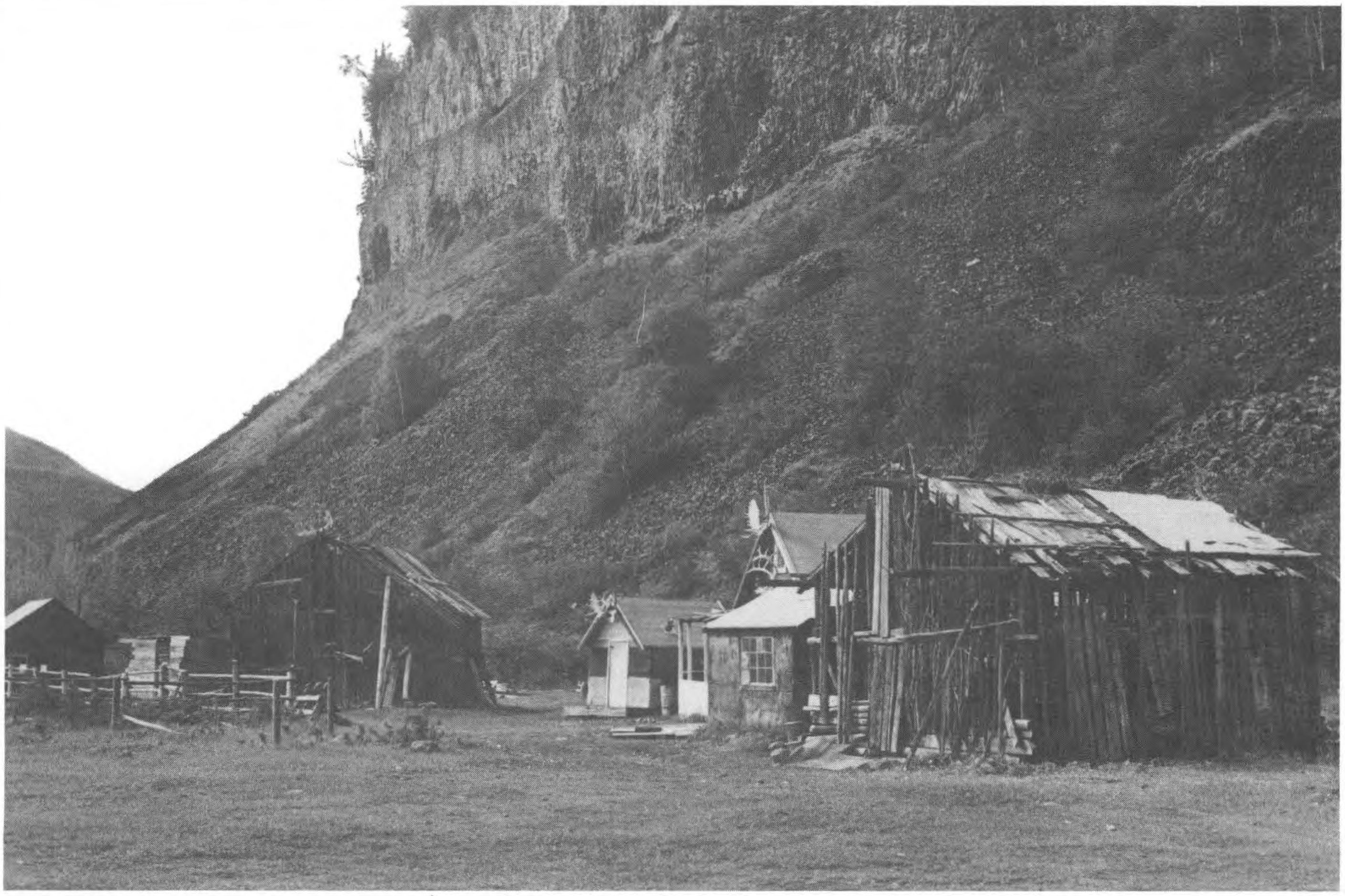
Tahltan Ethnoarchaeology



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Publication Number 15
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Cover Photo: Fishing camp at Tahltan-Stikine Confluence.
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I BACKGROUND TO RESEARCH

Introduction

This report presents results of research into traditional Tahltan subsistence practices. It represents an attempt to apply a relatively new approach, ethnoarchaeology, to British Columbia archaeology in order to understand the nature of past cultural adaptation in a northern sub-arctic environment.

The goals of the present research are based on the premise that an understanding of the dynamics of prehistoric subsistence behavior and site formation processes is crucial for full interpretation of archaeological remains of an area. Thus, the major goal of this research was to establish a model of traditional subsistence patterns of the Tahltan Indians useful for interpretation of archaeological sites in the Upper Stikine River area of northern British Columbia.

A second goal has been to provide more general theoretic contributions to the study of hunter-gatherer societies. Using an ethnoarchaeological approach to the study of subsistence patterns, this research has gathered data which provide a basis for the formulation of testable hypotheses concerning processes of subsistence specific site formation and transformation.

The rapid increase in development of natural resources in the northern part of the province has stimulated an increased need for archaeological research in more remote areas of British Columbia. The B.C. Hydro and Power Authority are currently conducting feasibility studies for the damming of several major rivers in the province, including the Stikine and Liard rivers in the far north. The expansion of mining and logging operations and the development of hydroelectric power also require the extension of highways, railways, and transmission line corridors, as well as the sale of large tracts of land for private and commercial development.

Rapid increase in resource development is accompanied by changes not only in the physical landscape but also in the social environment of groups living in these areas. This means that opportunities for ethnographic recording of traditional aspects of native culture are quickly being eroded away. This situation is not restricted to British Columbia and has been recognised by the National Museum of Man through the implementation of an Urgent Ethnology Program for research in many parts of Canada. Two research contracts have been granted for work in the Stikine area of British Columbia; one to Robert Adlam, of the University of Toronto, for a study of Tahltan kinship systems, the second to Howard Higgins, of the University of New Mexico, who is concerned with symbolic aspects of Tahltan use of space.

Most of the Stikine River area is still relatively isolated in comparison with other parts of British Columbia. However, a number of development projects have been proposed for the area. Plans for leasing a large tract of Crown Land along the Stikine River on either side of Telegraph Creek instigated an archaeological site survey and inventory project by the B.C. Heritage Conservation Branch during the summer of 1978. This survey project recorded 132 new sites along the Stikine and lower Tahltan Rivers (French 1980).

Previous interest in the prehistory of the Stikine River area was first stimulated by the discovery of archaeological remains in the vicinity of Telegraph Creek by W. Workman during a brief visit in 1967. Bryan C. Gordan carried out preliminary survey of the road between Telegraph Creek and the Tahltan River in 1968, recording several sites. J. Smith, of the University of Calgary, returned to the area in 1969 and 1970 at which time he conducted test excavations of several sites in the vicinity of the confluence of the Tahltan River with the Stikine. On the basis of obsidian hydration values, Smith defined five phases in a somewhat questionable chronological sequence of occupation extending from the historic period back more than 10,000 years. The latest "Tahltan" phase has been directly related to occupation of the area by Athabaskan speaking Tahltans for at least the last 500 years (Smith 1970, 1971).

More recently, Fladmark and Nelson (1977) conducted a brief reconnaissance in the southwestern portion of Mt. Edziza Provincial Park to assess the archaeological potential of this previously unknown area. A large number of quarry sites as well as associated workshops and camp sites were found in several localities adjacent to extensive obsidian sources in the Rasberry Pass area. Subsequent investigation of these sites (Fladmark 1982) indicates occupation and use of the area during the past 5,000 years.

X-ray fluorescence analysis of obsidian artifacts (Nelson et al. 1975) suggests that extensive trade networks were established throughout northern British Columbia by aboriginal peoples in early prehistoric times. Artifacts made of obsidian from Mt. Edziza sources have been identified in archaeological sites as far away as the Yukon, northern Alberta, central B.C., and southeast Alaska, and from components as old as 9,000 to 10,000 years (Fladmark 1982).

Archaeological investigations have also been conducted in the middle Stikine River area in response to B.C. Hydro's proposed generation dams on the Stikine (Apland 1980, Friesen 1982, Magne 1982).

Many native people in British Columbia still maintain strong ties to their aboriginal land through continued involvement in traditional subsistence activities. In some areas traditional economic pursuits are still carried out even in the face of rapidly encroaching industrial development, as poignantly described by Brody (1981) in his recent study with the Beaver Indians. Many older native people have a wealth of knowledge concerning traditional activities which they are often willing to share with the archaeologist who has a genuine interest and who is willing to spend time actively participating in them.

The present author's introduction to the Stikine River area was during the summer of 1978 as part of the crew carrying out archaeological survey and inventory under K. Fladmark. It was during this time that I had the opportunity to observe and participate in summer salmon fishing activities with several Tahltan people. Although it was suggested that a more narrowly focused study would have been suitable for research, it was the encouragement of Tahltan people to learn more about their traditional subsistence activities that led to the research on which this report is based. This study is therefore a reflection of my extended involvement with the Tahltan people in the Stikine area. It is written as much for them, and others who live in or are interested in the Stikine area, as for students of aboriginal peoples and cultures.

