Tourism Yukon
Heritage Branch
Hudę Hudān Series

Occasional Papers in Archaeology No. 3

SALMON AND STORAGE: SOUTHERN TUTCHONE USE OF AN "ABUNDANT" RESOURCE

Beth Laura O'Leary

YUKON
Tourism
Heritage Branch
Art Webster, Minister

1992

SALMON AND STORAGE: SOUTHERN TUTCHONE USE OF AN "ABUNDANT" RESOURCE

by

BETH LAURA O'LEARY

A dissertation submitted in partial fulfillment of the Requirements for the Degree of Doctor of Philosophy in Anthropology at the University of New Mexico

FOREWORD

In writing Salmon and Storage, Beth O'Leary has accomplished something that most anthropologists would be delighted to achieve. She has written a Ph.D. dissertation that contributes to fundamental issues debated in academic anthropology. But Salmon and Storage also provides valuable information for members of the Champagne-Aishihik First Nation who have worked closely with her in her research.

When I first met Beth at Klukshu, she was covered with fish guts as she had been working with several families while participating in their salmon fishery. She told me that Dave Hume, an Elder at Klukshu had seen her carry so many fish back and forth to the fish racks that he had given her the name "Klu el ma" or "fish-packing mama". She has put the same kind of energy into completing a solid academic thesis.

The academic issues have to do with the central role played by salmon in the economies of people living on or near the Northwest Coast. Cultures of the Northwest Coast of North America are usually considered unique in the world. This is primarily because the people who lived near the coast - from the Columbia River all the way to Alaska - developed all the social and organizational features usually associated with agricultural economies, yet they did so pursuing a hunting and gathering way of life. According to the common wisdom, this is possible because of the regular availability and "abundance" of a single resource - salmon - which receives its energy offshore and appears annually to be harvested, coming upriver to spawn.

Salmon have always been tremendously important for the Southern Tutchone, particularly at their Klukshu fishery. Much of what has been written on the Northwest Coast also has relevance for people living just over the mountains in the southwest Yukon. Using data on fish in the Klukshu river system in her study of the Klukshu fishery, O'Leary emphasizes the availability of salmon as well as the the more complicated issues of preserving and storing the fish and the enormous amount of work and skill this involves.

Important issues emerge. First, she demonstrates salmon are not necessarily always abundant: the timing and availability of salmon actually varies considerably from year to year and Southern Tutchone people have always understood the ecology of their system. Consequently, there is a tremendous amount of social organization, movement, and activity involved in procedures leading to storage so that people can make the most productive use of that resource. Strategies for catching, preserving and storing food must be adjusted annually and seasonally in order to make effective use of the salmon that do come, when they come.

The study has particular relevance for questions today, now that the fisheries at Dalton Post, Nesketaheen and Klukshu are coming under pressure from mineral exploration, sports fishermen and rafters. O'Leary compares data collected by Catharine McClellan in the 1940's with her own very detailed survey in the 1970's, providing baseline anthropological data for studying current fish populations. Her detailed discussion of trap construction, trap ownership, salmon gaffing, cutting and preserving will be of considerable interest to younger people hoping to learn more about long-standing traditions associated with life at Klukshu. In 1979, in one of the first major anthropological projects undertaken directly by a Yukon First Nation, she directed an archeological and ethnographic survey of two major historic fishing and trading villages, Dalton Post and Nesketaheen.

Her work will contribute to ongoing research by the Champagne-Aishihik people, and once again demonstrates the importance of the contributions of their Elders like Mrs. Marge Jackson, Beth's friend and partner in her work.

Julie Cruikshank
Vancouver

ABSTRACT

This dissertation investigates the relationship between the spatial and temporal distribution of salmon resources, and mobility strategies, group size and labor organization. It focusses on the Champagne/Aishihik band of Southern Tutchone on the Klukshu River in the southwest Yukon, Canada.

One of the key concepts used to analyze distribution is the idea of clumping or abundance. It was found that on the Klukshu River the salmon runs fluctuated greatly from year to year (1976-1980) and within the period of the total run fish were clumped into very short periods of time. In a peak year fifty percent of the sockeye run happened in 7.5 days, while in a bad year fifty percent happened in 2.5 non-consecutive days. This clumping was analyzed in terms of the ability of a human group to process the fish for both immediate and later consumption.

In order to operationalize the definition of abundance, the figure of 100 fish per day per female fish-cutter was utilized. It was found that the size of the local group increased with resource clumping, but the timing and unpredictability of a bad year tended to hold down group size as well as discouraging other bands from participating. Labor groups were highly efficient and specialized along sex lines but no other social dimensions along which people might be differentiated were necessary. Clumping of the resource was correlated with logistical mobility, though the coincidence of other resources at the same season, especially moose, tended to decrease group size and increase residential mobility. The idea that salmon allowed for increased sedentism, as argued for cultures on the Northwest Coast, was challenged by the fact that in the southwest Yukon other dispersed resources were equally critical; and dried salmon was packed to other locations or cached and both logistical and residential mobility were employed. The study attempts to reveal the complexity of salmon runs on one stream and provide warranting arguments about how the structure of a resource influences sociocultural variables.

RÉSUMÉ

Cette étude examine le rapport entre la distribution géographique et temporelle du saumon--tant annuelle que suivant le cours de sa migration, et les stratégies de mobilité, la taille des groupes et l'organisation du travail chez les Tutchones méridionaux de la bande Champagne/Aishihik. Ces derniers occupent la rivière Klukshu au sud-ouest du Yukon.

Un concept central utilisés dans cette étude pour l'analyse de la distribution du poisson est celle de l'abondance ou de la concentration. Nous avons découvert qu l'abondance du saumon de la rivière Klukshu varie de façon importante d'année en année (période d'étude: 1976 - 1980). Du plus, lors de leur migration, les saumons sont très nombreux, mais que pendant des périodes très courtes. En effet, la moitié des saumons sockeyes passait en 7,5 jours pendant les années d'abondance, tandis que lors des mauvaise années, 50% des saumons passaient au courant de 2 journées non-consécutives. L'analyse de la concentration du poisson a aussi tenu compte de la capacité des autochtones à préparer le poisson pour une conummation immédiate et/ou future.

Le seuil d'abondance du poisson fut défini comme 100 poissons/jour/préparateur de poisson. Il s'avéra que la taille du groupe local augmentait suivant la concentration de la ressource. Cependant, lors d'années incertaines, l'incapacité de prédire la concentration minimisait la taille des groupes et décourageait la participation d'autres bandes dans l'exploitation du saumon. Les unités de travail très efficaces se spécialisaient selon le sexe des individus et ne nécessitaient pas les autres divisions sociales. Nous avons découvert l'existence d'une corrélation entre la concentration du poisson et la mobilité logistique des groupes. Cependant, la disponsibilité d'autres ressources à la même période, surtout l'orignal, avait tendance à réduire la taille des groupes et à accroître la mobilité résidentielle. Sur la côte du Nord-Ouest, on a prétendu qu l'abondance du saumon a permis la sédentarisation. Cette notion est toutefois remise en question par l'importance des autres ressources dans le sud-ouest du Yukon. De plus, le saumon séché pouvait être transporté ailleurs ou placé dans des caches, et on utilisait des stratégies de mobilité résidentielle et logistique. En somme, cet ouvrage tente d'indiquer la complexité des migrations du saumon sur u cours d'eau en particulier, et essaie de démontrer l'influence de la structure d'une ressource sur les variables socio-culturelles.

Traduit par Jean-Luc Pilon et Luc Nolin.

ACKNOWLEDGMENTS

There are many ingredients that go into the making of a dissertation: intelligence, guidance, love, luck and endurance. I would like to thank those people who contributed to this work. Each member of my committee is thus acknowledged: Dr. John Martin Campbell for my introduction to northern fieldwork and consideration throughout its writing, Dr. Lewis Binford for his fine ideas and the intellectual stimulus to shape this dissertation, the late Dr. Harry Basehart for his needed editorial comments, Dr. Richard Chapman for his encouragement and key role in its completion, Dr. Roger Anderson for his perspective and interest and, finally, Dr. Scott Rushforth who consistently discussed and helped me to formulate my ideas, aided in its organization and provided great insight into the theoretical aspects of this study.

Many people need to be thanked who made my fieldwork possible and productive: The Arctic Institute of North America (Elizabeth Firestone Graham Foundation), and the University of New Mexico, Department of Anthropology. But I especially want to thank the people who shared their lives with me, without whose help this dissertation could not have been written and I want to thank both those people now living and express my pleasure in having known those who have passed on.

I would like to thank the people of the Champagne/Aishihik band, the Band Council and Chiefs from 1977 to 1985. Though no list can be exhaustive I'd like to mention the following: Harry Allen, Jack and Bessie Allen, Percy Allen, Lily Birckle, Paul Birckle, Stella Boss, Lawrence Boss and Renie, Sadie Brown, John Brown, Solomon and Annie Charlie, Bessie Crow, Mary Deguerre, Polly Fraser, Florence Griffith, David Hume, Chuck and Barbara Hume, Albert Hume, Doris Hume, Sophie Issac, Peter Jackson, Ray Jackson, Oliver Jackson, Margaret (Jackson) Promosic, Ronnie Jackson, Jackie Jackson, Allen and Sharon Jacobs, Albert James and Lee Wilkie of Tagish, Maggie Jim, Paddy and Stella Jim, Harry and Jessie Joe, David Joe, Jessie Joe of Burwash, Sadie Joe, Yvonne Joe, Dixon John, Dan Johnson of Carcross, Jimmy Kane, Parten and Lily Kane, Harold Kane, May Long, Trudy Long, Junior Moose, Jenny Moose, Annie Ned, Annie Nicholas, Francis and Dale Peterson, Mary Shadows, Annie Smith, Mary Smith, Rosie Blair Smith, Alex and Elsie Smith, Lena Smith, Harry Smith and Rosalie Washington. There are two people who are so special to me I don't know how to tell them. Without them I would have never completed this study. They are Marge Jackson and Doreen Grady.

There are the people who provided both tangible and intangible benefits to me. Throughout my career I have appreciated the support of my colleague Dr. Julie Cruikshank. Others who gave generously of their time and expertise include John Hyndman, Scott Gilbert, Dr. Roz Hunter-Anderson, Catharine McClellan, Jan Biella, Victoria Ross, Jane Campbell, Ray and Barbara Graham and Paul Robertson. I am grateful to Marc Hudson for all the fine maps and illustrations. I thank Raymond Montoya for his salmon drawings.

As for my family, I have a debt of gratitude to my mother Dorrit O'Leary (1913-1986) for her encouragement and editorial help (with some laughs) throughout the production of the thesis. I would like to pay tribute to my grandmother Laura Sophia Blomstrom Anderson (1880-1980) who told me when I left the east coast for New Mexico, "Good, you don't want to be stuck in some apartment washing dishes". I would like to acknowledge my brother, Jerome Michael Edvard O'Leary (1955-1982) who always believed in my work and ability.

I dedicate this work to my father Jerome Michael O'Leary (1908-1980) who believed in his heart that I was "Dr. O'Leary" long before I received the degree on paper.

I am glad that the Yukon Heritage Branch has taken an active interest in publishing anthropological works about the Yukon and would like to acknowledge the support and patience of Ruth Gotthardt and Jeff Hunston.

TABLE OF CONTENTS

LIST OF FIGURES

Figure

LIST OF TABLES

Table

CHAPTER I

INTRODUCTION

Anthropology has long stressed the relationship between the environment and culture. Cultural ecology has tried to define the structure of resources and the organizational responses to it. These studies follow a tradition dating from Julian Steward who wrote that:

> It is human ecology or the modes of behavior by which human beings adapt themselves to their environment. Any adaptation necessarily involves an interaction of two elements: the natural environment and the particular cultural devices, invented and borrowed, by which the environment is exploited. The kinds of activities entailed in this exploitation affect the different phases of the culture to varying degrees. The present problem, therefore, is partly to ascertain the effects of ecology upon sociopolitical institutions (1938:2).

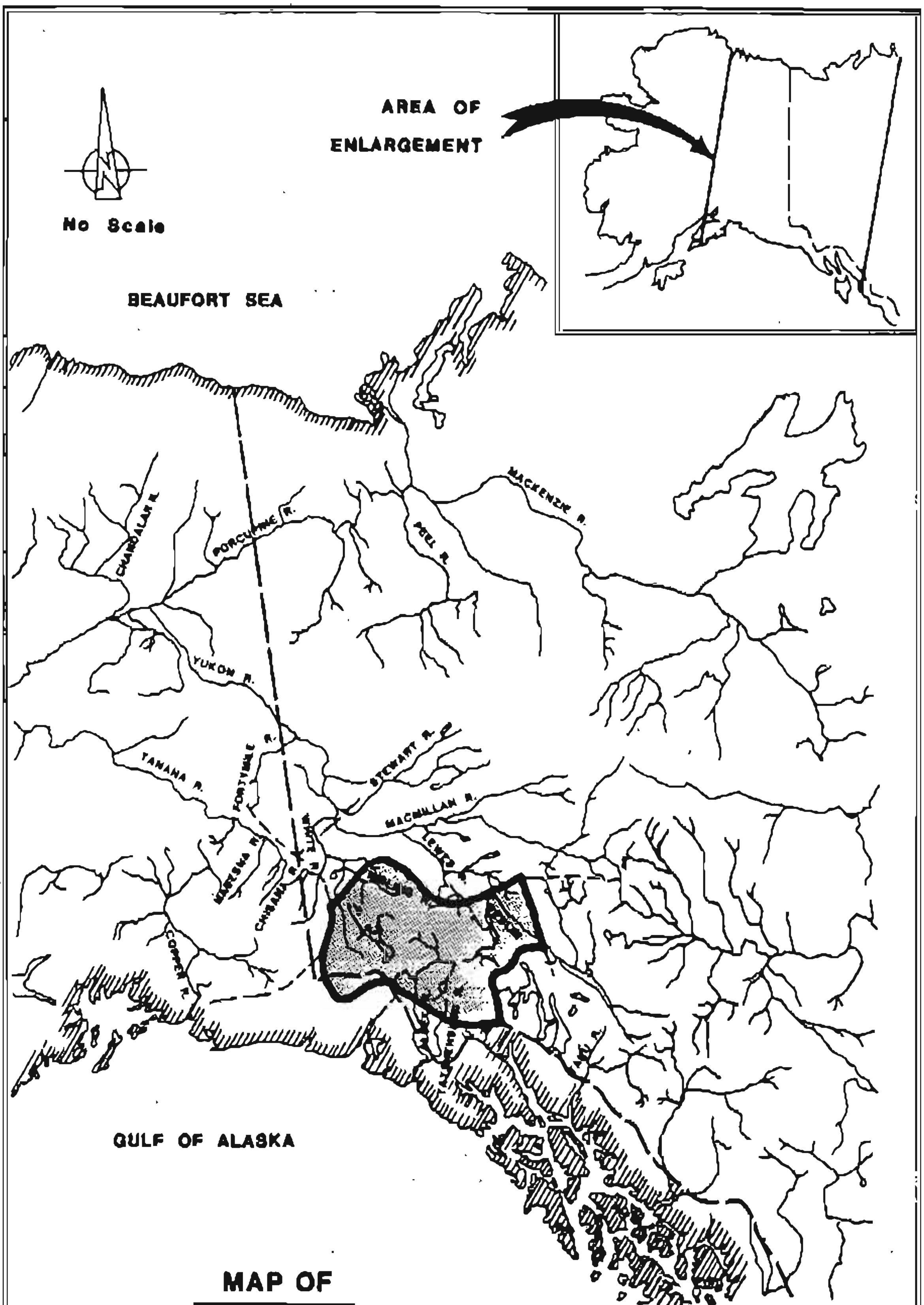
> The extent and degree to which subsistence patterns affect the total structure of the society and the functional integration of its various parts are questions to be answered by empirical procedure (1955:134).

Current studies by Jorgensen (1980:1) try to find, through comparative analysis, correspondence among the environment, language and culture. He stated that:

> [T]he important threads to follow as we set out to explicate and account for such complex and interdependent phenomenon as economic, social, political and ceremonial organization are the abundance, predictability and stability of extractive resources (wild plants and animals) ... (1980:3).

This dissertation attempts to investigate specific environmental resources and how they relate to certain socio-cultural variables that are important in the spatial organization of the seasonal round. The study will deal with specific organizational responses to resource procurement for a band of Southern Tutchone in the Southwest Yukon, Canada (Figure 1.1). The three variables are mobility strategies, group size and labor organization which exist in a dynamic interrelationship. All are suggested to be largely dependent on the nature, abundance and spatial and temporal distribution of resources.

The underlying assumptions of this dissertation are based upon the general principles of natural selection. Like the "optimality" models of biological ecology (Charnov 1973), it is assumed here that behaviors which most effectively use time and energy will be adopted. This does not mean that all humans "maximize" all energy, but that energy and time are to be viewed as part of a resource utilization budget. Those other activities, not exclusively associated with resource procurement (i.e., certain aspects of social organization), may also enhance a human's functioning or "fitness" (Schoerner 1969). Unlike organisms used in ecological models (i.e., plants and animals), humans with culture have an ability to choose behaviors and do not always make an "optimal" choice because environmental change (major and minor) cannot always be accurately predicted. Though humans recognize that the environment changes constantly they may not be able to perceive how or when it is changing. For



MAP OF SOUTHERN TUTCHONE AREA

Figure 1-1

example, the caribou hunted by the Nunamiut Eskimos in Alaska were affected by Gold Rush seekers in the Yukon Territory at the turn of the century - an affect, both distant in time and space, that the Eskimos could neither predict nor anticipate (Binford 1983:207). Behaviors which involve certain kinds of mobility (i.e., monitoring) and the ability to store food and cache it may allow security in an ecosystem whose resources may not be predictable in time and space. The ability to behave in a flexible manner is one of the most fundamental characteristics of human behavior.

At least since Steward (1938), ecological studies used by anthropologists have tried to identify the environmental variables that regulate the distributional structure of food resources (MacArthur 1972; Fretwell 1972; MacArthur and Wilson 1967; Schalk 1978). Recently two of these variables, resource "clumping and dispersion/density" (Horn 1968; Wilmsen 1973; Schalk 1978) have been thought to be particularly important and are the focus of this study.

In the past various loose descriptions of clumping and dispersal variables have been prevalent in the anthropological literature. For example, the most relevant data base to the one examined here is the environment of the Northwest Coast of North America. There has been extensive ethnographic study of the Northwest Coast and societies have been seen as "complex" or essentially different from other groups of hunters and gatherers (Murdock 1968:15; Suttles 1968:56; Vayda 1961:623; Service 1968).

Both early and recent anthropological discussions have classified the Northwest Coast environment as "rich." This concept of richness has been most closely linked with the idea of the "abundance" of resources, or the clumping or high density of available foods. The richness has been invoked most frequently with the nature of coastal resources (Pearlman 1980) and more specifically with salmon (Murdock 1968; Boas 1921; Curtis 1915). Salmon has been used to "explain" high population density, sedentism, large residential groupings, social stratification, warfare, rich culture and a rich ceremonial life among Pacific drainage Athapaskans (Osgood 1936). Recent studies such as Graburn and Strong (1974) cite the main independent variable as the "richness" of an area's resources when they classify coastal and interior groups of northwestern North America. Van Stone (1974:31) cites the presence of salmon among the Ingalik as a "... predictable resource [which] made possible a relatively settled way of life." Hefley (1981:133,147) describes salmon as both "evenly spaced" and "clumped and predictable" for northern Athapaskans.

But how rich is rich? How predictable is predictable? None of these concepts have been adequately defined, though certain attempts have been more successful than others (Schalk 1977). This problem becomes more clear when arguments about the nature of salmon resource are examined. Along the Northwest Coast, the salmon resource has been described as "extremely productive" (Barnett 1968:76), "fantastically abundant" (Codere 1950:121) and "inexhaustible" (Benedict 1934:25). Others describe the periodicity of scarcity (Vayda 1961; Harris 1968) and "considerable year-to-year variation" (Piddocke 1969:135). Even commercial salmon fisheries data have been used to quantify each side of the debate on the abundance or lack of abundance of salmon. (See Piddocke (1965) on the origin of the potlatch.)

Quantitative data in themselves do not "explain" anything. The structure of certain environments, taken alone, does not imply much about what variations one might anticipate in human subsistence systems (Kelley 1980:227). These categorizations about salmon through which empirical patterning can be seen, are only justified by the use of bridging or warranting arguments from general ecological theory to the empirical anthropological world. Furthermore, the use of commercial data does not even qualify as adequate in measuring variation among different runs of salmon for different groups. This is because commercial data report ocean-run salmon, whose numbers are made up of many separate stream populations that cannot be measured individually. It is analogous to a scientist measuring the flow of water at Niagara Falls in order to determine the water pressure in a stream feeding into Lake Erie. It provides, at its best, a gross scale on which to compare cases.

This study differs from others (Schalk 1978; Kelley 1980) by presenting detailed structural characteristic of specific salmon runs within one stream as a measure of an ecosystem. It tends to disregard larger, more broadly regulating factors, such as primary/secondary production and biomass as estimated from climatic data. But these larger ecosystemic variables are known to underlie the structural characteristics. The data used in this study provide a clearer and fine-tuned vision of the environmental picture of a particular group of people on a particular stream.

One of the major assumptions in the discussion of the salmon resource has been its equation as the supreme resource. Hewes (1973:134) reports that on the Northwest Coast the demand for calories was satisfied largely from the fisheries "half was made up of salmon [because] other natural foods available in this area in quantity were notoriously low in fuel value." Hosley (1977:127) describes the salmon-fishing Athapaskans of the Pacific Drainage as having "greater efficiency in the use of the environment". They resorted to salmon fishing "in response to environmental opportunities" (Hosley 1977:129). He claims that the salmon fishing adaptation was a product of the Eskimo influence, the fur trade, dogs and the fish wheel. This argument is essentially the same as the opportunism claimed by Braidwood (1963) and Childe (1928) as the reason for the development of complex societies. The preoccupation with discovering a "wonderful resource" like salmon is what Binford (1983:199) refers to as the "Garden of Eden Proposition." In this view, "rich" environments tend to be highly productive usually because of one resource: salmon for the Northwest Coast, acorns for California and cattails for the Great Basin (Binford 1983:200-203). The assumption that salmon and cattails do a resource base make is the first problem. The idea of a single resource base masks much of the variation and complexity of resource procurement systems.

The second assumption is that in such an environment people will stop moving and become sedentary because it has "more survival value" (Beardsley 1956:135 as quoted in Binford 1983:200). Though the "Garden of Eden" proponents have tried to explore the origins of agriculture and complex societies, it is the assumption about mobility which is relevant to the discussion of this dissertation. With a peak year for salmon on the Klukshu river at over 30,000 fish, one might wonder why a small group did not choose to remain for twelve months of the year at their fishing village. They did not. This dissertation will the reasons why and discuss the mobility patterns of the band.

The quality of data on salmon runs available from the Canadian Department of Fisheries and Environment for the Klukshu river allows a detailed, structural view of what "abundance" means. It will be argued that abundance cannot be determined by sheer numbers of fish but by its spatial and temporal structure and, most importantly, the ability of a group to process it for storage. The size of the local group is related to the manner in which runs occur and the size of the task groups needed for fishing. The structure of the runs influences the actual access to fishing sites both within the group and with other groups because of its spatial dimensions. It will be further argued that the bulk storage of fish over periods of time longer than they are available seasonally makes sedentism possible while at the same time allowing people to move around more. Moves can also be made, in part, because the Southern Tutchone did have dried salmon. Similar situations can be found among the Eskimos and possibly among many groups if this idea were examined on a case by case basis (Binford 1983:204). The salmon at Klukshu could either be returned to or be taken with groups involved in other activities. Thus the runs are related to the group's mobility strategies.

Another assumption that is challenged is that salmon is the essential resource and its use or storage must be for as long as possible. Among the Southern Tutchone, salmon served as one of a number of critical, or strategic resources. Storage (especially the techniques of processing for storage) may also have served as one of the mechanisms through which specialization occurred.

Given the problems investigated in this dissertation, it is organized in the following sequence. Chapter II is a theoretical discussion of the concepts of mobility (including both residential and logistical), group size and labor organization. It will evaluate various ecological models (Schalk 1978, Kelley 1980) in the subsequent chapters by examination of the relevant data available on the Champagne/Aishihik band. The reader will be presented with the necessary ethnographic data on the group followed by the explanatory claims. Chapter III is an environmental overview of the territory of the Southern Tutchone in the southwest Yukon, Canada. It focuses on the Champagne/Aishihik band which, though joined as one band now, was historically two different bands. The study further focuses on the Champagne band's salmon-fishing village of Klukshu on the Klukshu River. Chapter IV is the historical background of the Southern Tutchone with an emphasis on the population size and settlement patterns of the Champagne/Aishihik band. Chapter V provides an analysis of the social organization at Klukshu village including the moiety system; specialization and the organization of labor and the distribution of fish. It will examine the integration of group size and restricted access. Chapter VI is a discussion of the salmon runs on the Klukshu river which were monitored by the Canadian Department of Fisheries and Environment (DFE) from 1976-1980. It attempts to operationalize definitions of "abundance" or clumping, both temporally and spatially, of the salmon runs. A comparison is made of the five years of data in order to seek generalizations on the structure of the salmon run. The next chapter, VII, describes the salmon fishery and the different methods of fishing including their locational properties and how mobility, group size and specialization are related to the fishery. Chapter VIII specifies the climatic variables effecting the processing and preservation of fish. It discusses the construction of facilities and the nature of storing dried fish, spoilage and caching. Chapter IX is a discussion of the limitations of the salmon run, both in terms of the structure of the run and numbers of fish needed. It examines the role of salmon in the seasonal round and the congruence of salmon with other resources. In the final chapter, a summary of the study is presented as well as concluding remarks and some possible directions for future research.

CHAPTER II

THEORETICAL CONCEPTS OF RESOURCE STRUCTURE, MOBILITY, GROUP SIZE AND LABOR ORGANIZATION

Mobility

The movement of people to locations of resource availability is how human cultures facilitate the transfer of energy from the point of production to the point of consumption. Variations in the way food resources are distributed in time and space, in different environments, require different methods of movements or mobility by people (hunter-gatherers) who exploit resources as they occur naturally in an ecosystem. This chapter will discuss the types of mobility and how they are related to the distribution of resources in time and space.

It should be emphasized that there is a great deal of variability within hunter-gatherer mobility strategies. There is little reason to expect that there should be any simple, clear relationship between environmental variables and components of a mobility strategy, but there are two or three sets of relationships between any two variables. Adopting one kind of mobility pattern usually precludes the other, but not always, because separate task groups can form within a larger group and both can utilize separate kinds of mobility. First, it is necessary to explain the mobility options among hunters and gatherers.

Residential and Logistical Mobility

Binford (n.d.) has defined two basic forms of mobility:

> Residential mobility is defined as the movement of both producers and dependents, as in the case of re- establishment of a camp at a new location. Logistic (or logistical) mobility is conceptualized as the movement of producers during procurement activities that depart from and return to a central location or habitation site (Schalk 1978:94).

Mobility strategies may be combined or may change.

> The point here is that logistical and residential variability are not to be viewed as opposing principles (although trends may be recognized) but as organizational alternatives which may be employed in varying mixes in different settings (Binford 1980:19).

For example, among the Mistassini Cree of northeastern Canada, a successful hunter, or group of hunters, was joined by the whole village in preference to transporting large amounts of meat considerable distances (Rogers 1963:79). Mobility strategies may change with improved transportation. For example, at Klukshu village gaffing locations for king salmon are reached by logistical mobility. Today, pick-up trucks transport the gaffers to locations five to twenty-five miles away from the fishing village. People gaff, load the fish, and return to the village in daily trips. In the past, gaffing parties stayed at their gaffing locations and processed fish until it was dry enough to transport (O'Leary field notes 1978; Glave 1890:376). With the advent of improved transportation (e.g. pick-up trucks), there was a reduction in residential mobility and an increase in logistical mobility.

Logistical mobility is constrained by the cost of procuring resources as compared with the distance traveled. Some resources may be more valuable than others depending on the given situation. The value of a particular resource will condition the distance at which that resource can be profitably obtained (Covich 1977:240). There may be greater variation in cost for resources which are non-food. Dry wood for fires and selected spruce saplings for fish traps were relatively high cost items at Klukshu because they were not immediately accessible to the village. In the past, moose hides were absolutely necessary for clothing and were a high return item compared to the cost of transportation.

One approach to modeling the distance of logistical trips is based on estimates of the physical limits of a human walking in a single day of travel or the foraging radius. Lee (1968), Binford (n.d.) and Williams (1974) have defined this distance both as a radius from a residential location and the catchment around it. Binford (n.d.) has postulated a foraging radius of 8.5 km and a catchment of 227 square km. Lee (1968:35) uses 9.7 km and 296 square km. Williams (1974:27) uses 5 km for foraging radius and a catchment of 79 square km.

If, as assumed above, logistical mobility is confined to the foraging radius, then residential mobility would vary inversely with food abundance; the more clumping of food resources the less residential mobility. Under what environmental circumstances is logistical mobility actually limited to the area prescribed by the foraging radius? The answer appears to be conditioned by the extent to which resources are clumped in time and space (Schalk 1978:97).

Resource Distribution and Mobility

Description of the distribution of resources has been a focus of ecology and anthropologists have tended to borrow their concepts and ideas from this field (Lee 1969; Yellen and Harpending 1972; Winterhalder 1981; Wilmsen 1973; Smith 1975). Generalizations about the environment, comparative in nature, have resulted in a dual categorization where one environmental description is in direct opposition to the other. These generalizations are said to affect both group size (which will be discussed in the second half of this chapter) and mobility, which is the focus of this section. Food sources have been described as "stable and evenly dispersed" and "mobile and clumped" (Horn 1968; Orlans 1971); or "uniformly or randomly distributed" (MacArthur 1972:59). Though these descriptive terms (clumped/dispersed) have been quantified under experimental conditions for plants and animals (Pyke, Pulliam and Charnov 1977; Krebs and Cowie 1976), they have not been adequately documented in human cultural situations. This study attempts to operationalize these terms for salmon. Most of these models are based on the assumption that a forager exploits them through random encounters (Hughs 1979:209). However, the fact that humans seek and maintain information about the environment (monitoring) has been virtually ignored in the literature, and will also be discussed.

It has been argued that where resources are relatively uniform in space, there is little advantage to make logistical forays beyond the foraging radius (Schalk 1978:98). When resources become depleted within the foraging radius then a new residential site would be chosen in preference to making longer logistical trips. Assuming uniform resource distribution, Williams (1968:147) has suggested that the distance moved between the residential sites would be close to twice the foraging radius in order to provide new unexploited resources. In situations of uniform resource distribution, the main response is the frequency of residential mobility. If resource distribution is not uniform (i.e., clumped) then this pattern of mobility should change. As the clumping of resources in space or time increases then several changes in both residential and logistical mobility are foreseen.

In situations where resources are clumped in space (for example, during salmon runs) then groups may become aggregated at that residential spot and other resources will be found through logistical forays that might exceed a day's walking, or the distance of the foraging radius. This is true if the other resources are more spatially dispersed or in lower densities.

With increased resource clumping, the distances of residential moves would be variable, sometimes less than the daily foraging radius, and at other times, greater than twice the distance. The actual distance may be conditioned by that resource which is more important than others in that particular season. With many highly clumped resources there may be both short-distance residential moves as well as those much greater than the foraging radius.

When several resources become available at the same time, this congruence is expected to favor logistical mobility over residential mobility. This is especially true in areas with marked seasonality (which is often associated with the clumping of resources). Marked seasonality has dramatic changes in temperature, light and precipitation in the boreal forest and subarctic ecosystems during the yearly cycle. Each season creates a kind of temporary environment where resources either increase through regeneration (e.g., spring births of arctic hares) or from migration into an area (e.g., the return of spawning salmon). This abundant season has many clumped resources, compressed in either time, space or both. If the resources are available at the same time, but not in the same place, then we would expect task groups to forage logistically.

Storage and Mobility

A storage strategy is one method of solving the problem of temporal incongruity of a resource. In a situation of clumping (e.g., salmon runs), when the time available for fishing is relatively short, this resource could not provide food for longer than five or six months, unless there is some method of storage. Storage, in effect, lengthens the season of availability of a resource. Schalk (1977) suggests that the two major determinants of the amount of fish stored are the natural limits of the fish population and the cultural limits or capacities of a group to take and process the resource. Stress falls on the group during the period when the fish must be processed for storage, as the resource is briefly available and must be processed immediately. The intensity and organization of the labor is a function of the quantity of fish required for storage. (A discussion of the organization of labor follows in this chapter.)

When the resources are not spatially congruent (i.e., not all critical resources are equally available in the landscape) then a residential move will not solve the problem. A move towards one resource inhibits access to the other, therefore, logistical mobility is usually favored. The site with the more critical resource, or as Binford (1980:15) has suggested, "... the one with the greatest bulk demand." is chosen as a residential location with logistical forays for other resources. When a group prepares food for storage by freezing or drying it solves the problem of seasonality, or the incongruity of the temporal dimension, but it increases spatial incongruity (i.e., the stored resource now accumulates in one place in considerable bulk which increases the transport cost to a residential site). It will be argued, however, that the actual reduction of bulk through drying of salmon may not be prohibitive in transport costs to a new residential site.

In looking at mobility patterns for a wide range of hunter-gatherer groups Binford has found that the incidence of storage will tend to increase with the decrease in the length of the growing season (1980:15). Also, a decrease in the length of the growing season acts simultaneously to increase the number of critical resources:

> The degree to which storage is practiced will, in turn, increase the likelihood of distributional incongruities and hence condition further increases in logistically organized settlement systems with attendant reductions in residential mobility, at least seasonally. Both of these conditions are related to environmental reductions in the length of the growing season and to the implications of this for man, both in terms of food and other temperature- regulated resources. This means that there is an environmental convergence of conditions acting simultaneously to increase the number of critical resources and to increase the conditions favoring storage (Binford 1980:15).

When Murdock's categories for settlement patterns (i.e., residential mobility) were cross-tabulated with different environments, the greatest concentration of "sedentary and semi-sedentary" hunters and gatherers were found in the temperate and boreal forest zones (Binford 1980:14). Thus, groups within the boreal forest seemed to move less residentially than logistically. However, when storage dependence was estimated by Murdock and Morrow (1970) as compared to the different environments, it was found that a boreal forest group near the Tutchone, the Ingalik, ranked lower in their dependence on storage than predicted by the environment and the decreased length of the growing season. Though Binford (1980:16) believes them to be miscoded, their placement makes sense in light of the data on the Southern Tutchone. The amount of salmon stored for the Ingalik was probably similar to that stored for the Tutchone; it served as one of a number of critical resources and within the boreal forest system it may have served as a back-up store in relation to other resources available in the environment.

Schalk (1978:100-101) has made two predictions about storage and logistical mobility. His first prediction is that:

> storage of food resources by means of such techniques as air-drying and smoking are frequently expected to be integral to long distance logistical expeditions.

This argument follows from ideas from Hamilton and Watt (1970:267) that the more refined a resource is, the less the cost of transporting it. Logistical forays are not hampered by carrying dried fish. Schalk's (1978:101) second prediction

> ... regarding storage and logistical mobility is that during the period in which stores are being consumed, residential mobility will not usually provide a viable solution to the need to procure supplementary fresh foods. In other words, the tethering effect of the food supplies themselves should favor greater reliance upon logistic mobility for whatever resources are procured during the period of low production.

The idea that people become "tethered" to their stores was suggested earlier by Taylor (1964). Both depict a group with stored foods as tethered to those supplies and limited in its movement because of the group's inability to transport the stores when it moves.

There are several problems with Schalk's model. First, the Klukshu people differ from the Northwest Coast groups that Schalk uses in his sample. Klukshu people are located in a boreal forest habitat that offers a very low density of large game animals. In the boreal forest there is a need to monitor game resources, but there is little ability to do so as the exploitable resources are dispersed, mobile and present in low densities (Kelly 1980:43). In other words, one cannot go out and look for moose, find a moose (or herd of moose which do not exist) and return with that information for future hunting. When a moose is found it is taken. Though other information about moose or other game is gathered on a hunting trip, the presence of moose at one location does not guarantee the presence of others at that location or the return of that moose to that location at another time.

When seasonality creates the clumping of resources like salmon it creates a kind of temporary environment which tends to increase group size and logistic mobility. But once the "abundant" season is over the Klukshu people find themselves in an environment which, because of the scattered, dispersed nature of game (i.e., moose), tends to decrease group size and increase residential mobility.

Schalk (1978:180) writes that in his study of coastal groups, it was "not possible to cleanly segregate" these two kinds of variation in resources (clumped and dispersed). In the interior, these two types of resource patterning are cleanly segregated, both spatially and temporally allowing us to follow a single group through an annual round which shows them significantly varying their mobility patterns and group size in conjunction with storage. The specifics of the annual round will be discussed in more detail in Chapter 9.

What do the Klukshu people do in the face of this abrupt change in environments? If we look at Klukshu village immediately after the fishing season and follow Schalk's prediction about tethering, we would expect to see the group remaining in the village while consuming all or most of its stores. Instead, we see a different pattern emerging. Other game resources in the area surrounding Klukshu are apt to be exhausted during the summer fishing season and to supplement stores with fresh game people must go beyond the daily foraging radius. The end of summer/ early fall is the prime moose season when the animals are in good condition before the rut and are also apt to congregate in groups of as many as ten animals (McClellan 1975:110). For the entire band to remain in the village living on dried fish would be to miss the prime moose season (moose within the foraging radius having already been taken) and to eat up most of the stores prior to the winter season. Klukshu people disperse in small groups to hunt, and the large quantities of processed fish turn out to be less cumbersome than implied.

