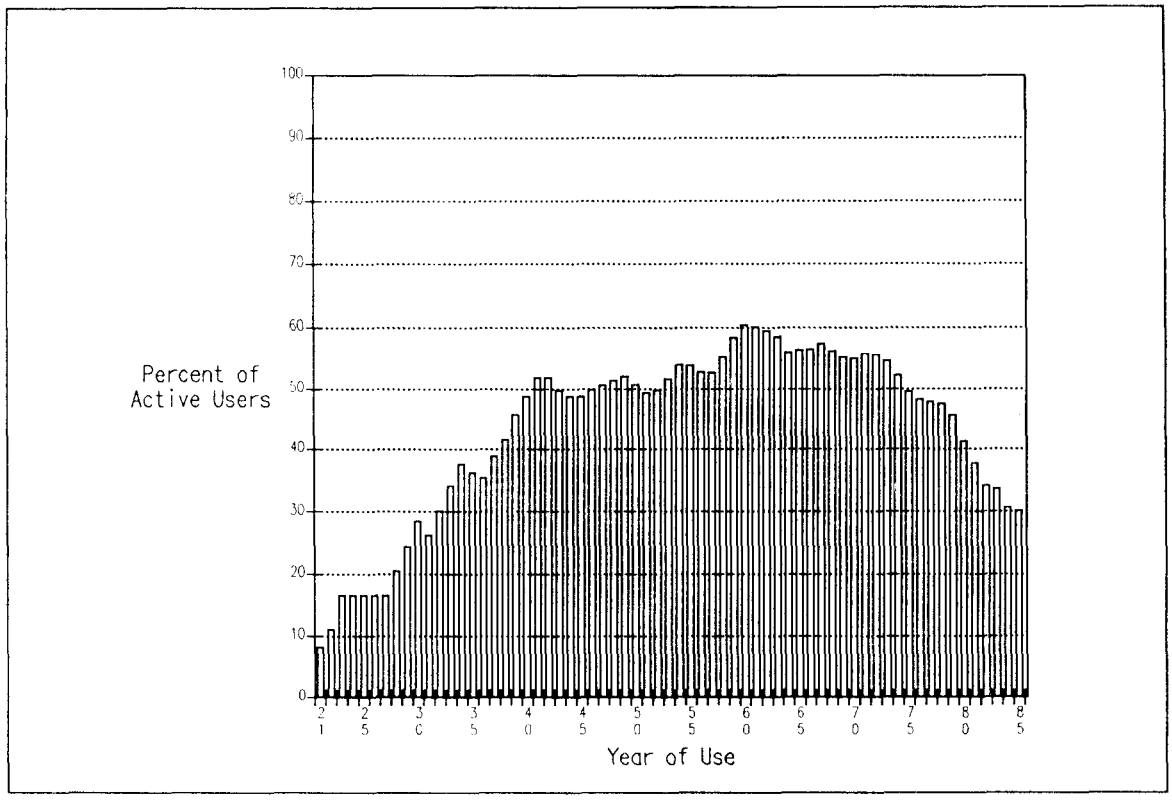

Figure 128. Intensity of Use in Unit 26, Excursion Inlet/Pleasant Island.

Unit 27, Point Couverden.

1. *Unit name and no.* Point Couverden, No. 27.

2. *Location:* Juneau quad, located at the junction of Chatham and Icy straits from Point Howard to Humpy Creek and inland and seaward areas.

3. *Land status:* Tongass National Forest.

4. *Habitat types:* The ecological continuum follows the coast line into the muskegs, salmon streams, old-growth to alpine. Numerous islands and rocks dot the area.jp317

Nine salmon streams (10180, 10250, 10350, 10370, 10380, 10060, 10080, 10100, and 10200 ASA) are located in this unit. The species identified in the streams are pink and chum salmon only. A Hoonah resident has found king salmon in one of the salmon streams in this unit.

5. *Subsistence harvest area for:*

Bear
Deer
Small game
Freshwater fish
Salmon
Marine fish
Marine invertebrates
Marine mammals
Marine plants

6. *Access (incl. anchorages):* Skiff and boat access only. Swanson Harbor or Couverden Harbor provide anchorages; a state float facility is located in Swanson Harbor.

7. *Logging or logging potential, logging roads:* Logging roads to a log transfer facility connects this unit to unit 26. Part of this unit has been roaded in anticipation of logging.

8. *Permanent structures:* state float.

9. *Historical sites:* The AHRS lists eight sites in this unit, including numerous historic habitation sites. Ground Hog Bay, a very important prehistoric site is located within this unit.

10. *Graph of use through time:* Figure 129 shows change in intensity of use over time for this unit. Use of this unit has varied from around 30 percent in the 1940s to about 10 percent at the present time.

11. *Use trend, change in use over time:* Seasonal harvesting camps may have been maintained in the earlier period. In the last years competition with sports hunters and fishers from Juneau may have had an adverse impact on Hoonah residents' use of key harvesting areas in this unit.

12. *Other comments:* The northern and western boundaries of this unit mark the division between the traditional territories of the Hoonah Tlingit clans and the territory of the Haines and Auke Tlingit clans.