Theoretical Framework

The conceptual framework underlying the focus of this study of subsistence patterns is founded in the approach of cultural ecology. The tendency to adopt an ecological perspective in anthropological analysis began to gather momentum in the late 1950's and early 1960's (Netting 1977:6). Steward (1955:30), who first defined the concept of cultural ecology, felt that a new approach was needed to supplement the usual historic approach in anthropology in order to explore the creative processes involved in the adaptation of culture to environment. Using a holistic view of culture in which all aspects of culture are functionally interdependent on one another, Steward (1955:37) also developed the concept of culture core--the constellation of cultural features which are most closely related to subsistence activities and economic arrangements.

In presenting a method for cultural ecological research Steward accords three research priorities: 1) the analysis of interrelationships of the exploitative or productive technology and the environment; 2) the analysis of behavior patterns in the exploitation of a particular area by means of a particular technology; and 3) to ascertain the extent to which behavior patterns entailed in exploiting the environment affect other aspects of culture (Steward 1955:40-41).

Following in the footsteps of cultural anthropology, archaeology slowly adopted ecological approaches in the study of prehistoric societies, accompanied by changing concepts of culture, and expanding goals for archaeological research. A theoretical debate which developed in the mid 1960's in American archaeology resulted in a split between the 'normative' approach of cultural historians and approaches used by members of the process school. A basic assumption of the process school, derived from the ecological approach in anthropology, is that culture is adaptive and systemic (Binford 1962, 1964, 1965, Flannery 1967). Process archaeologists have adopted White's definition of culture as man's extrasomatic means of adaptation which serves to fulfill his needs (White 1959:8).

Influenced by a developing body of general systems theory and ecological approaches in the biological sciences, White viewed cultures or sociocultural systems as living, open systems involved in harnessing free energy for maintenance and self extension. White was concerned with following the flow of energy through the cultural system as a process of energy transformation which conforms to the first and second principles of thermodynamics (White 1959:38, Odum 1975:60). Energy flow models are useful for analyzing how various forms of energy in terms of resources available within the physical environment are procured, transformed and finally discarded by the cultural system to form part of the archaeological record (Schiffer 1972, 1976).

A system is defined as "a set of objects together with the relationships between the objects and between their attributes" (Hall and Fagan 1956:18). A system can be biological, physical, or cultural and can be divided into subsystems. General systems theory is useful at the theoretical level of model building in order to study all possible relationships between component parts of a system which are abstracted from a concrete situation or body of empirical knowledge (Boulding 1956:11). A model is a theoretical construct which represents our understanding of the system under investigation. It is not static as long as research on the problem is in progress. As new data are acquired and our understanding of the system changes so do the models we use. Model building is thus important for the formulation and testing of hypotheses concerning relationships between component parts of the system.

Within an ecological framework, subsistence behavior is viewed as a subsystem of the larger cultural system which most closely links human groups to their environment. Each environmental zone consists of a set of potentially exploitable resources which presents particular problems for human utilization. Subsistence behavior reflects the nature of the cultural adaptation of a group to environmental variation in order to fulfill its basic needs of food, shelter, and clothing. Being complex adaptive systems, sociocultural groups are involved in processing, storing, and retrieving environmental information in order to make decisions concerning the scheduling of activities (Buckley 1968:490-91).

According to cultural materialists, the study of subsistence activities is of primary importance in understanding the way cultures function and for the reconstruction of other aspects of culture (Harris 1968, 1971, 1974, 1977, 1979, White 1959). Subsistence activities have a direct and demonstrable influence on other cultural subsystems and variables such as settlement patterns, level of technology, social and political organization, degree of sedentism, as well as on archaeological factors such as intensity of refuse discarded at sites of occupation.

Since subsistence activities can be more readily reconstructed and interpreted from remains which are visible and indentifiable in the archaeological record, subsistence studies have predominated the field of ecological archaeology over the past few years. A growing body of recent studies on hunter-gatherers has focused on the need to develop general models of economic behavior which have predictive value in interpreting adaptive responses to specific situations.

In a survey of some of the recently proposed general models of hunter-gatherer behavior, many of which draw upon theories or principals used in other disciplines, Bettinger (1981) groups these into four types according to their specific focus and predictive value. Among the models of environment, subsistence, settlement location, and population, models of subsistence are seen as having the greatest potential for developing general explanatory approaches to problems of adaptive responses among hunter-gatherers. While subsistence studies must include a consideration of environmental variables, prior knowledge of subsistence adaptation is required in formulating models of settlement location and population.

Several recently developed models of hunter-gatherer subsistence examine the extent to which adaptive subsistence strategies depend on maximization of energy acquisition and minimization of risk. These models use mathematical techniques for weighing relative costs and benefits of different economic choices in an attempt to predict optimal strategies for a given environment.

Among these recent models, Jochim (1976) uses a decision making approach in order to develop a predictive model of proportional resource use. Assuming that different resources are exploited according to their ability to satisfy basic subsistence goals, this model evaluates seasonal variation in animal characteristics, including weight, non-food yield, aggregation size, density, and mobility.

Optimal foraging theory, developed in the field of evolutionary ecology, has recently been applied to the study of hunter-gatherers and the development of a variety of predictive models of subsistence behavior, focusing on such problems as optimal diet, optimal group size, and optimal levels of information exchange. Optimal diet models (Hawkes et al. 1982, Perlman 1980, Winterhalder 1981) attempt to predict the range of items exploited based on relative abundance and net caloric yield of different resources in relation to costs of procuring and processing them.

Earle (1980) combines a decision making approach with optimal foraging concepts to develop a model in which the costs of individual procurement strategies are weighted against their potential yields in order to predict an optimal foraging strategy mix.

The recent application of linear programming techniques to optimal foraging models (Keene 1979, Reidhead 1979, 1980) allows for a more complex analysis of a wider range variables and resource attributes in order to predict the most efficient solution to a given economic problem.

Bettinger (1981: 231-241) has reviewed some of the critical assumptions and conditions that must be dealt with if the predictions of recently proposed models are to be valid: 1) The models require that all potential resources be listed and their costs and payoffs specified. It must also be assumed that aboriginal groups had full knowledge of these resources so that the subsistence system is the result of economic decision; 2) It must be assumed that the environment and its resources are stable so that the yield of individual resources can be described by a mean or range of values, and that exploitation of a resource does not affect these values; 3) Holding technology constant, it must be assumed that decisions regarding the range and intensity of resources to be exploited are made with reference to the local group (minimum band), and that no larger regional system is being involved; 4) It is usually assumed that for a given environment, and a given technology, there is only one optimal adaptive solution and that the adaptive process is sufficiently constraining that local groups will closely approximate this optimal solution.

Application and testing of these

predictive models in specific ethnographic and archaeological situations have met with limited success to date, largely due to rigid data requirements and some unrealistic theoretical assumptions on which the models are based (Bettinger 1981, Durham 1981). These studies suggest that reliability rather than efficiency may be a major factor influencing economic decisions made by hunter-gatherers. For these reasons I have not attempted to use one of these recent mathematical models in the present study to describe Tahltan subsistence behavior. However, this research gathers a data base which could be used in formulating mathematical models for testing with archaeological data at a more detailed level of analysis in the future.

Taking a general systems approach to reconstructing subsistence patterns, the present research investigates the relationships between environmental variables, resource attributes, technology of exploitation, and details of subsistence activities derived from ethnographic data. This study examines the extent to which seasonal and long term fluctuations in resource abundance and availability influence the subsistence strategies employed by Tahltan people in adapting to a northern environment. A seasonal model of subsistence patterns is reconstructed as a basis for predicting the types of archaeological sites, their location, and kinds of remains which might be found in the Stikine River area.

Methodology

In order to reconstruct traditional subsistence patterns in the form of a model useful for the interpretation of archaeological sites in the Tahltan area, the present research has gathered data from a wide range of sources, using a variety of methods. Theoretical considerations, based on a review of other studies of hunter-gatherer groups and their adaptation, have been used to direct investigations and postulate hypotheses concerning subsistence behavior and site formation processes.

With a cultural ecological approach to the study of subsistence patterns, environmental factors such as geomorphology, topography, climate, vegetation, and fauna are essential variables in the model. Much of the data on these aspects is obtained from Federal and Provincial Government agencies including Departments of Agriculture, Environment, Fish and Wildlife, Forestry, and the Geological Survey of Canada.

Library study of historic accounts of early exploration and culture contact in the Stikine area has been carried out in order to establish historical continuity of the Tahltan people in the study area and to determine the degree of influence of culture contact on traditional subsistence practices. Early ethnographic literature on the Tahltan was consulted for information recorded on technology and subsistence activities as practiced during the early historic and protohistoric period. Extensive use has been made of Teit's unpublished notes which provide a wealth of information concerning traditional aspects of Tahltan culture. While the ethnographic data available covers a wide range of topics, this study only summarizes those aspects which are related to subsistence behavior.