Dried Fish and Caching

The importance of dried fish and its effect on mobility may be overlooked by anthropologists. Without dried fish it would be difficult to transport food sufficient for a family for any length of time. The Southern Tutchone, historically, had at least one or two pack dogs (prior to the use of traction). Each dog could easily carry between 40 and 50 pounds of dried fish. This together with another 100 pounds packed by the family, would have given them enough to subsist on for at least ten days. These estimates tend to be conservative; and are based on a family of five members with two dogs where each person and animal requires 2.5 pounds per day. The dog ration was probably closer to 1 to 1.5 pounds a day increasing the food availability to 14 days. During the fishing season families would have cached some fish at points further downriver where they intercepted the earlier runs. Much of the fish was taken and moved to caches where a family expected to hunt and trap during the winter. Thus dried fish is not "expensive" to transport residentially as well as logistically. At the turn of the century and until recently, after the end of the fishing season, families moved their dried salmon by dog pack and boat up the Dezadeash river to Champagne, a distance of over 60 km.

Without exploring all variations of caching, we can begin to create a model for the Klukshu people's use of stored fish. Given the seasonal or "environmental" change from clumped resources to highly dispersed resources we would expect an equally abrupt shift from logistic mobility and large group size to residential mobility and small group size. With storage of a clumped resource (i.e., salmon), logistical mobility will be favored, but the degree to which it restricts residential mobility is dependent on how much salmon can be or is stored, which, in turn, is related to the structural limitations of the run and the ability of the group to process it for later use and finally its importance as a critical resource as compared to other resources in that environment.

Group Size

Group size like mobility strategies is expected to vary with different environments and within the same environment with the change of seasons and distributional change in resources. The following is a discussion of group size under various conditions of resource distribution.

Horn's (1968) model for forager group size based on the distribution of food sources can be summarized as follows: when food resources are evenly distributed and stable, then groups will tend towards regular dispersion of individuals or small social units; when resources are mobile and unevenly distributed or clumped, then groups will be aggregated at a central location.

One of the problems with Horn's model is that it assumes that no information is exchanged between foragers. Horn does note (1968:690) that if the distribution of resources is aggregated and their location unpredictable then the exchange of information at a central location gives an added advantage to the aggregation. But he neglects to notice that when a resource is aggregated and its location is predictable but not the timing, as is suggested by the Klukshu salmon runs, then it might not be advantageous to have large aggregations of people. Instead, smaller groups or individuals "monitoring" the early runs provide the necessary information while utilizing but not depleting the runs. By not having more people harvesting the run before its peak the run can support more people over a short period. Salmon are predictable in space; they will always ascend the river barring some major catastrophe, but as will be evidenced in Chapter 6 they are not always predictably available at the same time.

Dispersed Resources and Group Size

Within the boreal forest during the winter, Rogers (1963:78) has noted among the Mistassini Cree that group size tends to be small when hunting moose. He comments:

> The densities of the game animals are extremely low. An area of several hundred square miles is needed to support a hunter and his wife and children. Restrictions imposed by the transportation facilities, together with the poverty of environmental resources, imposes a maximal limit to hunting group size. If nearly 300 square miles are needed to support a family and a group can only exploit 1500 square miles, group size cannot exceed five families.

Though this may represent an extreme case among boreal forest peoples, the Southern Tutchone are also dependent on moose as one of a number of critical resources. Hunting patterns for moose are very similar among boreal hunters in the north (McClellan 1975:110; Osgood 1936:27; Higgins n.d.). Usually two hunters are sent out to stalk the solitary animal, tracking it in a series of loops. A moose will frequently walk into the wind and double back stopping close to its own trail to see if it can smell or hear anything. Prior to the advent of the rifle moose were also snared along trails or hunted with bow and arrow (McClellan 1975:111). In late spring when a crust forms on the snow the moose is run down with dogs by a hunter on snowshoes (O'Leary field notes 1978; McClellan 1975:112). During the summer fish runs men go out on logistical forays from the fishing village, radiating in different directions with the expectation that one group will make a kill. Frequently, if word gets back to camp, others join the hunters at the kill site to pack back the meat, etc. In the fall moose are killed by hunters to provide people with meat for drying which is done either at the kill site or at the fish smokehouses. As areas surrounding the fishing villages become more frequently hunted out, the decision is made to leave the camp for individual families or hunting partners to hunt in areas outside the normal hunting radius.

Though authors have stressed the great influence of the fur trade on northern Indians (Krech 1983 ; Ray 1974), aboriginally hides and furs were essential to natives. Many fur bearers are solitary animals (i.e., lynx, mink) or live in colonies best exploited by one or two families (i.e., arctic ground squirrel). Trapping activities were essentially small group or single family enterprises. Prior to any commercial fur trade, furs and hides were critically important to the Southern Tutchone as clothing and were pursued by small groups.

There have also been changes in group size based on technological changes. Slobodin (1962:80) has hypothesized that the use of the breech loading rifle among the Peel River Kutchin of the Yukon reduced the size of hunting parties. He attributes this to increased effectiveness of individual hunters. Where previously a large scale caribou surround needed many people to construct it, the rifle allowed for individual hunting and decreased group size. There are also foraging strategies that favor a larger group size. Cooperative procurement techniques are of considerable significance in influencing group size. The larger a group the greater the mobility costs to that group, but where a complex division of labor allows increased efficiency and energy extracting capability, this compensates for the added cost. Groups need to be large enough to provide the critical number of producers. Large groups put a strain on resources in the local environment, making residential moves necessary though the density of such resources has an important effect on the frequency of such moves.

Clumped Resources and Group Size

With seasonal change and the clumping of resources, the influence of mobility costs in restricting group size should be less severe. With an increase in resource density there are advantages to increasing group size. Situations which require the cooperation of a great number of producers, or food-sharing among different procurement parties or technology that demands a certain number of people will increase group size.

Group size has some effect on the number of times a residence is moved each year. It should be noted that there is probably some single set of factors conditioning both mobility and group size, so that we should not expect to find any simple linear relationship between the two.

Many anthropologists have noted the relationship between group size and high density of food resources. Birdsell(1968:235) writes:

> Local groups of larger size (than twenty-five) have been widely documented in the ethnological literature and in a general way their occurrence is based upon concentrations of food rather than high population densities per se.
>
> ... the very availability of large masses of food in a concentrated form, combined with methods of food preservation, suggests that the local groups will be maintained at a much looser system of equilibrium forces and that these will show a wide variety of forms.

As discussed earlier, one of the ways resources become clumped is with increasing seasonality. With high densities of food available throughout the year a group would exhaust the resources in direct proportion to the size of the group. A large group depletes the resource faster than a smaller group and thus has to move. One of the ways in which food density increases seasonally in northern ecosystems is what Binford (n.d.) has called "unearned resources." Generally, these are migratory resources, either marine, aquatic or terrestrial. Examples of these resources would be whales, waterfowl, salmon and caribou. These resources are "unearned" in the sense that the energy available to people in these resources has come from a wide area, larger than the immediate local area, over which these animals lived. Schalk has commented that:

...It is apparent why hunters and gatherers, dependent upon unearned resources that are both highly concentrated in space and seasonal in time, would show some of the largest group sizes (Schalk:1978)

When the actual number of a resource, fish, for example, is available for a compressed period of time it can support more people in the short run. A resource at a given density available for a month could support 100 people, but the same resource available for two weeks could support 200 people. But as group size increases the length of time the food can feed the group goes down. Similarly, when food is stored, there is less food available for storage with the increase in group size. There are also restraints on the ability of a group to process food for storage, especially if the food is only temporarily available.

The degree to which unearned resources are spatially clumped in their distribution is to a large extent controlled by physiographic factors. For example, with salmon the river drainage structure has much to do with movement of these fish from the ocean into fresh water. Some studies have been done on stream size and group size along the Northwest Coast. Donald and Mitchell (1975) studied data on local group size for the Southern Kwakiutl of British Columbia and compared it with Canadian Department of Fisheries estimates of salmon escapement for 1950 to 1967. They provide a median escapement estimate for the salmon streams for each of their local groups. For eleven of the sixteen local groups, 72% of the variance in group size could be accounted for with the indices of median salmon escapement (Donald and Mitchell 1975:343). When a log-log regression of these two variables is computed for the total sixteen cases, a correlation coefficient of .72 with a significance at the 99% level with 14 degrees of freedom is found. What Donald and Mitchell (1975) have shown is a strong relationship between the number of fish, or how they are clumped spatially by stream size, and group size. The Klukshu data presented in this dissertation show the spatial dimension as well as the temporal structure of the salmon run and how it effects the local group size. It is essential to know when and how many fish become available and, specifically, where such fish are located and how they are taken. Though both sets of data indicate that physiographic factors condition resource clumping and are correlated with group size; the Klukshu data is an attempt is made to take this analysis a step further with a more fine-grained approach to what other factors regulate the structure of the resource.

Clumping, Group Size and Labor Organization

In situations where resources are relatively dispersed and the local group is both the producing and consuming unit, large group size will result in an increased density of resources and labor requirements may not necessarily be changed. But when resource concentrations are large enough the local group can be made up of multiple productive units. Labor requirements establish a minimum number of people that can effectively exploit a resource. When the period of resource availability in time and space decreases, as in the case of the salmon runs, the abundance of the resource is balanced by its utility for later consumption, which in turn is dependent on the success with which it can be processed for storage. Also, when there is a temporal congruence of the fishing season with other subsistence activities, as is the case with the salmon runs in the fall and moose hunting, then there is a need for efficiency.

One organizational response to pressures for efficiency is increased specialization in task performance within the productive unit. This can take many forms. Specialization can occur by distinguishing work by sex, (i.e., that women cut fish for processing) or by task group where co-workers regularly or on a seasonal basis work together to accomplish a task. Marian Smith (1940:30) has commented that:

> pooling within a productive unit of different products of specialists not only allows them to engage in a few occupations but to spend more time upon them and become more expert at them.

At Klukshu, women were instructed at an early age how to cut fish for drying and frequently were the exclusive cutters of fish, while men were involved with gaffing of the fish. Individual women cut their own fish, though facilities such as the smokehouse or fish trap might be shared. Jorgensen (1980:150) has commented that:

> It is not enough to know whether one sex contributed most of the labor for a particular task. It is important to know whether individual persons, ad hoc groups of two to three people or task-groups did the work required in each project, and whether or not work was accomplished by specialists or by laymen.

Many Northwest Coast groups had fishing specialists who either directed the task group or performed rituals considered to be vital to successful (DeLaguna 1972). In viewing the Klukshu data there was a definite specialization in task performance within the productive unit. Fish traps were built by three women and their families. These traps were essential to the sockeye fishery and provided the bulk of the fish caught in the village. The three women who built and put in the traps according to traditional rights were specialized in fishing. They were equally ranked and were none individually nor any in a group who could be considered chiefs. They were technicians of the fishery. The fact that there were three people involved instead of two or four is arbitrary, but the fact that not every woman in the village was a trap owner is significant because the fishery was more efficiently organized by fewer number of women and traps.

Several anthropologists have argued that pressure favoring increased complexity of labor and specialization in task performance favors additional social dimensions along which people might be differentiated (i.e., rank, class, clan). Among some groups, moities or clans take over as specialized leaders of certain activities connected with subsistence. The headman of a clan or moiety acted as a director of activities or distributing agent of goods (Ortiz 1969). Fried (1960) has argued that increased specialization calls for a single administrative head to coordinate activities. He suggests also that:

> Specialization in task performance within a productive unit, in turn, favors mechanisms for the redistribution of its products within the group that also tend to favor increased authority of a group leader.

There were no traditional leaders at Klukshu who controlled the salmon fishery. Several anthropologists have made arguments that along the Northwest Coast, with decreased temporal availability of fish and decreased salmon species diversity, there is an increased importance of social differentiation (Suttles 1968:64). Kroeber (1939:31) has suggested the most "intense" forms of social organization occurred in the northern areas of the Northwest Coast where, compared to the southern parts, anadromous fish are more compressed in time. Extending these arguments, the Southern Tutchone represent one of the most northern groups near the Tlingit, (which most anthropologists agree is the northern limit of Northwest Coastal culture area), and have salmon runs more compressed and less diverse than their coastal neighbors but do not have the formally developed social organization of the Northwest Coast. The Southern Tutchone labor groups consist of nuclear or extended family sub-units that function as relatively autonomous productive units. The answer for this seems to lie in the structure of the run itself, local group sizes in the southwest Yukon, and the congruence of salmon with other resources.

Storage and Labor Organization

Finally, the subject of storage requires added attention. When resources are clumped, regardless of how abundant a resource is, its utility for later use is dependent upon whether it can be processed for storage. The greater the need for stores the more stress upon the efficiency of the labor. When resources are clumped in time to allow harvest in excess of immediate consumer needs, then storage can take place. With fish, the vulnerability of the resource (i.e. the speed with which spoilage takes place), demands laying in large quantities at one time. This is satisfied by the use of a facility (the fish trap) and the preservation technology developed by the Klukshu people. Schalk (1978:161) has commented that it is important to understand the use and importance of stored foods within the seasonal round.

> ... If one imagines a group of people who live on stored foods as the major staple for four months during a non-productive season. For every month of subsistence from stores there must be some other month of the year during which resource yield is doubled over non-storing levels. That is, there must be a 100% increase in harvest rates during the productive season for each month of living from stores. But the relationship is not always so simple. It is equally possible that the resource(s) which is present in a way that allows high rates of yield required for storing large amounts, will only be available for a period of of much less than four months. If the period of availability of a storable resource is only one month, a group of producers would be faced with the need to increase harvest rates during that interval by 400% over the non-storing level.

The structure of the Klukshu salmon resource, which reveals a much shorter period of availability than could be understood from looking only at the total escapement, is discussed in Chapter 6. It is under these conditions of compressed availability that specialized increased labor inputs are demanded. Food storage seems to favor larger sized productive units and group size to meet increased labor demand. But there are two important factors which may be overlooked. First, though the salmon resource appears to be able to support many more people by looking at the total numbers of fish, the structure of that resource may preclude the aggregation of a larger group size. Also the degree of dependence on stored salmon, and how much it is supplemented by other game, may favor smaller, more dispersed groups.

In summary, mobility strategies, group size and the organization of labor are closely associated with one another. The concepts of clumped and dispersed resources have been used to model some of the changes in these variables, especially as the salmon resource effects them. The following chapters provide the necessary background on the Southern Tutchone, especially those people living at Klukshu village, and an in-depth look at the structure of the salmon runs and the seasonal round.

CHAPTER III

THE ENVIRONMENTAL BACKGROUND OF THE SOUTHERN TUTCHONE

Territory

The Southern Tutchone people occupy the southwest corner of the Yukon Territory, Canada. This part of the Yukon is geographically known as the High Plateau (McClellan 1975:16). To the north it is bounded by the headwaters of the Nisling River, to the south and west by the Saint Elias Mountains and to the east by the Teslin River and Big Salmon Range (Figure 3.1). The area is topographically irregular and has broad river valleys, high glaciated peaks, large lakes and many dissecting rivers. In the northern part of the territory, the rivers are tributaries of the Yukon River which flows into the Bering Sea. These drainages include the Donjek, Kluane, Nisling, Nordenskiold and Takhini. In the southern section the rivers empty into the Pacific. They include the Alsek, Tatsheshini, Dezadeash and Klukshu. The Shakwak Trench is a huge fault running east-southeast along the base of the Saint Elias, the coastal range on the west whose highest peak exceeds 19,000 feet above sea level. Much of the landscape was created or influenced by glacial activity, including terracing, moraines and eskers. Glaciers today are most active in the Saint Elias Ranges.

Covering much of this area is a layer of volcanic ash, which was deposited from a volcanic activity in the White River area to the northwest around A.D. 400 (Lerbekmo et al 1975:110, Workman 1977:79). This layer is frequently used as a chronological marker in archaeological sites. The broad river valleys and massive mountains are composed of various sedimentary and intrusive rocks. The soil is generally thin and poor with intermittent sections of permafrost (MacNeish 1964:21).

Climate

Climatological data for the southwest Yukon has been lacking until quite recently (Kendrew and Kerr 1955). Four Southern Tutchone bands; the Champagne, Hutshi, Kloo Lake and Whitehorse live in the climatic division known as the Southwest Yukon, while the Aishihik and Burwash bands live within the Central Interior zone (McClellan 1975:180).

The Southwest zone is the closest to the Pacific Ocean. In the southern part of the zone the winters are a little milder than the rest of the territory. The mean daily temperature (measured at the weather station at Haines Junction) is below 32 degrees Fahrenheit for seven months of the year from October until the end of March (Kendrew and Kerr 1955:165). Four months of the year (January, February, November, December), the mean daily temperature is 0 degrees or below (Workman 1978:11). However,temperatures may drop to -60 F in winter. In June and July the monthly mean temperature is 56 degrees (McClellan 1975:18).

Southern winds prevail in the southwest zone for most of the year. Winter and summer calms are frequent in both areas. Also, the interior of the southern Yukon is very dry and although the total annual precipitation near the coastal range is 60

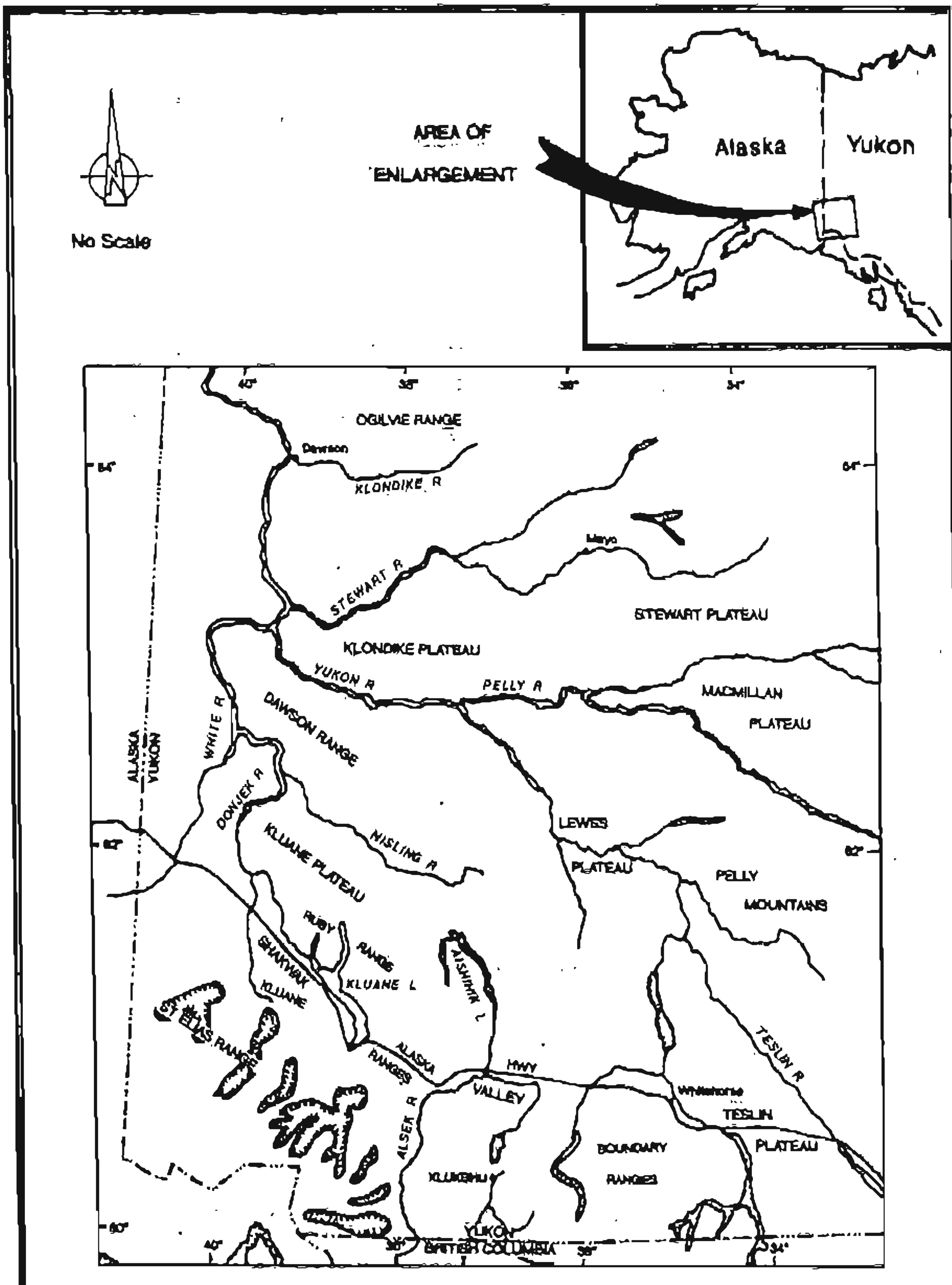


Figure 3-1

TOPOGRAPHIC MAP OF SOUTHWEST YUKON

inches, it falls to less than 15 inches inland (Workman 1978:11). Most rain falls in the summer. Snow begins in late September and early October and lasts until May. The average depth is 20 inches. Run-off from snows and glaciers is severe in late summer.

The Central Interior zone is adjacent to the coldest spot on the North American continent at Snag, Alaska (McClellan 1975:18). Throughout the zone the mean daily temperature is below 32 degrees F for eight months of the year (Workman 1978:10). Aishihik has a January mean temperature of -1 degree F. Severe winter winds at Aishihik blow frequently from the north. The whole Yukon is dry, with an annual precipitation less then 17 inches as reported by valley stations (Terasmae 1967:2).

The Champagne/Aishihik Band

This study focuses on one particular band of present- day Southern Tutchone, the Champagne/Aishihik band. This group is composed of two historically different bands whose territory lies in the central and southern section of the Southern Tutchone area. The environment and resources of these areas will be described in detail, highlighting sites of the major villages or settlements.

Environment/The Champagne Band

Most of the major settlements of the Champagne band, Nesketaheen, Klukshu, Champagne, occur on open meadow grasslands (Figure 3.2). These grasslands provide the only open areas in an otherwise dense boreal forest. All fishing settlements, Klukshu, Nesketaheen and Nuquik, are located on natural grasslands at the heads of river valleys because they afford prevailing winds necessary to the drying and processing of fish. There is evidence to suggest that the area along the west bank of the Tatshenshini River, where both Dalton Post and Nesketaheen are located, was once a continuous open grassland, formed in part by changes in the river and by a recent fire (within the last 150 years).

The Champagne band has several major settlements each of which supports groups of the Champagne people. The village of Champagne, ca DAl Ran (sunshine mountain camp), is located on the Champagne/Dezadeash river at about Mile 974 of the Alaska Highway (McClellan 1975: 25). The Dezadeash river, between Dezadeash Lake to the south and Champagne to the north is bordered for a greater part of the distance by swampy flats with numerous lakes resulting from cut-off meanders. Though it is the location of an ancient campsite, the present village came into existence around A.D. 1902 when a trading post was built there the bulk of the population coming up from Dalton Post and Nesketaheen (McClellan 1975:25). This village is located just north of the Shakwak Valley and immediately west of a large end moraine (Workman 1977:42). Further south are the settlements of Klukshu, Nesketaheen, Dalton Post and Nuquik. These represent the southernmost settlements of the Champagne band. All are located within the Alsek-Tatshenshini drainage.

The village of Klukshu is the focus of this dissertation. Klukshu village is situated on the Klukshu River at the outlet of Klukshu Lake. Klukshu River, also referred to as the Unahini River (McClellan 1975:186), flows south approximately 20 miles to join the Tatshenshini River near Dalton Post (Figure 3.3). The village lies at an elevation of 2,295

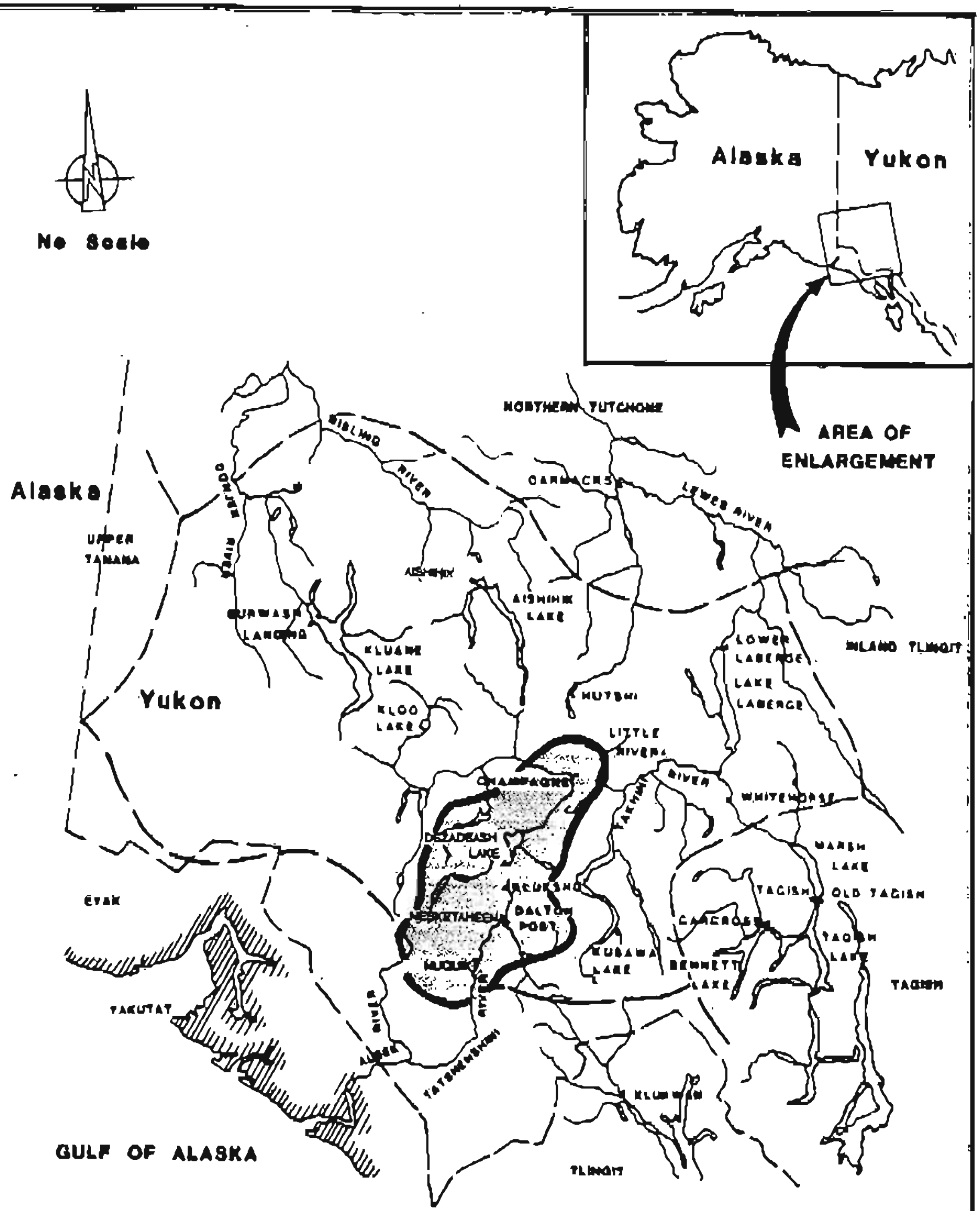


Figure 3-2

MAJOR SETTLEMENTS OF THE CHAMPAGNE BAND

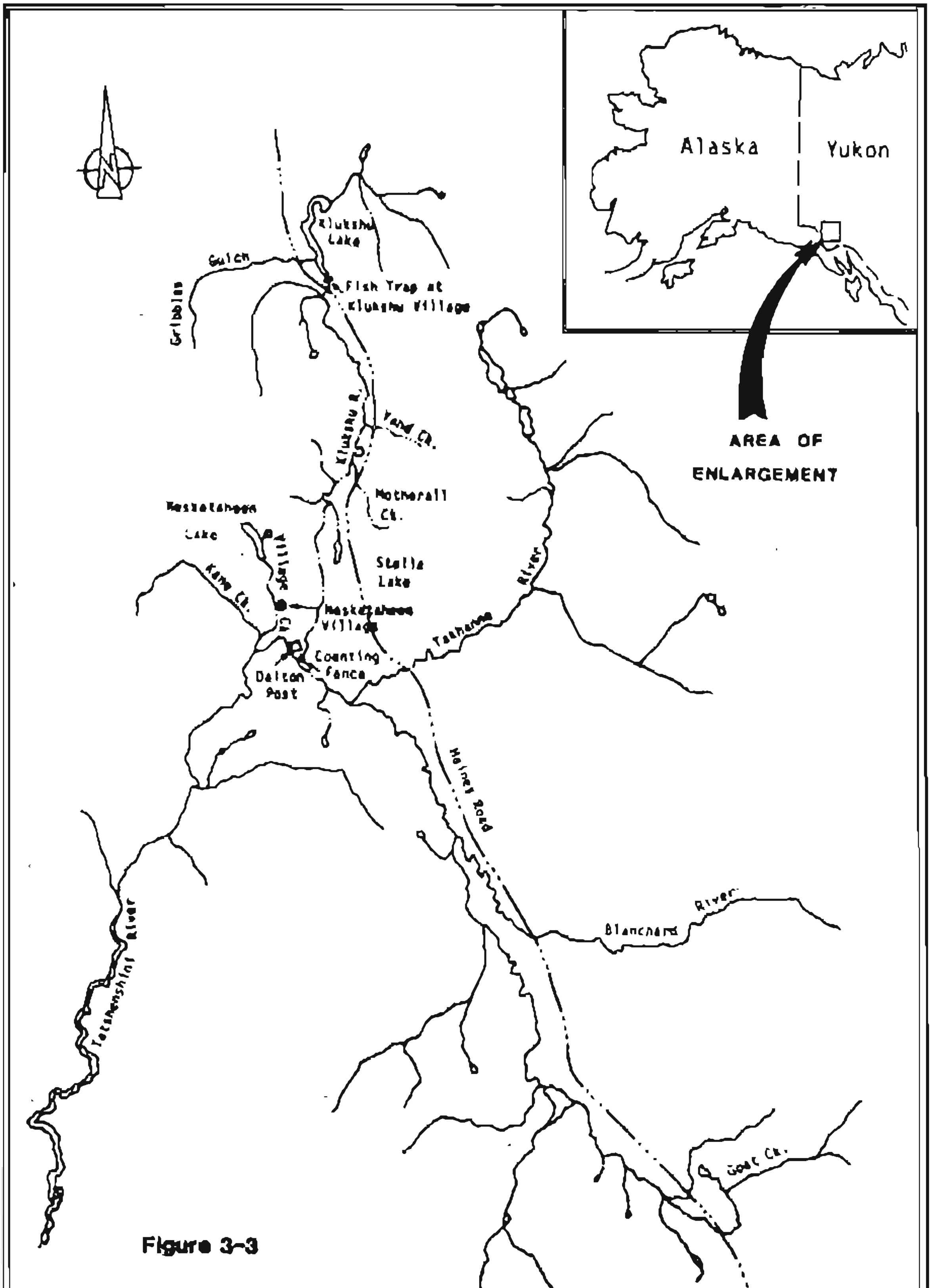


Figure 3-3

UPPER TATSHENSHINI RIVER DRAINAGE, AND KLUKSHU RIVER feet in a valley between two mountain ranges; to the west are the southern limits of the Kluane Ranges (elevation 7,130 feet) and to the east is the northern extension of the Coastal Mountains (elevation 5,725 feet). The village itself is situated on a broad open meadow of approximately 50 acres. Its eastern boundary is the Klukshu River, which at this location is no wider than 15 feet across, and relatively shallow (about 3.5 feet deep depending on run-off from the mountains and rainfall). It is bounded on the other three sides by boreal forest which encroaches onto the meadow. The edges of the meadow are fringed by poplar and water birch. Alder covers the banks of the river where there has been little human activity. Several abandoned cabins and the small cemetery are hidden by foliage in the summer. The soil at Klukshu is very poor with only a thin layer of humus (c. 1-3 inches thick) underlain by sorted river and glacial cobbles. In separate pits which were dug at Klukshu, cultural artifacts were found only in the first three inches.

Nesketaheen is on Village Creek about 2 miles from its confluence with the Tatshenshini River. It is also in an open meadow. Dalton Post is a trading post first opened around 1894 when Jack Dalton, an American trader, decided to do some direct trading with the Southern Tutchone. It is located on the banks of the Tatshenshini at its confluence with the Klukshu River. The last settlement, Nuquik, is located on Detour Creek in British Columbia where it joins the Tatshenshini River. It functioned as a village for both the Southern Tutchone and the Nuquas, who might have been a remnant coastal population.

The territory of the Champagne band ranges in elevation from 1900 feet to 2600 feet above sea level. It is bordered on the north by an unnamed 3000 foot peak in the foothills of the Kluane Range. To the east are the Boundary Mountains which rise to a height of 6000 feet. To the west and south the Tatshenshini River cuts through the Alsek and Squaw Ranges on its way to the confluence with the Alsek, which drains into the Pacific Ocean. Mountain glaciers are evident on all of the high peaks within the Saint Elias Mountains, and glaciers such as the Fisher and the Lowell have periodically closed the drainage of the Alsek River, damming the water flow to form great lakes in the Shakwak and tributary valleys (Johnson and Raup 1964:16). Pleistocene Lake Champagne flooded part of the southwest Yukon before the advent of Hypithermal, though the southern section has not yet been extensively studied by glaciologists.

The Tatshenshini itself, which defines the southern border of the area, is a large, shallow, highly-braided river choked with erosional debris. It lies in a relatively broad flood plain until it reaches the Alsek Ranges ten to fifteen miles downstream from its confluence with the Klukshu, where it has cut a deep canyon.

The southernmost section of the Champagne band territory can be divided into three types of environmental strata: flood plain, river terraces and alluvial slopes. Most of the surface soils are fine-textured silts, interspersed locally with till, outwash gravels and sand. The vegetation in the area can be grossly divided into two types: grassland-meadows and forests. The band settlements are located in these grassland-meadows, which are clearly visible as large breaks in the boreal forest when viewed from ridgetops overlooking the valley. Also on gently sloping terraces within the area, there are several grassland areas growing in marsh-like conditions in shallow depressions, indicative of places where ponds used to exist.

Flora of the Champagne Band Area

For the most part the species of grass (GRAMINEAE) and sedge (CYPERACEAE) are all species of the boreal forest. The margins of the meadows are edged and broken here and there by clumps of willow (Salix sp.), groves of trembling aspen (Populus tremoloides) and balsam poplar (Populus balsam form.). In summer these grasslands are ablaze with flowering herbs including fireweed (Epilibium sp.), Jacob's Ladder (Polemonium acutiflorum), Bear root (Hedysarum sp.) etc.

Forests cover most of the area and range from dense, heavy stands of spruce to open parkland groves of trees. The forests of the Shakwak Valley are simple in species composition; out of a total of seven species of trees found, excepting willow, only four species or sub-species are common in the area. These include white spruce (Picea glauca var. Albertina), Porsild spruce (Picea glauca var. Porsildi), balsam poplar (Populus balsamifera) and trembling aspen. Except for the grasslands and marshlands previously mentioned, the river valleys in the southern area are forested up to the timberline on the neighboring slopes at 3,000 to 4,000 feet (Johnson and Raup 1964:84). The white spruce was found to be the most common species, growing in all kinds of forest sites from dry sand and gravel outwash plains to swampy muskegs. It was found on sandy ridges overlooking the Tatshenshini River and on the west-facing slopes with a high permafrost table. The spruce forest is variable in terms height, spacing and other accompanying species.

Tall straight spruce (c. 70 feet) were found on the flood plain mixed with balsam poplar. Because new deposits often form with shifting river channels, balsam poplar is usually the colonizing species lasting through one generation to be succeeded by spruce. Scattered willows make up the undergrowth with mats of moss (Lycoposium sp.) and (Selaginella sp.). There are trembling aspen of varying ages included with these other species on the flood plain and onto the slopes of the terraces. These are characterized as a "weed tree" (Johnson and Raup 1964: 84). A relatively short-lived tree, it is abundant after various kinds of disturbances, the most important of which is fire. Fire has probably been a major factor in the life of the valley for thousands of years.

Common forest on well-drained uplands consists of white spruce (c. 60 feet), which have a definite taper in their trunks. Moss and humus thickly cover the ground along with scattered willow, soapberry (Sherperdia canadensis), wild rose (Rosa acicularis), bluebell (Mertensia panicula). In less well-drained areas, spruce forests are literally choked with thick stands of water birch (Betula occidentalis), willow, alder (Alnus sp.), Labrador Tea (Ledum sp., and Jacob's Ladder. On very dry soils the woods have a park-like appearance with moss berry (Arctostaphylos Uva-ursi) and reindeer moss (Cladonia sp.) and scattered shrubs.

On some west-facing slopes within the area there are stunted and twisted spruces leaning at various angles. Many trees are very old (400-500 years) and yet are only 40 feet tall. The soils they grow in are subject to periodic slumping due to the permafrost being very close to the surface. The forests for the Southern Tutchone have provided abundant building materials for structures that ranged from brush shelters to large spruce log cabins. They provided wood for fuel as well as tools and traps.

Environment/The Aishihik Band

The physiography of the northern area of the Southern Tutchone, where the Aishihik band lived, is quite different (Figure 3.4). Though the Aishihik people abandoned their village in 1968, families have continued to use the land. Aishihik has a long history, with the earliest date of 3100 B.P. at the Chimi site, one half mile north of the village at Aishihik (Workman 1966). The name Aishihik is derived from the Tutchone a cl yi (tail hanging down) (McClellan 1975 :30). It refers to the many caribou passing by. The territory of the band lies between Aishihik Lake, a huge, 70 km long lake draining into the Aishihik river and eventually into the Alsek River, and Kluane Lake, another large lake to the west, which drains into the Yukon River. To the east and north, the Nisling and Nordenskiold rivers mark the territorial boundaries.

The territory lies at the western end of the Kluane Plateau. The plateau is subdivided into two basins separated by the Ruby and Nisling Mountains. The Aishihik Basin is a large rolling depression between 4000 and 5000 feet sloping gently to the northeast. Only a few isolated mountains with elevations over 6000 feet are present (Workman 1978:8). It is not markedly dissected except for a few widely separated valleys (c.3000 feet)(Bostock 1948:72). Sekulman Lake is west of Aishihik. It is similar in shape though not as long. Sekulman drains into Gladstone creek which flows into Kluane Lake and the Yukon drainage. The uplands of the Ruby and Nisling Ranges reach elevations of 8000 feet and 6000 feet respectively. The Ruby Range serves as a divider between Aishihik Lake and Kluane Lake.