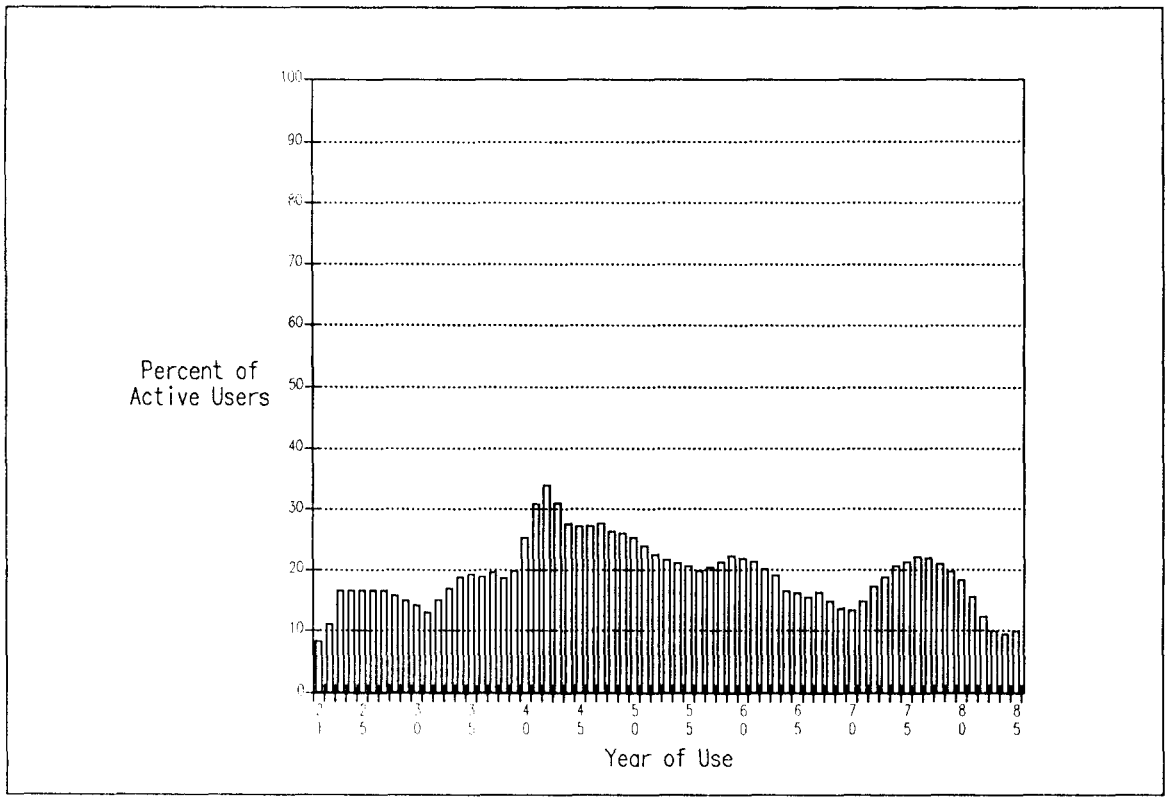

Figure 129. Intensity of Use in Unit 27, Point Couverden, Point Howard.

Unit 28, Hawk Inlet.

1. *Unit name and no.* Hawk Inlet, No.28.

2. *Location:* Juneau quad, located on Admiralty Island from Funter Bay to Fishery Point and inland areas.

3. *Land status:* Tongass National Forest, Funter Bay community, mining camp, logging camp, and private property.

4. *Habitat types:* Coastal area with extensive mud flats, muskeg, old-growth forest and some alpine areas.

Twelve salmon streams (ASA) are identified in this unit and chum, coho, and pink salmon are documented in these streams. Two Hoonah residents identified king salmon in Wheeler Creek. Traditional king harvest by both Hoonah and Angoon residents has been reported.

5. *Subsistence harvest area for:*

Deer
Salmon
Marine fish
Marine invertebrates
Marine mammals

6. *Access (incl. anchorages):* Skiff and boat access. Shee Atika now has a landing strip in their land selection.

7. *Logging or logging potential, logging roads:* Roading, site exploration, and some land clearing in connection with the Greens Creek mine has taken place.

8. *Permanent structures:* Old cannery site, mining camp, logging camp, cabins, Funter Bay community, micro wave towers, boat harbor, floating dock, log transfer facility, mining and logging roads.

9. *Historical sites:* Historical site at mouth of Hawk Inlet. The AHRS lists seven sites in this unit, including a petroglyp, and a prehistoric midden,

10. *Graph of use through time:* Figure 130 shows change in intensity of use over time for this unit. Use of this unit fluctuated around 30 percent until the early 1970s and has declined to about 13 percent at the present time.

11. *Use trend, change in use over time:* In the last years competition with sports hunters and fishers from Juneau may have had an adverse impact on Hoonah residents' use of key harvesting areas in this unit.

12. *Other comments:* The southern boundary of this unit marks the division between the traditional territories of the Hoonah Tlingit clans and the territory of the Angoon Tlingit clans.