Since most ethnographies generally lack the kinds of specific data useful to the archaeologist in reconstructing past lifeways, an ethnoarchaeological approach has also been used. Considerable time was spent in active participant observation and recording of subsistence activities which are still being carried out in a traditional manner. In cooperation with the band councils, a summer program was implemented which involved local Tahltan young people in interviewing knowledgeable elders in the communities about a variety of aspects of traditional lifestyle. Field work also involved survey and mapping of fishing camps and other sites in the area.

Recent emphasis in archaeology on explanation and reconstruction of cultural institutions and cultural processes has brought with it a new realization of the need for data concerning the relationship between a group's adaptive behaviour, the tools that are used, their social organization, and other aspects of culture. According to Stanislawski (1974:18), to understand cultural processes and the structure and function of prehistoric societies, information is best derived from a study of living societies as well as the archaeological record. He defines ethnoarchaeology as the study from an archaeological point of view of the form, manufacture, distribution, meaning, and use of material culture in its institutional setting among non-industrial societies for the purpose of constructing better explanatory models to aid archaeological interpretation and inference.

Thus, ethnographic analogy refers to a general theoretical framework for comparing ethnographic and archaeological patterning. Archaeologists have made use of ethnographic analogy long before the ethnoarchaeological approach received formal recognition (Chang 1967). There are several levels at which ethnographic analogy can be useful in archaeological research. At the most general level, discontinuous models are based on general analogy between areas widely separated in time and space but in which the ecology, resources, and technology used are similar. Although this level of analogy has the widest application, it must be used with caution since it is the most susceptible to misuse and poor application. The most specific, and potentially the most reliable, level of analogy is the direct historic approach (Steward 1942, Baerreis 1961) which makes use of continuous models in situations where the ethnographic society is historically continuous with the prehistoric culture being excavated in the same region (Gould 1974:38-39).

One point of criticism of the use of ethnographic analogy by some archaeologists is that culture change does not allow for a one to one relation or analogy. However, it is probably more efficient to test archaeological data against ethnographic data for an analysis of the relationship between material items in the archaeological record and the adaptive behaviour of which they are the result. It must be stressed that ethnographic data are not used for the purpose of finding the answer to a problem but rather to obtain suggestions for possible solutions to problems of archaeological interpretation in the form of testable hypotheses (Binford 1967, 1968:27). We have a greater probability of finding appropriate solutions to problems by beginning with possibilities suggested from ethnographic examples than we do by randomly applying just any imaginable solution to the problem (Hayden 1978:184).

One of the major problems confronting archaeologists in their attempts to reconstruct subsistence patterns from archaeological remains is that of archaeological visibility. Because the problem of archaeological visibility is greatest for the student of nomadic or semi-nomadic hunter-gatherer groups whose short term, transitory subsistence activities leave little in the way of visible archaeological remains, the use of ethnoarchaeological approaches is especially valuable.

Schiffer (1976: 11-12) has indicated that the archaeological record is an incomplete and often distorted reflection of a past cultural system due to the cultural and non-cultural processes which have transformed cultural materials spatially, qualitatively, formally, and relationally. Several studies (Gould 1968, Lee 1968, Yellen 1976, 1977) have indicated that open air camp sites of highly mobile groups with minimal structures are very susceptible to rapid erosion by wind and rain. Bones are altered or quickly carried off by dogs and other animals. Other natural processes such as vulcanism, stream action, rapid vegetation growth, and frost action can also destroy, alter, or conceal archaeological remains.

Since a large proportion of the material culture of hunter-gatherer peoples is manufactured from organic materials which leave little or no trace in the archaeological record, lithic using activities must be sufficiently focused in a restricted area for the accumulation of tools to be visible.

Yellen (1977) indicates that task specific activities carried out away from habitation camps have low archaeological visibility. The procurement of plant foods, small game, or the occasional larger game animal, leaves too few remains to be significantly visible in the archaeological record.

Archaeological visibility of sites also depends on a variety of factors related to organization of subsistence activities and the technology used to carry them out (Binford 1979), including caching of food and equipment, curation of personal tool kits and valuable items, length of occupation, group size, and range of activities taking place.

It seems evident that the formulation of a model of subsistence patterns through ethnographic observation as well as oral reconstruction of activities, frequencies of visits, duration of occupation as well as the disposition of debris resulting from subsistence activities would enable us to predict the degree of visibility of various types of archaeological sites occupied as well as the nature of the remains. An ethnoarchaeological study of subsistence behavior would thus permit the reconstruction of a much more complete picture of the cultural system than would interpretation of archaeological remains alone. This kind of approach also allows for the generation of useful heuristic and predictive models for different types of subsistence strategies.

II THE TAHLTAN PEOPLE

Introduction

The Tahltan are an Athapaskan speaking group of people who occupy the Stikine Plateau area of northern British Columbia (Figure 1) between the Coastal and Cassiar mountain ranges, and between 56° and 60° north latitude. On the basis of latitude, climate, and vegetation, the area occupied by the Tahltan is considered part of the Subarctic or Boreal Forest Region of Canada. In terms of cultural areas, the Tahltan have variously been classified as belonging to the Western Subarctic (Kroeber 1939), the Cordilleran Cultural Area (Jenness 1932), the Pacific Drainage Cultural Area (Osgood 1936), or the Yukon Subarctic Culture Area (Driver and Massey 1957). More recent studies of Athapaskan groups (McClellan 1970, McClellan and Denniston 1981, VanStone 1974) define Tahltan as belonging to the Subarctic Cordilleran Cultural Area in a classification based on physiographic units which recognize significant ecological factors.

According to linguistic studies (Krauss 1973, 1979, Krauss and Golla 1981:82) the language spoken by the Tahltan people is a dialect of a language referred to as Tahltan-Kaska-Tagish. This language has been called Nahane, a term which is no longer used in this sense. Mutually intelligible dialects of this language are (or were) also spoken by Kaska groups of the Dease and Liard drainages, the Tagish around Bennett and Tagish Lakes, and the Tlingitized Athapaskan group of the upper Taku River and the area of Atlin and Teslin Lakes. The phonology of Tahltan-Kaska-Tagish resembles that of Sekani and Beaver but is sharply distinct from both Tutchone and Slavey-Hare languages.

During the 19th century only a few brief descriptions of the Tahltan people were recorded by early explorers and travellers in the Stikine area. These include Blake (1868), Campbell (1958), Dawson (1888), Muir (1915), and Pike (1967). The principal ethnographers of the Tahltan are Emmons (1911) whose work was carried out in 1904 and 1906, and Teit (1906, 1912, 1919, 1921, 1956, n.d.) who appears to have spent considerable time with the Tahltan people over a period of several years from 1903 to 1915. It is unfortunate that much of the information gathered by Teit has never been published. There are also a few unpublished notes on the Tahltan recorded by the early missionaries (Palgrave n.d., Thorman n.d.) at the turn of the century.

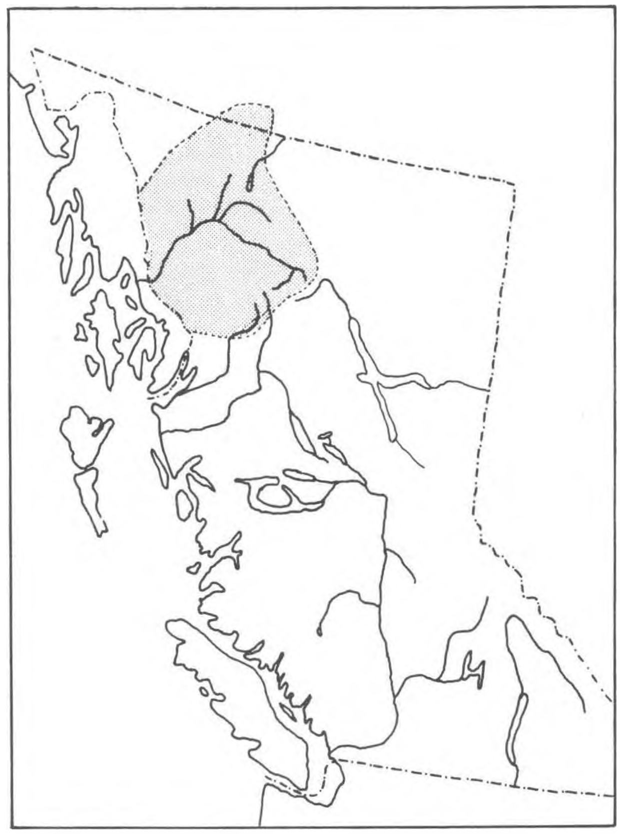


Figure 1. Location of Tahltan territories

Traditional Territories

As recorded at the turn of the century, traditional Tahltan territories included the drainage basin of the Stikine River and its tributaries as far down as the Iskut, Dease Lake and River as far down as the Cottonwood, the upper Rancheria River, the northern sources of the Nass and Skeena Rivers, and some of the southern tributaries of the Teslin and Taku Rivers including the Sheslay and Nahlin (Emmons 1911:6, Teit 1956:43).