Flora of the Aishihik Band Area

The boreal forest, as described for the Champagne area, also covers much of the territory of the Aishihik band. The white spruce is the most abundant with the black spruce (Picea mariana) one of the most common species in the American boreal forest. It is found at only a few locations, north of Kluane Lake and at the head of Talbot Arm (Workman 1978:14). The soils on the mountain slopes bordering the valley are much like the well-drained soils on the valley floor and are often open and interspersed with small prairies or grasslands (Johnson and Raup 1964:88). Small grassy openings in the forest in the dry, south-facing bluffs of the major lakes are common. Two-thirds of the grasses have wide ranges in boreal America, while the other are also known in the arctic tundra of Alaska (Johnson and Raup 1964:89-92). The grasslands grade into one another depending on differences in soil and moisture. The most common types are on drier ground and include Poa glauca and Calamagrostis purpurascens interspersed with some sedge (Carex filifolia) and sage (Artemisia frigida). There are also over thirty species of secondary significance ranging from willows to roses. The areas with more moisture support Agropyron trachycaulum and Festuca rubra, interspersed with clumps of willows, groves of trembling aspens and various flowering herbs.

At higher elevations on the Kluane Plateau, grasslands merge into tundra with species common to both including Bromis pumpellianus var. arcticus, Fetuca altaica, Agropyron yukonense, and Agropyron alaskanum (Johnson and Raup 1964:89-92).

Tundra is outside of the limits of the Dezadeash- Shakwak valley in the neighboring mountains and sections of the Aishihik Basin above timberline. In this

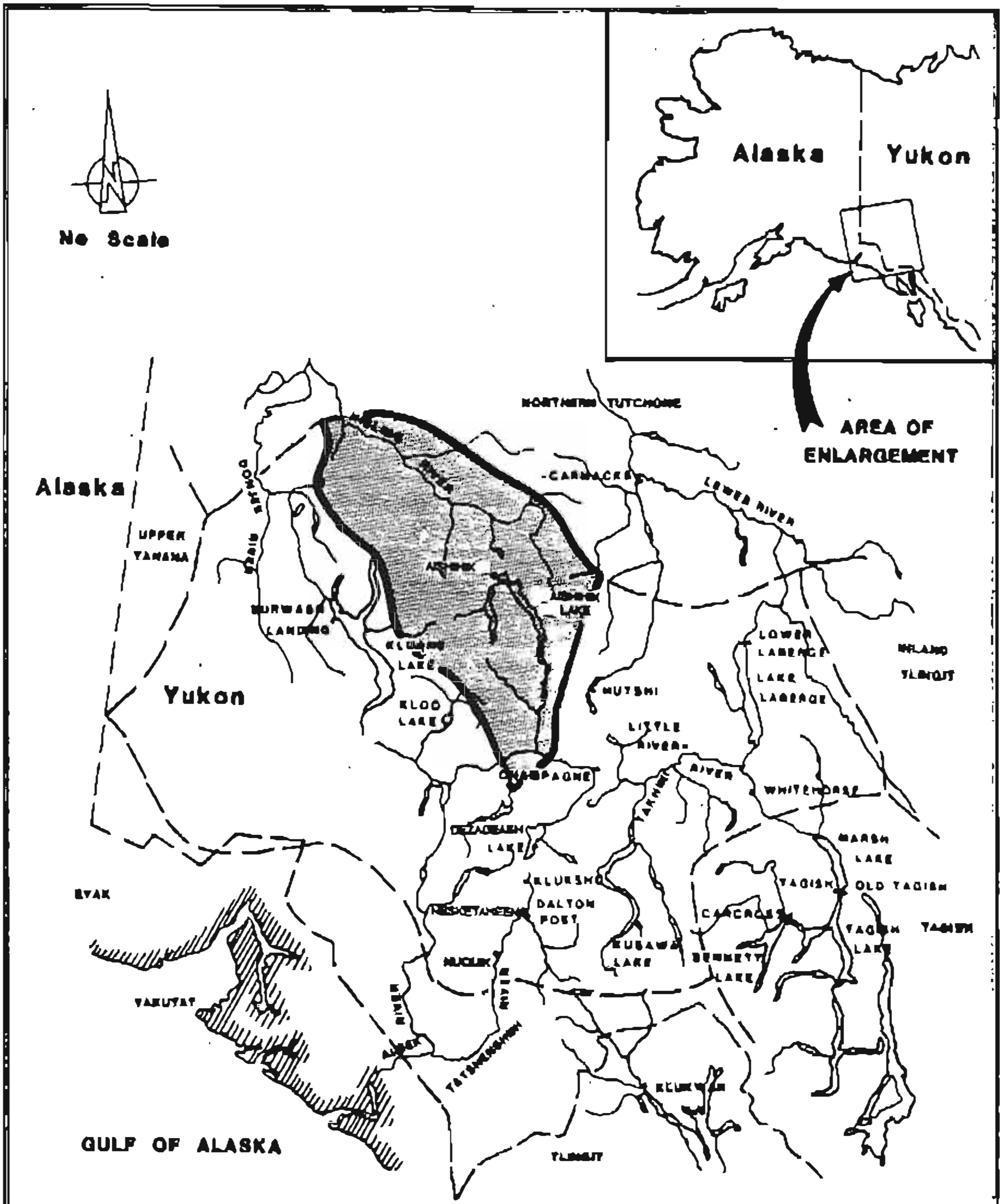


Figure 3-4

MAP OF THE AISHIHIK BAND

area the timberline is at 3600 to 4000 feet and has a considerable number of species which are "Beringian" (Johnson and Raup 1964: 99). Most of the tundra in the mountain region was established on ancient, non-glaciated surfaces (Johnson and Raup 1964:99). The moisture available in the soil affects the species composition with drier tundra supporting lichens (Lichenes spp.), mosses (Lycopodium spp., Selaginella spp.) and plants of the heath family (Ericaceae). Undrained depressions are made up of large tussocks of cotton-grass (Eriophorum vaginatum spp.) (Johnson and Raup 1964:104). These grasslands and tundra provided forage for many large mammals.

Although the data presented on the geology, topography and flora are qualitative, they do provide important information useful in considering plant-animal relationships. The plant communities support many herb and shrub plants which in turn are food for many kinds of animals. Though many of the animals are ubiquitous over the Champagne/Aishihik area, some species are more prevalent in certain environments. The availability of some species in an area is noted in the following description used by either the Champagne or Aishihik band.

Fauna

Mammals

Two major food animals of the Southern Tutchone in recent generations have been the caribou (Rangifer arcticus osborni, Rangifer arcticus stonei) and the moose (Alces alces). The caribou has been a major resource of the Aishihik band while the moose is a major resource of the Champagne/Klukshu people. In general the caribou herds range south in the summer and north in the winter. Rangifer arcticus stonei constituted huge herds that ranged as far south as Whitehorse as recently as 1932, summering between the Yukon and Tanana Rivers (Workman 1978:16). Indian tradition reports that they used to blacken the ice of Kluane and Aishihik Lakes. While essentially mountain creatures, they often concentrated on the divides between the river systems (McClellan 1975:108; Henshaw 1970:389; Rand 1945:72-82; Tanner 1966:50). Browsers, they rely on lichens and a variety of mosses, willows and grasses. The large herds no longer exist, but small numbers are found in the high country.

During the end of the last century caribou began to decrease in numbers, being replaced by moose moving north from British Columbia and south from the middle Yukon River (McClellan 1975:108). The reason for this is not completely known. Intensive hunting of caribou by the Gold Rush miners definitely contributed to their population decrease. It is possible that the increase of browsing areas for moose was a consequence of fires or climatic changes. Peterson (1955:14-18) has suggested drastic changes in moose ranges in the north over the last 100 years. Moose availability, locations and movements which vary in cycles longer than a year are only poorly understood by scientists. An area rich in moose one year may well be barren the next. Oscillation of the size of the moose population is a critical determinant of its availability in an area. Though oscillations for several Arctic and Subarctic species are well known, Higgins (n.d.) has commented on the lack of documented explanations of such oscillations. Also the role of predation by wolves on moose has led to different conclusions on the fluctuations of moose numbers (See Smith 1975; Walsberg 1976). Oscillations in moose populations in cycles of 50 to 60 years have been suggested (Higgins n.d.).

The intensity of browsing by moose was noted by Douglas (1974) in a large area (3100 square km) of the Tatshenshini-Alsek River drainage. The major shrub browsed by moose in this region are willow, especially (Salix glauca) and white birch (Betula glandulosa) (Douglas 1974:2527). These shrubs and Rocky Mountain fescue (Festuca saximontana) are important components of community types in the montane zone and are also major dominants in the sub-alpine zone which provides part of the moose summer range. The most intensively browsed sample areas in the region are in the Sockeye Lake area along the Haines Road from the Dezadeash River to just south of Kathleen Lake. The Bates Lake and Dezadeash River valley (within 3 to 4 miles of the highway) showed indications of moderate browsing. The latter area is used by moose mainly during the winter, since the extensive marsh and fen communities along the river provide an ample summer food source for the moose (Douglas 1974:2527). To the west of Dezadeash and around Klukshu Lake, Douglas noted low browsing intensities for moose. This may be less a function of plant communities than the intensity of native and non-native hunting in these areas. Moose continues to be the single most important game animal for the Champagne band.

In the nearby mountain ranges Dall sheep (Ovis dalli) and mountain goat (Oreamnos americanus) exist, or did exist, in the last 200 years. McClellan (1975:120) believes that mountain sheep were important to all Southern Tutchone bands before moose moved into the area in large numbers. They were especially important to those Tutchone bands who did not have easy access to summer salmon runs. In late August sheep were hunted by the Aishihik band. McClellan saw "good numbers of sheep being dried at a hunting camp on Kluane Lake" (1975:120). Sheep can be found in bands of 50 or more on steep-sided canyons or uplands (Rand 1945:84; Henshaw 1970:389). These sheep have also been known to displace or run off caribou herds in marginal habitats (Henshaw 1970:390).

Sheep Mountain is a range at the southwestern end of Kluane Lake where numbers of sheep can be seen low on the slopes at various times of the year. They can also be found in the Ruby and Nisling Ranges to the north (Muller 1967:4). Today sheep are shot with high-powered rifles. In the past they were driven down into snares by several men. Sheep were then shot with a bow and arrow (McClellan 1975:121). Meat was either dried in fall camps, eaten fresh or cached frozen in the winter. Other sheep products were also used (i.e., sheep horn and wool).

The mountain goat is a larger animal, and more scarce in the southwest Yukon, appearing only in the very steep Saint Elias Range (Rand 1945:86). It was also snared. The wool of the mountain goat was traded to the Chilkat Tlingit for weaving their famous blankets (Emmons 1907:4). Goat was less important as a food animal than sheep.

Douglas (1974) also noted the intensity of browsing for the snowshoe hare (Lepus americanus). It was low in only three areas: Dezadeash Lake, Sockeye and Bates Lakes. Studies of snowshoe hare have been continuing for the southwest Yukon by Krebs (personal communication), with counts taken at various locations from Burwash Landing to a small island on the west side of the Dezadeash Lake. Populations of snowshoe hares are known to vary cyclically in the north (Krebs 1972:251); within the Yukon a seven- year cycle has been discovered. Peak populations were in 1981-82; and a subsequent population crash in 1984

(Gilbert:personal communication). When abundant, they are available year round, but are especially important to the Champagne people in the late winter and early summer.

Douglas (1974) also noted browsing by four other species in the area: black bear (Ursus americanus), grizzly bear (Ursus arctos), red squirrel (Tamiasciurus hudsonicus) and arctic ground squirrel (Citellus undulatus). One of the most abundant mammals in the southwest Yukon is the arctic ground squirrel. It is present in almost every plant community type and is absent only from communities with a consistently high water table. The highest densities occur in herb, shrub and deciduous forest types (Douglas 1974:2528). Their populations also fluctuate cyclically (Krebs 1972:303). A small area may contain many burrows of these one to two pound rodents in a colony-like setting. They hibernate for approximately seven months from October to May. Traditionally they are snared in mid-May and again in late summer/early fall when the animals are fattest and their skins are in the best condition.

Other mammals of small body size include: marten (Martes americana), mink (Mustela vision), otter (Lutra canadensis), and weasel (Mustela spp.), muskrat (Ondatra zibethica), and various mice and moles. Animals of medium body size include fox (Vulpes spp.), beaver (Castor lupis), porcupine (Erethzon dorsatum) and coyote (Canis latrans). Almost all the carnivores continue to be trapped for fur by the Southern Tutchone.

Birds

Few birds in the southwest Yukon are economically important, though certain species have ceremonial or symbolic value. Only those used by the Southern Tutchone for food will be discussed. Spruce grouse (Canachites canadensis) is common in boreal forest, but fluctuates periodically. Now it is frequently shot along the highway in the early morning and late evenings when it goes to the road to obtain gravel. In the past it was shot with a bunting arrow (McClellan 1975:168). This is also true of the ruffed grouse (Bonasa umbellus) which is far less common in the area. Both were also taken with snares either tethered on felled brush or snared with simple loop at the end of a long pole. The birds are quite docile, especially in winter (McClellan 1975:168).

Willow ptarmigan (Lagopus lagopus) is common in upland areas on the tundra in the summer, migrating to the valleys in the late winter (McClellan 1975:168). Rock ptarmigan (Lagopus mutus) is found in the mountains, above the treeline, and is less common in the area. These birds were snared in the same way as grouse or driven into nets in the winter (McClellan 1975:168).

Waterfowl (Anseriformes), including many species of swans, geese and ducks are plentiful in the southwest Yukon on a seasonal basis. They are no longer frequently killed and were not heavily relied upon in the past. They may, however, have been important in the spring. Duck eggs were gathered at that time especially around Dezadeash Lake (O'Leary field notes:1978). Some ducks were snared along the water. One ceremonial object, a drinking tube made from the wing bone of a swan, was given to girls reaching puberty (McClellan 1975:169). All waterfowl were eaten fresh; none were preserved for storage.

Fish

The area also contains an abundance of fish in the many rivers and lakes. According to Lindsey (1975:2367) most of the species in the Alsek River probably entered early from the Yukon River, during the time of Glacial Lake Champagne (c. 13,500 B.P.). Some species of whitefish are absent from the Alsek but present in Kluane Lake. As the drainage for Kluane has reversed itself, perhaps these did not reach the headwaters early enough to be involved in the water reversal. Also northern pike (Esox lucius) occurs in no other Pacific slope system, but is found in the Alsek River and in Dezadeash, Pine, Aishihik and Frederick Lakes. Three species of whitefish (Prosopium cylindraceum, P. coulteri, and Coregonus clupea formis) are found in the Alsek River system. Slimy sculpin (Cottus cognatus), Arctic grayling (Thymallus articus), Northern sucker (Catostomus catostomus), and fresh water burbot (Lota lota) also are found in the drainage. Occurring in several lakes and tributaries are Dolly Varden char (Salvelinus malma) and Lake trout (Salvelinus namaycush) (Lindsey 1975:2368). Of the four species of salmon listed by Lindsey (1975), only the presence of chum salmon (Oncorhynchus keta) is not confirmed by Canadian government fisheries personnel (D.F.E. 1977:1). The other species of salmon which exist within the territory of the Champagne band are king or chinook salmon (Oncorhynchus tshawytscha), coho (O. kisutch) and sockeye (O. nerka) (D.F.E 1977:1). Both sockeye and anadromous runs of steelhead trout (Onchorynchus mykiss) now ascend the Tatshenshini River to its headwaters, but neither have anadromous runs which ascend the main Alsek River and reach the Shakwak Trench (Smith et al 1989). But it is clear that both earlier penetrated the upper parts of the watershed; non- anadromous populations of O. nerka persist in Sockeye, Kathleen and Frederick Lakes; O. mykiss in Kathleen and Rainbow Lakes (Lindsey 1975:2369). The most recent blockage of the main Alsek River by the Lowell Glacier (c. 125 years ago) exterminated the anadromous runs of both these fish and they have not been re-established, though the non-migratory populations have survived. Wynne-Edwards (1947) and O'Leary (field notes:1978) have collected Indian legends which tell of salmon being plentiful in the upper Alsek system a few generations ago.

Though rainbow trout were reported to have been planted in the Aishihik River during the construction of the Alaska Highway (1942 - 1943), Wynne-Edwards (1947) found them well-established in the Dezadeash and Alsek river systems at that time.

Recent studies by the Canadian Department of Fisheries, beginning in 1976 until the present, document the numbers and species of salmon present in the Klukshu River and a few other minor drainages of the Tatshenshini/Alsek system. These data provide excellent quantitative information for one of the most important resources for the Champagne band.

The Aishihik band did not have the same access to salmon. These fish were present only in the northern part of the Southern Tutchone territory in the Nisling River and other Yukon drainages which mark the border of the Northern Tutchone area.

CHAPTER IV

HISTORY AND ARCHAEOLOGY OF THE SOUTHERN TUTCHONE

Population

At an ethnolinguistic conference held in 1984 in Vancouver, British Columbia, it was estimated that there are approximately 500 Tutchone speakers in the Yukon; this included both Northern and Southern Tutchone (Jackson, personal communication). Statistics available in 1977 on band populations list 125 Champagne/Aishihik band members, including Kloo lake people and Hutchi people; Burwash Landing or Kluane band had 65 people (Lysyk, Bohmer and Phelps 1977). McClellan (1975:20) lists six Southern Tutchone bands in 1950 which made their "headquarters" at Lake Laberge, Hutchi, Champagne, Aishihik, Kloo Lake, and Burwash Landing (Figure 4.1). She reports that by 1950 there were "not more than 200 to 300 Indians in an area of 22,000 square miles" (McClellan 1975:20). Historic population data on on the number of Southern Tutchone is scant. Population figures compiled by the Indian Agency for 1944 listed 64 Indians at Champagne, 40 at Aishihik, "one family" at Hutchi, 49 at Burwash Landing and 20 at Kloo Lake (McClellan 1975:20).

In the past, there have been epidemics of smallpox, measles and influenza induced by both direct and indirect contacts with whites after their arrival in the nineteenth century. This has reduced the numbers of Southern Tutchone. However, all researchers are in agreement that the population of this tribe was always small (McClellan 1975:20; Workman 1977:77; MacNeish 1964:461).

Chronology of Early White Contact

Robert Campbell of the Hudson's Bay Company was one of the earliest explorers into the central Yukon. He opened a post at Fort Selkirk in 1848 and considered the Indians in that area to be "Wood Indians" (Campbell 1958:68,81). McClellan (1975:22) feels that these were Northern Tutchone, though there may have been some Southern Tutchone families who frequented the area. Dall's later research on the area located "a group on the shore of a river heading near the Chilkat, but flowing in the opposite direction and falling into the Lewes River near Lake Laberge" (Dall 1877:33). This included part of the eastern range of the Southern Tutchone. He wrote:

> These people are bold and enterprising, great traders and of great intelligence. They carry goods brought from the Chilkaht Kwan (who do not allow them to descend the Chilkaht River) to the Yukon, where they trade with the Crows and Nehaunees. They appear to be a numerous people, but have never mixed with the whites, except on a few occasions at Fort Selkirk ...

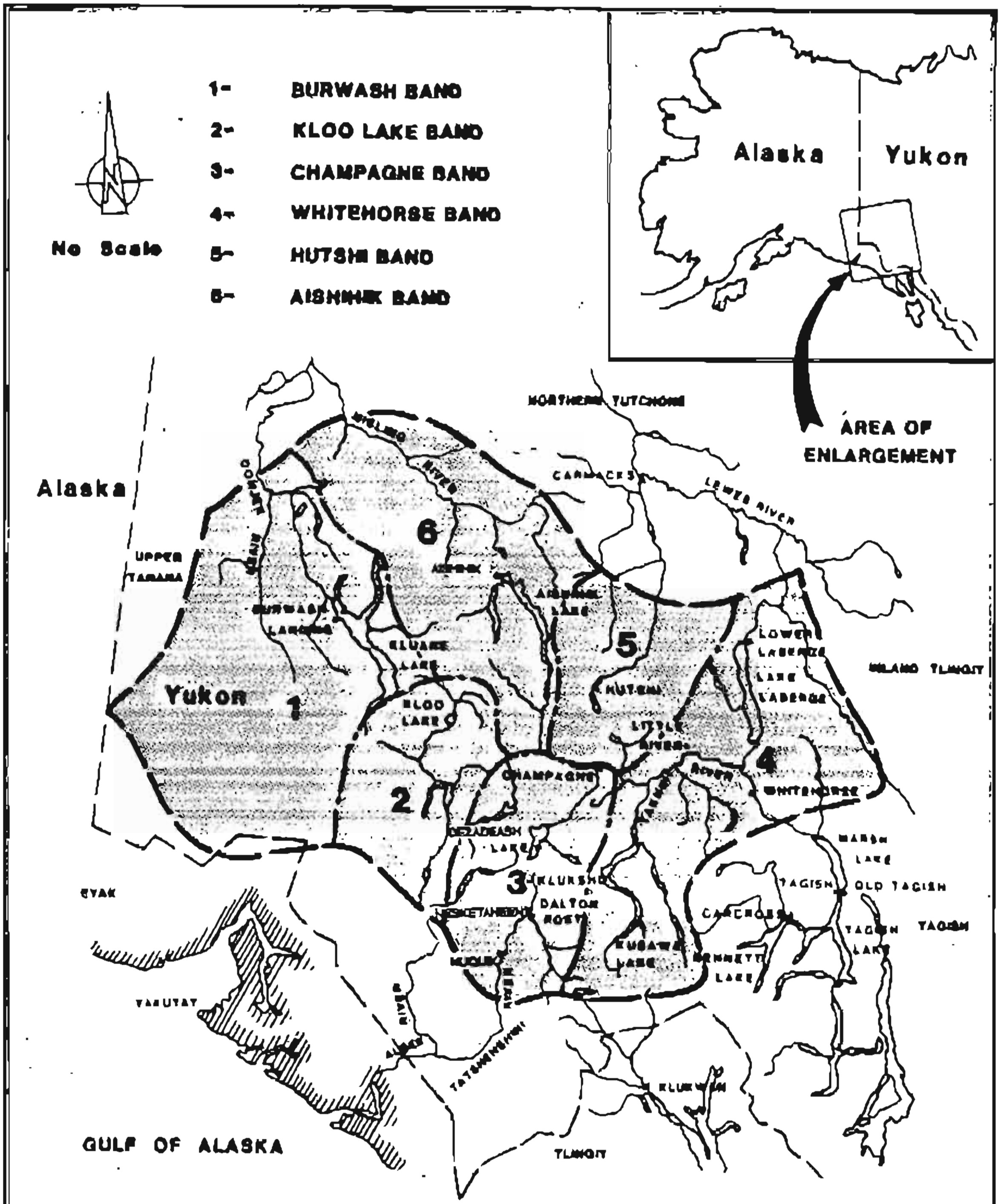


Figure 4-1

BAND TERRITORIES OF THE SOUTHERN TUTCHONE

Dall first called these people the Chilkaht-Tena but later called them the "Nehauanees of the Chilkat River." He later grouped these people with what McClellan believes are either the Tagish or Inland Tlingit and called them Kun-un-ah or "Stick Indians". Kun-un-ah is a Tlingit word, gunana (stranger) and it applies to all interior Indians (McClellan 1975:22). The term "Stick" is the Chinook word for wood. (Chinook was the lingua franca trade language on the coast.) When pressed to answer the question "what kind of Indian are you?" older Indians will sometimes answer "Stick Indian" (O'Leary field notes 1977). References in the subsequent literature use gunana or Sticks, until the term Tutchone became accepted by anthropologists (Osgood 1936).

Other documentation of the southwest Yukon occurs in the form of explorers' notes and popular articles. In 1869, George Davidson elicited geographical information from Chief Kohklux, an imprisoned Tlingit chief at Klukwan, near Haines, Alaska (Davidson 1901). Kohklux was persuaded to draw a map of the southwest Yukon with the route to and from Fort Selkirk at the junction of the Pelly and Lewes rivers. Fort Selkirk had been set up as a trading post for the Hudson's Bay Company by Robert Campbell for trade with the Northern Tutchone. The Tlingit chief and his followers destroyed the post in 1852 because they feared it would ruin their monopoly. Some researchers believe that it might have been Kohklux' father who actually conducted the raid (Johnson 1984:13).

Included on this map was the village of Nesketaheen, placed between an unnamed stream with a small lake as its source (Village Creek) and the "Una-heena" river, now called the Klukshu River. "Dalton's Post" is written on the map by Davidson, underneath the word Nesketaheen. This must have been written after 1890, as Dalton did not enter the area until then, and Davidson worked on his map until 1898. Other Southern Tutchone villages are not marked on the map but Klukshu, Hutchi ("Hootchai") and Aishihik Lake are all located. Three other villages are marked along the Tatshenshini River (called on Davidson's map, the "All-segh"). They are "Tin-chor-han" or " or "Hut, Russian style log hut" on the west bank of the Tatshenshini described by Koklux, and further south two Stick villages which may have been inhabited by the Southern Tutchone.

Aurel Krause, a scientist-explorer, traveled into the Chilkat Pass area of Alaska in June of 1882. He was guided by two Tlingits who jealously did not want to show him their trade routes into the interior. They took him only as far as Lake Arkel (now Kusawa) which lies ca. 30 miles east of Nesketaheen. Later another trip to the Alsek River was similarly foiled by Tlingit guides (Arthur Krause 1882:318-25; Aurel Krause 1885:6).

The most complete and earliest historic report was made by E.J. Glave. He was a member of the Alaskan expedition sponsored by Frank Leslie's Illustrated Newspaper in 1890. During the summer of 1890 he visited the southwest Yukon. He first met a Southern Tutchone family at Frederick Lake just east of Klukshu Lake. Glave wrote:

> The party was composed of one old Indian, his squaw and young son. After a while two other small boys made their appearance and we learned that these two little fellows had been startled at our unusual appearance.

The old man was dressed in a shirt of old blanket of many colors and patches, with moccasins, socks and pants in one garment made of dressed moose-hide.

The little camp was situated in a forest clearing. An old cotton sheet patched with buckskin, raised to the weather, formed their only shelter from wind and rain, under which was stored their bundles of skins and furs, blankets and muskets. A large two gallon tin serving as the family saucepan was full of fish, and boiling over the campfire. On the bushes around the camp their fish were hanging in the breeze to dry. (Glave 1890: 266).

It was this group which led Glave and his companion Jack Dalton to Nesketaheen which he described as the "Headquarters of the Guena or Stick Indians" (Glave 1890:310). Nesketaheen served as a major salmon fishing camp for the Champagne/Klukshu people. The other major fish camp was Klukshu, which is the focus of this dissertation. Nesketaheen was also a trading center for the coastal Tlingit and Southern Tutchone. The Tlingit held a monopoly, trading European/American goods for Southern Tutchone furs.

The following year (1891), Glave returned with Jack Dalton as a partner. Dalton later became a notorious entrepreneur during the gold rush and founded several trading posts in Tutchone country. Glave's report, though biased, presents sketches of nineteenth century Southern Tutchone life which are historically valuable.

Glave also visited the site of Klukshu village, which from the rotten posts of "former houses" and extensive cutting of the forest around the village attested to what Glave believed was a former occupation by a large population (Glave 1890:286). Glave and Dalton also met Indians from Hutchi and Aishihik bands, though it seems they did not visit either of the villages.

The two explorers also visited the abandoned site of Nuquik, which was being used as a fish camp by the people of Nesketaheen in the spring of 1890. Glave claims Nuquik was the village of an old coast tribe called the Nua Quas who were looking for flint to make tools (Glave 1890:376). Archeological survey in 1978 recognized a series of microblade quarries in the Auriol Range within Kluane National Park. This mountain is referred to as "Flint Mountain" by older Southern Tutchone consultants (O'Leary 1980).

By the time Glave and Dalton reached these Southern Tutchone settlements in the 1890's, the Indians had acquired many of the goods of white society (cloth, metal utensils, guns, tea, etc.) even though they had not seen whites in their territory and were prevented by the Tlingits from visiting the coast to trade directly. The name for whites was "little faces" because of the small area of clean skin surrounded by the bushy whiskers which were worn by white men in that period. When Glave and Dalton brought packhorses into the villages of Nesketaheen on their second trip, the Indians hid their drying fish and meat from what they believed to be huge dogs (Glave 1892:676).

Sometime between 1892 and 1896, Jack Dalton returned to a site one mile south of Nesketaheen to build his trading post, Dalton's Post. He traded here mostly with Indian clients and later with white prospectors whom he charged for using his

"Dalton Trail," which was actually the Tlingit/Southern Tutchone trading trail. He also built a store at Pleasant Camp, north of Haines, Alaska. This later became a Northwest Mounted Police Post in 1898 (McClellan 1975:23). A policeman was also stationed at Dalton Post in the last years of the nineteenth century. Inspector A.M. Jarvis reported that Nesketaheen had a population which numbered between 100 and 150 people (Jarvis 1899:104; Wood 1899:41). By 1904 the population had been reduced to 69 in the official census (Wood 1905:19). It is not known if this census counted only the native population or included whites. Decline in population of the area around Dalton Post was encouraged when the British Columbia-Yukon border was established in 1908, because Yukon Indians were no longer allowed to hunt in British Columbia which lies less than 15 miles south of their village. McClellan feels that the bulk of the Nesketaheen/Dalton Post population moved to the present settlement of Champagne when Jack Dalton built a new post there in 1902 (McClellan 1975:).

In 1898, a "tourist" named Henry Dow Banks of Springfield, Massachusetts undertook a trip into the southwest Yukon and took a series of photographs at Nesketaheen, Klukshu and the surrounding area (Banks 1898). He left no written record of his travels except the subtitles to his pictures. One picture taken at Nesketaheen shows a group of Indians dressed in Canadian clothing standing in front of a large coast-type plank house. Informants recognized some of these people as coastal men who had taken Southern Tutchone wives (O'Leary field notes 1979). At Nesketaheen, Glave describes a dozen houses of varying sizes (Glave 1890:310). The 1979 Nesketaheen Village Preservation and Survey Project (NVPSP) recorded thirteen structures, one of which was free-standing (O'Leary 1980).

In the winter of 1898 Arthur Thompson made a trip in the Yukon, visiting Dalton Post. There he and his party stayed at the store of Ike Martin, who was employed by Dalton. The store "traded primarily with the Stick Indians, whose village lay nearly a mile downstream to the west" (Thompson 1925:107). Thompson's brief description of the village as he passed through it on the trail north is in agreement with Glave's description and Bank's photos.

The trail was quickly and roughly mapped by J.J. MacArthur in the summer of 1897 (MacArthur 1898). In the winter of 1897-1898 there were reports of starvation in the Klondike gold fields near Dawson. To relieve the miners, the American government purchased domestic reindeer and their Lapland herders to send over the Dalton Trail. Upon reaching the Klondike, half the herd had escaped or died and the famine was over (Coutts 1980:16). In later years, other livestock, mainly cattle were driven on the trail. These drives were still remembered by some of the older people of the Champagne/Aishihik band.

During the rush to the Klondike gold fields, 300 persons landed in the spring of 1898 at Disenchantment Bay at the mouth of the Alsek. By the spring of 1899, not more than a dozen of these same men reached Dalton Post on the Tatshenshini after struggling up the river and over the most formidable glaciers in North America (Brooks 1900:353).

Some information is available on post-1900 gold mining operations in the area. There was a great influx of Indian people into the southern range of the Southern Tutchone when a Nesketaheen resident named Paddy Duncan found gold at Squaw (Dollis) Creek in 1927 (Kindle 1953:265). Subsequent mining occurred in tributaries of the Alsek and Tatshenshini in the 1930's and 40's.

Anthropological Research

No other substantive research was done in the Southern Tutchone area until anthropological studies began with the work of Frederica DeLaguna among the Tlingit of southeast Alaska. Her book briefly investigates trade and marriage relations between the Tlingit and the Interior Athapaskans, including Southern Tutchone (DeLaguna 1972:90). Quoting Glave as a source, DeLaguna writes (1972:90)

> parties down Dry Bay [Alaska] must have known the way up the Alsek and Tatshenshini to Wesketaheen, the great native trading center...

Wesketaheen is the name given to Nesketaheen on the original Canada Geological Survey (CGS) maps. It is not known why the name was changed on the CGS map. DeLaguna also claims that Nesketaheen was a center for the trading of native copper which was obtained from the White River, far to the northwest. Some copper was taken to the Chilkat Tlingit and some was taken down the Alsek to Dry Bay to the Yakutat Tlingit.

The most complete study, to date, of the Southern Tutchone is Catharine McClellan's My Old People Say. Her book is a classic ethnography of the Southern Tutchone, Tagish and Inland Tlingit. In her book Nesketaheen is referred to as a "big city ...thousands of years old" by the Southern Tutchone informants who talked with McClellan (1975:26). These same informants identified more than half of the individuals pictured in Glaves article as relatives or acquaintances. McClellan claims that the population at Nesketaheen was probably a mixture of Southern Tutchone and Tlingit. She relates a story of an earlier settlement, also mentioned by Glave, called Nuquik. This settlement was nearly devastated by a suspected smallpox epidemic in the mid-nineteenth century. Some of the survivors may have gone to Nesketaheen. It was these people (both from Nuquik and Nesketaheen) as well as others who became members of the present day Champagne/Aishihik band. McClellan's work with informants on Southern Tutchone culture in the last thirty years provides the baseline for present and future anthropological studies in the area.

The Prehistoric Past

The archaeological investigations into the Southern Tutchone territory have been scattered. They usually involved survey and limited test pitting. The earliest archaeological work in the Yukon, by Johnson and Raup, was done after the completion of the Alaska Highway in 1944 and 1948. The survey concentrated on the Dezadeash, Kluane and Shakwak valleys. The basic purpose of this work was the reconstruction of the landscape in which archaeological cultures had developed, with an emphasis on collecting geo-botanical and paleoenvironmental data. Forty sites were located during the two seasons' work (Johnson and Raup 1964: 4). Most were found in the area north of Dezadeash River; none in the southern portion of the territory. However, Johnson and Raup did visit Dalton Post, where they found "a dugout canoe which they assumed was from the Pacific coast" (Johnson and Raup 1964:196). Other historic sites were found in the Burwash Landing area.

MacNeish's archaeological work in the Yukon began in 1957. His crew field-checked Johnson and Raup's sites and covered a more extensive area than just the southwest Yukon. Also the first stratified sites were excavated with MacNeish using the crucial chronological significance of the soil zones, which had been previously determined by the earlier researchers.

It was MacNeish who put together the first southwest Yukon archaeological chronology based on relative dating techniques. He considers some of the layers of excavated sites and single period sites to be "components". A component being defined as "a single occupation by a single cultural group" (MacNeish 1964:204). However, when sites were compared and artifacts placed in sequential order, certain clustering of types of artifacts appeared in a number of different components and these were classified as either "phases" or "complexes." A phase is defined as "a distinctive cluster of artifacts and traits which occurs at one or more pure, probable or possible component sites" (MacNeish 1964:205). A clustering of types or traits which appeared only in one or more possible or probable components, is called a complex. A complex is therefore a tentative phase (MacNeish 1964:205).

Direct Southern Tutchone ancestors are most clearly recognized by archaeologists in the Lake Bennett Phase (A.D. 1800-1900), but proto-Athapaskan history and prehistory in the southwest Yukon dates back to the Kluane phase c. 7,000 to 10,000 years ago (MacNeish 1964: 286).

One of the earliest archaeological sites in the southwest Yukon was the Gladstone site (JhVq-1), [National Museum of Man Site Designation], found by MacNeish in 1959. Resting on unweathered Kluane silts, MacNeish named the component "the Kluane complex" which he felt to be part of the Cordilleran tradition which is dated to c. 10,000 B.P. The component consisted of few artifacts and provided no radiocarbon sample.

By 10,000 B.P., glacial ice had retreated and Glacial Lake Champagne had drained, throwing the entire region open to colonization by plants, animals and man (Workman 1978:64). Though colder than at present, there was decreasing moisture and rising temperature. By 7,500 B.P. all the Beringian megafauna (i.e., giant moose, mammoth, ground sloth, etc.) were extinct (Guthrie 1968:24).

Workman (1977:52; 1978:124) has discredited MacNeish's poorly defined Kluane complex, and chose instead to begin his archaeological chronology with the Little Arm component. At present the oldest Little Arm complex is dated to 7,195 +/- 100 years ago, as obtained at the Canyon site (JfVg-1) (Workman 1977:52). Bison bones have been associated with this component. It is the only important food mammal in the archaeological record that is absent from the area today. It is thought to be the Woodland bison (Bison bison athabaskae). Workman (1978:56) believes that it was absent from the grasslands of the upper Aishihik valley during the Taye Lake Phase (c. 3,000 B.P.). Moose and caribou are present throughout the regional archeological record, often occurring in the same strata at a site. One must credit the native accounts of the scarcity of moose in the last century. This scarcity does not seem to be reflected archeologically, but the sample size remains very small.

Not enough is known about the Little Arm component. Most remains suggest small group size and short term occupancy of sites, with the exception of the Pelly Farms site (KfVd-2) which had a large occupation (MacNeish 1964:228). These first occupants of the area were bison hunters on the grassland of the Dezadeash Valley who also took some moose and caribou. Their technology is characterized by microblades, a variety of burins and geometric, round-based projectile points (Workman 1977:51). Chronologically, the Little Arm component extends into the Paleo-Indian tradition, but the microblades evidence an ultimately Asian origin through early Alaskan industries.

The Taye Lake phase which follows Little Arm is a technology rooted in the Northern Archaic tradition of northwest Alaska. Both MacNeish and Workman feel that this technology is intrusive in the southwest Yukon. This phase, dated to c. 5000 years B.P., and the subsequent Aishihik and historic Bennett Lake phase, appear closely related to one another. The Taye Lake technology does not have microblades, but has abundant large bifaces, side- notched projectile points, endscrapers and unifaces. There is also a hint of a bone and antler technology (Workman 1977:60). Scanty evidence from the Chinimi site (JjVi-7), a Taye Lake component site, suggests that big game hunting was supplemented with fish and birds. Sites can be large and rich suggesting that larger groups had a longer term of occupancy.