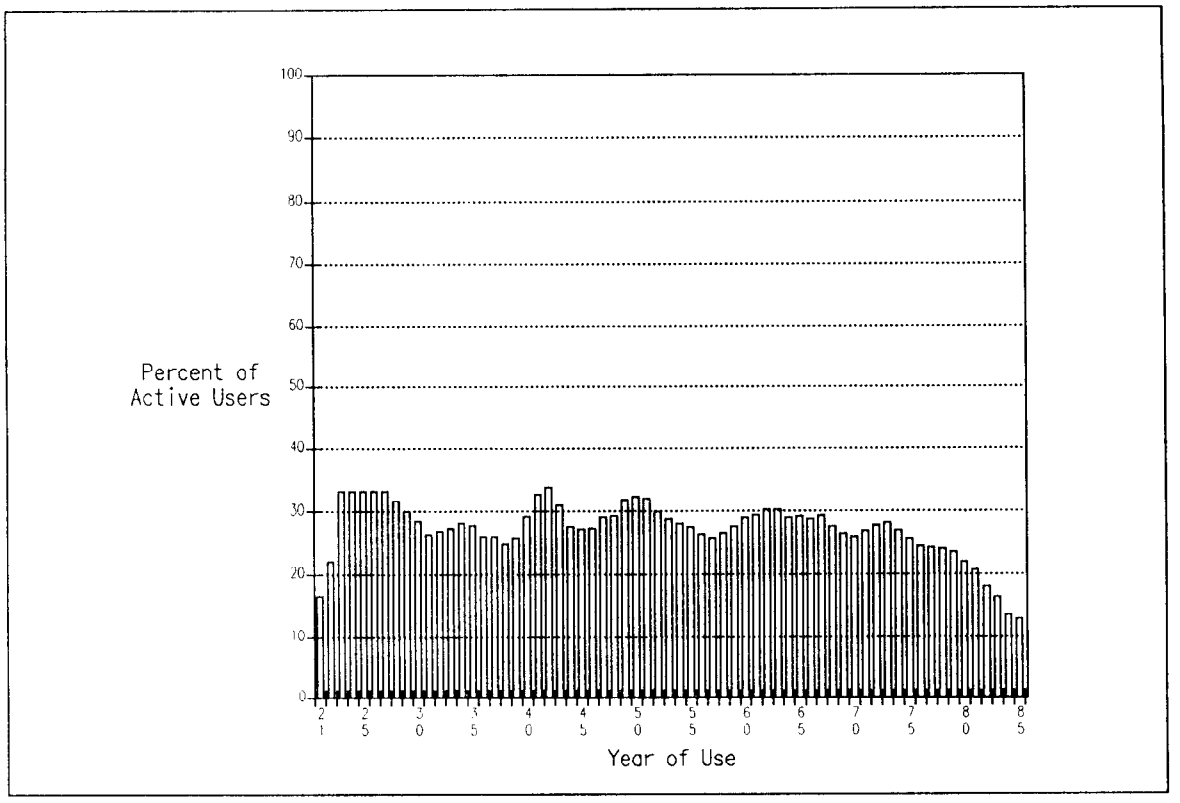

Figure 130. Intensity of Use in Unit 28, Hawk Inlet.

Unit 29, Freshwater Bay.

1. *Unit name and no.* Freshwater Bay, No.29.

2. *Location:* Sitka quad, located on Chichagof Island to Chatham Strait from Point Augusta to East Point at the mouth of Tenakee Inlet.

3. *Land status:* Tongass National Forest.

4. *Habitat types:* Ecological continuum with extensive wetlands from coastal beach fringe, muskeg, old-growth forest, to alpine in undisturbed areas; recent clear-cuts in logged areas.

Nine salmon streams (10060, 10500, 10460, 10380,10320, 10300, 10250, 10100, and 10050 ASA) and two tributaries (2004 and 3004 ASA) drain into this unit. The species documented in these streams are chum, coho, pink, and sockeye salmon, Dolly Varden, and steel head trout.

5. *Subsistence harvest area for:*

Deer
Small game
Waterfowl
Salmon
Marine fish
Marine invertebrates
Marine mammals

6. *Access (incl. anchorages):* Access by skiff and boat; Watchusettes Cove, Pavlof Harbor, Cedar Cove, and head of Freshwater Bay provide excellent anchorages. Logging roads have recently been put through connecting to Hoonah and Indian River.

7. *Logging or logging potential, logging roads:* Extensive logging has taken place in the upper part of the bay on National Forset land and is continuing.

8. *Permanent structures:* Cabins, logging roads, logging camp, and a fish weir at Pavlof Creek.

9. *Historical sites:* The AHRS lists ten sites in this unit, including prehistoric and historic habitation sites and petroglyphs.

10. *Graph of use through time:* Figure 131 shows change in intensity of use over time for this unit. Use levels from 40 to 50 percent occurred through 1950. Levels fluctuated above 30 percent to the late 1970s and have declined to about 18 percent at the present time.

11. *Use trend, change in use over time:* The early high levels of use may be associated with seasonal harvesting camps. Key respondents stated that the recent decline in use was the result of extensive logging activities in the unit which have made this unit less appealing or productive to hunters. Easier access to other units and recent boating accidental deaths due to bad weather may also be factors that have limited use.