Teit spent considerable time with a number of informants in order to locate as correctly as possible the boundaries of the territories claimed by the Tahltan (these are shown in Figure 2). On the west the boundary generally follow the axis of the Coast Range. On the north, from the most westerly point at 133° west longitude, the boundary runs northeasterly parallel to the Taku and Nakina Rivers to near the head of Teslin Lake, crossing the Inlin a little lower than halfway between the Taku and Sheslay confluences. It continues northeasterly, across the Jennings River not far from its mouth, to beyond the Yukon-Mackenzie watershed at 60° north latitude. The Tahltan claim hunting rights to the drainage basin of the upper Rancheria River to its junction with the Liard where they had a trading place. Bending back around the head of Blue River, the boundary runs south and southeasterly, crossing the Dease River about the mouth of the Cottonwood. It continues to the sources of Muddy River almost to 127° west longitude, the most eastern point. From here the boundary follows the Cassiar Mountains south and southwesterly between the sources of the Stikine and Findlay to the headwaters of the Skeena, which is crossed somewhat east of Groundhog Mountain. In the south the boundary follows the watershed between the Skeena and Nass to about latitude 56°, the most southern point. The boundary then crosses the upper Nass near the mouth of Cottonwood Creek, reaching the Cascades again near the heads of Bear and Salmon Rivers (Teit 1956:50-53).

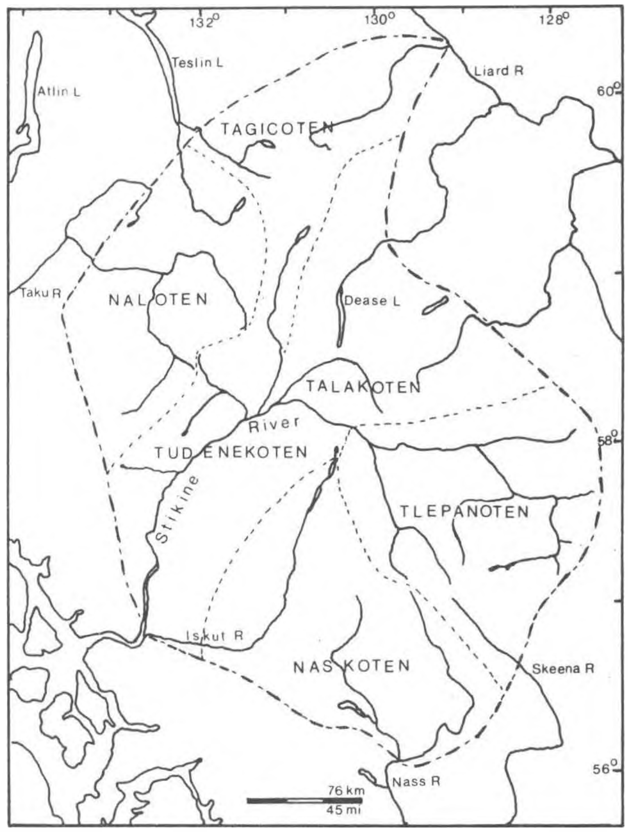


Figure 2. Clan territories and Tahltan tribal boundaries (based on Teit 1956 and unpublished notes)

Through alliances established by intermarriage of Tahltan families with those of other tribes, areas along borders were often shared by both tribes for hunting, fishing, and purposes of trade. In protohistoric times Tahltan shared the lower Stikine River below Telegraph Creek with Tlingit who ascended in summer to dry salmon and berries in the drier interior climate. In winter, Tahltan families had exclusive use of the Stikine as far down as the Iskut for hunting and trapping (Teit 1956:51).

Social Organization

Those aspects of social organization which relate to Tahltan subsistence and settlement patterns will be discussed here. Kinship, or social organization, is the topic of separate and more detailed research conducted by Robert Adlam of the University of Toronto. There is a need to clarify some of the confusion concerning the number and names of Tahltan clans which is present in recent archaeological literature on the Tahltan (Apland 1980, French 1980). This confusion is largely due to having only locally available ethnographic sources to draw upon.

References to six tribal divisions among the Tahltan by Jenness (1932:373) and Osgood (1936:18) are based on Teit's unpublished field notes. Teit indicates that the Tahltan were divided into two exogamous moieties, raven (cheskie) and wolf (chiyone). The Tlingit names for these same divisions are 'katsede' and 'taxtlowedi'. Each moiety had three clans (local bands in earlier times) named after geographical areas in which each clan claimed hunting rights. A fourth, more recent, wolf clan, the 'nana'ai', was formed about 1750 through intermarriage of Tahltan and Tlingit. Table 1 presents the various names used to refer to Tahltan clans. Confusion has arisen from the use of Tlingit terms for phratry divisions in referring to clans or families.

Figure 2 presents the geographical distribution of the six Tahltan clans within

Table 1. Alternate Names Used in Reference to Tahltan Clans or Families.

	Teit n.d.	Current Terms	Thorman n.d.	Emmons 1911
Raven phratry	tceskea (Tahltan) katcede (Tlingit)	cheskie		cheskea
Clan 1.	<u>Tudenekoten</u> Ilkaihitoten Edaxhoten	iskahigotine edatigotine	Ticha'an'oten	Kartchottee
Clan 2.	<u>Naloten</u>	nahlotin	Nahlodeen	sub family Narlotin
Clan 3.	<u>Tlepanoten</u>	tlepanotin klogotine	Thlegtodeen	sub family Klabbahnotin
Wolf phratry	tseone (Tahltan) taxtlowede (Tlingit)	chiyone		cheona
Clan 1.	<u>Talakoten</u>	tahlogotin	Tahlagoteen	Talarkotin
Clan 2.	<u>Naskoten</u>	toklowedi	Nassgodeen	Tucklarwaytee
Clan 3.	<u>Tagicoten</u> Nokagotin			
Clan 4.	Nana'ai	nana'a nanga'ai	Shutin	Naniyee

the tribal territories outlined by Teit as above and noted on a map among his unpublished notes. A similar map has been recently presented by Maclachlan (1981) in volume six of the Handbook of North American Indians. The "nana'ai" clan had no recognized territory, but hunted with others or along the lower Stikine River.

The clan was a group of families claiming common origin; the original possessors and inhabitants of a certain district. It was marked by localization, matrilineal descent, and grades of rank. Each clan had its own chief whose position and name were inherited through the nearest maternal line from a man to his brother or his sister's son. Sometimes, however, the nearest relative might be passed over in favour of a more distant one who was wealthier or more prominent. Status was based on personal character and skills; wealth was a sign of competence. While both Teit (n.d.) and Emmons (1911:27) indicate that women could not inherit chieftainship, Campbell, the first White to encounter the Tahltan, relates his meeting with the Tahltan chieftainess in 1838 (Campbell 1956: July 23, 1838).

Hunting territories belonged to the whole clan in common, although generally each family had its favourite and customary hunting and fishing grounds. The chief of the clan directed the hunting and trapping so that he knew where each household was. These matters were arranged before families dispersed from the major village in the fall. Usually each family let the chief know where they proposed to hunt that season. The chief made regulations concerning the use of hunting grounds and settled any disputes, although he himself had no special privilege or ownership of hunting grounds (Teit n.d.).

Marriage, accompanied by mutual rights and obligations, exchange of goods and services, and access to hunting areas, served to strengthen alliances between clans, particularly those with adjacent territories. Cross cousin marriage appears to be the preferred form of marriage, often with several siblings of one family marrying several of the other. When a woman's husband died she might marry his brother or nephew. Often a man married his dead wife's sister or other close female relative. Although not common, polygyny, as well as adoption, ensured that the physical and social needs of all were fulfilled.

Each clan had its own names, stories, songs, dances, and crests, which were presented at feasts held in the large communal houses when families gathered at the major villages and camps (Teit n.d.). Emmons (1911:27) is of the opinion that matrilineal descent and inheritance of rights was adopted by the Tahltan through trade with the coastal Tlingit, having originally had a social organization based on patrilineal descent. While admittedly many aspects of the social organization were adopted or elaborated along with ceremonials and displays of wealth, through intensified relations with the Tlingit, it would appear that matrilineal descent is a long term Athapaskan trait. Through lexical reconstruction matrilineality has been related to the proto-Athapaskan or proto-Nadene speech community (Aberle 1974:76, Dyen and Aberle 1974).

Subsistence Economy and Trade

While the Tahltan shared many cultural traits with other Athapaskan peoples as well as their coastal neighbours, their subsistence economy reflects their adaptation to a unique geographical area and environment. The ethnographic record indicates that the Tahltan were traditionally semi-nomadic in their yearly round of subsistence activities. The seasonal round is reconstructed in detail in Chapter 7. It is characterized by a pattern of yearly aggregation at summer fishing villages and dispersal during the rest of the year in smaller family groups to travel and hunt within the clan territories. This central based wandering type of community pattern (Beardsley *et al.* 1956:138) is characteristic of several western Athapaskan groups having salmon producing rivers within their territories (VanStone 1974:39)

During the season of the salmon runs, Tahltan families gathered at permanent fishing villages along the major salmon producing rivers for two to three months. Large communal houses, constructed of spruce and pine poles with gabled roofs covered with spruce bark, were used as shelters and for drying large quantities of salmon for storage. Fishing activities involved communal effort and sharing of the season's products. Summer congregation at the permanent villages was also a time of ceremonies, feasting, and trading.