At the end of the Taye Lake phase and the advent of the late post-glacial or Neo-glacial, there were several pulses of new glaciation. Kluane Lake reversed its drainage from the Pacific to Bering Sea. Huge lakes covered large areas of the Dezadeash valley. Workman (1978:58) feels that with the formation of the large lakes covering the grasslands, bison range was restricted, and the animals became easy prey for man, to the point of extinction. Archaeological faunal samples are so small that this remains a conjecture.

Workman (1977:51) regards the Taye Lake people as the technological ancestors of the historic Tutchone inhabitants. He also suggests that the technological continuity implies linguistic continuity. This should be examined in the area to further substantiate the idea that the last 5000 years has reflected Athapaskan, or at least Na-Den'e prehistory.

Immediately preceding the contact period with American-Europeans, the Aishihik phase has its lower stratigraphic boundary marked by its position above the White River volcanic ash (c. A.D. 700), but it lacks foreign trade goods. It shares traits with both the antecedent and subsequent phases, including artifacts of native copper. Paleoenvironmental data indicates a cooling trend, and the completion of the present spruce forest biome (Workman 1977:49). Sites tend to be small and meager in cultural debris compared to Taye Lake. Settlement patterns and subsistence systems were similar to Taye Lake with small bands hunting and fishing on lakes. MacNeish claims that it is during this phase that a "new pattern has been added" (MacNeish 1964:294). Some of the bands were settling during part of the summer, along rivers to catch salmon. The evidence for this is based, however, on only one site located along the Yukon River (MacNeish 1964:464).

The interior streams and lakes were available to salmon as soon as Glacial Lake Champagne drained 9,000 years ago (at the latest). Klein (1965) has presented evidence that salmon establish themselves as soon as the ice is gone. Salmon were thus available from the first human occupation of the southwest Yukon, until the onset of the Neo-Glacial era. They were blocked from the drainage from the first millennium B.C. or late second millennium until 1,500 years ago. From about 1,500 to c. 400 B.P. the Tatshenshini/Alsek drainage was accessible to salmon. After 400 B.P. they were blocked on several occasions until the last dams burst during the last century (Workman 1977:60). Indian legends refer to periods when canoe trips down the

Tatshenshini/ Alsek took place "underneath" the glacier (Delaguna 1972:243; O'Leary field notes 1977). Perhaps some episodes of glacial surging did not completely block the rivers' course. Archaeological evidence of salmon fishing by the Southern Tutchone has not been systematically collected in the region for either historic or prehistoric periods. An intensive survey of the relevant drainages would probably reveal a wealth of fish camps.

The Bennett Lake phase represents the immediate ancestors of the modern Southern Tutchone (c. A.D. 1800- 1900). One excavated site dating to this period, Old Aishihik village (the major settlement of the Aishihik band) had a continuous occupation until the late 1960s. This phase has evidence of first log cabin villages, the replacement of stone and copper tools with imported metal tools, and the influence of the fur trade and its attendant material goods. There is also evidence of brush camps used during moose hunting and deadfalls to trap moose before the advent of the musket. Caribou corrals and sheep fences along which these animals were driven were also discovered. Contemporary Tutchone consultants were children during the latter part of this period (McClellan 1975: 26; O'Leary 1980:17). The influx of the gold prospectors at the turn of the century marks the end of this phase.

There have been few wide-ranging surveys or excavations since MacNeish's work. The site of Nesketaheen itself was surveyed in 1972 by two archaeologists Roback and Gates. They produced two short unpublished manuscripts were completed which emphasize the significance of the inter-cultural trading at Nesketaheen. However, the results of their archaeological work at the site are minimally discussed. A brief sketch map was made of the site and four test pits were excavated. They reveal two distinct occupation zones. Dates of only the later occupation were ascertained by the few artifacts dating from 1897 to 1919 (Roback and Gates 1973). Unfortunately, little direct ethnographic information was elicited from informants by the two anthropologists.

A brief cultural inventory of archaeological and historical sites was conducted in 1974 by the request of the Tourism and Information Branch of the Yukon Government. Each site was briefly investigated using existing literature. In 1978 a burial (probably of a Tlingit shaman) was excavated at a location north of Nesketaheen which dated to the late eighteenth/early nineteenth century (Morlan, personal communication).

In the 1960's there were brief investigations of Dalton Post and Nesketaheen by McClellan and Cook (McClellan personal communication). In 1979, an ethnoarchaeological survey was undertaken by the Champagne/Aishihik band, the Nesketaheen Village Survey and Preservation Project (NVSPP). Thirteen historic sites were located and an in-depth study was made of the culture history of Nesketaheen. The survey revealed evidence of pre-Christian gravesites (cremation sites) and adze-cut stumps. One elder of the Champagne/Aishihik band located an area within the present village of Nesketaheen which he described as "the real old village." It contained the surficial remains of an early coastal style house (O'Leary 1980:96).

The survey also located the remains of thirteen structures, including one still standing, which was made of milled lumber and had cedar shingles imported from the coast. The remains of 36 gravehouses or fenced-in gravesites were recorded. These are probably the same ones Glave saw in 1890. Also the graves of the immediate relatives of current band members were noted. Some had elaborate

Victorian newel posts and ornate iron fencing.

Though Glave described the landscape around Nesketaheen as "open" and elders remembered being able to see all the way to the Tatshenshini River from Nesketaheen, the area is now heavily covered with poplar. The overwhelming presence of poplar suggests that the area is in the first stage of succession on the floodplain, but points also to the possibility of a recent fire (100 to 150 years ago).

The demography of Dalton Post was also explored by NVSPP and it was discovered that Indian families lived at Dalton Post when it was first founded, moving in as a unit or in several instances intermarrying with whites. The site of Dalton Post was not simply a white trading post, but a mixed community of Indian and whites. Several stories exist about the transfer of political and military power into Indian hands (O'Leary 1980:99).

Also, though McClellan feels that the bulk of the population moved to Champagne around 1902, both artifactual and ethnographic data collected show that Nesketaheen was occupied on a regular basis through 1918. With the demise of Dalton Post, and after the whites had moved out, Indian families continued to live there, some as recently as the 1940's. A large Southern Tutchone fish camp was located on the banks of the Klukshu River less than .5 miles from Dalton Post. It dated to 1927 when gold was first found at Squaw Creek, 12 miles to the south.

Other archaeological work done in the Southern Tutchone area (1978-1980) included a survey of prehistoric sites within the boundaries of Kluane National Park. Most dated to the Little Arm phase (Stephenson, personal communication). Work in 1982 and 1983 has included an archaeological field school in the Gladstone Lakes/Ruby Range area in the northwestern section of Southern Tutchone territory focusing on prehistoric sites (Legat, personal communication).

From 1900 to the present the most significant event in the lives of the Southern Tutchone has been the building of the Alaska Highway and the Haines Road (1942-1943). Several U.S. Army camps were set up along the highway to provide supplies and barracks for workers. One, on the Haines road at Takanne Falls, housed several hundred men. The road itself also created a easier route to the city of Whitehorse so supplies were more available. Indian people express ambivalence about the effects of the highway (Cruikshank 1979:53). There were problems of alcohol abuse among whites and Indians and game animals were needlessly slaughtered by workers. However, possibilities for earning money occurred, and some social relationships developed between Indian families and soldiers. Some Indian men became guides to the highway surveyors (Hudson, personal communication), or worked on construction crews. Some women achieved economic independence working for soldiers by sewing and doing wash (usually in settlements near towns). The Army also brought major flu epidemics, diptheria and measles. Many changes on the part of the Tutchone were required during this period.

Adaptation to rapidly changing conditions is often said to characterize Athapaskan culture both in technological inventiveness, economic and social flexibility in male hunting patterns (Van Stone 1974:3; McClellan and Cruikshank 1976). Also there is considerable adaptability and flexibility underlying women's roles (McClellan and Cruikshank 1976).

CHAPTER V

ASPECTS OF SOUTHERN TUTCHONE SOCIAL ORGANIZATION

Klukshu is a Southern Tutchone village located approximately one quarter mile from the Haines Road at mile 120. It was and continues to be one of the main fishing villages for members of the Champagne/Aishihik band. As previously stated, the Champagne/Aishihik band is composed of two historically different bands. It is the Champagne band which is most closely associated with the village of Klukshu as well as the historic village of Neskataheen and its attendant trading center, Dalton Post.

The name Klukshu is a Tlingit word meaning "silver salmon, end of" (McClellan 1975:26). Though McClellan records a Southern Tutchone word for the village, Kluwan, as "fish place/where they are", the village is seldom called by this name (O'Leary field notes 1978). The founding of the village is traditionally accounted in a story about Axllyls, who was the first Southern Tutchone man to find where the salmon (sockeyes) spawned. He was discovered by some Tlingit from the village of Klukwan, who had brought with them a fish trap (McClellan 1975:26-27). Another story related that Axllyls gave Klukshu to a man in gratitude for his life being spared.

Group Size

The earliest reference to Klukshu village is by Glave in 1890. He visited Klukshu that summer and saw the rotten house posts of "former houses" which he felt were evidence of "former occupation by great numbers of people" because "whole forests of big trees have been felled, the oldest marks being the most numerous" (Glave 1890:286). Glave's linking a large population with number of trees felled may be erroneous, since much wood is needed to maintain the effectiveness of the smokehouses used to dry the salmon. There is one photograph dated to 1898 which shows a smokehouse and drying rack at Klukshu but there are no early complete views of the village (Banks 1898). McClellan (1975:186) reports that in 1948 and 1949 there were eight log cabins found on the right bank and two on the left with only five being lived in. She dates most cabins to the turn of the century. She also comments on several families living in tents or brush shelters.

In 1977 there were a total of 11 structures; five of which were no longer used. Several families lived in tent camps. From 1977 to 1982 there was a dramatic increase in the number of new cabins being built. This can be explained by people settling to satisfy land claims requirements, increased economic prosperity and the return of the younger generation to Klukshu for summer recreation and fishing. In 1977 and 1978 there were 18 families, approximately sixty people. In the 1944 census the population at Klukshu was listed as 64 (McClellan 1975:20) and in 1902 the population was estimated at 25 people (Cruikshank 1974:28). The small population size influenced the mobility strategies of the group and had major repercussions for the salmon fishery. Some people used the village for only brief periods, while others spent most of the summer months living there. The village was exclusively used during the summer months, with the exception in recent times of one man who spent a winter there. During the past sixty years one family lived there for a number of years because their trapping locations were close to the village. The traditional period of occupancy of the village begins in June. Some families remain until mid-September. Today, most are members of the Champagne band with other people who lived or live in Hutchi, Kloo Lake, Dalton Post, and Aishihik, while some visitors are affiliated with the Whitehorse and Burwash bands.

Physical Plan of Klukshu Village

The village is roughly circular in plan and all residents are related in some way, or at least known to each other as evidenced by the map drawn in 1978 (Figure 5.1). There is no physical division of the village along kinship or moiety lines. The place of residence of a family usually has a tradition of usage. Families that have recently built new cabins either have torn down existing but abandoned family cabins, or more commonly, have built in close proximity to the original family homestead. New cabins have also been built in old camping or tent places. A recently built cabin of a descendent of an Aishihik family was thought to be inappropriately placed within the village. Some people felt it should not have been built at all. The dispute developed because the Aishihik band traditionally did not come to Klukshu to fish, but remained at Aishihik Lake in the summer months. The new factor in the equation was the intervention of the Canadian Government, which displaced the Aishihik people from Aishihik Lake, their traditional territory, in the 1960's. The Aishihik people then moved to Haines Junction where they merged with the Champagne band.

There were three prominent families (i.e., those with present or past elected chiefs and/or fish traps) in the village. Entrances to the dwellings have no particular orientation. The smokehouses for each of the families tend to be located beside, or immediately behind, the dwellings. There is no electricity or plumbing in any of the dwellings which are all log cabins in various conditions, some with new flooring, propane refrigerators and furnishings. Most are one room structures though some are divided into three rooms. All are heated by wood stoves which are also used for cooking. Some are better insulated than others, though they are seldom used in the winter.

The Moiety System of the Champagne Band

"There is Crow and Wolf. That's the way it is. Crow marries Wolf and Wolf marries Crow."

The fundamental social structural feature of the Southern Tutchone is the matrilineal moiety, which divides all Southern Tutchone bands as well as several neighboring groups. In Tutchone mythology, it was Crow, the Creator of the Southern Tutchone who brought light to the dark world, created earth from the ocean and made Indian people out of poplar tree bark. He originated the moiety system. These myths have obvious parallels with the northwest coastal groups, especially the Tlingit (DeLaguna 1972:210). The two sides to the moiety are the Crow ts'Uk'i (a term which actually refers to the Raven (Corvus corax) of the boreal forest as the region's only crows (Corvus caurinus) are located on the coast), and the Wolf 'agoi'. Many of the Champagne people know the Tlingit names for Crow and Wolf yel and gotc, but rarely use them except in some songs imported from the coast (McClellan 1975:408).

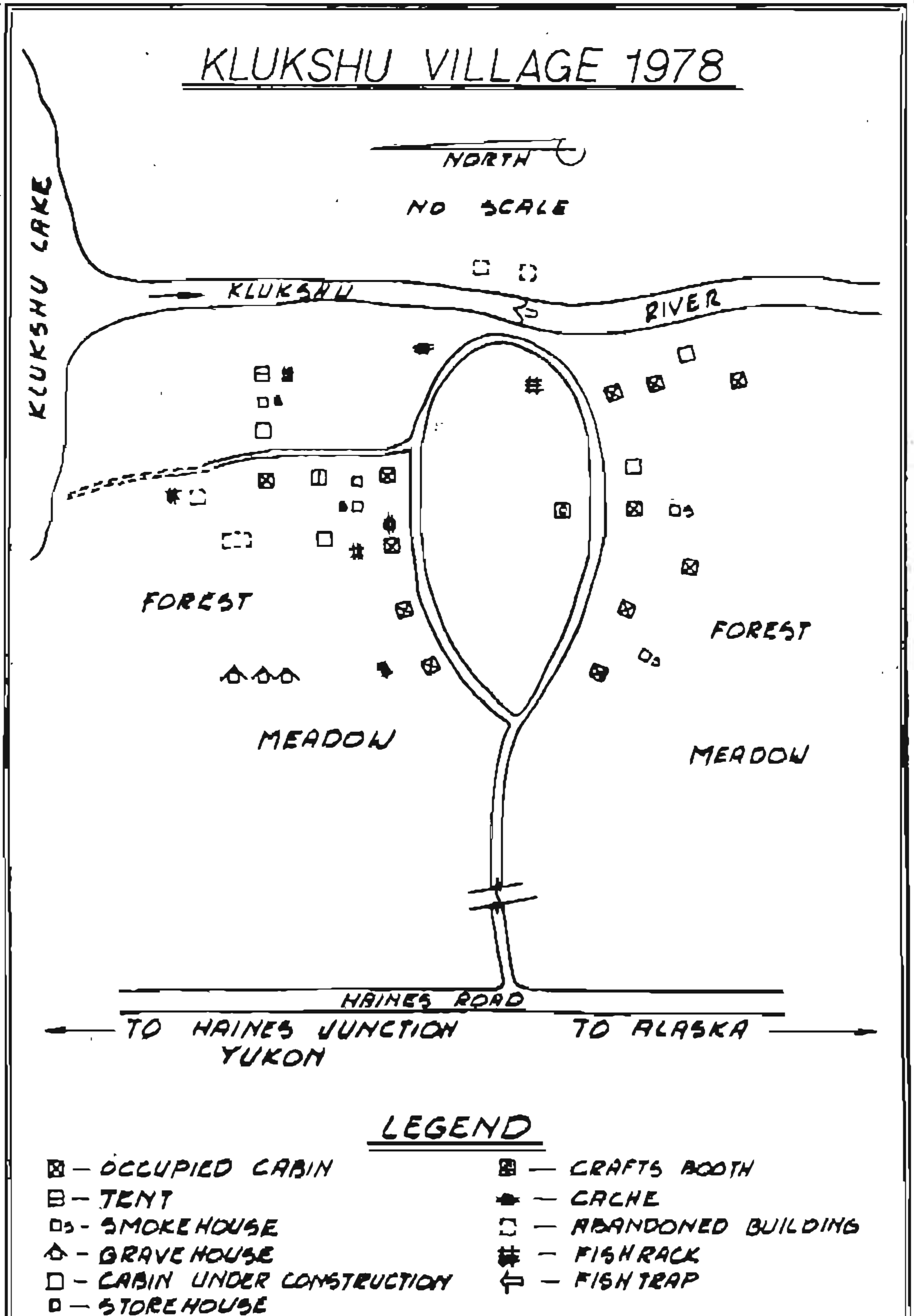

KLUKSHU VILLAGE 1978
NORTH
NO SCALE
KLUKSHU LAKE
KLUKSHU RIVER
FOREST
FOREST
MEADOW
MEADOW
HAINES ROAD
TO HAINES JUNCTION YUKON
TO ALASKA
LEGEND
OCCUPIED CABIN
TENT
SMOKEHOUSE
GRAVE HOUSE
CABIN UNDER CONSTRUCTION
STOREHOUSE
CRAFTS BOOTH
CACHE
ABANDONED BUILDING
FISHRACK
FISH TRAP

Figure 5–1

The moiety organization is thought of as Indian law and elders cannot help but complain that it is not followed as strictly by the younger generation. The moiety is most prominent in marriage and death. Thus, it operates during periods of transition, at times when group cohesion is either breaking apart or a new group is being created. The potential tensions between people were checked, in part, by the ritual dependence on members of the opposite moiety. One marries into one's opposite moiety. In the past, after a girl's puberty seclusion, the girl's mother usually stressed the need for the girl to marry. A man who had become a good hunter also went in search of a wife, usually away from his own camp (McClellan 1975:346). A marriage was arranged by the respective parents. Usually the man went to his extended family or the band from which his mother had come. A period of bride service and a dowry from the groom was expected and the prospective son-in-law usually hunted and worked for his in-laws about a year. Frequently, the married pair were providers for the woman's parents throughout their lives. In the past there was no formalized ceremony to sanctify marriage by the moieties. Today all people are married by the church or a judge. McClellan (1975:412) reports that a man's preferred marriage was with his father's sister or his father's sisters' daughter. Conversely, a woman expected to marry her brother's son or her mother's brother son. If one carries through the permissible extension of sibling terms to the whole moiety, almost all preferred marriages are "brother-sister" exchanges. Spouses were, however, often related in an extended classificatory sense.

There is no word for a matrilineage in the Southern Tutchone terminology (McClellan 1975:415). The term for the local group 'InIAn' is also used for a joint family or all individuals in one household with persons of both moieties. People refer to their moiety as either 'aara'OUnt' or 'alant' or "on my side/Crow or Wolf" (McClellan 1975:416).

The moiety also is most prominent at the funeral of an individual. The tradition is that one may not handle the body of one's own dead. In the past the opposite moiety of the deceased cremated the body and prepared the grave house or fence erected a year later. They carried out duties for which they were paid by the matrilineal kin of the deceased. A funeral today is held at the band hall and organized by the opposite moiety of the dead person. A priest or minister is present and a casket is paid for by donations given at the funeral. These donations also defray the expenses of the feast after the burial. The one moiety prepares the feast, usually both wild game and store bought provisions, and sets the table for the opposite moiety to eat first. Food, cigarettes, and small gifts are given away after the feast. Donations by moiety of the deceased are recorded and made public by one of the moiety members giving the funeral. The costs of the casket, labor, and provisions are paid first and the surplus is given to the moiety holding the feast. Since the expenses for some caskets are very high, the immediate family of the deceased are sometimes asked to bear most of its cost. A potlatch or second ceremony is given a year later and is a most important ceremony. A gravehouse or stone is erected over the grave and another larger feast is usually given by the opposite moiety. Since the Southern Tutchone share the same moiety system, it creates a balance and reciprocity between the members of the different bands.

McClellan (1975:439) reports that some of the southernmost Southern Tutchone bands sometimes substitute sib terms for moiety terms but always use Tlingit terminology. They are conscious that the sib organization came from the coast but has never been as important to the Champagne band as the moiety. Because the population of these Interior Athapaskans is so small, it greatly inhibited the spread of sibs. Knowledge of the sibs by the Champagne band (usually among members linked historically to Nesketaheen and Dalton Post) reflects the direct connection by trade and/or marriage with the Yakutat, Dry Bay and Chilkat Tlingit (McClellan 1975:445). There is also a secondary influence through intermarriage with the neighboring tribes of Tagish and Inland Tlingit.

Some people believe that the Wolf moiety is represented by both the cAnkukedi and daql'awedi sibs, though the terms are sometimes used interchangeably. The Crow sib is ganaxtedi. This is supported by the traditions that the trading routes from the coast were said to be owned by the daql'awedi and ganaxtedi (McClellan 1975:441). Sibs generally have a set of traditions which lay claim to certain crests, songs or dances and different territories and demarcate a group of people unilaterally descended from a real or supposed ancestor. Some Champagne people, though they do not have any coherent history of the sibs, demarcate certain areas or houses as belonging to certain sibs within a moiety. However, there is no mention of exclusive rights to resources in that area. Thus, Klukshu is thought to belong to the Crows because the legendary founder of Klukshu, Axlivis, gave it to a man from that moiety. Nesketaheen is thought to belong to the Wolf moiety, or more specifically to have been started by two coastal women of the cAnkukedi sib who had married Southern Tutchone men (O'Leary field notes 1977; McClellan 1975:441). Another person attributes the ownership of Nesketaheen to the daql'awedi sib, as well as the abandoned site of Nuquik further downstream. It is clear that these sibs are equated and interchanged by some of the Champagne people.

McClellan (1975:442) believes that the Southern Tutchone sibs are composed of one or more lineages. She reports four named houses of the different sib/moiety affiliations. I have knowledge of only one, the ganaxtedi Crow house at Nesketaheen called gau n hit (Drum Sound House).

This structure at Nesketaheen was still standing in 1978 and was a two level farm house style house (O'Leary 1980). A painted sign was attached to the house in the 1950 which read " ... Tina zati white man's friend." McClellan (1975:443) believes the house was built four times; the first at Nuqualk where tinE'zati (copper master/Tlingit) is the head of the Crows. Glave (1890:493) also commented on old "Tensarti" who he had heard about at Nuquik and who died before Glave's visit. The name refers to a copper door originally from Nuquik which has been lost. A brass replica was made during the 1940s and inscribed "Been lost this is in place now, Teenah Big Jim." Big Jim was a coast man (Tlingit) married to a Southern Tutchone women. A fourth gau n hit house was built at Champagne. The knowledge of sibs among the Champagne people reflects the connection, both in trading and marriage, between these Athapaskans and the coastal Tlingit. In general it is the moiety which regulates the most important social events such as marriage and death. In historic times it also played a role in birth, puberty ceremony, and peace-making occasions.

Basic Southern Tutchone Values

Among the values, noted for other northern Athapaskan groups the most important is "a belief in the interdependence of people and the necessity and rightfulness of generosity, reciprocity, mutual aid and cooperation " (Rushforth and Chisholm 1991). The system is ego-centric rather than socio-centric. Though generosity is an important value, an individual is not expected or required to provide goods and services to anyone in any type of situation. The amount and kind of aid someone is expected to give to others depends on their social relationship. For example, more is expected from close relatives through blood and marriage than from other kinds of people (Rushforth and Chisholm 1991). People who hoard or fail to reciprocate goods or services receive labels such as "greedy" or "stingy." A person who is stingy is not well liked in the community. The most common response to stinginess is to remove material support and approval, though the person will never fall out of the support system. However, where reciprocal relations are most intense among close relatives, kinsmen are expected to be very generous even if it is not reciprocated (Rushforth and Chisholm 1991). One woman complained that her sister-in-law was always greedy with her fresh salmon. Yet in the winter when the sister-in- law was out of meat the woman felt compelled to give her meat from her freezer because "after all she's my sister, Indian way" (O'Leary field notes 1981). These qualities were also desired in a chief. He was supposed to be generous and not bossy. Since there was no ranking of individuals, each moiety had equal chance of having a chief elected, though historically certain chiefs or leaders at different villages came from one moiety (O'Leary field notes 1978; McClellan 1975:156).

Social Values and the Fishery

As previously mentioned certain moieties laid claim to certain fishing locations. This did not proscribe the other moiety from fishing there since it was already intermarried with the owning moiety. Thus there was no true ownership of a fishing village by one moiety. McClellan makes only one reference to any actual payment made to the "owning moiety." Village creek at Nesketaheen is said to be owned by the Wolf moiety. If a Crow moiety member takes from that creek he is supposed to give presents to the Wolf people, or as the informant put it:

> If a Crow man bothers that creek, he [must] get whiskey, get them drunk. Oh, lots of whiskey he potlatches and makes the Wolf men drunk (McClellan 1975:186).

However my field work in 1979 on Nesketaheen located two people who had been born and raised there and never spoke of any kind of payment for fishing made from one moiety to the other. One of the two fish traps reported to be in place in the early twentieth century belonged to a woman of the Wolf moiety while the other belonged to a Crow woman (O'Leary field notes 1978). Perhaps, in the past, certain moieties laid claim to various fishing sites along the Tatshenshini/Alsek drainage, but these were symbolic rather than actual exclusively owned locations.

Currently at Klukshu there are three fish traps spanning the river at the village. One belongs to a woman of the Wolf moiety, while the other two belong to two women from Crow moiety. McClellan (1975:188) reports that during her field work in the 1950 and 60's there were two traps owned by Crow families. One of these traps belonged to the current chief. The other belonged to a Wolf family who is said to be one of the original families at Klukshu. During my fieldwork, the husband of the Crow trap owner was the elected chief, but subsequently a member of the family of the Wolf trap owner was voted in as chief. One of the Crow trap owners was a woman whose family had come from Dalton Post, and whose father had been one of the first Northwest Mounted Police in the area. She was usually the first one to put her trap in in the beginning of the fishing season. Other trap owners sometimes felt she was a little ambitious putting in the trap first but her right to do so was never questioned.

When asked why they consistently put in their fish traps the women reported because they always had a fish trap there. One women reported "My mother had a trap there, so I got mine there too" (O'Leary field notes 1978). The placement of the trap at a given location in the river also held true for the years 1977-81. When asked if other families could put in fish traps the answer was "Sure, anyone can put them in" (O'Leary field notes 1977). However, there was only space for three traps across the river and any attempt to put it further downstream would have cut off those fish from the upstream traps. No other family was seen to construct or talk about putting in another trap even when a family would complain that they were hungry for fish and did not get enough from their relatives (O'Leary field notes 1978).

One of the organizational responses to pressures of a salmon run that was compressed in time and space is efficiency. This efficiency at Klukshu village took the form of increased specialization in task performance. Women were the specialized directors of the fishery. They caught most of the fish and were responsible for the butchering and cutting of salmon for later storage. Thus, specialization occurred by distinguishing work by sex and also by task group. The three women who built and maintained the fish traps according to their traditional rights were a specialized task group. They were equally ranked but in one sense were ranked above others because they controlled the bulk of the sockeye catch in the fish traps. It can be argued that the involvement of only three women more efficiently organized the trap fishery. The fact that there were three instead of two or four is arbitrary, but the fact that not every woman in the village was a trap owner argues that organization of the fishery was organized for efficiency by fewer number of women.

The distribution of the fish from the traps cross- cut moiety lines and anyone of the current Champagne/Aishihik band was given a permit to gaff salmon from the creek or its tributaries. For example, one Crow trap owner gave fish to her immediate family, her sons' children, her younger brother and his wife and her older brother and his wife. Her older brother's wife was the Wolf owner of the other trap. Fish usually made its way to everyone living at Klukshu, and families without traps could take as much as they wanted by gaffing. Fish traps were also put "on loan" to a family. One Crow family, when they had caught enough fish, let another family maintain and use their trap. It was, however, considered a grave offense to take fish out of anyone's trap without their permission. This behavior was discouraged by each family monitoring or having someone monitor their traps in their absence and by ridicule and socially negative discussion of the offending party. Another negative comment made about a family was who was rumored to be selling fish to other bands or outsiders. This was both illegal from the Canadian Fisheries' point of view and seen as a travesty of the belief in sharing from the native point of view. Fish was generally shared within the Klukshu community.

Families who owned traps talked constantly about how many fish were being caught. The number of fish for the different traps was probably fairly equal, though when in 1978 Canadian Department of Fisheries personnel asked people to report the numbers of fish caught this was looked upon as an invasion of privacy and was feared to be later used to limit the catch by the band. Fish were also distributed at potlatch feasts during the summer when the moiety would donate fish from their traps to the feasts.

In the fishery the moiety acted in only a superficial sense to help distribute the fish as each moiety owned at least one trap; however it was the closeness of kin ties which cross-cut moiety lines and the value of sharing, generosity and reciprocity which allowed a fair, informal network for the distribution of fish within the band.

CHAPTER VI

DATA ON SALMON

History of Salmon in the Southwest Yukon

The time of the initial appearance of salmon in the Alsek/Tatshenshini drainage is one of both biological and archaeological interest. Lindsey (1975:2367) has argued that most species of fish in the Alsek River probably entered it early from the Yukon River during the time of Glacial Lake Champagne (13,500 B.P.). The Yukon River drains into the Bering Sea. Two species of anadromous fish, the sockeye salmon and the steelhead trout, do not occur in the upper Yukon River. However, both species now ascend the Tatshenshini (from the Pacific Ocean) to its headwaters. Neither species ascend the main Alsek nor reach the Shakwak Trench, yet both species have evidently penetrated to the upper parts of the watershed in the past; non-migratory populations of sockeyes persist in Kathleen, Rainbow, Sockeye and Frederick Lakes within the territory of the Champagne band (Lindsey 1975:2368). The complex glacial history of the area has greatly effected the fauna of the rivers. There was a blockage of the main Alsek River by the Lowell Glacier as recently as 125 B.P. which probably exterminated anadromous runs of sockeyes. The species has not yet become re-established, although the previously mentioned non-migratory populations of kokanee have survived in the upper reaches.

Kindle (1953) speculates that salmon ascended the Alsek and its tributaries further in the recent past than they do today. At one time they spawned in Jarvis, Dezadeash and Kathleen Lakes (north and west of Klukshu Lake). The barrier to the main Alsek is no longer glacial blockage, but migratory salmon may be blocked by a temperature limit, or turbidity of the water (Johnson: personal communication). Presumably impassable falls have always prevented the sockeye from reaching Aishihik Lake, a part of the Alsek drainage. The lake probably acquired its fauna about 10,500 B.P. when it was discharging northward through Stevens Lake before its southern outlet became ice-free (Lindsey 1975:2369). Indian tradition relates that not many generations ago salmon abounded in the upper Alsek system. This is consistent with a geologically documented blockage 125 years ago (Wynne-Edwards 1947). There are stories of a shaman who had been angered by his people causing the blockage by the glacier and the disappearance of the salmon (O'Leary field notes 1978).

In order to fully understand the factors which caused only one of the two bands, the Champagne band, within the same drainage to specialize on salmon, it is necessary to review the archaeological literature to document the initial occurrence and the time depth of this adaptation. To date, the only extensive archaeological surveys in the southwest Yukon, have been done by MacNeish. On the basis of a single site (KeVd-2), located near Fort Selkirk on the Yukon River), MacNeish has decided that "some macrobands were settling during part of the summer along rivers to catch salmon" (1964:294). He correlates this alleged fishing period with the Aishihik complex, dating to A.D. 0-1000. There were no artifactual remains nor faunal remains evidencing a salmon fishery, and his conclusion was based wholly on the site's location on the Yukon River which has salmon. Conclusions based on such meager evidence (a single site) are provocative but untenable.

Though no extensive surveys have been conducted of the entire Alsek/Tatshenshini drainage, two recent surveys (1974, 1978) included sections of the drainage. The Kluane Park archaeological survey located only one previously known historic fishing village (Nuquik). A brief reconnaissance of the Tatshenshini downstream from Dalton Post produced no archaeological sites (Gates and Robach 1974). Workman (1978) has suggested a late appearance for salmon fishing camps, speculating an eighteenth century origin. He wrote,"Fishing would have been of minor importanc in the annual cycle and settled communities such as Klukshu would have been unknown" (Workman 1978:115). Workman believes this because of an allusion in Klukshu legend that the fish trap was introduced by a mythical figure from the coast. He assumes this allusion to be an historical fact, because he believes trade with the Tlingit to have had an eighteenth century origin. He further assumes the fishing adaptation to be coincident with trade. In my opinion, both MacNeish and Workman are premature in their assumptions about the initial occurrences of fishing adaptations. Given the paucity of archaeological data I would suggest three ways of finding early salmon fishing sites in the region: (1) excavation of known and/or existing fishing villages (Klukshu, Nesketaheen, Nuquik) to determine their initial settlement and antiquity. The site formation processes observed at currently used sites such as Klukshu would aid in pattern recognition of earlier occupation. (2) A survey of the mouths of other smaller salmon streams downstream from present or historic fish camps where earlier more abundant runs may or do occur instead of the major tributaries where no known historic fishing sites were located. (3) A survey of the outlets of lakes with supposed or established migratory and non-migratory populations of salmon (i.e., Kathleen Lake).

Schalk (1977) believes that salmon fishing was only occasional and insubstantial before the advent of storage procedures. Without storage, especially in the more distant tributaries of the salmon drainages where runs are smaller and have greater fluctuations, dependence on salmon would decrease and a more generalized form of adaptation would occur. The key to early fishing sites may well be the initial appearance of storage at sites in the form of facilities and material culture. One does not have to rely solely on historic legends or archaeological conclusions based on meager evidence in order to determine the occurrence and location of salmon fishing.

Archaeological research into the problem of the earliest occurrence of salmon fishing cannot be undertaken without understanding the structure of the salmon resource and those factors which govern the adaptation by a cultural group.

The Life Cycle of the Tatshenshini/Alsek Salmon

In 1976 there were three species of Pacific salmon identified in the Klukshu River: king or chinook, sockeye and coho salmon. The life cycle of the salmon varies according to species, but all spend most of their life in the ocean. When they approach maturity they return to freshwater to spawn. The life cycle of the sockeye is described below and in general its life cycle is similar for both other species. The sockeye select those coastal streams or tributaries of river systems which originate in lakes. Klukshu and Village Creek, with their associated lakes are the principal sockeye spawning areas (DFE 1977:8). In the Klukshu system, sockeye spawning occurs in Klukshu Lake outlet and is also concentrated in two areas on the west side of the lake near Gribble's Gulch. The areas selected by fish are those having gravels suitable for the nests or "redds" that the females build. The eggs are deposited in the redds and are fertilized by the accompanying males who often compete on the redds. The eggs are then covered up by the female parent (Foerester 1968:7). The period of egg incubation depends on the temperature of the water flowing through the redd and may vary from 80 to 140 days depending on water conditions. The young, free swimming fry emerge from the gravel in early spring depending on water temperature (Foerester 1968:7). The young live there for a period of one or two years or, more rarely, three years before setting out in the spring and early summer of their second or third year as computed from the time of fry emergence. They remain in the ocean from one to four years, and with the onset of maturity, return to their natal stream (Foerester 1968:8). From samples at the Klukshu River, it was determined that age "4(2)" sockeyes were most frequent spawners (DFE 1977:30). These "4(2)" age groups are fish, which as yearlings travel to and reside in the ocean for two years and then migrate back to their home streams. There are several distinct periods of arrival or runs. The return of these fish after a period of several years in the ocean to their own birthplace is remarkable (Schultz and Stern 1948:10). The maintenance of a run depends on the numbers of maturing adults that reach the spawning grounds. This passage of fish to the spawning area, which are not caught by fishermen or other predators, is termed the escapement (Foerester 1968:51). The numbers of fish required to constitute an adequate spawning escapement is not clearly known, though several critical factors have been identified. The escapement should bear a close relationship to the incoming total population with regard to timing. To this end, it is necessary to know when each individual population enters a river, and in what quantity, to provide for a proper division between catch and escapement (Foerester 1968:62). The fish arriving at the peak are likely to find the best spawning conditions, and the bulk of the escapement should consist of these fish (Foerester 1968:52). The advent of commercial fishing, both pelagic and set-net in rivers, has complicated the "pristine" conditions under which salmon thrive. The proper catch to escapement ratio is dependent on a variety of factors which will be discussed in a later chapter. However it is important to note that the salmon data for the Klukshu are one of the first long term, specific enumerations available for use with a native Indian fishery.

The D.F.E. Salmon Data (1976-1980)

In 1976 The Canadian Department of Fisheries and Environment (DFE) undertook a program of species enumeration of salmon spawning populations in the Klukshu River (DFE 1977). The goals of the biologists were to enumerate the daily abundance of adult salmon entering the Klukshu river system; to determine the distribution of spawners; to collect baseline information on stocks such as sex and length; to obtain a seasonal estimate of abundance of salmon in other streams of the Tatshenshini system, and to measure some parameters of the habitat and relate them to salmon productivity (DFE 1977:3). A counting fence was selected as the best method of enumerating the salmon, and most of the data were drawn from a twenty-four hour daily log kept by a field crew and from other stream surveys.

Salmon Runs on the Klukshu River and Selected Tributaries of the Tatshenshini Drainage

Of the three species which migrate up the Klukshu and associated streams, the king salmon is the largest. The sockeye, which are smaller, are more numerous than kings. The coho, based only on partial counts by the DFE, run late in the fall and are equal to or less numerous than the king. The data obtained from the DFE for this study covers a five year period from 1976 to 1980 (Table 6.1). Though there has been a program of enumeration since 1980, these data are not included. It is important to note that the fish were being counted at the mouth of the Klukshu River where it empties into the Tatshenshini River. This is about 15 air miles downstream from the Indian village and the traps. This means that for sockeye the dates given for numbers of fish entering the river is actually about five days earlier than the dates the fish reached the village. From 1976 to 1980 the sockeye run has averaged 17,880 and the king run, 2,881 fish. But these averages do not reveal the year to year fluctuations.

Clumping/Spatially and Temporally

In the peak year of 1978, there were 26,867 sockeye, a 50% increase from the average year. In the peak year for king salmon, 1979, there were 4,404 fish, an increase of 67% over an average year. Similarly, in the worst year, which coincided for both species (1976), there were only 11,683 sockeyes and 1,244 king salmon. This represents a 35% decrease for the sockeye, and a 57% decrease for the kings, relative to an average year. The numbers of fish during a peak year may be two and one half to three and one half times the numbers in a bad year (O'Leary field notes 1978).