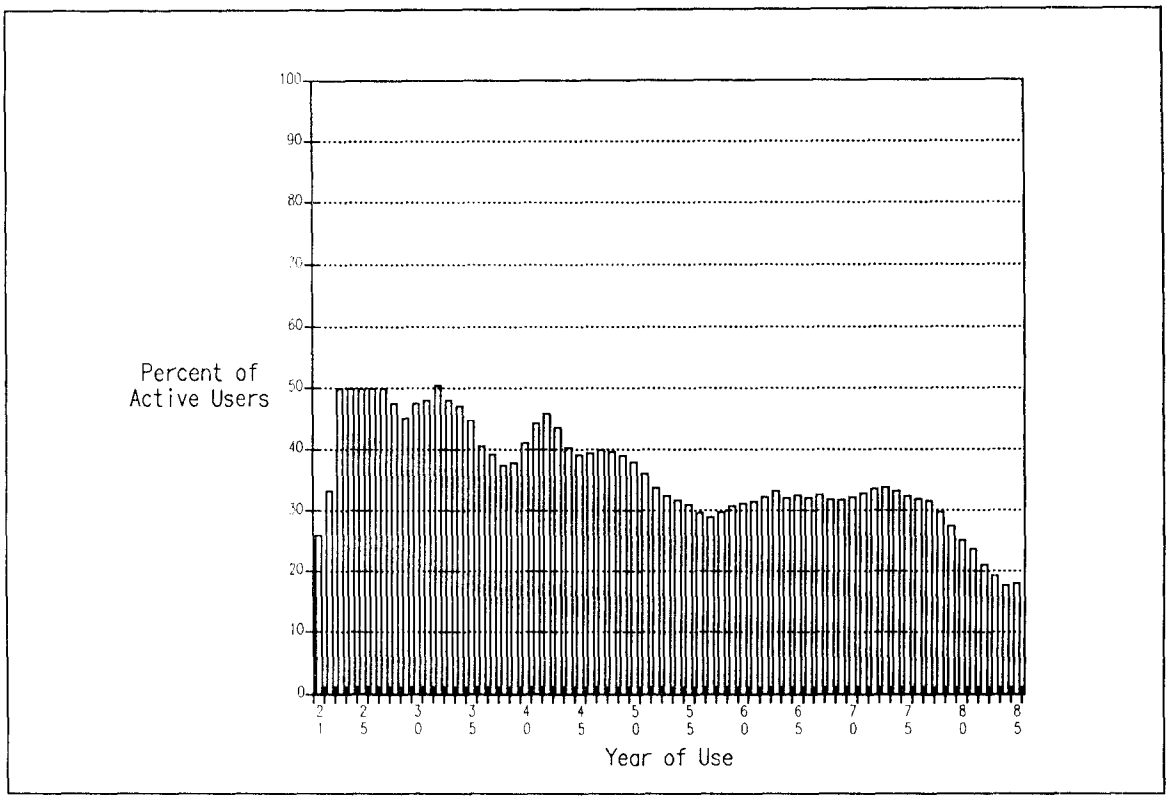

Figure 131. Intensity of Use in Unit 29, Freshwater Bay.

Unit 30, Tenakee Inlet.

1. *Unit name and no.* Tenakee Inlet, No. 30.

2. *Location:* Sitka quad, this unit includes all of Tenakee Inlet, adjacent land, and extends south to Basket Bay.

3. *Land status:* Tongass National Forest, City of Tenakee, private property.

4. *Habitat types:* This large unit contains most of the habitat types found in the area and includes extensive wetlands and intertidal areas.

Seventeen salmon streams (ASA) are documented in this unit. Four species of salmon and three species of trout are identified by the ADF&G Anadromous Stream Atlas.

5. *Subsistence harvest area for:*

Deer
Small game
Waterfowl
Salmon
Marine fish
Marine invertebrates
Marine mammals
Plants and berries

6. *Access (incl. anchorages):* Alaska ferry system, boat, skiff.

7. *Logging or logging potential, logging roads:* Extensive logging and roading throughout this unit on Forest Service land, with more logging scheduled.

8. *Permanent structures:* City of Tenakee and facilities, boat harbor, ferry terminal, airplane facility, logging roads, log transfer facility, and logging camp.

9. *Historical sites:* A Tlingit settlement was located near the existing boat harbor. Fish camps were found at the head of Tenakee Inlet and Kadashan Bay. The AHRS lists 12 sites in this unit including historic and prehistoric habitation sites, petroglyphs, and burial grounds.

10. *Graph of use through time:* Figure 132 shows change in intensity of use over time for this unit. Between 30 and 40 percent of Hoonah active harvesters used this unit over the 1945 to 1978 time period; use has declined to about 18 percent.

11. *Use trend, change in use over time:* The extensive logging activity in the inlet which has made hunting less desirable is a major cause for the decline in use of this unit. Logging activity has decreased use of units in upper Port Frederick, including unit 10 at the portage. Increased competition from other hunters is the second major cause for decline. Most deer in this unit are taken by hunters from Juneau who use the ferry system for access to Tenakee Springs.