In late August families dispersed to upland areas to snare marmots and ground squirrels, which they dried in quantity for winter. Sheep, goats, and bear were also hunted at high elevations in early fall while a variety of berries were gathered and preserved. Major fall and winter hunting camps were returned to regularly on a seasonal basis. Permanent shelters at these camps were of the single or double lean-to style, made of poles, covered with bark and boughs, and banked with earth. Caribou was a major winter resource which provided not only meat, but also bone and antler for tool making, hides for clothing and bags, as well as babiche, and sinew for thread and fine cordage. Caribou fences with snares set at regular intervals were constructed at strategic locations. Bows and arrows were used when stalking the more solitary browsing animals. Projectile points and knives were generally made of obsidian which was abundant on the slopes of Mt. Edziza. Other tools and utensils were made of wood, bone and antler. Fur bearing animals were caught by means of traps and deadfalls, and furs were used for robes and bedding.

The Tahltan travelled extensively overland on foot, using snowshoes in winter. They rarely travelled by water, using spruce bark canoes or rafts to cross lakes and rivers. Fresh water fish were caught in the many small lakes and streams, mainly in spring. Beaver, bear, grouse, and rabbits were procured in the river valleys during spring along with a variety of vegetable foods.

Close trading relations were maintained with several Tlingit clans who ascended the Stikine from the coast in large canoes to trading camps located between Telegraph Creek and Tahltan River. To the Tlingit, the Tahltan traded caribou and moose hides, furs, robes of marmot and ground squirrel, sinew, babiche, obsidian, snowshoes, and articles of skin clothing and bags in exchange for fish oils, dentalia and haliotis shells, shell knives, stone axes, wooden boxes, woven baskets, Chilkat blankets and other ceremonial items (Teit 1956:97-98). The Tahltan also traded with the Kaska and Sekani peoples further to the interior, and profited in the exchange of coastal goods obtained from the Tlingit for furs from the interior tribes.

In proto-historic times at least, all Tahltan clans recognized the area around the Stikine-Tahltan confluence as the tribal headquarters, and most families visited there annually either to fish or trade. It was rare for a family to stay in its own hunting grounds for more than two or three years without coming to Tahltan confluence (Teit n.d.). Indeed, while the body of anyone who died was cremated within a few days of death, wherever the family might be at the time, the ashes were carried back to Tahltan for ceremonial burial and a funerary feast in honour of the dead person.

The Tudenekoten clan (after Tudessa, meaning long river, the Tahltan name of the Stikine) had prior rights to the Stikine River in the vicinity of the Tahltan confluence where many of the fishing and trading camps were located, and in which various clans gathered. It became the highest ranking and most dominant Tahltan clan in tribal activities during proto-historic times.

III HISTORICAL EVENTS IN THE STIKINE RIVER AREA

Introduction

In order to reconstruct traditional or prehistoric subsistence and settlement patterns it is considered essential in the present study to understand the extent and manner in which the traditional patterns have been influenced and changed by European contact. To this end, library and archival research has been conducted in order to outline the historical events in the Stikine area and the kinds of influences these events have had on the traditional way of life of the Tahltan people.

While the sequence of historic events on the Stikine River was similar to that occurring in other areas of British Columbia, the influence of direct European contact on traditional Tahltan culture was felt much later than in most areas. Throughout the historic period, Tahltans have maintained strong ties to their land and to those aspects of their traditional culture related to a subsistence economy.

Discovery and the Fur Trade Era

European discovery of the Stikine River is attributed to early fur trading ships on the coast. The Russian sea based fur trade was stimulated by Bering's discovery in 1741 that the northwest coast of America was rich in furs, particularly sea otter (Galbraith 1957:114). Although the many shoals and channels of the Stikine estuary were mapped by Captain Vancouver in 1793, the explorer did not recognize the existence of a large river. Ship journals indicate that Captain Cleveland in the sloop "Dragon" and Captain Rowan in the sloop "Eliza" both visited the Stikine delta in 1799 (Dawson 1888:61B). The Russian American Company, created in 1799, was granted a monopoly on the fur trade on the Pacific coast north of 55° latitude, which it held until 1839.

The Tlingit became famous as middlemen in the fur trade with the Russians. The traditional trading patterns between the coastal Tlingit and the Tahltan were intensified during this period. The Stikine chief, Shakes, held a monopoly on trade up the Stikine River similar to that of the Tsimshian chief, Legaic, on the Skeena River (Fisher 1977:32). Chief Shakes brought Russian goods, including very desirable metals, up the river to a trading camp in the vicinity of the Tahltan-Stikine confluence, where they were exchanged for large quantities of interior furs. The Tahltan in turn acted as middlemen, exchanging goods obtained from the Tlingit for furs from the Kaska and other interior groups.

After the amalgamation of the Hudson's Bay Company with the Northwest Company in 1821, the Hudson's Bay Company began expanding its operations to the western slope of the Rocky Mountains. The explorations of Samuel Black in the northern interior during the summer of 1824 made the company aware of the trading patterns established between the interior Indians and the coastal tribes (Fisher 1977:31, Rich 1959:597). In an attempt to reach the Stikine fur trade from the interior, John McLeod set out from Fort Halkett on the Liard River in 1834, discovered Dease Lake and followed aboriginal trails across to the Stikine River. However, this and other attempts to make contact with the "trading Nahannies", as they were known at that time, were unsuccessful due to the fear of reported hostilities on the part of the Indians.

It was not until 1838 that Robert Campbell made his way from Fort Halkett to the Stikine River and crossed "terror bridge" over the Tuya, to become the first white man to make contact with the Tahltan tribe. Although his encounter with the Tahltans and their chieftainess appeared peaceful enough, his life was in danger since Chief Shakes was among them on a trading expedition. Chief Shakes had so impressed upon the Tahltans that white traders from the interior were enemies and should be killed, that Campbell was discouraged from staying in their camp (Campbell 1958: July 23, 1838).

Campbell spent the winter of 1838-39 at Dease Lake. Although the Tahltans on occasion brought him a fresh supply of provisions, they threatened him severely, saying that their country was defiled by his presence. They demanded high prices for their furs, as well as payment for occupying their land. They resented the disruption of established trading patterns and indicated that if Campbell would not trade in the manner of the Russians then he should clear out (Wilson 1970:37-38). Campbell had great difficulty in surviving that winter. The Indians he had brought with him were unfamiliar with the area and as a result were unsuccessful in procuring meat locally. Other groups could not be persuaded to bring him supplies, fearing for their lives if the Tahltans found out about their cooperation with the Whites. Campbell's small group suffered so severely from starvation that winter that they were forced to retreat to Fort Halkett before spring (Campbell 1958: Feb./Mar. 1839).

At the same time the Hudson's Bay Company was attempting to intercept the Stikine fur trade from the coast. A ship named the "Dryad" was outfitted in 1834 for the purpose of establishing a post and colony at the mouth of the Stikine River. This attempt was thwarted by the Russians who built Fort Dionysius on Wrangell Island. After several years of negotiations with the Russian American Company an agreement was finally reached in 1839 by which the Hudson's Bay Company was allowed to lease the coastal territories for an annual rent of 2,000 land otter skins and a condition of supplying Russian colonies with provisions (Galbraith 1957:154, Rich 1959:665). The British took over the fort on Wrangell Island in 1840 which was renamed Fort Stikine, and built another near the mouth of the Taku River. The Stikine Tlingit, however, were not to be denied their monopoly on the interior fur trade and set about harassing Hudson's Bay Company operations. Fort Stikine was attacked several times (Dawson 1888:61B) until the company was forced to suspend attempts to occupy the interior and restrict trading operations to the coast (Rich 1959:637).

Intensified trading activities between the Tlingit and Tahltan brought about increased intermarriage between the two groups, the use of Tlingit as the language of trade, and the adoption of many aspects of Tlingit social customs and organization including displays of wealth and status. The introduction of metals replaced the traditional use of obsidian, bone, and antler in the manufacture of tools with cutting and chopping functions, providing increased efficiency in tool use. The demand for furs intensified an existing traditional activity without affecting the basic subsistence and settlement patterns of the Tahltan. The trapping of fur bearing animals continued to be an activity which all members of the extended family could engage in at winter camps. The fur trade may have stimulated a period of territorial expansion on the part of the Tahltan. Increased conflicts between them and their neighbours on the Taku and upper Nass Rivers during the middle of the nineteenth century may have developed out of the need to defend newly acquired territories.

Another effect of the fur trade on the Tahltans, was a drastic reduction in population due to the spread of smallpox from Tlingit traders. They experienced several epidemics, although the first, which came between 1832 and 1838 (Thorman n.d.), was especially devastating. It came during the late summer while people were still congregated at the fishing villages. The storage of dried salmon in the pits had not yet been completed when all activities came to a halt. Being gathered together in villages, almost all the people were subject to the disease within a short time.