Definition of Abundance

The total yearly count does not accurately reflect the wide daily fluctuations within a single year. During any of the five years, the numbers of fish available are not evenly distributed or abundant temporally. By assigning 100 fish per day as the bottom line for an "abundant" day, we realistically estimate the number of fish a woman can reasonably process for storage in a day. The assumption is that one woman can process about 100 fish per day but as the run increases so can the number of women increase. Thus at 100 fish per day, two women can take 50 fish each, four women can take 25 fish each, etc. The entire run may extend from mid-June to late October, roughly one hundred days, but during this time the number of days which qualify as abundant are few. If we use 1979 as our sample year, (it was actually 31% below the average), there were only 19 non-consecutive days in which there were more than 100 fish available. That is, fish are abundant during only 20% of the fishing season. It is important to note that those nineteen days represent 87% of the total run.

In fact, 20% may be too high an estimate for abundant days. A closer look at the data for the five years, reveals that fully one-half of a run passes a given point on the river in a very short time. In 1979, one-half of the entire sockeye run occurred in the space of 4.3 non- consecutive days. In the peak year (1978), it took 7.3 non-consecutive days for one-half of the run to pass and in the worst year (1980) it took only 2.5 non-consecutive days for 50% of the run to occur (Figure 6.1). To generalize, there are fewer days of abundant fish during a bad year, and a large percentage of the run (i.e., 50% or more) happens in fewer days in a bad year.

To further complicate the structure of a specific run, in a bad year, a large percentage of a run may pass in a single day. In the three bad (below average)

Table 6.1. Annual Counts of Salmon on the Klukshu River 1976-1980. (Department of Fisheries and Environment Canada)

Year	Species	
	King	Sockeye
1976	1244	11,683
1977	3144	26,791
1978	2996	26,867
1979	4404	12,311
1980	2637	11,750

TOTAL NUMBERS OF SOCKEYE SALMON

BY YEAR

KLUKSHU RIVER

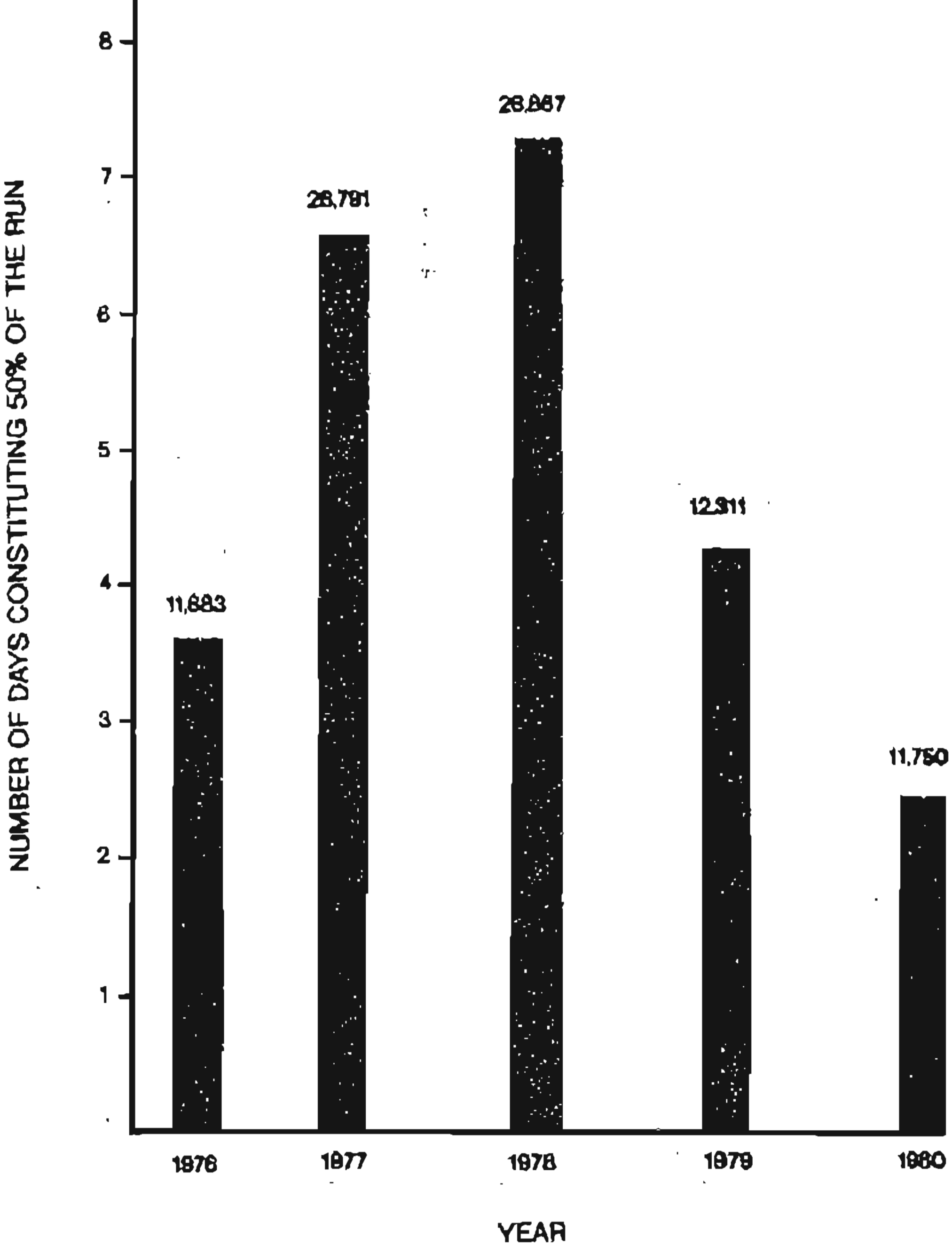


Figure 6-1

years (1976, 1979, 1980), 17%, 23% and 33% respectively of the total runs, occurred in a single day. In the two peak years (1977 and 1978), only 11% and 9% of the runs occurred on a single day. It is interesting to note that the one day with the most fish available varies within a sixteen day range extending from August 30 to September 15 (Figure 6.2). This would indicate that despite a difference of roughly two weeks, the peak days occur in a less than random fashion, happening sometime between late August and mid-September (DFE 1977).

Another pattern also emerges when we look at the earliest annual dates when sockeyes are available - that is, the first fish are counted through the gate. In the two peak years (1977 and 1978), sockeyes were first available on June 10 and June 15. In the three worst years (1976, 1979, 1980) the sockeye arrived on July 6, July 2 and June 26. (Appendix A). Thus, in a bad year, the runs happens more quickly (there are fewer abundant days) and the first fish are available at a later date.

The temporal patterning of the king salmon are similar to the sockeye, but their Klukshu River spawning localities differ. King salmon do not travel as far as the outlet of Klukshu Lake, where the village is located, to spawn. Instead, they spawn at various locations along the length of the Klukshu River, as well as several of its smaller tributaries and several other tributaries of the Tatshenshini River. King salmon spawning grounds are located at (Wal Kun) Klukshu Crossing, (Da et lin) Klukshu Flats on the Klukshu; Vand Creek, Motherall Creek, Village Creek, Blanchard River, Goat Creek, and the Takhanne River (DFE 1977:17-25; O'Leary field notes 1978). The king salmon are larger and heavier fish than the sockeyes. A sample of kings caught by the sports fishery in the Klukshu area in 1976 recorded the mean fork length as 923.59 mm and an average weight of 21 pounds (DFE 1977:27). This is approximately four times the weight of the sockeye. Weights may vary enormously since some king salmon return early from the ocean during their first year, and are known as "jack" fish, weighing from 2 1/2 pounds to 6 pounds. The heaviest kings can weigh up to 125 pounds, though the record in the Klukshu is 65 pounds (Doreen Grady: personal communication). The average age of these fish, as determined by scale determination, was 5(2) or, when a yearling, they spent three years in ocean residence.

The run of king salmon in the Klukshu river peaks between 30 to 40 days before the sockeye. In all five years examined, the largest number of kings entered the river during the ten day period from July 10 to July 20 (Figure 6.3). During this ten day span, at least 40% of the entire run passed the fish counter. In 1980, 70% of the run happened during these ten days. Furthermore, in three of the years (1977, 1979 and 1980), 80% of the total run of kings is complete by July 20 (Figure 6.4). But averaging the five years does not give us a true picture of how bad a bad year can be. In bad years the fish are usually late. If we take the worst of the the five years (1976), by July 5, no fish of either species have yet passed the counter. When the first salmon (kings) arrived on July 6, it was 46 days from this initial arrival, until the beginning of the abundant sockeye run around August 21. Since the majority of the earliest fish are king salmon, in of the 5 years, kings outnumbered sockeyes as late as August 20. As noted above, king salmon do not spawn in Klukshu Lake. This characteristic spawning behavior of kings has major repercussions for the Indian fishery and where the group must be located in order to get their fish. It has an effect on the kinds of groups, size and whether they can return to their residences after gaffing or move their residence to the gaffing location. Bad years for sockeye and king salmon do not

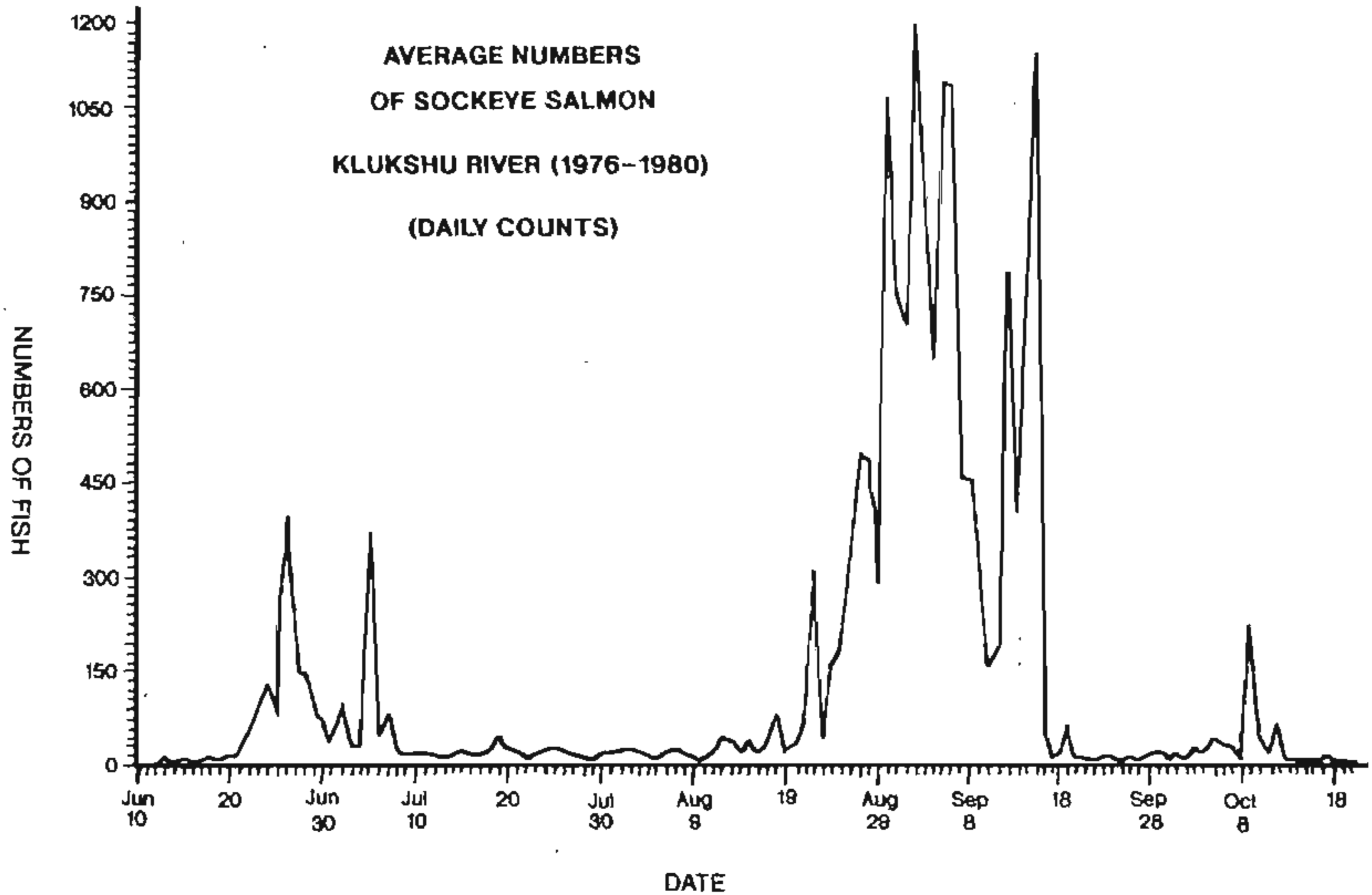

AVERAGE NUMBERS
OF SOCKEYE SALMON
KLUKSHU RIVER (1976-1980)
(DAILY COUNTS)
NUMBERS OF FISH
1200
1050
900
750
600
450
300
150
0
Jun 10
20
Jun 30
Jul 10
20
Jul 30
Aug 8
19
Aug 28
Sep 8
18
Sep 28
Oct 8
18
DATE

Figure 6-2

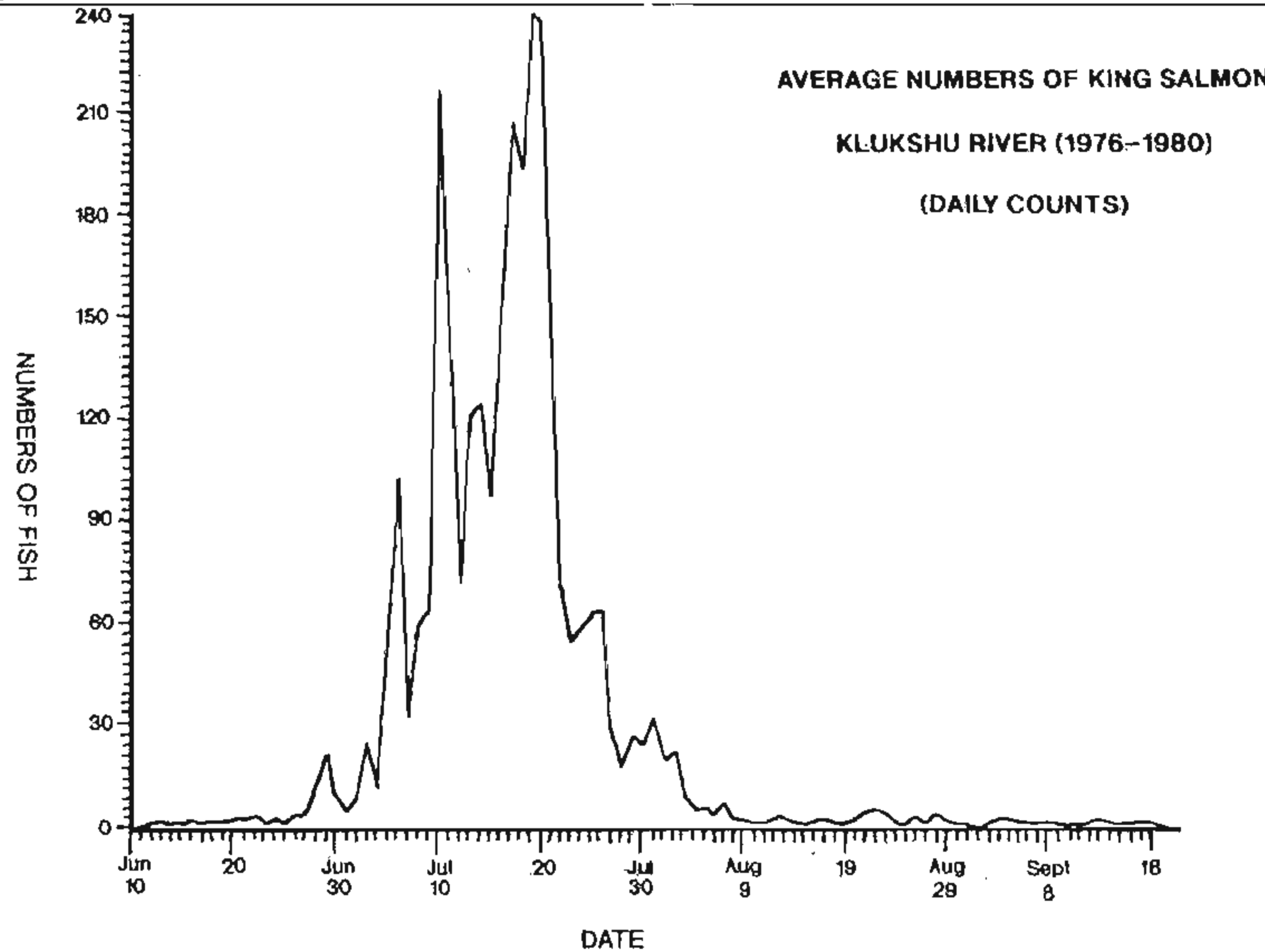

AVERAGE NUMBERS OF KING SALMON
KLUKSHU RIVER (1976-1980)
(DAILY COUNTS)
NUMBERS OF FISH
240
210
180
150
120
90
60
30
0
Jun 10
20
Jun 30
Jul 10
20
Jul 30
Aug 9
19
Aug 29
Sept 8
18
DATE

Figure 6-3

TOTAL NUMBER OF KING SALMON

BY YEAR

KLUKSHU RIVER

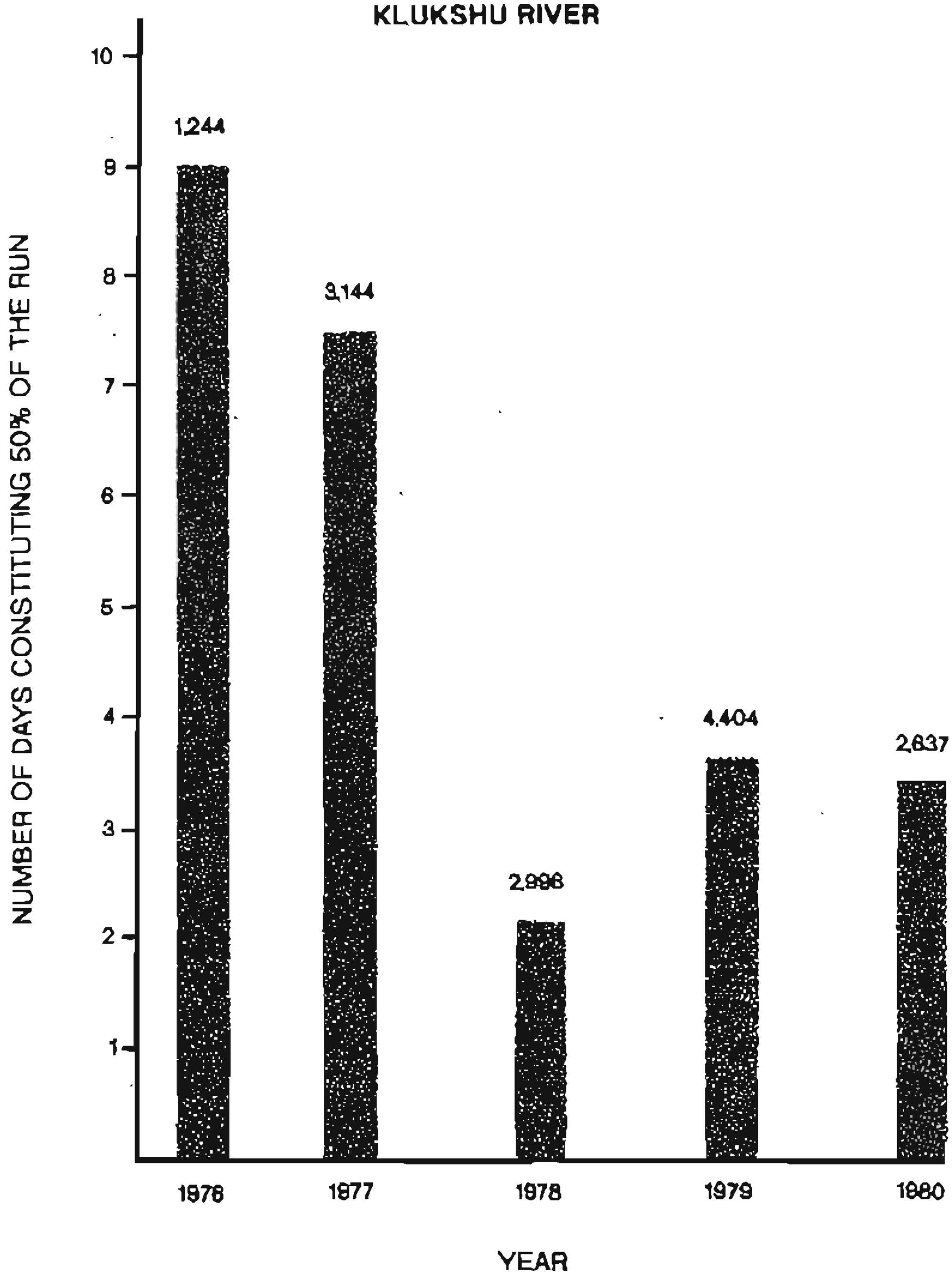


Figure 6-4

necessarily coincide (as they did in 1976); 1979 was a peak year for kings, but an off year for sockeye. Numbers of fish during a peak year may be two and one-half to three and one-half times the numbers in a bad year.

Neither the sockeye nor king run is entirely random in terms of prediction. A look at the daily counts for the five year period shows that the bulk of the king run occurs before the sockeye. Usually the king run is 80% complete by July 20 and most of that percentage falls within the ten days between July 10 and July 20. The sockeye runs occurred regularly between August 20 and September 20. A look at the daily counts shows that in 1976, 98% of the run happened during this period. Percentages of the other annual sockeye runs falling between August 20 and September 20 were as follows: 1977 - 67%, 1978 - 89%, 1979 - 78% and 1980 - 88%. The 61% figure for 1977 is misleading since during this year, one of the peak years for sockeye, a large number of fish (over 16,000) entered the river at this time. However, the remaining part (49%) of this large run occurred after September 20.

The temporal and locational structure of the sockeye and king runs in large part determine the kinds of fishing strategies employed. The structure of the resource also influenced the kinds of social groups and division of labor formed at particular times of the season. The following chapter discusses the different methods of salmon fishing and processing as they are affected by the structure of the salmon runs.

CHAPTER VII

SALMON FISHING AND PROCESSING

Today Klukshu village is the only large salmon fishing village in the Southern Tutchone area; other historic fish camps included Nesketaheen, Nuquik and Garshuwa. As the physical lay-out of the village was described in Chapter V, the focus here will be on those facilities and activities involving the fishery itself which will be described in detail.

The Fish Trap

By the time the Klukshu River reaches the village it is no more than a creek, from 2 to 3 feet deep and about 20 feet across. It is thus ideal for the location of a facility to block the sockeye salmon returning to spawn. These sockeyes run into Klukshu Lake, which forms the northeast boundary of the village.

The trap used by the Klukshu people is based on the same principle as a lobster pot or a biologist's live trap; the fish swimming upstream into the trap fall back to a caged area and cannot swim back out (Figure 7.1). The trap is made of peeled spruce poles about 2 inches in diameter and various lengths. It consists of three parts. The prow, which is a fence of horizontal poles pointed upstream, essentially blocks all fish movement beyond it. There is an opening about 6 inches wide at the base of this fence where the box or cage of the actual trap fits. This rectangular cage is made of spruce poles and measures approximately six to eight feet long, three feet wide and about two feet high. It is open on the prow end and closed at the downstream end. The poles are spaced two to three inches apart so water passes easily through. The cage is tied to the prow with rope and positioned in the stream so there are only a few inches of water above the bottom. As the water level fluctuates frequently in the stream the cage must be re-positioned so that the water level in the trap remains fairly constant. If there is too much water in the trap the fish have a better chance of jumping the fence. If there is too little water it is difficult for the fish to become caught in the trap as they try to turn around and swim downstream. The third feature of the trap is a set of pronged poles arranged at a 45 degree angle to the bottom of the trap; these prevent the fish from swimming upstream out of the trap. The ends of these poles jut only a few inches out of the water but there is insufficient water and space for the fish to jump them.

Though the predominant material for the traps is spruce poles, recent traps have been constructed of milled lumber (2" by 1/2") and chicken wire. The traps are usually repaired each year and replaced every two or three years (O'Leary field notes 1979). A spruce pole trap made in 1978 took approximately 14 man hours (exclusive of transport time) to build. The poles were selected from a fairly extensive growth of new white spruce about 3 miles distant from the village. The poles were cut and peeled and then assembled. The work was done by a women, her two sons and three younger children. In the case of the three traps built at Klukshu during 1976-1980, two were built by older women and one by an older man.

Since the water is fairly swift even though the stream is small, it takes four to five people to position the traps. Usually a women directs and works with her husband,

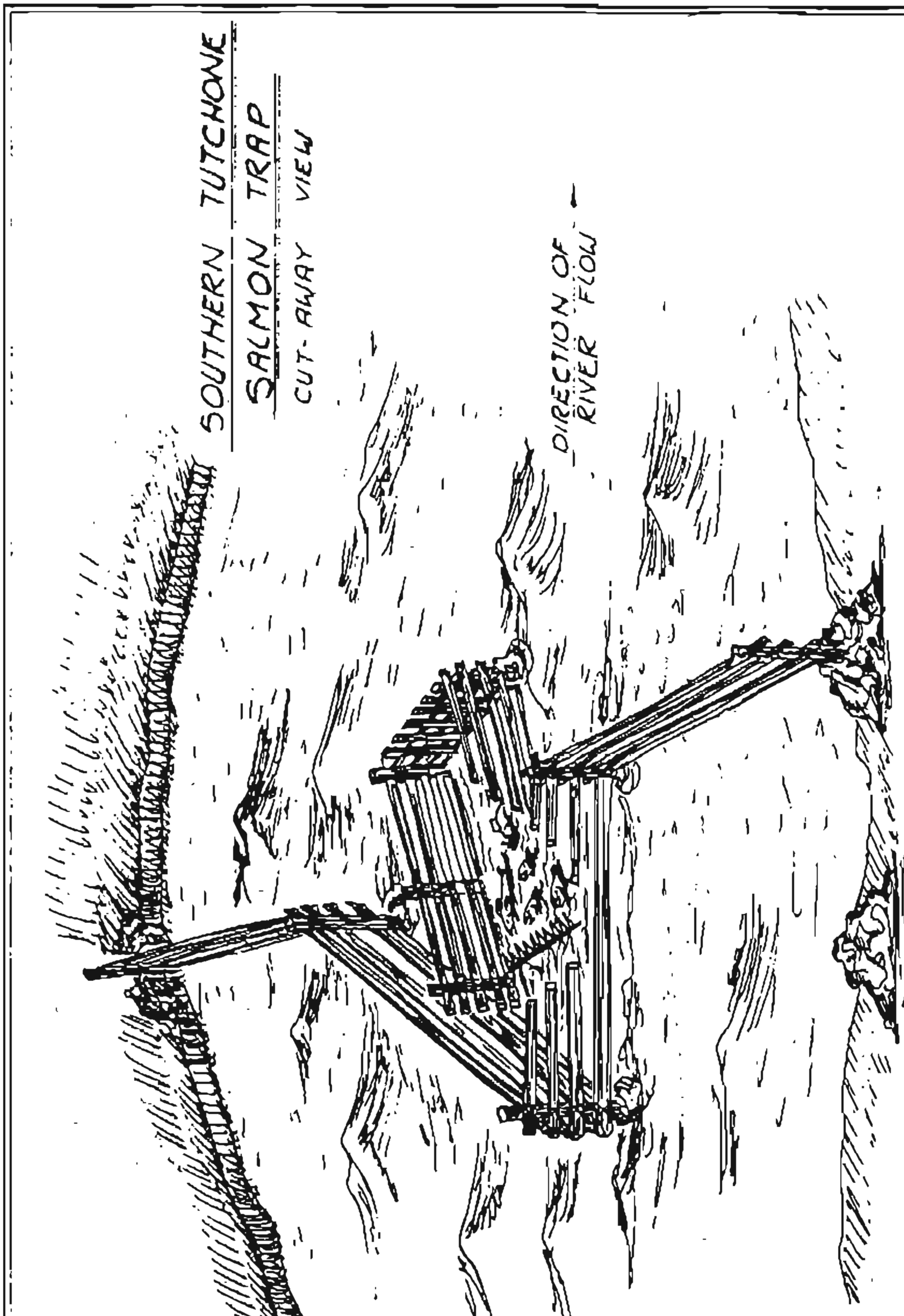

SOUTHERN TUTCHONE
SALMON TRAP
CUT-AWAY VIEW
DIRECTION OF RIVER FLOW

Figure 7-1

son or a young man to place the fence and trap. First, a large spruce stake about 3 inches in diameter and 4 feet long is driven into the river bottom with a sledge hammer to form the point at the tip of the prow. Metal rebar may be used instead of the wooden stake. Several large, heavy rocks or heavy pieces of metal are placed around the bottom of the stake to secure it. Four other large posts are also drive into the stream bed. These posts mark the corners of the cage. The assembled cage is then floated up to the prow and secured with ropes. Although today all the poles used in constructing the cage are nailed to supports, in the past ropes were used instead of nails (McClellan 1975:187). McClellan reports that willow roots were used prior to commercial rope (1975:187). The trap owners then excavate deeper channels in the river gravels with their feet, guiding the fish towards the mouth of the trap. These channels are 6 to 10 feet in length and about 1/2 to 1 inch deeper than the surrounding gravels. It takes four people about two hours to put the traps in the stream.

Trap Ownership and Restricted Access

Three traps are set in the Klukshu as there is no room for a fourth trap given the width of the stream. The ownership of these traps is determined by tradition and is passed down by families through the women (Chapter V). The three traps act as one, yet the fact that there are three significantly affects the social system of the Klukshu band. There is no one owner or chief who obtains all the fish caught and decides on a distribution system. The three women and their families control the trap-caught resource. They are distributed along kin lines and across moiety boundaries, which in effect allows every member of the Klukshu band to have access to the fish. Those who feel they need more sockeyes may gaff fish in front of the traps during peak times. Exclusive ownership of the fish trap is most clearly evident in relation to "outsiders" or other bands without kin relationships.

The entire process of building, maintaining and using the fish trap for sockeyes is dominated by the women who own the fish traps. Men play a less important role in this fishery, aiding in putting in the traps and taking fish from the traps and clubbing them. For the most part the men involved are the husbands of the women who own the traps. Younger sons or other male family members are occasionally asked to participate in these activities. This exclusion of males from the fishery is probably based on traditional values and norms but may be exacerbated by the male absenteeism in the village, as older husbands tend to die earlier than their wives. One older man (c. 70 years old) who cut fish for storage was clearly less experienced and slower than women his own age. He had lost his wife many years ago and did not have other women in his family interested in cutting fish the traditional way. The man realized his own slowness and excused himself on the basis that he wasn't used to cutting, it being "women's work." Many younger men from the village seek wage labor in communities of Haines Junction and Whitehorse, communities too distant to allow their daily participation in the fishery.

As the trap is such an efficient barrier to migrating sockeyes, it is necessary to allow escapement in order to ensure the perpetuation of the run. From 1978 -1980 the traps had to be opened by Canadian Fisheries law from Friday night to Sunday morning or other one or two day periods determined by Fisheries personnel. Owners remove a section of the fence and take out the back ends of their traps. When elders were questioned about escapement prior to Fisheries rules, people reported that when there were "too many fish to handle" (i.e., there were not enough Klukshu people to do the work or the number of fish caught were already sufficient to the people's needs) the barrier was taken down. Even today when the run is huge on a particular day or set of days the barriers are taken down and fish are allowed to pass through, whether or not it is a day for escapement set by Fisheries personnel. This aspect of efficiency and concern for the not abusing the fishery probably governed the prudent use of salmon resources in the historic and prehistoric past.

When sockeye are running, as many as 3000 fish may pass in a single day, and the trap must be monitored daily throughout the season. During the peak days, it must be checked hourly. The trap-caught sockeye are always taken out within a twelve hour period except under unusual circumstances (i.e., when trap owners must leave Klukshu village). A large amount of trap-caught fish can overflow and damage the trap. Some fish are also kept alive in the trap (or at least those on the bottom during a large run) by virtue of the water running over them. This along with the cold water temperature which retards spoilage.

The fish are taken out with a short fish gaff or by hand by their gills. The fish are then killed by hitting them on the head with a wooden club. Clubs are made of an unpeeled spruce log about 2 feet long and 2 inches in diameter (O'Leary field notes 1977). These clubs are usually left by the stream or brought back and forth from the house. McClellan (1975:187) reports that a special club was used, though she does not describe how it is special. Though today the fish are hauled on the bank and held by the tail and clubbed in the most expedient manner, elders reported that the fish should be held with its head pointing upstream so as not to offend the spirit of the fish. The fish are then strung up on a line through their gills and left in the water. As many as 60 or 70 fish are strung on one line. Secured to the stake of an individual's cutting trough, they float freely downstream. This exposure of dead fish in the water on the line and in the traps is a great enticement to the black and grizzly bears which live in the area. Fish are more frequently robbed at night by bears who are especially prevalent during the peak of the runs when many fish are around the village in various stages of processing. Only the most vigilant people who build fires at night near the stream and fire shots into the air are able to prevent bears from robbing any of their fish. Although now protected by game laws, in the past bears were shot for raiding fish. They probably never took a significant amount of fish from the village. But they have been known to clean out accessible stored fish in smokehouses and caches.

In order to retard spoilage, the fish is allowed to lay whole in the water for 6 to 12 hours (overnight) depending on when it was caught and the amount of fish being processed for storage. The coolness of the stream (average 7 degrees C.) helps preserve the flesh as rigor mortis sets in (D. Grady personal communication; DFE 1977:38). Also when the fish is stiff and cool it is much easier to eviscerate and " first cut" for the initial stages of drying. This process will be described later.

<u>Gaffing Salmon</u>

Besides taking sockeye salmon in traps, gaffing salmon provided a good part of the Indian catch. The majority of salmon gaffed were kings, sockeyes being gaffed only at the village by those wanting more fish than provided by the trap and/or when the run was very heavy and traps could not handle the overflow. The king salmon are very large, fighting fish weighing on the average 25 pounds. When disturbed they tend to head downstream at a very fast rate. Within the river they tend to use the deeper channels in the stream and are thus less visible. The Klukshu River and other tributaries can be quite murky depending on the glacial run-off and weather conditions. King salmon are always gaffed with a long 8 to 12 foot spruce pole with a bent 12 inch spike secured with moosehide or electrical tape to one end. In most cases the spike is a bent cabin nail 1/2 inch in diameter. It is cold hammered and sharpened with a metal file until it resembles a large barbless fish hook. In the past the sharpened nasal bones of a moose were used (O'Leary field notes 1978). This was probably not as durable as metal, and required more maintenance and frequent replacement. Gaffing, though primarily a male activity, is done by many women. Few young women are interested in gaffing, but most teen-aged boys participate excitedly in gaffing. Mixed male and female groups always participate in gaffing expeditions.

Gaffing is a skilled activity; the pole is swept underwater usually not touching the bottom so as to frighten the fish. When an object (the fish) is felt, the gaffer must pull quickly towards himself so that the gaff is firmly set, usually in the back section of the fish behind the dorsal fin or in the tail. The fish then twists and pulls downstream and can be quickly lost if the gaffer does not wade toward the fish raising the gaff pole up so that the fish cannot twist free. Most people now wear rubber waders, either thigh or chest height. Those without them wade in their shoes and pants. The fish is then dragged onshore or lifted and thrown back towards the land. The fish are still strong and vital, especially the larger males. Fish that have not spawned are the preferred targets. Spawned-out fish are usually badly beaten, thin and ragged. These are referred to as "old fish" and it is said their flesh is mushy, very lean and not tasty, although it is sometimes eaten. These fish are sometimes used as practice targets for younger, less experienced gaffers.

Good consistent success is limited to a few individuals, just as a few hunters in most hunter-gatherer societies bring in proportionately more game (Binford n.d.). Though impaled the fish does not die on the gaff, but by clubbing on the head after it is dragged ashore. Usually one person is the "clubber" and carries or finds a stout branch to club the fish on the head when it is brought ashore. Increased success at gaffing is also a function of the size of the run at a particular location. The more fish in an area, the greater the chance of striking one.

Gaffing Sites and Mobility

Since there are few kings at the village, gaffing by Klukshu people involves being away from the village at various locations, anywhere from a distance of 1/4 mile to 14 miles (Figure 7.2). Obviously, the advent of trucks and a highway have made it easier to commute longer distances, more frequently. With improved transportation, the resources can be moved to the consumers rather than the consumers moved to the resources. The range of logistical mobility is increased; residential mobility might decrease.