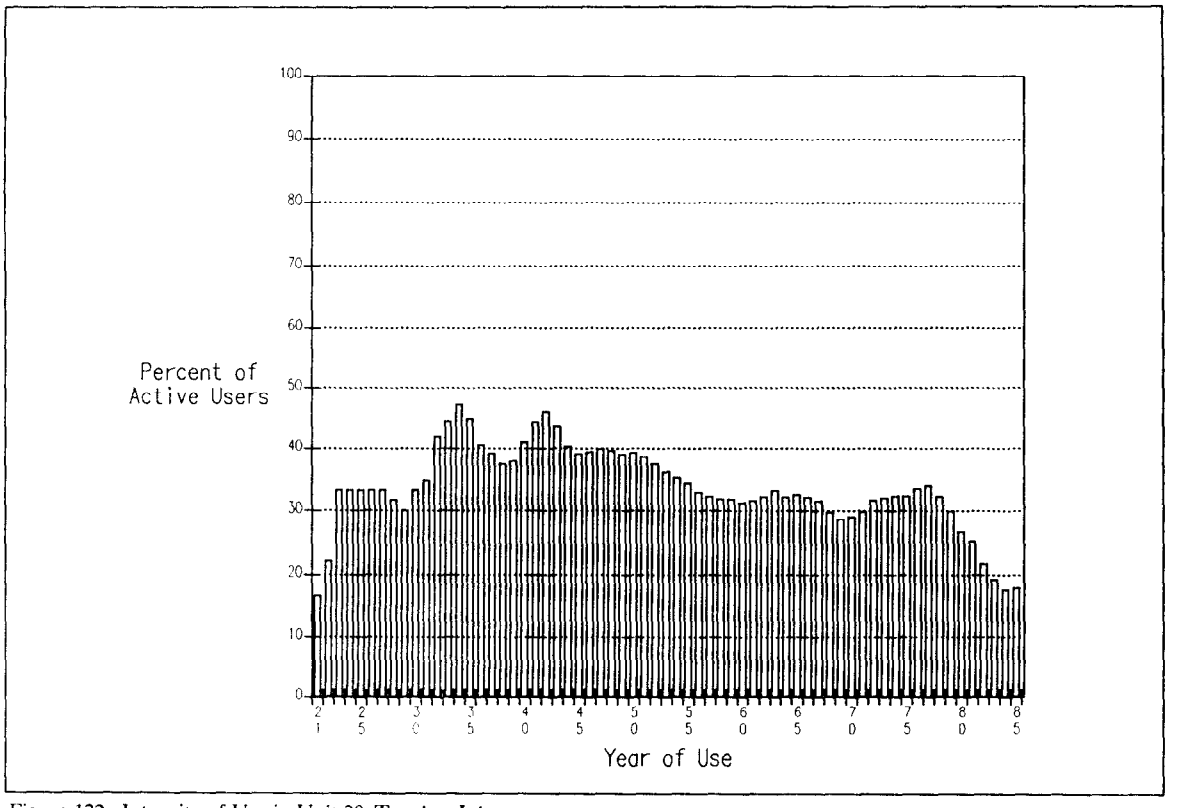

Figure 132. Intensity of Use in Unit 30, Tenakee Inlet.

APPENDIX IV: ADF&G RECOMMENDATIONS TO FOREST SERVICE FOR SEC. 810 PROCEDURES[4]

The department welcomes the invitation of the Forest Plan IDT to assist in designing the ANILCA Sec. 810 evaluation that is a necessary part of the EIS for the Tongass Plan Revision. As you know, we have worked with the Forest Service over the past two years to collect and compile the data we collectively felt was necessary for the subsistence effects analyses.

I. Four Stages of an 810 Evaluation and Finding

As we will discuss below, the legal requirements of Sec. 810 and other sections of ANILCA concerned with subsistence uses, access to subsistence resources, and subsistence research are being defined in numerous court cases impinging on federal implementation of Sec. 810 and state regulation of subsistence. We expect further definition to take place in legal proceedings in coming years which may require federal agencies to follow different or more rigorous procedures than the ones we are now recommending.

ANILCA Sec. 810 and the recent court decisions define the data, analysis, and hearing procedures required by Sec. 810. Based on our interpretation of these legal directions we are recommending both what needs to be done in 810s and how to implement these 810 tasks.

An adequate 810 evaluation and determination calls for the following straight-forward tasks or procedures:

1. Assembling and presenting best available data on subsistence; identifying crucial data gaps. This is the primary baseline or inventory analysis that needs to be presented in the EIS.

2. Evaluating whether or not the proposed activity may significantly restrict subsistence. This step determines on a site-specific basis whether alternatives *may significantly restrict* subsistence uses.

3. Holding hearings if the proposed activity may significantly restrict subsistence. In this step, data are presented by U.S. Forest Service in affected communities to a) validate site-specific determinations that alternatives *may significantly restrict* subsistence uses, b) examine if the planned logging, roading, or other land use activity are *necessary* as defined by law, and c) identify means of eliminating or mitigating impacts that *may significantly restrict* subsistence uses.

4. Finding other land for the activity that *may significantly restrict* subsistence uses or mitigating impact upon subsistence uses if the activity is found to restrict subsistence uses and be *necessary*.

ADF&G has suggestions on how all four of these Sec. 810 procedures should take place; in this letter we will focus on the first two steps. Since these two steps are conceptually and operationally discrete steps, we will discuss them in turn. Given the scale, scope, and complexity of the Tongass Land Use Management Plan, we would anticipate that the sections dealing with Sec. 810 would comprise a separate volume in the final plan.

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4. Source: May 22, 1989 letter from R. Bosworth, D. Anderson, and R. Reed, ADF&G Southeast Regional Supervisors to Steve Brink, Team Leader, Tongass Plan Revision, Juneau, Alaska.

II. Presenting Best Available Data on Subsistence; Identifying Crucial Data Gaps

A. Baseline and inventory analysis

This is the basic data gathering task. Meeting other 810 requirements depends on this task being done thoroughly by professional social scientists familiar with subsistence research. We doubt that adequate Sec. 810 evaluations can be accomplished if professional staff are not assigned, and we encourage U.S. Forest Service to incorporate needed expertise on the planning team.