Messengers carried both the bad news and the disease to other villages along the Tahltan and Sheslay Rivers. Over half the population died either from the smallpox itself or from starvation the following winter. The second epidemic arrived in a year between 1847 and 1849. The Tahltan people estimated their original population at between 1000 and 1500 (Thorman n.d.). After the second epidemic their population was not more than 300 - 325. The rapid decline in population meant that there was not enough manpower to maintain the more elaborate fishing operations at fishing villages in the Stikine canyon, so that at least two of these fell into disuse. Many of the respected clan leaders and oral historians died during this period, resulting in a weakening of such traditional institutions as the clan story tellers guild.

The Gold Rush Period

In 1861 two miners named Choquette and Carpenter discovered placer gold in the gravel bars on the Stikine River. The announcement of this discovery created some excitement in Victoria the following winter and several parties outfitted themselves the next spring. They were brought up the Stikine from Wrangell by Captain William Moore in a small steamboat. The Indians camped at Shakes Creek were quite hostile when the steamboat landed there. Their fear that the hiss and clatter of this devilish machine would scare away the salmon and game was only appeased after much argument and gifts of Hudson's Bay blankets. The gold deposits on the Stikine were not very extensive and most of the miners returned south in the fall. This brief flurry however caused the Stikine territory to be defined in 1862 and put under the direction of Governor Douglas. Choquette continued to prospect and operate a small trading post on the lower Stikine for several years (Andrews 1937:32-34).

Explorations for the Western Union or Collins Overland Telegraph Company were extended northwards to the Stikine River by Pope in 1866. At that time the line had been completed in British Columbia from New Westminster as far as Fort Stager, 15 miles north of Hazelton. In 1866 the Steamer "Mumford" arrived at Shakesville with provisions and supplies for the construction of the line north from the Stikine. Thomas Elwyn wintered at Shakesville and carried out exploration on the Stikine that winter. It was at this time that Telegraph Creek was named for the intended crossing of the telegraph line. However, further work on the line was abandoned in 1867 when word came that a transatlantic cable had been laid and was operating successfully. When British Columbia became a province of Canada in 1871, the Dominion Government took over the lease of the telegraph system and maintained it as far as Quesnel while the rest was left to fall into ruin (Mackay 1946:209-214).

The discovery of gold on Thibert Creek, close to Dease Lake, by Thibert and McCullough in 1873, created the Cassiar Gold Rush of 1874. A second wave of miners ascended the Stikine by riverboat as far as Glenora and headed overland to Dease Lake. The Hudson's Bay Company and John C. Calbraith set up trading stores at Glenora in that year. Captain Moore obtained a contract from the Provincial Government to build a road from Glenora to Dease Lake along the aboriginal trail which Campbell had followed 36 years before.

While the prospecting activities on the lower Stikine during the 1860's did not threaten the aboriginal way of life to any extent, the 1874 gold rush brought a sudden influx of miners passing through traditional Tahltan territories. The introduction of large quantities of liquor and infectious diseases, such as measles, resulted in conflicts between Whites and Indians and a further reduction in Tahltan population. In an effort to maintain their identity the various clans gathered together to build a communal village close to the confluence of the Tahltan River with the Stikine, which brought them closer to the trading stores at Glenora. The establishment of these stores shattered the monopoly which the Tlingit had held on interior fur trade and broke down traditional trading patterns between the Tlingit and Tahltan, although the Tlingit continued to ascend the river to fish in summer until the turn of the century.

The Klondyke Gold Rush saw yet another wave of gold seekers pass up the Stikine River, the first leg of the favourite "All Canadian" route to the gold fields in the Yukon. During the winter of 1897 - 1898, between 3,000 and 3,500 men camped at Glenora; the largest and briefest occupation the Stikine has ever seen (Buri 1978:27). Twelve miles upstream, Telegraph Creek became an important centre as the head of navigation on the Stikine. In 1897 the Telegraph Trail north from Telegraph Creek to Atlin was cleared and used as a major transportation route to the Yukon. In 1899 the Dominion Government agreed to connect the existing Yukon telegraph line with the British Columbia system which ended at Quesnel. The line followed closely the route laid out by the Collins Overland Explorations and was completed in 1901 (see Figure 3).

A wide range of new goods and foodstuffs became available to the Tahltan people. The absolute dependency on subsistence hunting for survival was dispelled when furs could be exchanged for other foodstuffs. New methods of preserving and storing native foods such as salting of fish and use of raised log caches were introduced. While the trapping of furs continued to be a major economic activity for the Tahltans, many young men were also employed as packers and hunters by the trading stores. In an effort to increase their population, Tahltan marriage regulations were relaxed and the turn of the century saw several Tahltan women marrying Whites who had come during the 1898 rush and stayed to settle in the area. And, of course, the 1898 Gold Rush brought missionaries to the Tahltan people.

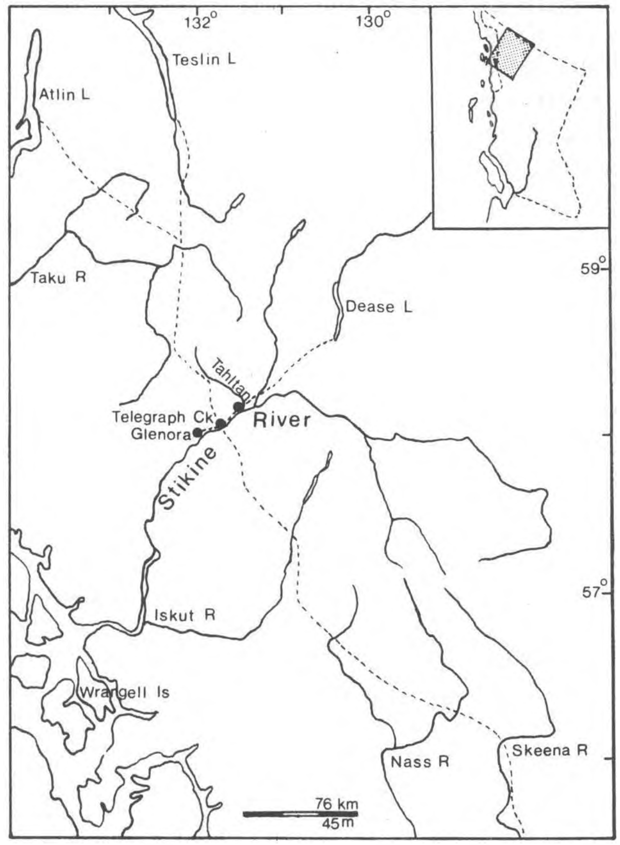


Figure 3. Historic settlements and routes in the Stikine area 1900

Missionary Influences

Bishop Ridley, of the Anglican diocese of Caledonia, came up the Stikine River with the first miners on their way to the Klondyke in 1896. Upon his return to Metlakatla, he made an appeal for someone to carry out missionary work among the miners and the Tahltan Indians. Reverend F.M.T. Palgrave took up the call in 1897 and established a mission at Tahltan village. Ridley was pleased with his efforts to convert the Tahltans to Christianity, and protect them from the debaucheries of the miners (Kreuger et al. 1971:52-57). During his five year stay among them, Palgrave did much to record Tahltan language and grammar. He also made a detailed census of the Tahltans living in the village, listing them by name, who at that time numbered about 225.

In 1901 Palgrave was replaced by T.P.W. Thorman who arrived with his wife and five children. He began immediately to build a mission house and a church which still stand in the village today. Before the end of 1903, 50 Tahltans had been baptised and traditional methods of cremating the dead were replaced by inhumation. However, due to lack of funds the mission was forced to close and the Thormans returned to England. In 1903 the Presbyterian Church sent a medical missionary, Rev. Dr. F. Inglis, to Telegraph Creek, and a government elementary school was opened there (Kreuger et al. 1971:60). Both the medical services and the school were directed mainly towards the White population as very few Tahltans were living in Telegraph Creek at that time.

Interest in the Tahltan mission was renewed through a campaign for funds to support it. The Thormans returned to Tahltan village in 1910. Supported by a grant from the Federal Government, Thorman opened a day school at the village and was pleased to have 15 children in attendance that first summer (Kreuger et al. 1971:62). However, his son Fred, who took charge of the mission in 1912, disparaged the fact that the Tahltan people were still involved in their traditional seasonal subsistence round to the point that he did not have enough students in the school to obtain the government grant to keep it running.

It was during this period that the Tahltans heard rumours that the British Columbia Government claimed as crown property all land outside of Federal Reserves, and they joined other tribes in British Columbia in the Indian Rights Movement. In October 1910 a formal "Declaration of the Tahltan Tribe" was signed by Chief Nanok and eighty other members of the tribe. The Tahltans claimed their rights over their traditional territories which they had defended with wars, still depended on for their livelihood, and did not intend to give up without adequate compensation. James Teit, noted ethnographer of several interior tribes, who was living at Spences Bridge with his Thompson Indian wife, helped form the "Friends of the Indians" and acted as an agent for the Allied Tribes of the province. Teit, had visited Tahltan country several times and carried out ethnographic work among them. He provided a liason between the Tahltan and the southern interior groups and helped draft the Declaration of 1910, as well as those originating at Spences Bridge about the same time. The Thormans remarked several times during this period that the concern for native land claims was hindering their missionary work among the Tahltans (Kreuger et al. 1971:63-64).