In the past, people spent longer periods of time at gaffing locations and put up dried fish at the gaffing sites to carry back to the permanent villages later. One of the more frequently used gaffing locations is the culvert near the village where the Haines Road crosses the Klukshu River. It is a short walk from the village, about 1/4 mile along the banks of the Klukshu. Except for certain small open areas the banks are choked with willow and water birch. It is known to be attractive to bears for

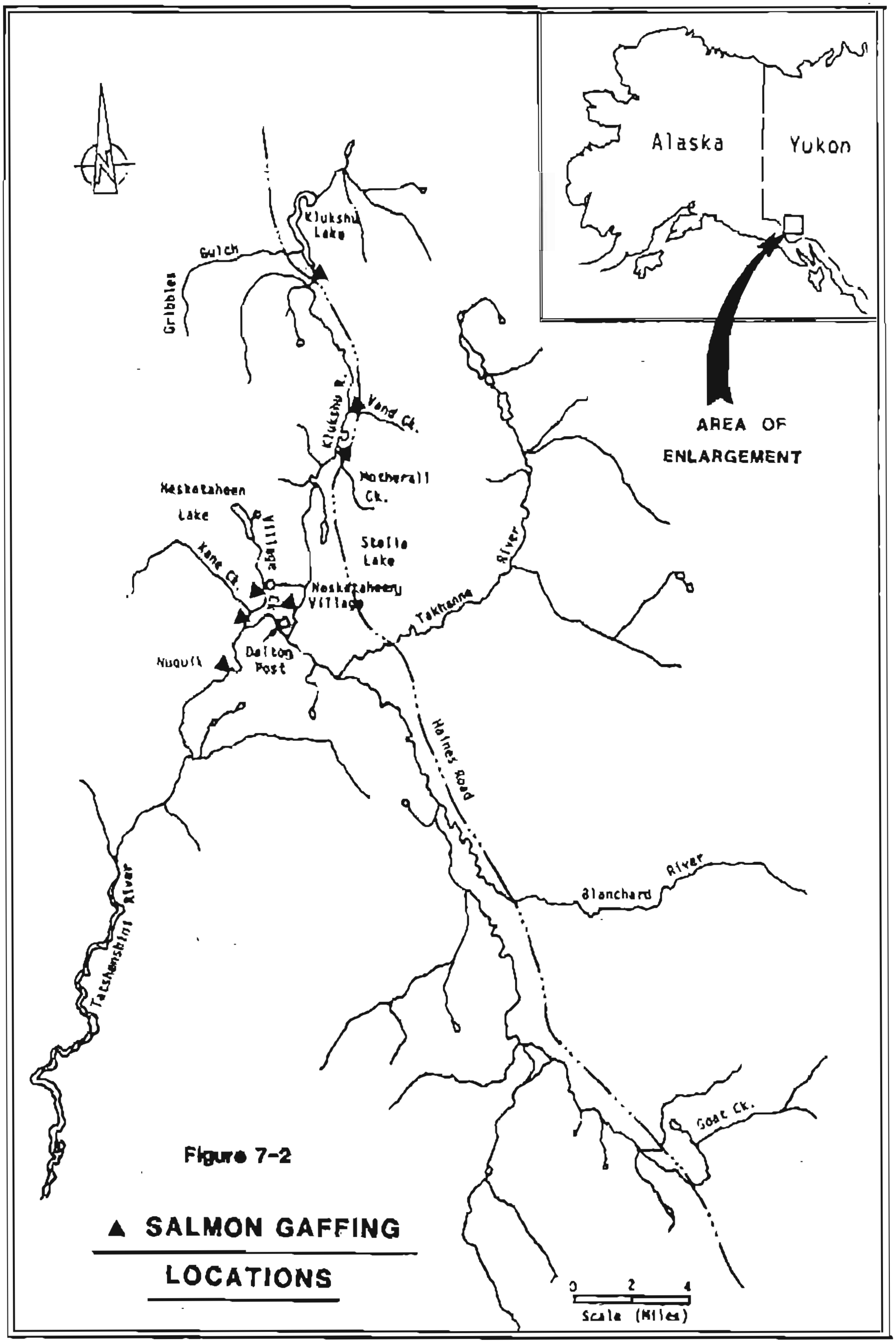


Figure 7-2

▲ SALMON GAFFING LOCATIONS

catching salmon,thus gaffing is always done with several people, Another popular gaffing location near the outlet of Vand Creek, HWal Ku [Klukshu Crossing] is located about 5 miles south of the village about 1000 ft from the main road. It offers a large bend in the river,where there is an flat, open gravel bank covering about 1/4 acre. The stream is about 30 feet across. Because of the lightness of the gravels and the shallowness of certain areas, king salmon can be seen clearly; however along the bank opposite the gaffing location water is deeper and in shadow. King salmon frequently move along this side of the stream and most gaffing is done there.

Gaffing expeditions may have increased in frequency in recent times since transportation has improved. Having to carry the fish no further than a road makes gaffing a more appealing alternative than hauling it five miles. In the "old days", Klukshu people reported that they both gaffed salmon close to the village (within 2 to 5 miles) or at other more distant location; if close they carried the fresh fish back to the village for processing. If they gaffed the fish at a more distant location or had many fish, they would usually camp at the gaffing area for a few weeks, building drying racks and makeshift smokehouses. They would remain until the fish were dried out and weighed considerably less. Gaffing king salmon was always vital to the Klukshu people regardless of transportation changes since the highway. This is due to the fact that it is the king salmon which run early, when there are fewer resources available, and the fact that one king salmon equals 5 or more sockeyes.

Another less popular gaffing location was Klukshu Flats (Da et lin), located on Motherall Creek about 6.5 miles from Klukshu Village. Though it is not located far from the Haines Road, the trail descends at a very steep angle and involves a climb back up over 1000 feet long. Another unnamed creek feeding into the Klukshu River near Klukshu Flats was also a gaffing location, but since at least 1977 it has been dammed by beavers and is now called Moose Pond. According to one informant "there used to be lots of fish there but no more since beaver built his dam" (O'Leary field notes 1977). The people used to pull down the stick and mud dams in the spring, trapping or killing the beaver so that the fish would not be impeded in their spawning. In 1978, a group of beaver had begun a dam on Village Creek and this was destroyed by Fisheries personnel, who finally had to kill the beaver to permanently solve the problem. Dams not only prohibit those returning spawners and destroy possible salmon habitat but also make it impossible for fry to migrate to the ocean.

One of the most popular gaffing locations was on Village Creek near the abandoned settlement of Nesketaheen. Here the earliest king and sockeye salmon can be gaffed as it is approximately 18 river miles from Klukshu village. Village Creek was only briefly surveyed by Fisheries personnel: in 1976 they reported 24 kings in the creek and by aerial estimate 5000 sockeyes in Nesketaheen Lake which discharges into Village Creek (DFE 1977). Village Creek was gaffed usually at points close to where it empties into the Tatshenshini River. Salmon were also gaffed at various locations downstream from Nesketaheen village, a distance of approximately 2 miles. Several families would go together by truck south on the Haines Road to an unimproved dirt road leading to both the Fisheries Counting fence, Dalton Post and crossing Village Creek. All gaffed fish is hauled by truck back to Klukshu Village.

Such locations downstream from the village were used for gaffing, as cited in the early historical sources, as the fish arrive there approximately one and one half weeks before fish arrive at Klukshu. People reported that early in the summer they would travel downstream to "meet" the salmon (O'Leary field notes 1978). Such early resources of salmon would be available when stored resources were low and could be obtained along with snowshoe hare, arctic ground squirrel and grouse.

Even further downstream on the Tatshenshini River is the abandoned fish camp of Nuqulk. According to Glave (1890:310) this fish camp, located 25 miles below the mouth of the Klukshu at Detour Creek in British Columbia, was being used by Klukshu Indians in the summer of 1890 when he visited Nesketaheen. Nuqulk was identified by informants working with Kluane Park archaeologists in the summer 1978 (Ron Chambers personal communication). It consisted of a flat terrace with six to eight log house remains (about 6 to 8 inches above the surrounding surface) and a fairly heavy growth of aspen. Some preliminary testing revealed several hearths in the centers of the house mounds with charcoal and bone chips. A copper nail(?) was found beaten into a scraper (Marc Stevenson: personal communication). A high cache set in a tree by two Klukshu men in the 1930's was also re-located. The cache was used to store traps and food for this winter trapping station (O'Leary field notes 1978).

Another site (Ga shu wa) was used by people as a fish camp, probably in the late 1800's (O'Leary field notes 1978). It was said to be at the outlet of O'Connor Creek on the Tatshenshini River, about 25 miles downstream from Nuqulk. One informant reported that people would travel there in the early spring when the river was low to get fish (early kings and sockeyes) to take back up to Nesketaheen. Also king salmon were gaffed at Kudwat Creek several miles north of Nuqulk by people coming from Squaw Creek mining area when it was active in 1927 and perhaps earlier (O'Leary field notes 1978).

A fish camp, used for one or two seasons around 1927, was located during the NVSPP 1979 survey just north of the junction of the Klukshu and Tatshenshini River. The camp was lived in mostly by women and children as the men were involved in mining at Squaw Creek (O'Leary 1980:15). There are probably other gaffing and fishing locations at the many feeder creeks along the Tatshenshini River which support populations of migrating salmon. All fishing camps and gaffing locations are always situated on tributary streams or creeks to the Tatshenshini River rather than the main river itself. This pattern is not unusual for other northern, sub-arctic groups. Rainey (1939:378-79) noticed that practically all old archaeological sites on the Tainaina, Copper and Yukon rivers were found on small clear water tributaries, rather than on the banks of the main rivers as he had expected. Many of the early European travelers and explorers, including Allen (1887:147), Brooks (1900:493) and Zagoskin (Michael 1967: passim) report few meetings with native groups traveling the main rivers. The reasoning given for this phenomenon by anthropologists is faulty. Hosley (1977:127) believes that

> their time away from the main streams ... in nomadic hunting of caribou. At most fishing could support a group for only four months of the year ... the remainder of time was devoted to hunting.

Instead it should be stressed that the use of facilities such as fish traps and the success rate of gaffing is higher in the smaller, less rapid streams. Every fish camp located in the Tatshenshini/Alsek drainage is on a smaller tributary or stream. It is at the outlet of these streams to the main river and at lakes that salmon tend to congregate and can be restricted even further by the use of traps. A limited archaeological survey in 1977 of the Tatshenshini River downstream from Dalton Post revealed no archaeological sites. Except for one brief unsuccessful use (one season in the 1950's) of a European fish wheel at Dalton Post in the Tatshenshini, no use was made of the main rivers for fishing salmon (McClellan 1975:101).

Differences in Trapping and Gaffing Fish

The two different methods of taking salmon involve two different kinds of organization, two different salmon species (for the most part), and varying amounts of transportation time. The traps are facilities which "to be efficient require precise placement in space" and "...cooperative labor for their construction and maintenance" (Binford 1968:116). Once the trap is in place, it requires no further labor other than monitoring and repair. Transportation to the resource is only as far as the house to the creek. As a facility, it frees the person from active participation in the the actual catching of the salmon and allows time for other activities such as processing, etc.. In effect, it functions to increase the spatial aggregation a resource for later use, thus increasing the productivity of the fishery. The trap itself could possibly catch every sockeye which spawns in Klukshu Lake, but some essential constraints prevent this. The first is the ability of the Klukshu people to perceive that taking all of a a run will destroy a year's class of returning spawners. Ultimately, taking all fish would destroy the entire run up the Klukshu. Understanding the parameters of escapement has played a role in the size of the population at Klukshu and the social relations with other neighboring bands. Secondly, there is a constraint on the ability of women to take and process the fish either for fresh or later consumption. Due to the nature of the run, the few days when the run is abundant there is not the available labor to process all the fish. Also there is not a need to take more fish than is necessary, given the environment, other resources and mobility patterns of the group.

King salmon run earlier than sockeyes at locations downstream from the village. On the average the king run peaks in mid-July while the sockeye run peaks in late August/early September. Klukshu people must disperse in smaller groups to gaffing locations from 1/4 mile to over 40 miles away. It is clear, even at present, that these early fish were important to the Klukshu economy. In the past, depending on the amount of stored food available from the previous year, family groups would travel downstream to "meet" the early king salmon. In the past this travel usually necessitated a stay at a gaffing location until dried fish could be cached or carried back to the settlements. Today for such areas as Village Creek, day trips in trucks have increased the distance from the settlement that people may go to fish without moving there for a longer period of time. Gaffing success is based on both individual skill and the particular amount of fish at a given time at a given location. On the average king salmon are four to five times the weight of sockeyes, and this in one way may compensate for the amount of transport time.

Cutting the Fish

It is very important to have skilled labor to process fish for storage. Because of the time constraints placed on processors by the nature of the salmon run, women must be efficient as well as skilled in order to obtain the temporarily abundant resource. All of the processing is done by women. Women hold the specialized role of salmon cutter and are thus responsible for a large part of the annual resources. Processing fish for storage is not, as Drucker and Heizer (1967:149) would suggest, "a fairly simple technique." At Klukshu, there are basically three different ways to initially butcher the fish and two different methods of cutting them again for the final stages of drying.

The First Cut

The first cut of salmon has basically two purposes: (1) to eviscerate and clean the dead fish; and (2) to prepare the fish so that it can be initially dried for further processing. It varies by species, size and the sex of the fish.

The fish that are laying in the stream are taken off the line. They are placed on a wooden trough made of a hollowed out cottonwood log or two short pieces of 1 by 12 inch boards nailed together to form a "V". These are set on posts in the stream at about waist level to the cutter. They stand below the trap and about 1.5 feet from the bank. Each woman who has a trap also "owns" the trough, exclusively using it when she cuts fish or allowing other family members to use the trough. A fourth trough was also available for use and did not seem to be "owned" by anyone. Fish are also cut on the banks of the stream.

The fish is placed on the trough with the head usually facing upstream. A large rounded steel knife is used with a blade about eight inches in length. It is clenched firmly in the hand as one might hold a large spoon for mixing heavy dough. The knife is frequently sharpened either on a river cobble (usually a basalt or other fine-grained igneous rock), or a knife sharpener is brought along with the knife. Occasionally two knives are brought and the second is used when the first is too dull.

Sockeyes

The following procedure is used for male and large female sockeyes that are to be cut again and dried for human consumption. The cutter slices through the right side of the gill, then the left side, then she pokes a hole at the base of the throat. She then reaches in with two fingers and pulls out the red gills and throws them into the stream. All pieces that are discarded into the stream are washed downstream away from the village and are fed upon by various scavengers (i.e. seagulls). She then chops the head off and discards it or tosses it into a bucket for later use. Salmon heads are very popular delicacies and are either boiled or baked in the fire. The entire head, except the teeth and jaw bones, is eaten by people and dogs alike. Next, she makes a deep slit from the top of the throat to the anus. The fish is laid on its left side. She scrapes out the entrails, roe, liver, heart, etc. into the water. Next she chops deeper into the vertebral column, scraping out the blood. She swings the tail, which is away from her, towards her and cuts slightly into the left side of the tail about 4-5 inches from the end of it. She breaks the piece towards her and makes a small cut into this section. The last cutting of the tail is to provide a secure hand-hold for transporting the heavy slimy fish around (Figure 7.3). Next, the fish is held by the tail-hold and thoroughly rinsed in the stream, swung back and forth to clean out all the remaining entrails. The fish is then tossed into a box onshore or put on branches or plastic to be immediately taken up to the drying racks in the smokehouse. An adult can usually carry four fish. The process of first cut is different on female sockeyes or "eggs fish" as they are commonly called. This cut is for dog food and is simpler and slightly faster. The fish is de-gilled, then gutted but the head is left on. It is then split in

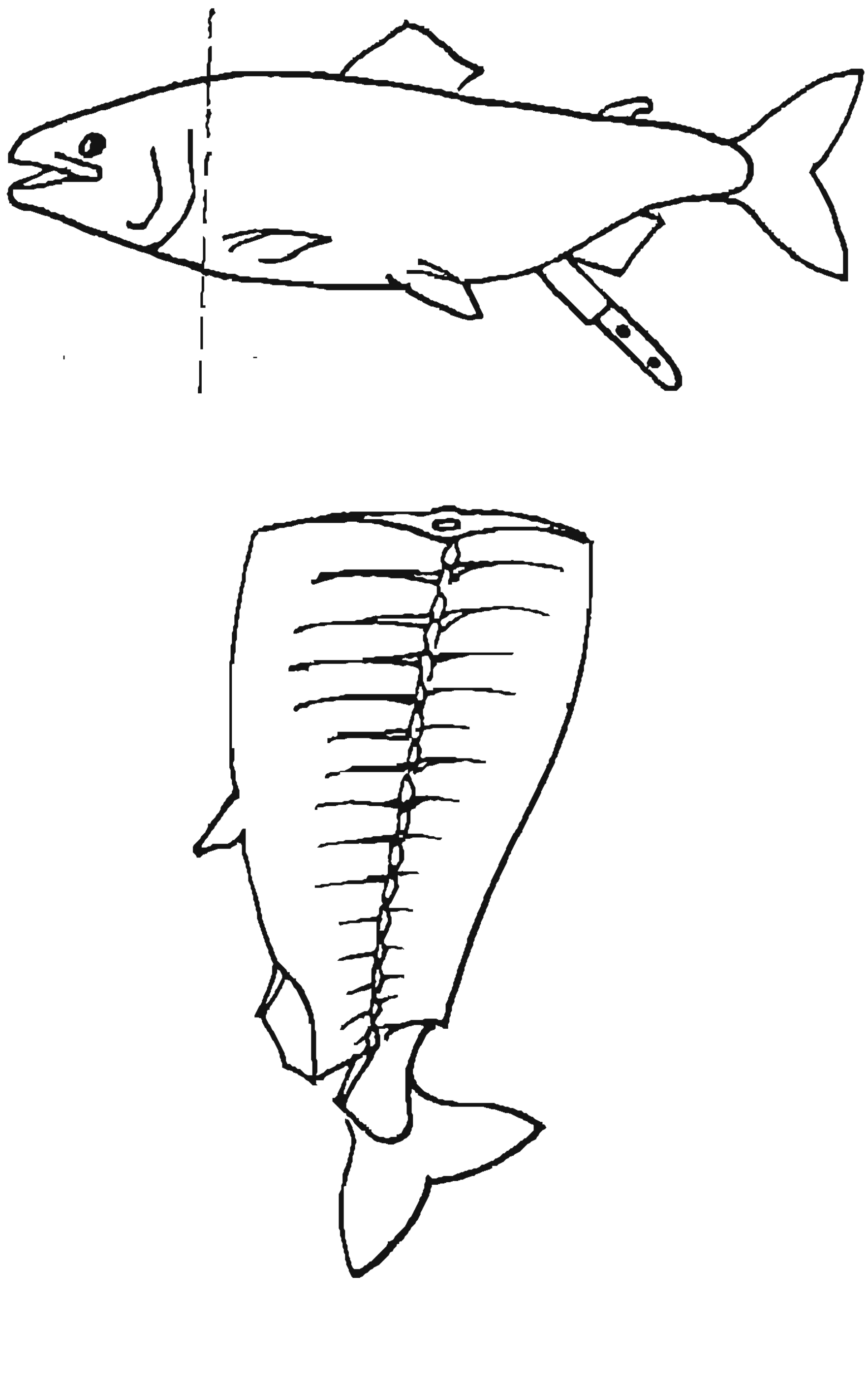


Figure 7-3 INITIAL CUT OF SOCKEYES

two from head to the beginning of the cartilage of the tail. Both sections of the fish are held together by the tail. The sides of the fish are then slashed horizontally.

Kings

The first cut of king salmon is basically the same as for sockeye. The difference is that because kings are bigger and heavier some parts are discarded (especially the vertebral column which is saved in the sockeyes within the body of the fish), and other sections are cut differently. The fish is cut on the trough with the head towards the woman; she then cuts off the two lateral front fins, then the dorsal fin, than cuts a slit through the jaw. She then lifts the gill flap back towards the top of the head and, in a quick chopping motion, releases the gills from the head and throws them into the water. She then turns the fish on its belly and chops off its head. This is also usually discarded but on occasion it is saved. When being saved it is further cut on either side of the palate to flatten it out for drying. Next, she slits the fish from anus to neck. Many times, with the female king this is done carefully, in order to preserve the eggs in their membrane "socks." The eggs can be boiled and eaten or dried and stored. The male gonads are only occasionally saved. She then cleans out the entrails and discards them into the stream. She then takes the knife and digs into the spinal column, releasing and scraping out layers of blood. She then fillets out the spinal column with the ribs attached. This is also discarded. This is usually done without splitting the fish in two, though sometimes the dorsal fin is slashed in two length- wise and hung to dry by the tail. The fish tail is then notched similarly to the sockeyes and provides a hand-hold for carrying. I observed only a few times when the spinal column was saved and hung to dry and these were particularly large fish. The person who kept the vertebrae said that she was saving them for making jewelry.

This initial butchering and first cut of the fish is done by older women who report that they have been doing this "all their lives." They are willing to show their daughters and granddaughters how to cut the fish, but the work is most efficiently done by the older women. Occasionally a woman who has married into the band will cut her fish a different way. A Southern Tutchone woman who was originally from Hutchi occasionally cut her king salmon "Carmack's style" which involved a similar first cut to the sockeye but a more elaborate cut the second time. Women are aware of different styles of cutting but at Klukshu prefer to use the styles described. Table 7.1 shows a sample of actual time taken to kill and butcher salmon. A woman working consistently on a line may initially process an average sockeye in less than one minute. The kings take slightly longer from 3.5 minutes to as long as 6.67 minutes for less experienced cutters. The butchering time for kings also varies according to its size which can be as much as 65 pounds. Some women first segregate their catch as to species and sex which will allow them to cut a group of fish the same way for a given period of time. Usually there is a round of activities taking place when some of the fish are being first cut, others are being killed and taken from the traps to the line, gaffed fish are brought in and other fish are in varying stages of drying. Women enlist as many helpers as possible to carry their fish to the smokehouse. This need is usually filled by young girls, daughters and sisters. Women may stop to carry their own fish or use a truck or wheelbarrow to go to their smokehouses, no more than a few to several hundred feet away.

Table 7-1

KILLING AND/OR EVISCERATING FISH - "FIRST CUT"

DATE	ACTIVITY	TOTAL HOURS OF ACTIVITY	NUMBER OF PEOPLE PRESENT	TOTAL NO. OF MAN HOURS ON SITE
July 5	21 sockeye cut	28 min.	1	.47
July 5	fillet cut of sockeye	1 min.	1	.02
July 5	clubbing 5 sockeyes in trap	10 min.	2	.33
July 5	5 sockeye cut	25 min.	1	.41
July 8	65 sockeye cut & stored on fish rack	8 hrs.	1	8
July 8	15 sockeye and kings cut	30 min.	2	1
July 10	8 kings cut	30 min.	1	.5
July 11	10 sockeyes cut with egg sacks carefully removed	35 min.	2	1.16
July 16	4 kings cut	35 min.	1	.59
July 16	3 sockeyes cut	15 min.	1	.25
July 20	9 kings cut	1 hr.	1	1
July 25	3 kings cut	24 min.	1	.4

CHAPTER VIII

PRESERVING THE FISH

Due to the nature of the salmon runs stress falls on the Klukshu people during the period when the fish must be processed for storage. It is important to have skilled, efficient labor both for the initial butchering of fish and secondary processing for storage. Processing fish for storage is not as Drucker and Heizer (1967:149) suggest "a fairly simple technique." There are three different methods of initially butchering fish and two different ways of second cutting them for the final stages of drying. The parameters of processing the fish will be discussed in this chapter.

After the fish have been initially butchered the process of preserving the fish begins. The preservation of the salmon is, of course, vital. All processes were designed to reduce the moisture content of the fish to prevent different kinds of spoilage. After long hours of butchering, cutting and preparing the salmon for ultimate consumption the Indians evolved a process of preservation so that the fish can be edible throughout the year. This process is often fraught with problems. Many external factors influence both the ways and the amount of time needed, to preserve the fish. The most important variable is the weather. One aspect of the weather that has a great affect on how well the processing will proceed is rain.

Rain

Workman wrote (1978:12) "In my judgement Yukon Indians of ethnographic times appeared to be less able to cope with moisture than cold per se ." This has been true for other groups involved in the preservation of fish. Panowski (1985: 91) has commented that on the Northwest Coast the high rainfall (from 100 to 200 inches) made processing and the long term storage of salmon extremely difficult. She speculates that the failure of being able to store salmon caused great losses of fish and periodic shortages. Along with rainfall, the humidity of the air also affected drying. Swann (1870:6), commenting on the Makah of the Washington coast, wrote "As the climate is very humid, it is rare that a season is propitious for the curing of their fish." Even though the interior of the Southwest Yukon is much drier than the coastal area, rainfall and humidity were still crucial factors.

The amount and periodicity of rainfall in the summer months is critical to preserving the fish. The closest weather station at Haines Junction (40 miles north) reports the months of highest precipitation are July (1.5"), in the form of rain, and November and December (1.5"), in the form of snow (Workman 1978:11). Precipitation increases from April to July, drops 0.5" in August and September and rises again in October and the early winter months. Fish that has been butchered must be protected from the rain or it rots, and becomes moldy, and the flesh is unfit for consumption.

Sun

Another climatic factor important in preserving the fish is the sun. Actual drying in the sun is not possible for salmon, since it "cooks" the fatty flesh and allows it to slip from the skin. Fish that is hanging without some sort of shade will rapidly become oily, and the flesh will be ruined for further drying. This has been noted for drying fish at the Dalles on the Columbia River and in the Frazer River Canyon by Rivera (1949:26 - 27):

> ... fish is never purposely exposed to sun, and during the last stages of the drying process, which lasts three weeks, the heat of the sun would draw the fats to the surface, thus damaging the keeping quality of the finished product

Open-air drying (i.e., outside a smokehouse) is practical only on overcast, windy days with low humidity. On days that become too sunny or threaten to rain, fish on outside fish racks are quickly covered with plastic or brought inside a smokehouse.

Wind

Wind is a critical factor in the preservation of fish. It both dries the fish and acts to cut down the populations of smaller insects that prey on both the people and the fish. Panowski (1985:94) found that a steady wind was one of the reasons why the two most famous places in the Northwest for drying salmon (The Dalles on the Columbia and the Frazer River Canyon) were chosen:

> ... the wind blows constantly ... which makes the spot ideal for drying racks. It can be counted on for a constant circulation of air around the drying slabs of fish, and it helps discourage flies.

Fish are dried by the wind; the smoke acts more as a deterrent to insects. This fact was also noted by Delaguna (1972:399) and Harrington (n.d.) who commented that among the Yakutat Tlingit fish is actually dried rather than smoked, since the amount of smoking is very light, and the natives speak of "smoked" salmon as "dried." Klukshu is an ideal location for drying as it is situated in an open meadow in a valley usually with a strong north wind. There are few locations along the river with this needed open windy area. This limits the placement of fish camps.

Insects

Flies and wasps can cause considerable damage to drying fish if not effectively deterred. These insects are abundant during the fishing season. Smoke is the major deterrent since it does not allow the insects to get close to the fish. Fish left exposed or even temporarily out of the range of smoke because of changes in wind direction are quickly preyed upon. Flies crawl over the flesh and deposit eggs called "fly blow" by the Klukshu people (O'Leary field notes 1978). These eggs produce maggots, and must be scraped off or the entire fish must be discarded. If they are not detected early and are allowed to be stored with other fish they may contaminate significant amounts of an entire cache.

Ransom (1946:618) reported on the problems of insects for the Aleuts:

> But during the period when flies are active the insects lay their eggs on the drying fish. This makes much work for the women who must scrape them away, ... even though not all the eggs are removed.

Wasps do more damage by actually eating the salmon. Carnivores, they riddle the salmon with small craters. Wasps are particularly offensive when the fish are being "second cut" and when more salmon flesh is exposed. Therefore this work must be done either within the smokehouse or in areas close to blowing smoke. When infestations are heavy around the smokehouses a pot of meat broth is hung outside the smoking area to attract the wasps which drown in it. This is called "bee soup" by one woman. Several people at Klukshu mentioned years when the wasps were particularly bad. One man who had lived at Dalton Post said in 1912 the insects were so bad everywhere that they" had to keep stumps and torches going continually." Another woman remarked that 1956 was "a terrible year for yellow-jackets at Klukshu" (O'Leary field notes 1978).

Smoke and Smokehouses

Smokehouses are built for the purpose of curing fish. They also serve as storage places for summer camp equipment. These are usually smaller than residences, though a few had more square footage, and are less carefully made. Abandoned buildings are occasionally used as smokehouses. Smokehouses are usually adjacent to, or directly behind, residences. They are frequently repaired each summer when a new section of roof is put on or new poles are made to hang the fish. Other items such as the smaller poles for the dried fish are also manufactured each fishing season. In 1978, a new smoke house was built for a family by friends and family members. It took approximately 40 man-hours to complete. Each smokehouse is owned by a family; two of the largest were owned by women who also owned fish traps. Members of an extended family frequently share the facility. A sister or brother smokes fish in a sibling's smokehouse or a women and her children use her sister-in-law's.

At Klukshu smokehouses varied in architecture from brush lean-tos to elaborate palisaded structures. Spruce poles are used sometimes in combination with scrap lumber and screening. The oldest type of smokehouse as reported by Klukshu people and confirmed by the NVSPP sites were simple rectangular-shaped structures with four to eight posts marking the perimeters. Connecting the tops of these posts were beams. These were overlaid with perpendicular poles and the whole was covered over with brush (cottonwood branches) when in use (Figure 8.1). Plastic may also be used for roofing. In some instances smokehouses are more elaborate. One built out of scrap plywood was walled up to a height of about 4 feet. The upper third of the wall was left open, and nailed frames with screening were placed around the smokehouse at this height. The pitched roof was covered with corrugated tin and plywood. Another palisade smokehouse contained spruce logs 2 inches in diameter and eight feet in height, sharpened and driven into the ground to enclose an area of 180 square feet. Makeshift fish racks are constructed during the fishing season when smokehouses are filled to overflowing. These racks are often A-frames with horizontal cross-pieces, or simply poles leaned at a forty-five degree angle to the wall of a smokehouse; these are covered over with plastic or canvas on rainy or particularly sunny days.

Fires

The purpose of the fire in a smokehouse is to produce a continual smoke that would fill the smokehouse and never burst into flame. A fire that is too hot cooks the

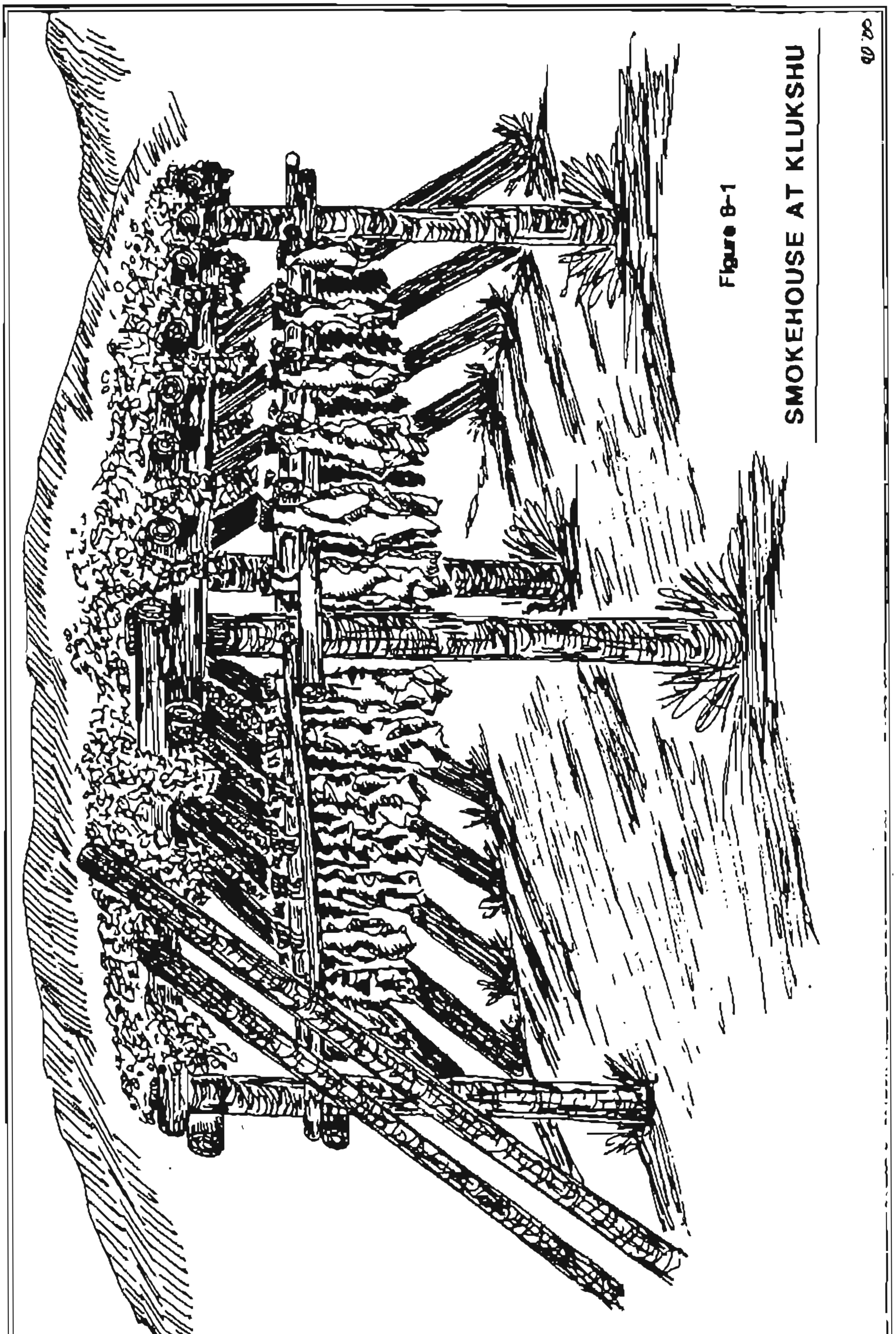


Figure 8-1

SMOKEHOUSE AT KLUKSHU

salmon flesh from the skins. A fire with only a little smoke does not deter insects and does not help preserve the drying fish. Green cottonwood or spruce are preferred woods for smoking, as they are still full of moisture and do not tend to flame, as does dried-out wood. About 9 or 10 in the evening the fire is banked. It is started again at 5 or 6 the next morning so that it will burn all day. Excursions for large cottonwood logs are frequent during the summer since they burn cooler and longer. "Rotten wood" of an undetermined species of tree, perhaps spruce, is also used. The wood is red-brown and crumbles easily, damping the flames. People with smokehouses rarely left them for longer than a few hours, or if they had to leave for longer periods a person was put in charge of monitoring the fire.

The type of fire varies with the structure of the smokehouse. The most common, with the larger palisade or plywood structures, is a fire set on the ground inside a metal 50 gallon oil drum which has been sawed in half to form an open cylinder. Another common fireplace is a metal 50 gallon oil drum which has been cut in half length-wise to form an open trough. Many times these were covered by a piece of metal with punched out holes or a piece of heavy, dense grating. This covering helped to damp the flame. By protecting the fire from gusts of wind and keeping it contained, it could produce more smoke evenly. In larger smokehouses two such barrel-fires are kept going continually. On makeshift fish racks and in smaller smokehouses, several small fires are placed under the racks. These are either made in barrels or placed directly on the ground. The location of these fires was frequently shifted depending on the direction of the prevailing wind. The fires are all located upwind of the fish racks. At one small fish rack six separate ash areas were located after Klukshu village residents left for their winter homes. The ash deposits were shallow and small in circumference. They were never excavated into the ground, nor were they lined with stones; sometimes larger, charred inner logs which enclosed the fire serving as a kind of windbreak and providing a ready supply of fuel were left. Cooking fires that are situated outside usually showed continual use since more wood was consumed in preparing meals or keeping tea or soups warm.

Cutting the Fish for Preservation

When the fish are initially cut ("first cut") for drying, they are hung in the smokehouse with the flesh side down against the pole with the dorsal fin at the top. The fish cut length-wise for dogs is hung by draping the two halves over the pole. These are usually held together by the unsplit tail (Figure 8.2). The skin and attached fins and tails are left to "harden up." The slime on the skin dries up making the fish more stiff. Slime and moisture drip from the fish as they dry and people are careful not to go under the fish. The fish are spaced evenly, and separated 2 to 3 inches. Every day the fish must be shifted, for they would spoil if left in the same place on the slimy poles.

Native women of many different groups knew that this movement of fish on the racks was important to preventing spoilage as evidenced by reports on the Northwest Coast (Gunther 1927: 208; Ham 1980:41). Both the salmon used for people, and that used for dogs, is also reversed with the skin side against the pole.

The initial drying time varies from overnight to one week, depending on the fish weight and weather conditions. The purpose is to hang it until the flesh is crusted over to protect it from damage by insects, and make it less susceptible to mold.

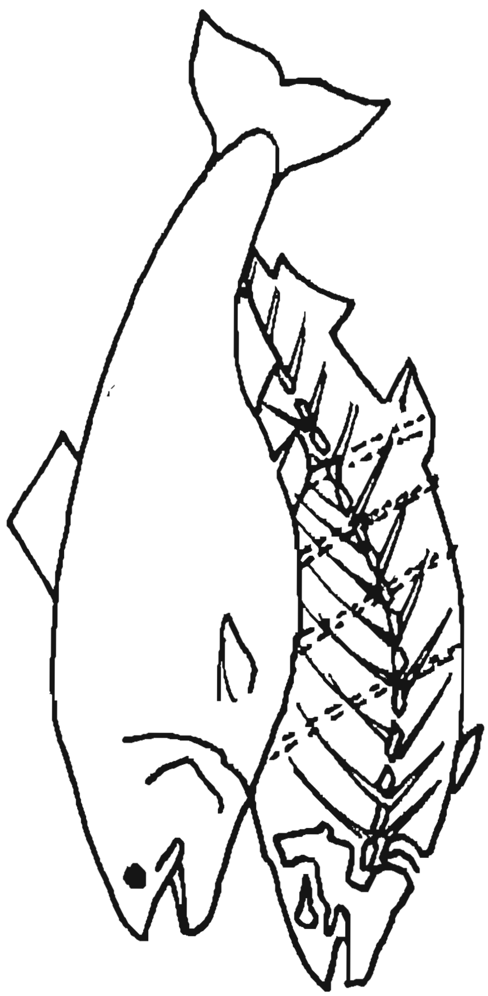


Figure 8-2 DRIED SOCKEYES CUT FOR DOGS

The Second Cut

After the fish have been initially dried, those cut for human consumption must be cut again to facilitate further drying. The second cut is a more precise cut than the first, and the thorough drying of the fish is dependent on the accuracy and evenness of this particular cut. The fish (either a male sockeye or small king salmon) is cut either on a flat board or on a small tent-shaped wooden structure (Figure 8.3). The fish is laid dorsal side down. The tail is either sliced off and kept for the dogs, or left on the drying fish. It is then cut down the middle, lengthwise, to one side of the vertebrae, to the skin which is dry and leathery. Then a deep cut is made to the left of the center cut. The knife is then carefully drawn horizontally away from the cutter and perpendicular to her. This cut slices the thick side of flesh into two thinner pieces still attached to each other and one to the skin. The goal is to leave an equal amount of flesh on the skin. The other side is similarly cut. The finished salmon is a wide unfolding strip of flesh with skin still adhering to parts of two sides. It can be folded together like a portfolio (Figure 8.4). This is draped over a pole in the smokehouse to dry in a similar manner to the first hanging. It is also rotated.