The goal of this component is a thorough description of the Tlingit/Haida and non-Native social and cultural context of subsistence in southeast Alaska including historical and time depth information, identification of species used by each community, diachronic levels of harvest by each community, delineation of Tlingit community territories and harvest areas used in the lifetime of living community members, and analysis of changes taking place in subsistence harvesting methods, levels, and areas due to federal land management activities. This section should provide a factual orientation to subsistence in southeast Alaska. We suggest that this baseline or inventory analysis section be unencumbered by discussion of impacts and effects. This could be part of the *Analysis of the Management Situation*.

Fortunately for the planning team, much of the data needed for this baseline or inventory analysis section is readily available from 1) Division of Subsistence technical reports, 2) the Tongass Resource Use Cooperative Study, 3) ADF&G files, 4) ethnographic literature describing Tlingit and Haida culture, 5) Sealaska Heritage Foundation, 6) completed state and federal planning documents, and 7) many other sources.

B. Data gaps and monitoring

Identification of geographical or topical areas where data are insufficient for planning needs is an important task. If missing data are needed for an adequate 810, TLMP must identify them and plan field research or monitoring activities that will provide needed information within a reasonable amount of time.

Although Division of Subsistence studies and the TRUCS study provide a strong base of data for TLMP, the research task is far from over. Adequate long range planning will demand an equally long range research perspective. Examples of data necessary for adequate planning not presently available include the following:

1. TRUCS maps show a) areas used for subsistence and b) one measure of intensity of use. Both field research and effective community involvement in planning are needed to identify the subsistence use areas that are **important** or **most important** to subsistence users .

2. Research is needed that will provide quantitative and mapped subsistence at periodic intervals over the life of the plan. Both TRUCS and Division of Subsistence studies provide single year estimations of harvest levels and participation.

3. We need well thought out impact studies in those communities most heavily impacted.

4. We need regional studies that will examine subsistence and logging impacts.

5. We need subsistence monitoring to track the "health" of subsistence in different parts of the forest.

III. Evaluating Whether or Not the Proposed Activity May Significantly Restrict Subsistence

This is the primary analytic task that will examine the effect upon subsistence uses of different planning alternatives and could result in findings that a particular alternative may significantly restrict the subsistence uses of a given community in a given area. This part of an adequate Sec. 810 analysis will show where impact may take place and what the impact may be. Analysis in this section will show reviewers and members of affected communities the Minor Harvest Units, drainages, and other areas **where** planners have found that alternatives *may significantly restrict* subsistence uses and detail **what** may cause the significant restriction.

Our suggestions are in two parts: first, consideration of the analytical unit and, second, means and methods of doing meaningful impact analysis with available data and available analytical tools. Gaps in available data and in impact models will constrain the type of impact analysis that can be done at this time. Given the importance of providing adequate protection for subsistence in the Tongass, however, TLMP must identify both data and model deficiencies and insure that these will be speedily addressed.

A. Unit of analysis

Subsistence impact analysis must take place at the **same scale as the basic land allocation or prescription unit**. For the past two years ADF&G has agreed with the TLMP Inter-disciplinary team that analysis using Minor Harvest Units (MHU) would be adequate for TLMP impact analysis on certain land mammals. This represented a compromise position for ADF&G; a finer scale would have been preferable. Significant amounts of staff time have been spent in preparing data at this resolution for TLMP. We are aware that Tenakee v. Barton and Hanlon v. Barton may require more site-specific analysis of impact upon subsistence than the MHU approach provides.

The use of MHUs, then, has been a pragmatic compromise on the part of ADF&G and may not satisfy legal requirements. We do not support use of analytic units significantly larger than MHUs for quantitative impact analysis. In particular, ADF&G does not support the division of the Tongass into 50 analytic units for the Sec. 810 determination. The scale of analysis must be close to the scale at which impact will take place so that the effect of different management alternatives can be clearly presented to the public. For TLMP, MHUs for land resources and drainages for anadromous fish resources are the meaningful units of analysis.

B. Means and methods of Sec. 810 analysis

This section recommends means and methods of data analysis that would enable findings that a significant restriction on subsistence for a particular community may or may not take place. Impact assessment and findings that alternatives *may significantly restrict* subsistence uses need to be done on a species by species basis and must also examine whether significant restriction may occur due to changes in access, competition from other harvesters, and cultural changes.

Courts have held that the assessment of cumulative subsistence impacts must include past, contemporaneous, and reasonably foreseeable future actions as part of any Sec. 810 analysis.

1. Deer/Moose/Mountain goat/Black bear/Brown bear/Furbearers - Supplies, Use, and Areas

The department has worked with the Forest Service over the past 2 years to develop a suitable GIS database and analysis framework for a legally adequate 810 evaluation for the TLMP Revision. The Tongass Resource Use Cooperative Study (TRUCS) is nearing completion, and the results from this study will soon be ready for integration into the USFS's GIS database. The department has provided harvest data by Minor Harvest Units for all game species, and deer harvest data for 1987 by Minor Harvest Units for each community. Additional harvest data for the rest of the game species by Minor Harvest Units by community will be provided.