Relying solely on donations, the Tahltan mission was maintained by two of the Thorman sons until 1952 when it was closed. Although the Thormans were genuinely concerned about the welfare of the Tahltan people and dedicated many years of missionary work among them, their conversion of the Tahltans to Christianity was only superficial. Underlying the Christian rituals and environment in which they lived at the Tahltan village, the basic elements of Tahltan culture and beliefs persisted and remained strong.

Recent Developments - Opening of the North

After the flurry of the Klondyke Gold Rush in 1898, Telegraph Creek, located at the head of navigation on the Stikine River, continued to be an important supply centre for isolated settlements in the northern interior for many years. Regular river boat service during the summer months brought supplies to Telegraph Creek from where they were transported by vehicle over the road to Dease Lake, or by pack train to other outposts. Trapping continued to be a major economic activity for the Tahltans along with subsistence hunting and fishing, although some families settled in Telegraph Creek and depended on employment with the trading stores or as guides for big game hunters.

However, the most recent period in the history of the Stikine River has seen Telegraph Creek slowly fade in importance. After the construction of the Alaska highway during the Second World War, there was a slow exodus of young Tahltans away from the heart of their traditional territories and way of life to take up jobs in other small towns and villages springing up in the north. This increased communication with the outside world also brought changes to those who remained tied to their homeland and traditions. Government legislation forced permanent settlement of Tahltan families in Telegraph Creek and regular attendance of their children in school. Outlying villages and camps were abandoned except in the summer for fishing or by men who continued trapping alone. The Stikine River became the focus for fishing activities with nets used instead of weirs or traps. New methods of preserving native foods such as canning became popular.

Formal survey and mapping of the north were accompanied by mining exploration in the 1950s. The subsequent opening of the Cassiar asbestos mine and construction of the gravel highway connecting it with Stewart on the coast, 300 miles to the south, provided temporary as well as some permanent employment for Tahltans. As the road became more and more practical for the transportation of goods the Stikine saw its last days as a transportation route to the interior. Since river boats stopped running on the Stikine in 1972, goods destined for Telegraph Creek have been brought in by road on a weekly basis summer and winter, ending the long isolation of winter.

The introduction of modern technology and communications over the past few years has suddenly plunged the Tahltan communities of Telegraph Creek and Iskut into the twentieth century. The introduction of electricity to the villages in 1975 created an unexpected revolution. Refrigeration and freezing units provide an easy and efficient means of preserving native foods, both fish and meat. Other appliances such as electric kettles, radios, and stereos have become popular Christmas gifts and common household items over the past few years. Television via satellite was introduced to the communities late in 1979, and 1980 saw telephones installed in many Tahltan houses, so that families can communicate with relatives living hundreds of miles outside of the valley.

But with this rapid introduction of modern technology also comes fear of being invaded from the south. Mining exploration is increasing at a rapid rate, and B.C. Hydro has started feasibility studies for dams on the Stikine River. Suddenly, the changes are happening too quickly to comprehend, to control and to cope with, and are being accompanied by serious social impacts such as increased alcoholism. While the combination of hunting, fishing and trapping continues to be a viable and preferred means of subsistence for many Tahltans, it is becoming more difficult to maintain this way of life due to increased government enforcement of hunting and fishing regulations on native people. Band politicians are now examining the viability of alternative, locally based, economic enterprises to develop. These include a commercial fishery on the Stikine River and guided wilderness adventures. Land claims has again become an important issue for many Tahltans who cherish their aboriginal heritage and homeland. There is an urgency felt now to record as well as renew a traditional heritage which seems to be quickly fading away as the elders of the community pass on.

Research conducted in the Telegraph Creek area by the author has concentrated on observing and recording traditional activities which are still carried out by local Tahltans. Salmon is still a major economic resource of the Tahltan people. While other methods of preservation are now available, quantities of salmon are still dried in traditional style smokehouses for winter storage as they have been for hundreds and perhaps thousands of years. The hunting of wild game continues to provide a major portion of the native diet. The process and many of the tools used in tanning hides today for making mittens, moccasins, and babiche, have remained unchanged since prehistoric times. Observations on such activities provide the archaeologist with an understanding of activities and processes occurring in the past which resulted in the formation of archaeological sites; an understanding which becomes essential for interpreting the significance of various activities within the overall patterns of subsistence strategies utilized in the past.

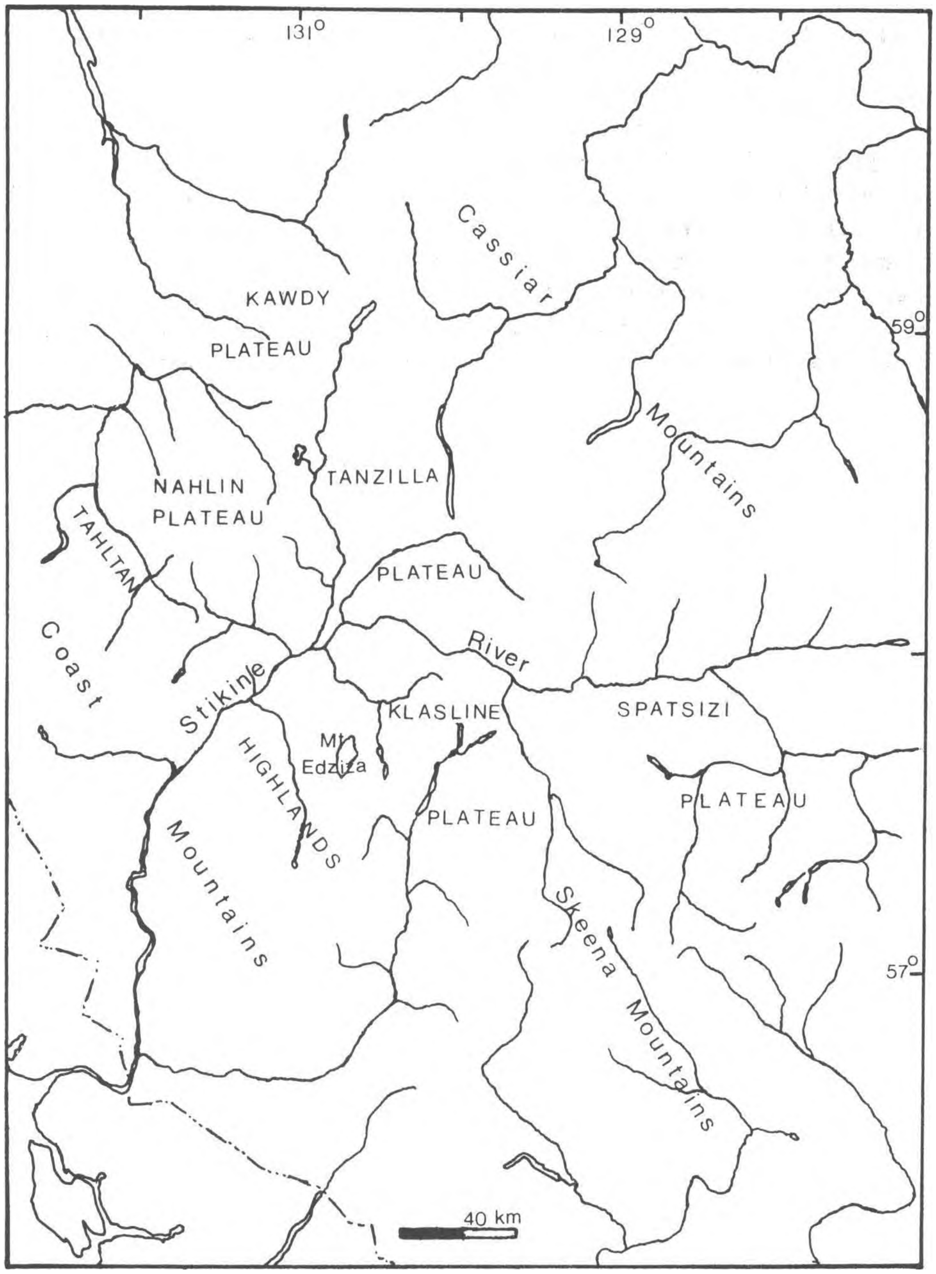


Figure 4. Physiographic areas in northwestern British Columbia

IV THE ENVIRONMENT

The traditional territories of the Tahltan people, as outlined above, are located within two natural physiographic regions, the Stikine Plateau and the Skeena Mountains (as shown in Figure 4). The complex interaction of geologic processes, topography, climate, soils, and vegetation contribute to the nature, abundance, and distribution of resources available for human exploitation. This section summarizes the environmental factors which have influenced human occupation of the area.

Physiographic Areas

The Stikine Plateau is generally characterized by flat and gently sloping upland surfaces which represent remnants of late Tertiary erosional surfaces, uplifted during the Pliocene. It also includes areas modified by extensive Pleistocene volcanic activity and glaciation. The Stikine Plateau is differentially dissected by several major river valleys, and is subdivided into several units each with its own distinct geographical and geological characteristics (Holland 1976:49-55).