King salmon is frequently so much larger that it takes longer to dry than the sockeyes and is frequently cut into smaller pieces to dry after the initial drying process is complete. First the backbone section is filleted out, usually keeping the tail intact with the backbone. The small pectoral fins are cut off and then the fish is laid tail side away from the cutter. The knife is then drawn away from the the cutter. It appears as if it is being held backwards. In a power grip the knife is drawn hard away from the cutter in a smooth, straight stroke, so that the flesh is cut cleanly. It is important not to make a jagged cut or fly eggs will be laid there. The fish is cut all the way through the skin. It needs a strong, steady stroke. The fish is cut into long strips which are hung on poles by the middle section (Figure 8.5).

If the flesh is too thick, there are many cuts made diagonally through the flesh to the skin, and the strip is stretched to open up sections a little. About 10 strips are cut from one side of the fish, (or about 20 total from a large king salmon). There are other methods of cutting fish, but these are only practiced occasionally. The basic cut for dogs, and the second cut fish for human consumption, is the same throughout the village.

The second cut fish is more carefully maintained than the fish for dogs. The fish for dogs is hung to dry and except for being rotated is not cut again. The fish for people is rotated, "second cut," and finally a hole is slashed through the middle of one end of the fish, along the pectoral line and hung on smaller poles. About 5 to 10 fish per pole are hung with the bulk of the fish hanging like a stiff curtain. These fish are then dried for 3 to 6 weeks or more, depending on the weather conditions, especially moisture, which increases drying time. When fish are totally dry, they can be easily stored in caches, though if packed too tightly they tend to rot.

Spoilage

Besides the other external factors mentioned, mold on fish is a constant problem. Mold can be scraped off if found early enough, but when it forms and is not detected it can ruin a significant amount of fish. Thus in 1978, about one quarter of

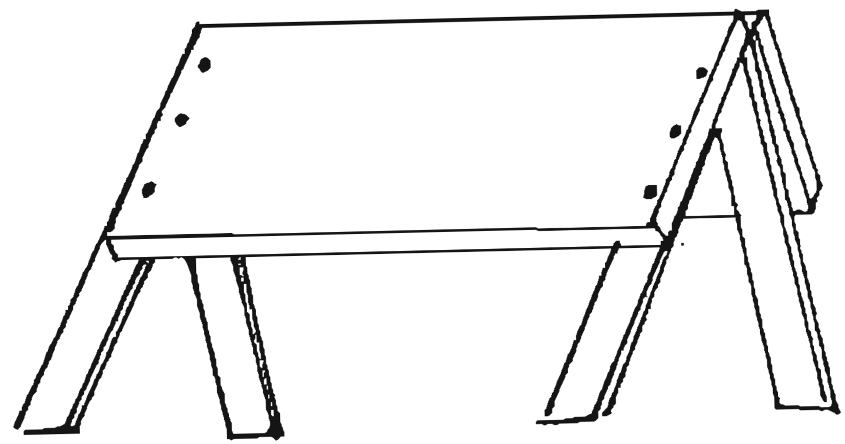


Figure 8-3 SALMON CUTTING BOARD

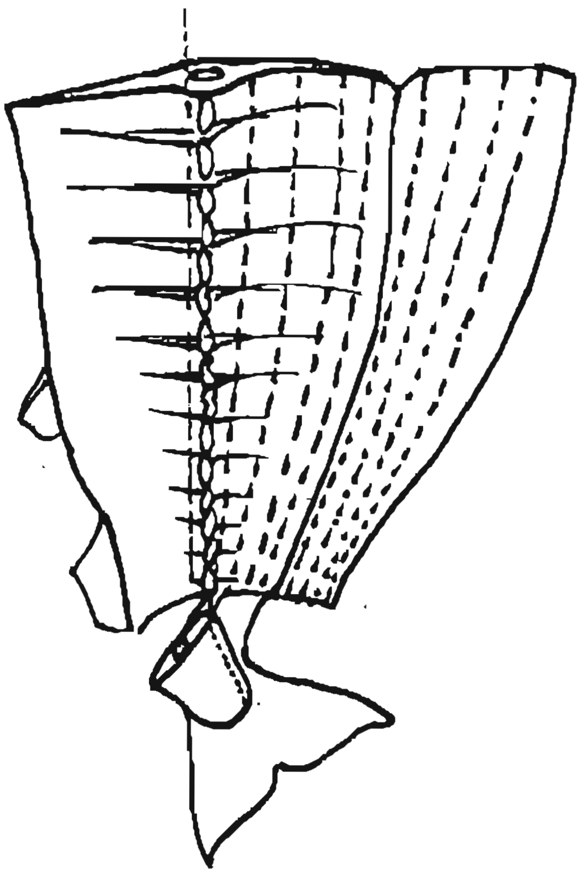


Figure 8-4 SECOND CUT SOCKEYES FOR PEOPLE

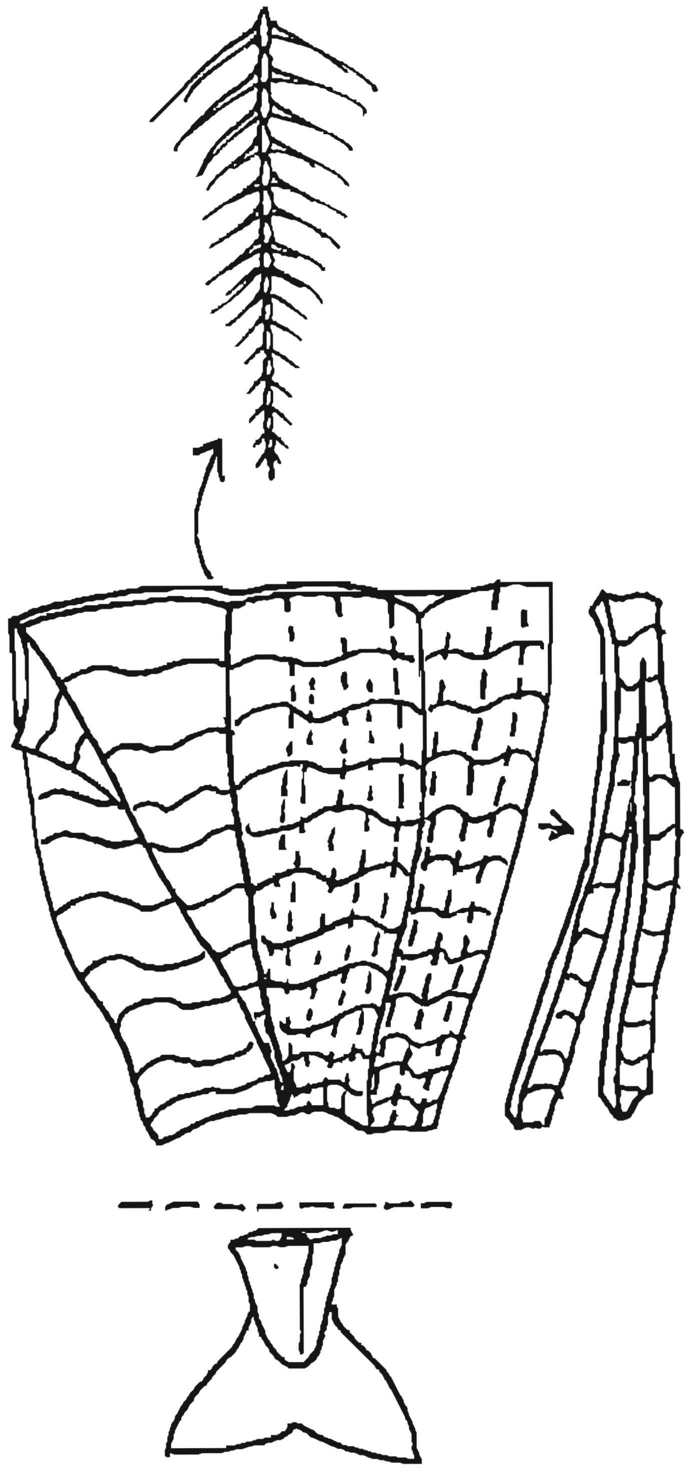


Figure 8-5 SECOND CUT KINGS FOR PEOPLE

the fish of one family was either improperly stored for winter, or had not been dried long enough, and had to be discarded. One informant reported that moldy fish was usually thrown away but could be eaten under dire circumstances. Though there are no quantitative data on the amount of fish wasted by spoilage due to mold, insects and weather, it could be a significant. However, salmon properly stored can last for years. Several caches in Haines Junction contained dried fish that had been hanging for as many as 3 years. It was fit for human consumption and had retained the oily fat of recently dried fish. The decrease in the amount of calories or various proteins, fats and minerals is not known. Today, older dried fish is usually given to dogs regardless of the way it is cut.

Bacterial Spoilage

Recent arguments about the amount of spoilage due to bacteria have been advanced by Panowski (1985:93-96). She rates bacterial contamination as the major cause of spoilage. The presence of such dangerous bacteria as Salmonella and staphylococcus and clostridium botulism, the cause of botulism, in fresh salmon and other ocean run fish cannot be denied (Lee 1977:8-9 as quoted in Panowski 1985:94). It can also flourish in cured salmon if it is not kept cool or heated in cooking to kill it. But Panowski (1985:94-96) argues that the lack of cleanliness in fish camps encouraged bacterial contamination and the spoilage from this cause would be completely unpredictable because people at that time did not understand germ theory. She further states that the fish would have to be discarded or tossed out in some years while in others the resource lasted quite well. While the actual ethnographic data on spoilage are not available, one of the problems with her argument is that people are not able to perceive bacteria on fish and discard them. One suspected case of botulism in salmon happened in a fish camp on the Klukshu River (O'Leary 1980:101). At an historic fishing site (NSVPP C/A 1) occupied in 1927, a Champagne/Aishihik band member reported that many small pits were dug and lined with tin cans for the storage of fresh salmon heads. She reported that several people were "poisoned" by eating the rotten heads and thus the camp was moved. This may have been from botulism, but two factors should be noted: (1) the "botulism" was not from dried fish, as Panowski suggests, but from fish heads and (2) the contamination was not perceived until people had become sick and died from it. It is also possible that lead in the tin cans tainted the food. Thus bacterial spoilage had more of an affect on decreasing the human population than on decreasing the amount of stored fish. However, certain parameters of spoilage by bacteria may be perceived, like the length of time it takes to develop. This may have forced people to practice storage for a shorter period than desired.

One factor on the coast that was different for the Southwest Yukon was the lesser amount of rainfall and the low temperatures for most months of the year. One factor that Panowski does not discuss is that long term storage may not have been desirable. The confluence of the salmon runs with other resources and viewing salmon as one of a number of critical resources will be argued for the Champagne/Aishihik band.

Dried Fish

In 1978, a sample was taken of dried fish (sockeye), both those cut for dog food and those for people. Each sample was weighed on a fish scale. The average reduction of live weight to dried state was about 75% from a sample of 40 fish weighed at Klukshu (Table 8.1). Thus, an average 5 pound sockeye when dried, weighed, on the average, 25% of its original weight, or about 1.20 pounds. The fish cut for dogs with the heads still attached averaged 1.27 pounds. Those "second cut" for people averaged 1.32 pounds. Further weight loss may have occurred in long term storage since some of the fish weighed were about 1 week away from storage. The difference is probably not significant. Weights of dried king salmon which was strip-cut were not taken, but probably a more significant weight loss would have occurred since the vertebral column was discarded in the cutting, as were the fins, tail and head.

Long Term Storage

Salmon which has been completely dried can be stored in various ways. Currently, dried salmon is kept in the winter village of Haines Junction in privately owned storehouses which are not unlike small barns with openings between the roof and the wall so that air can circulate freely. These storehouses also hold furs, dried moose meat and various pieces of equipment such as outboard motors, traps, etc. Salmon in these structures are kept on the poles from the smokehouses. With five to ten salmon per pole, they are placed across parallel poles about 2 or 3 feet apart. Or, they may be simply stacked flat on parallel poles. They are not covered since that would allow more moisture to be released from the fish. In the crisp, cold of winter with temperatures dipping to minus 40 degrees F, they are perfectly preserved. They are used as needed. Dried salmon can be eaten as is, or soaked in water and eaten or boiled to make a stew.

Caches

Raised Log Caches

Several older people still cache their fish in wooden caches on high stilts. This was the preferred mode of storage before the Alaska Highway was built and many old caches occur in the region. The structures vary in size from 8 by 6 feet, to small boxes 4 by 3 feet. The cache is usually a small wooden cabin set on top of poles 8 to 10 feet above the ground. Many are built in the same style as houses, using a notched, cribbed log construction with a ridge pole and pitched roof. There are however, no windows, but one side has a small hinged door. Others are notched log structures with a slanted or single-pitched roof (Figure 8.6). McClellan (1975:247) believes that this style is more recent (within the last 100 years) in the area and reflected the use of metal tools. She finds the style characteristic of the circumpolar zone that may have been introduced by the Russians. McClellan (1975:247) also reports that at Klukshu during the 1950's and 60's the majority of caches had single-pitched roofs. The predominant style cache in historic times was made by topping four living trees which grew close to each other.

TABLE 8-1. Weights of Dried Salmon at Klukshu Village.

SOCKEYES

Second cut for people (mostly male fish)

1. 2 lb.	11. 2 lb.
2. 1 lb.	12. 1 1/2 lb.
3. 1 lb.	13. 1/2 lb.
4. 3/4 lb.	14. 1 lb.
5. 1 1/4 lb.	15. 1 lb.
6. 2 1/8 lb	16. 1 1/4 lb.
7. 1 1/2 lb.	17. 1 1/2 lb.
8. 1 3/4 lb.	18. 1/4 lb.
9. 1 lb.	19. 1 1/4 lb.
**	*
10. 1 lb.	20. 1 lb.

Fish cut for dogs (female sockeyes)

1. 1 1/8 lb.	11. 3/4 lb.
2. 3/4 lb.	12. 1 lb.
3. 1 1/2 lb.	13. 3/4 lb.
4. 1 3/4 lb.	14. 3/4 lb.
5. 2 lb.	15. 1 1/4 lb.
6. 1 1/4 lb.	16. 1 lb.
7. 1 lb.	17. 1 lb.
8. 1 lb.	18. 1 1/2 lb.
9. 1 1/2 lb.	19. 1 lb.
**	*
10. 1 lb.	20. 1 lb.

* fish (11-20) had been dried for 3 weeks.
** fish (1 - 10) were not completely dried and needed "about 1 week more to dry" (O'Leary:field notes 1978).

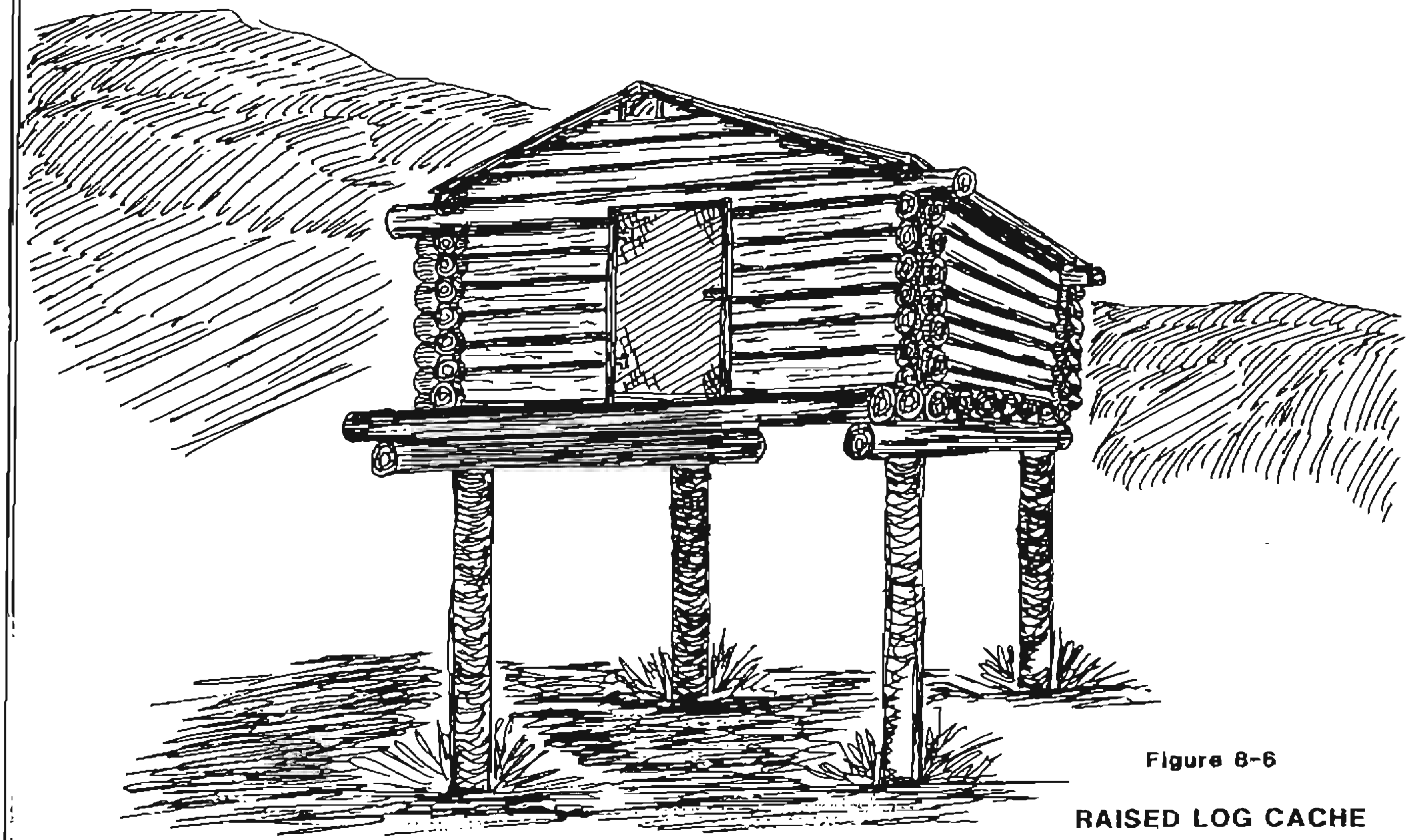


Figure 8-6

RAISED LOG CACHE

> A simple log platform was then built between the trees at a height of about 20 feet. Sometimes the sides were built up of logs by laying butts and points alternately, but the logs were not notched. When the cache was filled ... it was covered with a well-cleaned and dehaired hide, on top of which were laid three or four heavy logs and some brush. Two notched logs were used as a ladder to reach the platform. ... and when not in use the poles were laid on the ground nearby (McClellan 1975:247).

One such platform was located on the west bank of Village Creek near the historic village of Nesketaheen. However, two members of the Champagne/Aishihik band said they had used the platform as a blind in hunting a bear that had been bothering their smokehouse where they were preserving salmon. It is not known if it was used also for a cache. Another historic cache was used in the 1930's at Nuquik by a Southern Tutchone trapper. A small cache built on top of two spruce trees it was about 10 feet high to hold dry meat, fish, and staples such as flour and sugar, and trapping equipment. It was a cribbed log structure with pitched roof. Recent historic caches have wide strips of metal wrapped around the stilts to prevent predators from climbing up into the cache. The height of the cache and its sturdy nature discouraged predators from raiding the food supplies.

The most devastating predators in the area are bears, which have been known to tear apart a smokehouse even in summer when relatively well-fed. Black bears were able to reach high caches by climbing and destroying them. However, since the bears hibernate during the winter and are mobile in the spring when salmon stores are low or non-existent, they were a threat both summer and autumn. Wolverines were also an ever-present danger too since they are capable of tearing into a weak cache as well as wreaking havoc on trap lines.

Fish is put up in caches in packets of three fish lying side by side and stacked on top of each other, about three or four fish thick, tied loosely with string. It is important that the roof of the cache be tight enough to prevent rain or snow from coming in but that there be enough air let in through the side to keep it circulating within the cache. Caches, unlike houses, are not chinked with moss or mud.

<u>Other Types of Caches</u>

There are two other types of caches for salmon used in historic times. One is built only in the fall and winter when temperatures dip below freezing. The late run of coho salmon in the Klukshu river was sometimes frozen and put directly on the ground inside a pen of cribbed logs and was then covered with heavy fresh cut logs to deter predators (McClellan 1975:247). The fish were reported to have been frozen ungutted. This type of fish cache was discoverd at the historic fishing camp (NSVPP C/A 1), used in 1927 , when a group of Klukshu people who were fishing near the junction of the Klukshu and Tatshenshini Rivers. One person reported that coho were layered in a criss-cross fashion on top of each other and were pried out with an axe (O'Leary 1980:124). Fish stored in this manner must be eaten before spring thaw. McClellan (1975:247) reports that there were also ice cellars used to store foods during the summer, but she has no details about them. Because the permafrost is discontinuous in the southwest Yukon it would be hard to know where to locate such pits.

Another type of pit was used by close neighbors, the Inland Tlingit, who made squarish pits averaging about three feet in depth and several feet in length and width in gravel ridges (McClellan 1975:247). Several such pits were located on river terraces above the Tatshenshini River by the NSVPP project. They were excavated into the forest soil about one meter deep by three by three meters in area. One such pit was lined with logs. No artifacts or evidence of stored goods was found (O'Leary 1980:55). Pits for dried fish similar to these are noted for the Yakutat Tlingit by DeLaguna (1972:305). The holes were dug behind the dwellings and lined with logs or planks with a kind of arched Quonset hut built above it. The top of the cache was sometimes as high as 5 feet and the bottom, was perhaps, as deep. The bottom was used for dried fish and meat that was not supposed to freeze. Various similar prehistoric pit caches were also found in the Tlingit area.

Among the other methods of storing fish, only a few were used historically because of the lack of technology. Although today fish heads are commonly not stored, this was not the case historically. People at Klukshu reported that fish heads were stored in small, circular pits dug into the ground at fishing locations. The fish heads would rot and ferment into a kind of "head cheese." After fermenting, these heads could be eaten for several months. It was a favorite food in late autumn (McClellan, Fall and Shepard 1987). Multiple pits of this kind were located at an historic fish camp on the Klukshu river (NSVPP C/A 1). Each pit measured about 0.5 meters in diameter and was 0 .25 meters deep. This was the site mentioned earlier where several people may have died from botulism in the rotten fish heads. Storage of fish by this kind of method was also known for other neighboring groups in the interior and on the coast (DeLaguna 1972:305).

Also there are reports of drying fish eggs. The eggs were either stored within the membrane sacs and hung with the fish, or they were mixed with dried fish, berries and moose fat. These could be also stored in grease in the stomachs of large animals (McClellan, Fall and Shepard 1987).

Today fish is brought back to Haines Junction and other locations in the summer and stored in freezers for the winter. This is more prevalent among younger families or those members of the band who do not fish very much. Fish is now also canned in brine and stored in winter houses. Some fish is preserved by light smoking in commercial smokers with hickory or other flavorful wood used. This method represents only a small fraction of the total fish taken.

CHAPTER IX

LIMITATIONS OF THE SALMON RESOURCE

There has been considerable theoretical debate on the numbers of salmon needed and/or taken by various Northwest Coast aboriginal groups. All of the models are based on assumptions about human nutrition requirements, either couched in terms of caloric intake (the amount of proteins/fats etc. or simple number of calories needed per person), or on the number of pounds/ounces/individual fish needed to sustain human life. These arguments are not wrong per se, but it is necessary to scrutinize the two critical assumptions upon which they are based: namely that salmon is the most important resource to that group, and that if it is abundant, that a group will want to maximize its exploitation of that resource.

The idea of "abundance" of salmon has also certain underlying assumptions about the needs of groups with access to it. When examining the role of salmon to the diet, Hewes has assumed that "somewhat less then one half of the caloric requirement of the average native consumer of the area [Pacific Salmon area] was satisfied by eating salmon" (1973:135). Though Hewes uses this measure "for the sake of argument," it is one of the few times such an assumption is clearly stated. Most arguments are based on the assumption that when salmon was available it was utilized to the maximum extent. One way of maximizing the use of salmon is to increase the availability of salmon by some method of storage. Since the actual time to fish is relatively short, the resource only eaten fresh could not provide food for an extended time unless there was some method of preservation. Storage, in effect, lengthens the season of availability. The assumption is that people will process as much fish for storage as possible and eat their stored fish as long as possible. Implicit in this assumption are ideas about mobility; the argument carried to extremes would require a group to find an abundant resource, process enough to eat throughout the year and stay at the site until that resource becomes abundant again.

It will be argued here that salmon, while an important resource, was one of a number of critical or essential resources that has limitations. Though sedentism is made possible by the storage of products over a longer period of time than they are available when fresh, it is not necessarily a desired condition. In several ways, storage may actually allow a group to be mobile. Nutritional and caloric requirements of groups are important in modeling the numbers of fish needed annually to support a population, but this variable cannot be looked at in isolation from the other requirements for food placed on the Klukshu people. These arguments are important in modeling the limitations of the run to feed people over certain periods of time, and in modeling the "worst case" scenario when the fluctuation in the number of salmon is at its lowest, and how this affects the behavior of the group.

The Structure of the Salmon Resource

The temporal and spatial structure of the king and sockeye runs in large part influences the kind of fishing strategies employed. Their methods of fishing may be influenced by the size and numbers of the fish. Depending on the amount of fish available at a given location at a given time, the size of a group will increase or decrease. At Klukshu, DFE statistics on salmon reflect the fish of that particular river and not large scale commercial changes in ocean salmon where individual salmon populations cannot be segregated or examined in detail. By modeling the nutritional requirements it will become clear how the structure of the run affects the group.

By using 2.5 pounds of fish per day as adequate for human nutrition (Hewes 1973, DeLaguna 1972, Schalk 1977, O'Leary field notes 1978) and 150 days or approximately 5 months as the desired amount of time to have fish available to eat then given a population at Klukshu Village of 60 people as a reliable recent historic estimate, we can begin to construct the limitations imposed by the fishery. These will be compared with the estimates of the numbers of fish stored during my fieldwork. The following discussion will summarize the structure of the fish population and the fishing methods of the Klukshu people and their implications for storage and group size.

The run of king salmon peaks between 30 and 40 days before the sockeye run. In all five years examined, the largest number of kings entered the river during the ten day period from July 10 to July 20. During this ten day span at least 40% of the entire run passed the counter. In 1980, 70% of the run happened during these ten days. Furthermore, in three of the years (1977, 1979 and 1980), 80% of the total run of kings had happened by July 20. In terms of actual biomass, by July 20 there was an average of 35,000 pounds of king salmon in the river. If we assume that 80% of the biomass of an individual fish is edible, and that 25% of the king salmon are accessible by gaffing, then 7,000 pounds of king salmon are available by gaffing alone. It is important to note that incomplete records are available for numbers of gaffed fish. This is because gaffing was done at various sites and different times during the early part of the fishing season. In 1978, I observed 120 king salmon gaffed, or 4% of the total run. In 1977, 193 kings were recorded gaffed, or 6% of the run. Since reporting was sporadic and not a random sample, I believe that between 10 and 12% of the total run may be a more accurate estimate. Furthermore, since modern families at Klukshu rely on commercially available foodstuffs for at least 50% of their consumption, aboriginal gaffing may have taken as much as 25% of the annual king run. The percentage may have been greater than this, but thick vegetation along the river make it difficult, if not impossible to gaff a larger percentage of fish. With the exception of gaffing locations discussed in chapter VII, a DFE survey of the Klukshu from its source at Klukshu to its junction with the Tatshenshini revealed heavy vegetation along its banks with few unvegetated oxbows making most of the Klukshu river inaccessible to gaffing parties. For purposes of this discussion, I have chosen 25% as a reasonable estimate of the king salmon gaffed annually.

The 25% or 7,000 pounds of fish would be enough fish to feed 60 people for 47 days, if we assume that an individual consumes about 2 1/2 pounds of fish per day. But averaging the five years does not give us a true picture of how bad a bad year can be. If we take the worst of the five years monitored, 1976, we see that by July 5, no fish had yet passed the DFE counter - this at a time when resources were apt to be most depleted. By July 20, there were 772 king salmon in the river. It is important to emphasize here that not all of these spawn at accessible gaffing locations. Using the same conversions for weight mentioned previously, we find that this represents 3088 pounds of available food. This would be enough fish to feed 60 people for 21 days. It is unlikely that the aboriginal population at Klukshu was much higher than 100 persons. McClellan (1975:20) wrote that the Klukshu band numbered 64 persons in 1944. After diseases consequent to white contact, in the latter part of the nineteenth century and with the building of the Alaska Highway, the population was probably reduced. It has been demonstrated that even if the population is assumed to have been only 60 people, a bad year for salmon would have caused stress.

By August 20, 1976, there were 1187 kings and 175 sockeyes in the river. Assuming the Indians had been able to trap all of the sockeyes and gaff 25% of the kings, this would have provided daily fresh food for 60 people for only 46 days. This is without storing fish. The first salmon did not arrive until July 6 in 1976, and it happened to be 46 days from the arrival of the first fish until the beginning of the abundant sockeye run (August 21). It is likely that the people would have had to consume most of the fish caught with little or nothing available for storage. It is also clear that during a bad year the salmon resource could not support more than 60 people during the potentially critical months of depleted resources - namely May to early August.

Comparisons of Data with Klukshu Fishery

McClellan (1975:198) has written that:

> High on my list of regrets for information unrecorded or unrecordable is the amount of fish actually consumed by the various bands - especially in relation to the amount of meat. In aboriginal times the southern bands of Yukon natives probably ate as much fish as animal flesh, perhaps more.

In 1978 I was able to be present at Klukshu village for the entire salmon fishing season and am able to make estimates of the numbers of fish put up for storage. In total for ten extended families, an estimated 2,400 fish or on average 240 fish per family, was put up for storage, the majority of which were sockeyes. But the three trap owners took over 1,300 fish, or roughly 430 fish for each trap-owning family. Those families not owning traps took approximately 157 fish per family. Some of these families took salmon in traps lent to them while others gaffed fish. Trap-caught fish were later shared with other families during the winter.

This total is comparable to the 3,000 sockeyes reported for the Klukshu fishery in 1977 (DFE 1977:31). The estimate given by fisheries personnel for the Klukshu fishery in 1978 was 4,000 fish (O'Leary field notes 1978). But how does the Klukshu fishery today compare with the past fisheries? What was the amount taken prior to the advent of the Alaska Highway and the increased amount of commercial food in the diet? Much of this information is hypothetical, but important facts are known. On the whole, the trap owners are older women who practice the traditional ways of fishing and supply their own immediate family's needs for dried fish. It is these women who provide what we know about the past fishery.

McClellan (1975:41) who did most of her fieldwork in the southwest Yukon in the 1950's and 1960's, believed:

> Ideally each family should dry 300 or 400 fish for themselves and their dogs. If possible they prepare more since people give fish to their friends as presents.

Klukshu elders reported much greater counts of fish taken in the past than McClellan's estimates. Two women reported that between 1,000 and 1,500 fish were taken for each family and their dogs (O'Leary field notes 1978). When questioned about the number of dogs they needed to feed, the answer was usually six to eight, the number making up a dog team. The number of dogs for most families today is usually only one or two, although fish is still put up for these dogs.

If we use the amounts suggested by the Klukshu women, it would mean that the people at Klukshu were taking as many as 20,000 to 30,000 fish, assuming twenty families in the village, or approximately 100 people. This represents from 80,000 to 120,000 pounds of fish. One of the women reported that it was necessary to feed a "working dog" a whole dried fish per day (approximately one pound dry weight reduced from four pounds wet weight from a gutted fish). Hewes (1973:140) writes:

> We learn from Gilbert and O'Malley that the average Alaska work-dog consumes an amount equal to 1080 pounds of fresh salmon a year. This is equivalent to almost three pounds per day. It is probably conservative, then, to use a figure of 2.5 pounds per dog per day, the same figure we are using for human consumption.

If each of the village's twenty families had a team of eight dogs, the dogs would be consuming 400 pounds of fish per day, and the 100 people would consume 250 pounds per day for a total consumption of 650 pounds of fish per day. If the village took 20,000 fish (80,000 pounds), it would be sufficient to feed 100 people and 160 dogs for 123 days. If 30,000 fish were taken (120,000 pounds), it would be sufficient to feed people and dogs for 186 days. On the surface, the resource does, indeed, seem abundant if it was able to keep people and dogs fed for four to six months.

If we base McClellan's figures, 300 to 400 fish per family, on families of five persons with two dogs (using an estimate of 2.5 pounds of fish for each person and dog per day), each family with dogs would consume 17.5 pounds per day. Using the upper estimate, 400 fish per family, twenty families would take 8,000 fish or 32,000 pounds of fish. This would be sufficient to feed families and dogs for 91 days or roughly three months.

These statistics can be compared with information about salmon amounts taken by Northwest coast groups. DeLaguna (1972:400) reports that a large Yakutat Tlingit family smoked and dried 2,000 to 3,000 salmon. If the size of the family was twenty people as quoted by DeLaguna (1972:311), this would represent 100 to 150 salmon per person. By taking the average weight of four pounds (wet weight) for the most common, pink salmon (Oncorhynchus gorbusha) this would represent from 8,000 to 12,000 pounds of fish utilized by the family; sufficient to support them for 60 to 240 days, or two to eight months. As the size of the family may well have been larger, this estimated sufficiency may be high.

Hewes (1973) estimates that the per capita annual consumption of salmon by the Tlingit was 500 pounds. This is enough to feed a person for approximately 200 days. Neither Hewes nor Delaguna, however, has examined the estimated per capita salmon use in relation to the size and structure of a particular run of fish. In the Klukshu River, between 1976 and 1980, the sockeye run averaged 17,880 fish. There was a peak year of 26,867 fish and a low year of 11,683 fish. There is evidence that these considerable fluctuations are not uncommon; nor can they be attributed simply to the exigencies of the commercial ocean fishery. Foerester (1968:64) writes:

No matter what level of escapement we compare, whether it be relatively high ... or relatively low ... the variations in production, as indicated by the number of adult fish returning, are quite marked.

To illustrate, he shows that at Karluk Lake, Alaska, given three years when the number of spawning fish was almost identical, the returning populations (four years later) were widely different; respectively 76% of the original spawners, 240% of original spawners and 108% of original spawners. He shows that this wide fluctuation occurs independent of the numbers of spawners. His point is that many factors contribute to the size of a run, human predation being only one of them, and that the number of returning spawners cannot adequately be predicted based on a spawning population. Foerster also states, however, that specific catch: escapement ratios capable of maintaining salmon runs seem to be specific to individual riverine systems. In the Karluk River, for instance, a ratio of 1:1 (one fish caught for each fish escaping) was not sufficient to improve the runs. In fact, runs decreased (Foerster 1968:57). In the Frazer River, on the other hand, a ratio of 1:0.3 (that is 77:23) was sufficient to maintain runs. It is not known what the optimum catch escapement ratio is for the Klukshu River. Taking 50% of a run may lead to reductions in returning spawners; but similarly, taking 20% might also result in reductions. On the other hand, taking 80% of a run might not lead to reductions. Variance is great between systems. It is clear, however, that each system has an optimum catch:escapement ratio, and that overfishing can result in drastic reductions in fish populations.

Without knowing what exact amount constitutes overfishing the Klukshu sockeye population, we can nevertheless examine the implications of a "bad" year. In 1976, only 11,683 sockeye entered the river, 35% below average and 15,000 fewer fish than the peak year. This number does not appear unusually low, since the 1979 count was only 12,311 fish and the 1980 count (the returning spawners from 1976) was 11,750. Informants had estimated that families took 1000 to 1500 fish per family. In a year like 1976, the entire run would fall from 10,000 to 20,000 fish short of expectations. Since it would have been impossible for people to predict the size of a run, how did they monitor and control the number of fish taken? Given twenty families expecting to catch a thousand or more fish, one might expect heavy competition for existing fish and possible overfishing of the run. Assuming that they took 80% of a run of 12,000 fish, this would amount to 9,600 fish. Distributed equally between twenty families, this would be sufficient to feed people and dogs for just fifty-nine days if there were dog teams of eight dogs per family, or 110 days if each family had only a pair of dogs. Thus, a good year might provide salmon for no more than two to three and one-half months. Of further potential danger to the group would be the likelihood of reducing the number of returning spawners four years down the line by exceeding the optimum (and unknown) catchment:escapement ratio. Taking 80% of a run, as here suggested, might very well result in a decrease in returning spawners; a bad year might be significantly worse. It is conceivable that a disastrous year could occur if most fish in a small run were taken.

Though the runs appear huge and able to support large numbers of people for many months, this is not the case, as shown in this analysis. The ways in which the structure of the run itself has hampered the taking of 1000 fish by each family, as suggested by a Klukshu woman, is that the fish come in such large numbers in such a brief period of time that women could not cut the amounts needed for storage when the fish are available (see chapter 6). A bad year, which is not predictable even by the Canadian Department of Fisheries, held down group size. The restricted access of the Klukshu fishery to other neighboring bands seems to have evolved from this limiting minimum run.

The potential for a bad year and shortage would tend to discourage the people of another neighboring band (such as Aishihik band) from coming down to the Klukshu River during the king run. The Aishihik people would also have to make a round trip of c. 170 km. This amount of travel would discourage them in several ways: (1) the amount of time needed to be on-site for the salmon would require them to forgo game available at that time at Aishihik, namely the summer sheep hunt and whitefish runs, (2) the cost of a long transport of dried fish, and (3) the unpredictability of a bad year when the run would not be able to feed a larger group. It might also discourage the entire Klukshu band from concentrating on the king run, especially if the aboriginal population numbered 100 and not 60 people. Furthermore, many of the Klukshu people would have been forced, in a bad year, to take other game (hare, grouse, arctic ground squirrel, moose) in the immediate area of Klukshu village. This would effect both Aishihik and Klukshu. If Aishihik people traveled to Klukshu, they would find insufficient fish and other game in the vicinity would have been taken. The Klukshu people would be required to range at greater distances for other resources until it was more practical to move residence completely, which is what happened in the fall.

Salmon was not just stored, but needed to be eaten fresh as evidenced by the movement of people downstream to the earlier king salmon runs. The amount of salmon eaten fresh at streams needs to be factored into the equation as well as the amount stored. McClellan (1975:198) has argued that with the advent of dog teams there could have been a substantial increase in the numbers of salmon taken (offset by commercial foods becoming available for humans), but this may have provided people with less salmon than before dogs became important. The congruence of the salmon runs with other important resources usually taken in the late summer and fall made it one of a number of critical resources. The temporal and spatial aspects of the seasonal round will be discussed in the next section.