The department continues to recommend that the GIS and appropriate databases be used to evaluate the effects of each alternative on the ability of each community to harvest subsistence resources in their customary and traditional use areas over the period of a timber harvest rotation. A community needs clear, simple conclusions for specific areas on probable changes in access, supply of resources, and competition from other users. For example, members of a community need to know how proposed management actions will affect the number of deer available in their specific hunting areas over time, the number of deer needed in their hunting area to provide the community's deer harvest, accessibility of suitable hunting areas, changes in access to hunting areas, and the amount of competition from other users.

The Divisions of Habitat, Subsistence, and Wildlife Conservation recommend that the following information sources be used fully in the subsistence evaluation:

a) The wildlife habitat capability models to determine habitat capability for each game species by Minor harvest Unit for the pre-logging period (1950), current situation (1989), and future (2000, and 2100);

b) The Division of Wildlife Conservation's estimate of the population numbers needed to provide for a desired sustained harvest;

c) The harvest of each game species by Minor Harvest Unit by community for the year 1987 and the projected harvest requirements to meet subsistence needs in years 2000, and 2100;

d) The customary and traditional subsistence use areas of each community by species or species group;

e) The locations, and probable impact on wildlife habitat and hunting, of each management prescription; and

f) Research findings from the Division of Subsistence's project on Timber Management and Fish and Wildlife Utilization in Selected Southeast Communities.

The GIS should be used to overlay the mapped data listed in (a), (b), (c), (d), and (e) to estimate the absolute and proportionate changes in resource supply and subsistence use areas. A suggested format for presenting the effects of each alternative on each community's opportunity to harvest a particular species is shown below. The table would be repeated for each community and each species important to the community.

Community A/ Alternative A/ Subsistence Deer Use

	Deer Habitat Capability				No. of Deer Needed to Provide Harvest			Deer Harvest		
MHU	1950	1987	2000	2100	1987	2000	2100	1987	2000	2100
1										
2										
3										
etc										

All other relevant information on the effects of roading, timber harvest, and logging camps on subsistence use of these game species should also be used in the assessment of cumulative effects. Of particular relevance are the research reports by the Subsistence Division included in the project on Timber Management and Fish and Wildlife Utilization in Selected Southeast Alaska Communities.

2. Subsistence Resource Supplies/Harvest Area--Salmon.

The impacts of different alternatives on subsistence fishing for salmon are more difficult to assess because the natal stream for most troll-caught salmon can not be identified. In addition, sockeye are very important for subsistence, yet there is no habitat model for sockeye salmon able to estimate changes in sockeye productivity due to logging. Impact analysis should be done on several sockeye stream-based fisheries at a minimum.

Data on harvest levels by salmon species are available from the Division of Subsistence and from TRUCS. TRUCS and Division of Subsistence maps show where community residents fish for salmon. Division of Commercial Fisheries data show subsistence salmon permit data by stream; this division also has run size estimates for most significant salmon streams. The ADF&G Anadromous Fish Catalog lists all salmon streams documented in southeast Alaska and the species present in each stream.

Through analysis of these data sources, all of which would be presented in the data section of the Sec. 810 evaluation, TLMP should be able to determine a) the harvest level of each salmon species for each community and b) which salmon streams are used by each community.

In the absence of effects models or research results, major logging activity in a drainage used for subsistence salmon harvests, use of an area near a stream mouth for log storage or transfer, or other disturbances should probably be assumed to have a significant possibility to significantly restrict subsistence use of salmon and should be noted as such.

3. Other Species Subsistence Resource Supplies/Harvest Area.

Data on harvest levels by other fish and wildlife species are available from the Division of Subsistence and from TRUCS. TRUCS maps show where community residents harvest other fish and wildlife. Other data are available from ADF&G and U.S. Forest Service files and reports. All data should be presented in the data section of the Sec. 810 evaluation.

Procedures for assessing the impact of timber harvest on the subsistence use of these species need to be developed in consultation with management biologists and research social scientists.

4. Accessibility of subsistence resources.

Change in access to subsistence resources may act as a significant restriction to subsistence use and needs to be assessed. Changes in the accessibility of harvest areas remaining after logging should be quantified where possible. Important factors include distance from home community, additional travel and time required for hunting, danger of water crossings necessary to reach remaining harvest areas, and mode of access required compared to the type of vehicles owned in a community.

5. Competition from other harvesters.

Increased competition from other harvesters takes place when timber harvesting activities introduce a significant new population into an area or when road building or other activities improve the access of non-local harvesters to fish and wildlife resources. The anticipated increased population resident in an area and the improved access for non-local harvesters that may result from timber harvesting activity need to be detailed in the data section. TLMP planners will need to determine if the impact due to the introduced population or other increased competition may significantly restrict subsistence uses.

6. Cultural context.

Lastly, but perhaps most importantly, the Sec. 810 evaluation should assess if logging activities may result in significant cultural changes that may significantly restrict subsistence. Division of Subsistence specialists can assist in evaluating important cultural impacts which would be developed from the social and cultural baseline and inventory analysis.

IV. Presentation of Findings

Clear presentation of Sec. 810 findings needs to take place in documents distributed to the public to insure that readers and reviewers, particularly in the affected communities, can see what significant restrictions may take place on each area used for subsistence under each alternative, what the magnitude of the impact is thought to be, and what alternative management or mitigating measures could be taken.