The Effects of Salmon on the Seasonal Round

The place of salmon as a critical resource can be seen most clearly when other resources are not available. In the spring months, when stored resources are becoming depleted and when other game has not been secured, dried salmon became a critical "back-up" resource. But the importance of salmon in the diet is affected in the final analysis on the availability of other game. The storage of salmon may be life-saving in a lean year for other resources, or there may be a surfeit of it in a year when other resources are plentiful and create other choices for the Klukshu people. The important point is that most of the other resources for the Klukshu people are not structured in the same way as the salmon. The salmon run is a highly clumped resource in time and space, and when the runs are over, the boreal forest itself supports mostly dispersed, mobile game. The large group size at Klukshu village during the runs breaks down into smaller family groups who scatter throughout the landscape. Mobility changes from a settled life with logistical trips, to more residential moves with varying amounts of logistical mobility. Salmon does not tie people to the area around Klukshu village, but because it is a light, portable resource it is transported to winter settlements and cached and returned to as needed. During the summer when fishing activities went on, groups of hunters would logistically range on trips for moose and other game, usually within several hours or a day's radius, in effect, hunting out the game in the immediate area of Klukshu village. Therefore, in the late summer and fall the moose and other game would be located outside the normal foraging radius.

The storage of dried salmon, as well as berries and meats, involved a number of families together constructing several caches during the summer and fall. McClellan writes:

> One [cache] would be filled at the fish camp, another where sheep, caribou or moose hunting was good; perhaps a third in groundhog country. During the winter the young men would be sent out for these food supplies or all the people might camp near a cache... But there was never enough preserved food to last the entire winter (1975:199).

The dispersal of the group in winter involved movement to many locations away from the Klukshu river. Dried fish were carried with the group. A majority of the population at the turn of the century went to Champagne, with its attendant trading post, and remained there for part of the winter, making logistical trips to hunt. Many families used Champagne as a cache location moving residentially to many different areas in search of different resources. Many historic brush camps occupied for a few days to several weeks, can be located throughout the Shakwak valley. McClellan reports:

> The able-bodied hunters also looked continuously for moose and caribou, and when a kill had been made, the families who were traveling together moved to the fresh meat supply. Older people, women and children added small game, ptarmigan and other game birds to the larder (1975:97).

A brief generalized overview of the seasonal round will be presented for the Champagne/Aishihik band, highlighting the difference between the two bands and the role of salmon.

<u>Summer</u>

The earliest king salmon were gaffed for consumptions at locations downstream from Klukshu village (Nesketaheen, Nuquik, Village Creek) by members of the Champagne band. In early summer whitefish and grayling were taken at Dezadeash Lake and other surrounding lakes such as Kloo Lake, Rainbow Lake etc. In June and July, moose were hunted by salt licks, either using snares or shooting from blinds. Moose were also taken along trails near lakes and swamps (for example, along the Blanchard River). Salmon were taken at Klukshu, especially during the peak sockeye runs in August. This time was coincident with getting a moose that would be cut into strips and dried to be cached. In August and September sheep were fat and were hunted in the mountains, driven downhill into snares. Snowshoe hares were snared or called by making squeaking noises and then shot. For those families who had moved to Klukshu village early in the fishing season when few fish were in the river, hares were the main part of the diet.

Aishihik people hunted moose and caribou in small groups and had sheep camps in the Kluane Lake area. One man from Aishihik reported: "We had caches for all our food in various places in the area and when we needed food during the winter we went to these caches by dog team to get them" (Champagne/Aishihik Band notes 1979). Glave (1890) met a group of 20 Aishihik and Hutchi people camped in the interior hunting in mid-summer.

Fall

Moose were hunted during the rut, using a moose scapula as a moose call. Around October, after the rut the moose meat was considered bad. In September and October a run of coho salmon passed relatively undisturbed by the abandoned Klukshu village. A few coho were occasionally taken and were frozen late in the season. Klukshu families moved to meadows near Klukshu and to the Chilkat Pass area to trap arctic ground squirrel for both fur and meat. This was eaten either fresh, or was dried for later use. Several related nuclear families with five or six hunters might spend several months together hunting and caching meat. Dried moose meat was cached to be retrieved in winter. Beaver was also hunted. Aishihik people had fall fish camps on Aishihik Lake, moving to the Donjek river for caribou. There was fishing for whitefish in Kluane Lake by the Burwash band.

Winter

Many families were on trap lines. Most camped near lakes to get fish, especially Dezadeash and Aishihik Lakes for the respective bands. Fish was taken with lures, nets and spears. Ice fishing stopped around mid-November and resumed in the spring. Moose was obtained by setting snares along fences built by native peoples and was cached frozen. Many people reported the importance of caching a "Christmas" moose which could be used in December. In late winter, snowshoe hares were snared and hedysarum roots were collected from mice nests in lean times. Summer stores of fish and meat were utilized from caches.

Spring

Spring was a time of possible starvation. Whitefish and jackfish were caught with jigs and leister on Dezadeash and Kusawa Lake. Trout and suckers were obtained by netting. In March and April, under icy snow conditions, moose could be run down with dogs and killed by hunters on snowshoes. Much trapping of fur-bearers was done in late winter and early spring. The inner bark of cottonwood and berries that had overwintered could be gathered. In April, waterfowl in large numbers return to the Yukon. Muskrats were snared underwater. In late spring the early runs of salmon began to complete the seasonal round.

The congruence and coincidence of many important resources in the summer can be clearly seen in this description. Stored salmon did not allow for the sedentism usually predicted for groups since: (1) the amount of salmon could not support many people and dogs for a long period of time, (2) the dried fish was portable and was moved long distances (i.e. historically it was moved to Champagne and more recently Haines Junction), and (3) the nature of the other resources, especially moose, which was dispersed over the landscape, was first hunted out of the Klukshu area during the summer months. Later small family groups moved extensively residentially in search of game. Caching of both dried and frozen stores was a critical part of the seasonal round.

CHAPTER X

CONCLUSIONS

This dissertation has investigated the relationship between the spatial and temporal distribution of resources, especially salmon, and mobility strategies, group size and labor organization. It has focused on the Champagne/Aishihik band of Southern Tutchone, especially the Champagne component of that band in the southwest Yukon, Canada.

One of the key concepts used to discuss the spatial and temporal distribution of a resource is the idea of clumping or abundance. By analyzing the quantitative data of a specific salmon run (1976-1980) on the Klukshu River, that has a Southern Tutchone fishery, several patterns have become clear. The absolute size of the run, in numbers of fish, is only one aspect of abundance. The critical step is to examine the spatial and temporal parameters of the run. What may look abundant needs to be classified by describing both the temporal and locational patterns of the run.

It was found at Klukshu River that salmon were not equally available at all times. Runs fluctuated greatly from year to year. Relative to an average year for sockeye (17,880 fish), the runs ranged as much as 50% above average to 35% below average. For king salmon, relative to average (2,881 fish), runs varied as much as 67% above average to 57% below average. Perhaps more importantly, in the five years studied there were no years that approximate the average year for sockeyes. There were two years where there were nearly 27,000 fish per annum and three years where there were roughly 12,000 fish per annum; that is, a good year brought more than twice as many fish to the river.

Within the salmon runs, fish were clumped into shorter periods of time. Also, different species behaved in different ways when they spawned. King salmon spawned in the river downstream from the village and were gaffed at a limited number of locations. In a peak year, 50 percent of the run happened in 7.5 days, while in a bad year, 50 percent of the run happened in 2.5 non-consecutive days. Clumping needs also to be determined by the ability of a group to obtain food for immediate consumption and to process it for storage. In order to operationalize the definition of abundance, the figure of 100 fish per day per woman fish-cutter was utilized.

It was found that the size of the local group is influenced by the nature of clumping. Along a gradient of increased resource clumping, local group size tends to increase as people within a band become aggregated. But the timing of the run and the unpredictability of a bad year, tended to hold down group size as well as make it unprofitable for other bands, like Aishihik, to participate in the fishery. With the Aishihik band the cost of travel (c. 170 km) to the Klukshu River, and the availability of fresh water fish, caribou, moose and sheep at Aishihik Lake made a trip to Klukshu for salmon unnecessary.

When salmon concentrations were high the large local group was made up of multiple productive units. One response to this pressure for efficiency was increased specialization in task performance within the productive unit. Women at Klukshu became highly efficient, specialized fish cutters. Three women, by traditional usage, formed a task group to work together building and monitoring the three fish traps. But though this pressure favored increased complexity of labor and specialization in task performance, it did not favor additional social dimensions along which people might be differentiated. There was no headman or chief. The moiety system did not serve to control or distribute fish but was primarily a system to regulate marriage and death rituals.

The Southern Tutchone labor groups consisted of nuclear or extended family units that functioned as relatively autonomous productive units. The underlying basic Athapaskan values of interdependence, generosity and reciprocity serve to encourage the distribution of fish in the band along informal kin networks.

The clumping of the salmon resource also affected the mobility strategies of the group by increasing logistical mobility during the run, while small groups went to gaff or hunt. Within the sub-arctic boreal forest there is a high coincidence of resources, many resources become available at the same time, especially in the late summer and fall. The environment "changes" with seasonality and when the salmon runs begin to decrease, the desired game - moose is highly dispersed and unpredictable. Moose, as a critical resource, is less dense, and group size tends to decrease and residential mobility increases.

One assumption challenged was that for groups with access to salmon, salmon was <u>the</u> essential resource and its use or storage must be for as long as possible. With a peak year for salmon on the Klukshu river at over 30,000 fish, the band of Southern Tutchone did not choose to remain at the village for twelve months. This idea of dependence on a single resource masks much of the variation and complexity of resource procurement systems. Also the storage of salmon does not cause a group to become tied to stores. The Klukshu people neglected taking the last run of coho salmon and began hunting moose for drying and storing before the sockeye runs had finished. The group then moved residentially with their stored fish to winter locations. Historically they moved to Champagne, a distance of c. 60 km. Contrary to Schalk's (1978) prediction, residential mobility is possible with stored resources.

A system of caching both meat and fish (dried and frozen) was well-developed in the southwest Yukon. Winter and spring mobility involved decisions about the importance of various resources and was a mix of both logistical and residential mobility.

Finally, this analysis has been mainly concerned with one group of Athapaskans with an historic salmon fishery. The study was inspired by the debate about salmon on the Northwest Coast of North America, and it attempted to reveal the complexity of salmon runs for one stream to point out the inadequacy of both the salmon-statistics and lack of warranting arguments about how the structure influenced socio-cultural variables. What has been neglected and what will be more effectively addressed with comparative data for other groups is the application of concepts of abundance and clumping to the cultural systems in a wide variety of salmon fishing groups. By using similar quantitative data on salmon runs for specific streams with native fisheries and applying the models presented in this study, the correlation between the structure of a salmon resource and sociocultural variables can be further tested.

APPENDIX A

Numbers of Sockeye Salmon in the Klukshu River
(1976-1980)

Date	1976	1977	1978	1979	1980	Total/Average	
June 10						0	0
11		2				2	0
12		7				7	1
13		81				81	16
14		17				17	3
15		50	7			57	11
16		38				38	8
17		37	1			38	8
18		82				82	16
19		45				45	9
20		84				84	17
21		85				85	17
22		228				228	46
23		391	13		1	405	81
24		636	19			655	131
25		349				349	70
26		1990			5	1995	399
27		721			25	746	149
28		745				745	149
29		440	1			441	88
30		319	1		15	334	67
July 1		152	2			154	31
2		467		22	31	520	104
3		140		4	9	153	31
4		169			1	170	34
5		174	1688	14		1876	375
6	9	131	19	27	10	196	39
7	1	363	1	8	3	376	75
8	7	93	3	6	7	116	23
9	19	67		2	4	92	18
10	9	14	33	28	1	85	17
11	26	13	9	18	5	71	16
12	6	23		60	2	91	18
13	11	5		16	3	35	7
14	2	1			83	86	17
15	1		1		133	135	27
16	11	18		9	32	70	14
17		1	46	30	4	81	16
18	9	5	42	37	2	95	19
19	10	1	50	84	61	206	41
20			36	12	49	97	20
21	4	8	81	2	6	101	20

APPENDIX A (continued)

Date	1976	1977	1978	1979	1980	Total/Average	
July 22	4	14	12	10	12	52	10
23	4	27	9	15	29	84	17
24		81		25	1	107	22
25	1	72	16	52	5	146	29
26	6	89		21	6	122	24
27	2	30	19	17		69	14
28		26	3	24	1	54	11
29	2	19	15	4	3	43	9
30	5	49	3	46	1	104	21
31	5	10	34	9	41	99	20
Aug. 1	2	5		1	115	123	25
2		30	9	40	55	134	27
3	2	6	73	1	13	95	19
4	2	2	4	3	27	38	8
5	4	56	2	4		66	13
6	1			113		114	23
7	6	98	19	21	4	148	30
8		3	47	2	11	63	13
9		19	25		5	49	10
10				14	2	16	3
11		11	93		4	108	22
12	3	19	47	50	110	229	46
13		22	25	119	47	217	43
14		51		7	24	82	16
15		153	6	18	29	206	41
16		49		15	13	77	15
17		121		36	12	169	34
18		119	71	184	15	389	78
19		65			20	85	17
20	1	79	16	48	7	151	30
21	29	82	89	156	1	357	71
22	947	46	541	33		1567	313
23	56	8	83	27	13	187	37
24	22	75	701	5	3	806	161
25	135	92	662	8	11	918	184
26	1100	6	654	31	5	1796	359
27	834	7	1415	45	187	2489	498
28	507	4	1292	124	472	2399	480
29	19	80	577	123	634	1433	287
30	1710	1	3027	51	533	5342	1068
31	1314	443	1390	193	340	3780	756
Sept. 1	908	729	1687	23	121	3468	694
2	51	1887	2369		1631	5938	1188
3	9	574	1744	516	1466	4309	862

APPENDIX A (continued)

Date	1976	1977	1978	1979	1980	Total/Average	
Sept. 4		127	1346	980	721	3174	635
5		3039	2085	286	7	5417	1083
6		3060	1193	1172		5425	1085
7		1345	802	121	2	2270	454
8	14	1785	416	49		2264	453
9		1301	1	2	78	1382	272
10	1	167	300	234	37	739	146
11	1	35	12	928		976	195
12		1200	375	2830		4405	881
13		118	830	1012	3	1963	393
14	2034	22	32	368		2460	592
15	1443		233	166	3845	5687	1137
16		2			236	238	48
17		13		33		46	9
18		3		78		81	16
19	323	5		8		336	67
20	9	2	3	44	1	59	12
21		10	26	4	4	44	9
22		8				8	2
23		33	4		1	38	8
24		38	1			39	8
25		5				5	1
26	3	13		19	14	59	12
27			1			1	0
28		53		2		55	11
29		88	2			90	18
30		20			5	25	5
Oct. 1		57	2			59	16
2		1				1	0
3				80	47	127	25
4			5	3	62	70	14
5		202	6	5	1	214	43
6	1	72	38		15	126	25
7		41		1	47	89	18
8			33	1	10	34	7
9		23		1067		1090	218
10		6		186	3	195	39
11		17		19		36	7
12	1	329				330	66
13	1					1	0
14	1					1	0
15	1					1	0
16	1				4	5	1
17	4				50	54	11

APPENDIX A (continued)

Date	1976	1977	1978	1979	1980	Total/Average	
Oct. 18	1				22	23	5
19	1					1	0
20						0	0
21	1					1	0
22						0	0
23						0	0
24						0	0
25						0	0
26						0	0
27						0	0
28						0	0
29						0	0
30						0	0
31						0	0
Total	11,683	26,791	26,867	12,311	11,750		

APPENDIX A (continued)

Date	1976	1977	1978	1979	1980	Total/Average	
Sept. 4			1	2	1	4	1
5				3		3	1
6						0	0
7			1			1	0
8						0	0
9		1				1	0
10			1		1	2	0
11						0	0
12		3				3	1
13					1	1	0
14						0	0
15			1		1	2	0
16						0	0
17				1		1	0
18						0	0
19	2					2	0
20					1	1	0
21						0	0
22						0	0
23						0	0
24						0	0
25						0	0
26					4	4	1
27						0	0
28						0	0
29						0	0
30						0	0
Oct. 1						0	0
2						0	0
3					1	1	0
4						0	0
5						0	0
6						0	0
7						0	0
8						0	0
9						0	0
Total	1,244	3,144	2,976	4,404	2,637		

REFERENCES

Allen, H.T.

1887 Report of an Expedition to the Copper, Tanana and Koyukuk River, in the Territory of Alaska in the Year 1885. Washington.

Banks, Henry Dow

1898 Collected Photographs of Henry Dow Banks, Yukon Territorial Archives, Whitehorse, Yukon Canada.

Barnett, H.G.

1968 The Nature and Function of the Potlatch. Reprint of 1938 Masters thesis, University of Oregon, Eugene.

Benedict, Ruth

1934 Patterns of Culture. Boston: Little Brown.

Binford, L.R.

n.d. The Subsistence Ecology of Hunters and Gatherers. Manuscript.

1968 Methodological Considerations of the Archaeological Use of Ethnographic Data. In Man the Hunter, edited by Richard B. Lee and Irven DeVore. Chicago: Aldine.

1980 Willow Smoke and Dog's Tails: Hunter-Gatherer Settlement Systems and Archaeological Site Formation. American Antiquity 45(1):4-20.

1983 In Pursuit of the Past. New York: Thames and Hudson Inc.

Birdsell, J.B.

1968 Some Predictions for the Pleistocene Based on Equilibrium Systems Among Recent Hunter-Gatherers. In Man the Hunter, edited by Richard B. Lee and Irven DeVore. Chicago: Aldine.

Boas, Franz

1921 Ethnology of the Kwakiutl, Part 1. 35th Annual Report Bureau of American Ethnology. Washington.

Bostock, H.S.

1948 Physiography of the Canadian Cordillera with Special Reference to the Area North of the Fifty-fifth Parallel. Geological Survey of Canada Memoir 247. Ottawa: Queen's Printer.

Braidwood, R.J.

1963 Prehistoric Man. (Sixth ed.). Chicago.

Brooks, Alfred H.

1900 A Reconnaissance from Pyramid Harbour to Eagle City Alaska, including a Description of the Copper Deposits of the Upper White and Tanana Rivers. United States Geological Survey Twenty-first Annual Report, Part 2:333-391. Washington: Government Printing Office.

Campbell, Robert

1958 Two Journals of Robert Campbell (Chief Factor-Hudson's Bay Company) 1808 to 1853. Limited Edition.

Champagne/Aishihik Band

1979 Notes on Land Use by the Champagne/Aishihik People. Unpublished Ms on file, Champagne/Aishihik Band Office, Haines Junction, Yukon Canada.

Charnov, E.L.

1973 Optimal Foraging: Some Theoretical Explorations. Ph.D. dissertation. University of Washington.

Childe, V.G

1928 The Most Ancient East; The Oriental Prelude to European Prehistory. London.

Codere, Helen

1950 Fighting with Property, A study of Kwakiutl Potlatching and Warfare, 1792-1930. American Ethnological Society Monograph No. 18. New York: J.J. Augustin.

Coutts, R.C.

1980 Yukon Places and Names. Sidney, British Columbia: Gray's Publishing Limited.

Cruikshank, Julie

1979 Athapaskan Women: Lives and Legends. Canada National Museum of Man, Mercury Series Ethnology Service Paper 57, Ottawa.

Curtis, Edward

1915 The North American Indian; Vol. X, The Kwakiutl. Norwood, Mass.

Dall, William H.

1877 On the Distribution and Nomenclature of Native Tribes in Alaska. In Contributions to North American Ethnology, Vol. 1, edited by John W. Powell, U.S. Geographical and Geological Survey of the Rocky Mountain Region 1:7-40.

Davidson, George

1901 Explanation of an Indian Map. Mazama 2(2):75-82. Portland.

Delaguna, Fredericka

1947 The Prehistory of Northern North America as seen from the Yukon. SAA Memoir 3.

1972 Under Mount St. Elias: The History and Culture of the Yakutat Tlingit. Smithsonian Contributions to Anthropology 7:3 parts. Washington.

Department of Fisheries and Environment (DFE)
1977 Enumeration of the 1976 Salmon Spawning Populations in the Klukshu River, Yukon Territory. Northern British Columbia and Yukon Branch of the Fisheries and Marine Service, Department of Fisheries and Environment.

1977 "Counts of Salmon in the Klukshu River." Unpublished ms.

1978 "Counts of Salmon in the Klukshu River." Unpublished ms.

1979 "Counts of Salmon in the Klukshu River." Unpublished ms.

1980 "Counts of Salmon in the Klukshu River." Unpublished ms.

Donald, Leland and D.H. Mitchell
1975 Some Correlates of Local Group Rank Among the Southern Kwakiutl. Ethnology 14(4):325-346.

Douglas, G. W.
1974 Montane Zone Vegetation of the Alsek River Region, Southwest Yukon. Can. Journal of Botany 52:2505-2532.

Drucker, Phillip and Robert F. Heizer
1967 To Make My Name Good. Berkeley: University of California Press.

Emmons, George T.
1907 The Chilkat Blanket. Mem. of the American Museum of Natural History. Vol. V.:90-400.

Foerester, R. E.
1968 The Sockeye Salmon. Fisheries Research Board of Canada 162. Ottawa: Queen's Printer.

Fretwell, Stephen
1972 Populations in a Seasonal Environment. Monographs in Population Biology 5. Princeton, N.J.: Princeton University Press.

Fried, Morton
1960 On the Evolution of Social Stratification and the State. In Culture in History: Essays in Honor of Paul Radin, edited by Stanley Diamond. New York: Columbia University Press.

Gilbert, Scott
1978 Personal Communication.

Glave, E.J.
1890 The Alaska Expedition. Frank Leslie's Illustrated Newspaper. 70: 84, 86, 87, 266, 286-87, 310, 328, 332, 352, 374-76, 396-97, 485, 572.

1891 The Alaska Expedition, Frank Leslie's Illustrated Newspaper. 71:414:438.

1892 Pioneer Packhorses in Alaska, 1, The Advance. Century Illustrated Monthly Magazine. 44(5):671-82.

1892 Pioneer Packhorses in Alaska, 2, The Return to the Coast. Century Illustrated Monthly Magazine. 44(6):869-81.

Graburn, N.H. and B.S. Strong
1974 Circumpolar Peoples: An Anthropological Perspective. Pacific Palisades: Goodyear.

Guthrie, R.D.
1968 Paleoecology of a Late Pleistocene Small Mammal Community from Interior Alaska. Arctic 21(4):221-244.

Hamilton, W.J. and K.E.F. Watt
1970 Refuging. Annual Review of Ecology and Systematics 1:263-287.

Harrington, John
n.d. Unpublished notes and vocabulary from George Johnson, Alaska, 1940. Document No. 4100. Archives, Smithsonian Office of Anthropology.

Harris, Marvin
1968 The Rise of Anthropological Theory: A History of Theories of Culture. New York: Crowell.

Hefley, Sheri
1981 The Relationship Between Northern Athapaskan Settlement Patterns and Resource Distribution: An Application of Horn's Model. In Hunter-Gatherer Foraging Strategies, edited by Bruce Winterhalder and Eric Alden Smith. Chicago: University of Chicago Press.

Henshaw, John
1970 Conflict between Dall Sheep and Caribou. The Canadian Field-Naturalist 84(4):388-390.

Hewes, Gordon W.
1973 Indian Fisheries Productivity in Pre-contact Times in the Pacific Salmon Area. Northwest Anthropological Research Notes, 7(2):133-155.

Higgins, Howard
n.d. Tahltan Winter Subsistence: A New Perspective. Unpublished ms.

Hosley, Edward
1977 A Re-examination of the Salmon Dependence of the Pacific Drainage Culture Athapaskans. In Problems in the Prehistory of the North American Subarctic: The Athapaskan Question, edited by J. Helmer, S. VanDyke and P. Kense. Archaeological Association , Dept. of Archaeology, University of Calgary, Calgary Alberta, pp. 124-129.

Horn, H.S.
1968 The Adaptive Significance of Colonial Nesting in Brewer's Blackbird (Euphagus cyanocephalus). Ecology 49:682-94.

Hughs, Roger N.
1979 Optimal Diets under the Energy Maximization Premise: the Effects of Recognition Time and Learning. American Naturalist 113:209-21.

Jarvis, A.M.
1899 Annual Report of Inspector A.M. Jarvis. Northwest Mounted Police Report, 1898, Part III, Yukon Territory, Appendix H:95-110.

Johnson, Frederick and Hugh M. Raup
1964 Investigations in the Southwest Yukon:Geobotanical and Archaeological Reconnaissance. Papers of the Robert S. Peabody Foundation for Archaeology 6(1):1-198. Andover: Phillips Academy.

Johnson, Linda
1984 The Day the Sun was Sick. Yukon Indian News,Special Edition, Summer, pp.11-16.

Jorgensen, Joseph
1980 Western Indians. New York: W.H. Freeman and Company.

Kelley, Robert L.
1980 Hunter-Gatherer Settlement Systems. Unpublished Ph.D. dissertation, Department of Anthropology, University of New Mexico.

Kendrew, W.G. and D. Kerr
1955 The Climate of British Columbia and the Yukon Territory. Ottawa: Queen's Printer.

Kindle, E.D.
1953 Dezadeash Map Area, Yukon Territory. Geological Survey of Canada Memoir 268. Ottawa.

Klein, David R.
1965 Postglacial Distribution Patterns of Mammals in the Southern Coastal Regions of Alaska. Arctic 8(1):7-20.

Krause, Arthur
1882 Die Expedition der Bremer geographischen Gesellschaft nach der Tschuktschen-Halbinsel und Alaska, 1881-1882, III. Deustsche geographische Blatter 5(3):177-201. Bremen.

Krause, Aurel
1885 Die Expedition der Bremer geographischen Gesellschaft nach der Tschuktschen-Habinsel und Alaska, IV. Deutsche geographische Blatter 5(4):304-325. Bremen.

Krebs, Charles
1972 Optimal Foraging: Decision Rule for Predation. In Behavioral Ecology, edited by J.R. Krebs and N.B. Davies, pp. 23-63. London: Blackard Scientific Publications.

Krech, Shepard III
1983 The Influence of Disease and the Fur Trade in Arctic Drainage Lowlands Dene, 1800-1850. Journal of Anthropological Research 39:123-146.

Kroeber, Alfred
1939 Cultural and Natural Areas of Native North America. Berkeley: University of California Press.

Lee, Richard B.
1968 What Hunters Do for a Living or How to Make-out on Scarce Resources. In Man the Hunter, edited by R.B. Lee and I. Devore, pp. 30 -48. Chicago:Aldine Press.

1969 !Kung Bushmen Subsistence: an Input-output Analysis. In Environment and Cultural Behavior, edited by A.P. Vayda, pp. 47 - 79. New York: Natural History Press.

Lerbekmo, J.F., J.A. Westgate, D.G.W. Smith and G.H. Denton
1975 New Data on the Character and History of the White River Volcanic Eruption, Alaska. In Quarterary Studies, edited by R.P. Suggute and M.M. Cresswell, pp. 203-209. Wellington: The Royal Society of New Zealand.

Lindsey, C.C.
1975 Proglacial Lakes and Fish Dispersal in Southwestern Yukon Territory. Verh. Internat. Verin. Limnol. Bd. 19:2363-2370.

Lysk, Kenneth, Edith Bohmer and Willard Phelps
1977 Alaskan Highway Pipeline Inquiry. Ottawa: Minister of Supply and Service Canada.

McClellan, Catharine
1950 Culture Change and Native Trade in the Southern Yukon Territory. Ph.D. dissertation on microfilm. Berkeley,University of California.

1975 My Old People Say: An Ethnographic Survey of Southern Yukon Territory. National Museums of Canada, Publications in Ethnology 6(2). Ottawa.

1981 Tutchone. In Handbook of North America Indians. Vol. 6, Subarctic, edited by June Helm, William C. Sturtevant general editor, pp. 493-505. Washington D.C.: Smithsonian Institution.

McClellan, Catharine and Julie Cruikshank
1976 Preliminary Investigations of the Social Impact of the Alaska Highway on Yukon Indians: Probable Parallels to the Impact of Pipeline Construction. Evidence presented to the MacKenzie Valley Pipeline Inquiry. May 5, 1976. Yellowknife.

McClellan, Catharine, James A. Fall and Janice R. Sheppard
1987 Part of the Land, Part of the Water, A History of the Yukon Indians. Douglas & McIntyre. Vancouver.

MacArthur, J.J.
1898 Exploration of the Overland Route to the Yukon byway of the Chilkat Pass (Canada). Dept. of Interior Annual Report 1897, Part 2, Dominion Lands Surveys Report 20:128-140.

MacArthur, Robert H.
1972 Geographical Ecology. New York: Harper and Row.

MacArthur, Robert H. and Edward O. Wilson
1967 The Theory of Island Biogeography. Princeton,N.J.: Princeton University Press.

MacNeish Richard S.
1964 Investigations in Southwest Yukon: Archaeological Excavations, Comparisons, and Speculations. Papers of the R.S. Peabody Foundation for Archaeology. 6(2):201-488. Andover: Phillips Academy.

Muller, J.E.
1967 Kluane Lake Map-area, Yukon Territory(1156,115FE1/2). Geological Survey of Canada Memoir 340, Ottawa.

Murdock, George Peter
1968 The Current Status of the World's Hunting and Gathering Peoples. In Man the Hunter, edited by Richard B. Lee and Irven Devore. Chicago: Aldine.

Murdock, George Peter and Diana O. Morrow
1970 Subsistence Economy and Supportive Practices: Cross-cultural Codes 1. Ethnology 9:302-330.

O'Leary, Beth Laura
1977 Field Notes.

1978 Field Notes.

1979 Field Notes.

1980 The Nesketaheen Village Preservation and Survey Project. Unpublished Manuscript. Champagne/Aishihik Band Office, Haines Junction Yukon, Canada.

Orlans, G.H.
1971 Ecological Aspects of Behavior. In Avian Biology Vol. 1, edited by Donald S. Farner, James R. King, and K.C. Parkes, pp. 513-46. New York: Academic Press.

Ortiz, Alfonso
1969 The Tewa World. Chicago and London: University of Chicago Press.

Osgood, Cornelius

1936 The Distribution of Northern Athapaskan Indians. Yale University Publications in Anthropology. 7:1-23. New Haven, Yale University Press.

Panowski, Eileen

1985 Analyzing Hunter-Gatherer Tests of Population Pressure, Subsistence, Social Structure, Northwest Coast Societies and Slavery. Unpublished Ph.D. Dissertation. University of New Mexico.

Parnell, C.

1942 Campbell of the Yukon, pt. 1. The Beaver 273:4-6

1942 Campbell of the Yukon, pt. 2. The Beaver 273:16-18.

Penlington, Norman

1972 The Alaska Boundary Dispute: A Critical Reappraisal. McGraw-Hill Ryerson Limited.

Perlman, Stephen M.

1980 An Optimum Diet Model, Coastal Variability and Hunter-Gatherer. In Advances in Archaeological Method and Theory, Vol. 3, edited by M.B. Schiffer. pp. 126-142. New York: Academic Press.

Peterson, R.L.

1955 North American Moose. Toronto: University of Toronto Press.

Piddocke, Stuart

1965 The Potlatch System of the Southern Kwakiutl: A New Perspective. Southwestern Journal of Anthropology 21:244-264.

Pyke, G.H., H.R. Pulliam and E.L. Charnov

1977 Optimal Foraging: A Selective Review of Theory and Tests. Quart. Rev. Biol. 52:137-54

Rainey, F.G.

1939 Archaeology in Central Alaska. Anthropological Papers of the American Museum of Natural History 36(4):351-406.

Rand, A.L.

1945 Mammals of the Yukon. National Museum of Canada Bulletin 100, Ottawa: Canada.

Ransom, J.E.

1946 The Aleut Natural Food Economy. American Anthropologist 46:607-23.

Ray, Arthur

1974 Indians in the Fur Trade. Toronto: University of Toronto Press.

Rivera, Trinita

1949 Diet of a Food-gathering People, with Chemical Analysis of Salmon and Saskatoons. In Indians of the Urban Northwest, edited by Marian W. Smith, pp. 19-36. New York: Columbia University Press.

Roback, Frances and Michael Gates
1973 Patterns of Trade In Two Southern Tutchone Settlements, Southwest Yukon: An Ethnohistoric Approach. Ms. in the Yukon Archives, Whitehorse Yukon Canada.

Rogers, Edward S.
1963 The Hunting Group-Hunting Territory Complex Among the Mistassini Indians. National Museum of Canada Bulletin No. 195. Ottawa: Canada.

Rushforth, Scott and James Chisholm
1991 Cultural Persistence: Continuity in Meaning and Moral Responsibility Among Bearlake Athapaskans. University of Arizona Press. Tucson

Scholk, Randall F.
1977 The Structure of an Anadromous Fish Resource. In For Theory Building in Archaeology, edited by Lewis R. Binford, pp 207-249. New York:Academic Press.

1978 Foragers of the Northwest Coast of North America: The Ecology of Aboriginal Land Use Systems. Unpublished Ph.D. dissertation. University of New Mexico.

Schoemer, Thomas W.
1971 Theory of Feeding Strategies. Annual Review of Ecology and Systematics 2:369-404.

Schultz L.P. and E.M. Stern
1948 The Ways of Fishes. New York: D.Van Nostrand Co. Ltd.

Service, Elman R.
1968 Primitive Social Organization; An Evolutionary Perspective. New York: Random House.

Slobodin, Richard
1962 Band Organization of the Peel River Kutchin. National Museum of Canada Bulletin No. 179. Ottawa.

Smith, Eric Alden
1979 Human Adaptation and Energetic Efficiency. Human Ecology 7:53-74.

Smith, Gerald R. and Ralph F. Stearley
1989 The Classification and Scientific Names of Rainbow and Cutthroat Trouts. Fisheries 14(1):4-10.

Smith, Marian W.
1940 The Puyallup-Nisqually. New York: Columbia University Press.

Smith, Maynard
1975 Models in Ecology. London: Cambridge University Press.

Steward, Julian H.
1938 Basin-Plateau Aboriginal Socio-political Groups. Bureau of American Ethnology Bulletin No. 120. Washington: U.S. Government Printing Office.

1955 Theory of Culture Change: The Methodology of Multilinear Evolution. Urbana: University of Illinois Press.

Suttles, Wayne
1968 Coping with Abundance: Subsistence on the Northwest Coast. In Man the Hunter, edited by Richard B. Lee and Irven Devore. Chicago: Aldine.

Swann, J.G.
1870 The Indians of Cape Flattery. Contributions to Knowledge Vol. XVI. Washington: Smithsonian Institution.

Tanner, Adrian
1966 Trappers, Hunters and Fisherman: Wildlife Utilization in the Yukon Territory. Yukon Research Project Series No. 5. Ottawa: Department of Northern Affairs and Natural Resources.

Taylor, Walter
1964 Tethered Nomadism and Water Territory: an Hypothesis. Acts of the 35th International Congress of Americanists. pp. 197-203. Mexico City.

Terasmae, J.
1964 Notes on Quarternary Paleoecological Problems in the Yukon Territory and Adjacent Regions. Geological Survey of Canada Paper. 67-46. Ottawa: Queen's Printer.

Thompson, Arthur R.
1925 Gold-seeking on the Dalton Trail. Boston: Little Brown and Company.

Van Stone, James
1974 Athapaskan Adaptations: Hunters and Fisherman of the Subarctic Forest. Chicago: Aldine.

Vayda, Andrew P.
1961 A Re-examination of Northwest Coast Economic Systems. Transactions of the New York Academy of Sciences, series 2, 23:611-624.

Waisberg, L.G.
1976 Boreal Forest Subsistence and the Windigo: Fluctuations of Animal Populations. Anthropologica (17)2:324-347.

Williams, B.J.
1968 The Bihor of India and Some Comments on Band Organization. In Man the Hunter, edited by Richard B. Lee and Irven Devore. pp.126-31. Chicago: Aldine.

1974 A Model of Band Society. Society for American Archaeology Memoir 29.

Wilmsen, Edwin N.

1973 Interaction, Spacing Behavior and the Organization of Hunting Bands. Journal of Anthropological Research 29:1 - 31.

Winterhalder, Bruce

1981 Foraging Strategies in the Boreal Environment: an Analysis of Cree Hunting and Gathering. In Hunter-gatherer Foraging Strategies: Ethnographic and Archaeological analysis, edited by B. Winterhalder and E. Smith, pp. 13-35. Chicago: University of Chicago Press.

Wood, Z.T.

1899 Annual Report of Superintendent Z.T. Wood. Northwest Mounted Police Report, 1898, Part III, Yukon Territory, Appendix A: 32-56.

Workman, William B.

1972 "The Cultural Significance of a Volcanic Ash which Fell in the Upper Yukon Basin about 1400 Years Ago." Expanded version of a paper read at the International Conference on Prehistory and Paleoecology of the Western American Arctic and Subarctic. Calgary. Mimeoed.

1977 The Prehistory of the Southern Tutchone Area. In Problems in the Prehistory of the North American Subarctic: the Athapaskan Question, edited by J. Helmer, S. Van Dyke and P. Kense, pp. 46-54. Archaeological Association, Department of Archaeology. University of Calgary.

1978 Prehistory of the Aishihik-Kluane Area, Southwest Yukon Territory, Canada. National Museum of Man Mercury Series, Archaeological Survey of Canada Paper No. 74. Ottawa.

Wynne-Edwards, V.C.

1947 The Yukon Territory. In Northwest Canadian Fisheries Surveys in 1944-1945. Fisheries Res. Board Canada Bulletin 72:5-20.

Yellen, John and Henry Harpending

1972 Hunter-Gatherer Populations and Archaeological Inference. World Archaeology 4:244-253.

Zagoskin, Lt. L.A.

1967 Lieutenant Zagoskin's Travels in Russia-America, 1842-1844. Arctic Institute of North America, Anthropology of the North 7, edited by H.N. Michael, translations from Russian sources.