This will probably work best by having a summary section for each community that concisely shows expected impacts. This summary section will show the MHUs, drainages, or other areas in which analysis shows that alternatives *may significantly restrict* subsistence uses because of effects on fish and wildlife species, change in accessibility, competition from other harvesters, or cultural changes.

V. Legal Assumptions

We reviewed the following sources for direction on the type and scope of analyses required. ANILCA Sec. 810 and recent court rulings are included to provide a firm foundation from which to provide our recommendation, as biologists and social scientists, as to what would constitute a sound, professionally credible, and legally defensible, analysis.

A) ANILCA Title VIII, Section 810, entitled "Subsistence and Land Use Decisions", specifies that the Federal agency "shall evaluate the effect of such use, occupancy, or disposition on subsistence uses and needs, the availability of other lands for the purposes sought to be achieved, and other alternatives which would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes." ANILCA also requires a determination of whether or not the proposed action would "significantly restrict subsistence uses". ANILCA clearly establishes that it is the policy of Congress

that "consistent with sound management principles, and the conservation of healthy populations of fish and wildlife, the utilization of the public lands in Alaska is to cause the least adverse impact possible on rural residents who depend upon subsistence uses of the resources of such lands;" [Sec. 802 (1)].

ANILCA's mandate for a determination of "significant restriction" and "least adverse impact possible" calls for the quantification of impacts on a geographic scale of resolution meaningful to subsistence users. The state is on record as interpreting this section to require an analysis of the changes in resource availability, competition, and accessibility within documented customary and traditional use areas, clearly identifying impacts to specific groups of subsistence users.

B) The Alaska Land Use Council (ALUC) guidelines entitled "Section 810- Subsistence and Land Use Decisions" provide further direction. The guidelines define "significant restriction" as a substantial reduction in the opportunity to continue subsistence uses of renewable resources caused by:

1) reductions in the abundance of, or major redistribution of, resources;

2) substantial interference with access to resources, due to physical or legal barriers; or

3) increased competition for those resources by non rural residents.

The ALUC guidelines specify that the evaluation must address whether or not there is likely to be a significant restriction on subsistence uses.

The ALUC guidelines also require analysis of impacts at a geographic resolution fine enough to detect effects on localized, individual use patterns. They require a meaningful assessment of the changes in access to subsistence resources as a result of either population declines, population redistribution out of traditional harvest areas, or reduced proximity of sufficient supplies of resources.

C) The U.S. Ninth Circuit Court of Appeals decision on September 10, 1984 in the BLM/NPR-A lease case provides a definition of "significant restriction" under Sec. 810. The judge held that a significant restriction occurs when there is a:

1) large reduction in the abundance or major redistribution of the subsistence resources;

2) substantial interference with harvestable access to active subsistence sites; or

3) major increase in non-rural resident hunting.

The court finding appears to substantiate the need for a quantitative analysis of access to active subsistence sites, subsistence harvest levels, and competition from non-subsistence harvesters that are likely to result from a proposed plan.

D) In Bobby v. State, A84-544 Civil, the court held that "Need is not the standard. Again, it matters not that other food sources may be available at any given time or place." The court held that the Board of Game could not trade off reasonable opportunity for the customary and traditional use of another game population.

The court also held that the Board of Game and Division of Subsistence must do their best to correct and adjust their data to take account of the under-reporting which almost surely occurred. One final direction from the court was that a reasonable opportunity to satisfy subsistence uses must consider the vagaries of hunter skill, animal distribution, and chance.

E) In Sierra Club v. Penfold, 664 F. Supp. 1299, 1306-07 (D. Alaska 1987), the court held that NEPA 102 (2) (C) and ANILCA Sec. 810 require the analysis of cumulative impacts on subsistence uses whenever cumulative environmental actions may significantly restrict subsistence uses.

F) In Hanlon v. Barton, the court held, in its Memorandum and Order of 10 November 1988, relating to motion for a preliminary injunction, that a "significant restriction" of subsistence uses occurs whenever there is a significant possibility of significant restriction; it need not be likely. ANILCA Tier-II procedures are required whenever the Tier-I analysis indicates a possibility of "significant restriction".

The court held that increased competition for resources and forced change in use patterns may not necessarily constitute a "significant restriction". The court also held, however, that the Forest Service may have failed to adequately consider some essential characteristics of the manner and locations of subsistence uses. Based on the judge's opinion in this regard, a greater level of site-specificity may be required that was provided in the 810 evaluation done in the "1986-90 Operating Period for the Alaska Pulp Corporation Long-term Sale Area".

VI. Summary

ADF&G will work with the TLMP social scientists to develop a listing of data sources to be consulted and to suggest an outline for including ethnographic, quantitative, and mapped data that needs to be in this section. We also can provide assistance in developing procedures to be followed in the Sec. 810 findings of *may significantly restrict*. The listings, outline, and procedures would adapt our *Recommended Approach to Implementation of ANILCA Sec. 810* submitted to the Alaska Land Use Council in 1986 and the 1986 Habitat Guides Guidance section for the special needs of TLMP.

ADF&G and U.S. Forest Service have worked well together over the past two years to develop the database necessary to link proposed actions, fish and wildlife resources, and subsistence uses. The U.S. Forest Service now has the technical capability, expertise, and database to conduct a state-of-the-art 810 evaluation. We encourage you to commit the necessary resources to complete an analysis that will withstand potential appeals and thereby allow for the timely completion of the TLMP revision and continued cooperative resource management.