The Tahltan highland, running from northwest to southeast, is a transitional zone between the Boundary Range of the Coastal Mountains and the plateau areas to the east. The Mount Edziza Complex and the Spectrum Range dominate the eastern edge of the highlands. Mt. Edziza is a composite volcano rising to a height of 2700 metres (9000 feet) with an ice covered peak. The first Edziza flow, dated to six million years ago by radiometric assay (Souther 1973:16), was followed by many similar flows forming a basal shield volcano with a radial system of canyons. During the late Pleistocene, until about 10,000 years ago, activity in the central conduit built up the central dome and summit crater with lava flowing down the radial valleys.

Since 10,000 years ago, 30 to 40 eruptions from small pyroclastic cones have produced mobile flows of blocky olivine basalt. One of these on the north slope of Edziza has been dated to 1340 ± 130 B.P. with even younger material overlying it (Souther 1970:63). Edziza derives its name from the Tahltan term 'edzi0a' meaning 'volcano ash and sand mountain,' and oral traditions describe eruptions which have forced people to move their camps quickly. The base of the dome provides sources of good quality obsidian for stone tool technologies. Most of the obsidian is black whose thinned edges sometimes show black lines and specks. Opaque green, grey, and blue varieties are less common while mottled, striped or speckled varieties are rare. These good quality obsidians were formed about 0.9 to 1.1 million years ago, according to fission track and potassium argon dating, and have an abnormally high uranium content (Souther 1970:63).

The blocky alkali olivine basalt flows from the younger cone volcanos do not produce a workable glass suitable for making stone tools. However, the scattered eruptions of these cones have caused sudden changes in drainage patterns. Well defined lacustrine terraces on Mess Creek and Klastline River mark the former extent of now dry lava dammed lakes that persisted for hundreds of years and may have influenced the location of early campsites. The effect of lava dams on salmon migrations may also have had important repercussions on early human populations. The absence of salmon in upper Iskut River may be attributed to an impassable barrier of recent lava from a cinder cone near the mouth of Forest Kerr Creek (Souther 1970:55).

The plateau areas, including Nahlin, Kawdy, Tanzilla, Spatsizi, and Klastline Plateaus, have gently rolling upland surfaces of low relief, lying mainly above timberline at 1500 metres (5000 feet). These areas support a wide range of subalpine and alpine vegetation including grassland communities, low lying shrubs, mosses, and lichens. Within the Spatsizi Plateau, Pojar (1976) has identified more than 370 species of vascular plants and over 200 species of mosses and lichens. These rich habitats support large populations of larger game such as caribou, sheep, and goats as well as small animals such as marmots.

The Skeena Mountains extend south from the Spatsizi and Klastline plateau areas. The transition between the plateau areas and the mountains is represented by gently sloping upland areas which are remnants of dissected late Tertiary erosional surfaces. Drained by the Stikine, Nass, and Skeena Rivers, the Skeena Mountains consist of a series of ranges divided by prominent northwesterly trending valleys. The valley bottoms lie at 2,500 to 4,000 feet (750 to 1200 m) in elevation and are wide and drift filled (Holland 1976:55).

Climate

Most of the study area has a climate which is in direct contrast to that of the Coastal Mountains. Situated within the rainshadow of the Coast Mountains, the Stikine Plateau has low precipitation, averaging 12 to 23 inches (30-58 cm) annually. Precipitation is particularly low in the Tahltan highlands adjacent to the mountains and increases eastward towards the Cassiar Mountains. The area also experiences extremes in temperature, although it is characterized by long cold winters and short cool summers, due to the combined factors of high northern latitude and high elevation of most of the area.

The amount of direct sunlight received within the study area varies greatly from summer to winter as shown in Table 2. The long hours of daylight during summer contribute to high plant productivity of more hardy frost resistant species. Low rainfall, combined with short frost free summers in the Stikine Plateau, prohibits extensive horticulture or agricultural activities except in a very restricted portion of the Middle Stikine Valley in the vicinity of Telegraph Creek.

Table 2 Hours of Direct Sunlight

Latitude	December 21	June 21
56°	6 hr 57 min	17 hr 37 min
57°	6 hr 41 min	17 hr 56 min
58°	6 hr 24 min	18 hr 15 min
59°	6 hr 08 min	18 hr 34 min
60°	5 hr 52 min	18 hr 53 min

(Kendrew and Kerr 1956:156)

The major rivers freeze over by the end of November and are closed to navigation by boat until late April. At higher elevations, lakes start to freeze over in October and do not open again until late May or June.

Within the study area marked differences in topography, climate, soils, and vegetation are related to elevational zonation in local land forms. These differences are presented according to the biogeoclimatic classification system developed by Dr. V.J. Krajina (1965, 1969).

Biogeoclimatic Zones

Alpine Tundra Zone

The Alpine Tundra zone consists of treeless meadows, slopes, rocky ridges, snowfields, and icefields at high elevations in mountainous as well as plateau areas. Within the study area alpine tundra occurs above 1500 to 1800 metres (5,000 to 6,000 feet) (Valentine et al. 1978:154). The harsh climate of the alpine environment is the result of both increasing elevation and latitude. The climate is described as subarctic (Dfc after Koppen) with less than 25 frost free days. Frost may occur, however, any day of the year at higher elevations. Absolute temperatures range from 28° C to -45° C (83° to -49° F) while the average temperature of the warmest month is less than 10° C (50° F). Average annual precipitation is 72 cm (29 in.) with approximately 75% as snowfall (Krajina 1965, 1969).

Factors such as high elevation, very cold subarctic climate, lack of moisture, and rugged or often rocky terrain, all tend to restrict soil formation processes in the Alpine Tundra zone. Periglacial activity such as cryoturbation is very active in this zone resulting in churning of soil materials, patterned ground features, and poor horizon differentiation. Regosol landscapes are most common under these conditions (Valentine et al. 1978:155).

Alpine meadows occur under moist conditions on flat or gently sloping topography where snow cover lasts longer. They have a short but colourful vegetative season and produce such species as grasses, sedges, lupines, anemones, Indian paintbrush, and arnicas. A wide variety of mosses, lichens, and mountain heathers grow in the alpine tundra zone. Subalpine fir and scrub birch may occur in Krummholz, or dwarf, form in especially protected habitats with moderate snow cover (Valentine et al. 1978:38).

Spruce - Willow - Birch Zone

The subalpine Spruce - Willow - Birch zone occurs in the Stikine Plateau area between 900 and 1800 metres (3,000 to 6,000 feet). It is characterized by a cold continental climate (Dfc after Koppen) with short cool summers, and severe winters. Only tress which tolerate extended periods of frozen ground grow successfully in this zone. These include subalpine fir (Abies lasiocarpa), white and black spruce (Picea glauca and mariana), Sitka alder (Alnus sinuata), willows (Salix spp.), and shrub birch (Betula occidentalis).

Within the subalpine zone, Humo-Ferric Podzols are the most common soils throughout. On moderate to well drained sites on colluvial and morainal parent materials white spruce and subalpine fir often grow in colonies or pure stands with a resulting thin acidic litter mat. On the dry exposed plateau areas, such as the Spatsizi, shrub willows and birch predominate, along with grassland communities. In some valleys subject to cold air drainage from adjacent mountains, shrub willows and birch, along with alpine species, occupy the valley floor as well as upper elevations (Valentine et al. 1979: 154:55). Turbic Cryosol soils occur at higher elevations where solifluction and nivation become active in moist areas between clumps of krummholz, or dwarf, tree forms. Although the Stikine Plateau lies south of the limit of discontinuous permafrost, permafrost occurs sporadically at higher elevations in the subalpine and alpine tundra zones, particularly in the mountainous areas of the region.

Boreal White and Black Spruce Zone

This boreal forest zone occurs at lower elevations in the major river valleys of the Stikine Plateau from 150 to 900 metres (500 to 3000 feet). This zone is characterized by a humid continental climate (Dfc - Dsb after Koppen), with cool summers and fairly evenly distributed precipitation over the year. Mean annual temperatures range from -3° to 3° C (27° to 37° F). The number of frost free days varies from 20 to 150 (Krajina 1965, 1969).

The major tree species in this zone are

white and black spruce (Picea glauca and mariana), lodgepole pine (Pinus contorta), subalpine fir (Abies lasiocarpa), trembling aspen (Populus tremuloides), cottonwood (Populus trichocarpa), alders (Alnus sinuata and tenuifolia), and paper birch (Betula papyfera). Within the broad valleys of this zone, extensive fluvioglacial deposits are common. These coarse textured soils of the Dystric and Eutric Brunisolic type are characterized by rapid percolation and iron accumulation, especially on acidic parent materials. Dystric Brunisols occur on dry acidic sites, where forest fires are common and lodgepole pine dominates the forest growth which is kept in a constant early successional stage. Black spruce, which is the most shade tolerant tree growing in this zone, often grows with moss communities on imperfectly drained habitats with acid soils (Valentine et al. 1979:153).

The penetration of warm westerly winds up the Stikine River valley produces a small warmer and drier microclimate in the middle section of the Stikine valley. Annual total precipitation in this area is 12 to 15 inches (30 to 37 cm). Absolute temperatures range from 35° to -50° C (95° to -60° F). Eutric Brunisol soils occur on the dry, south facing terraces in this area where grassland communities dominate. The surface soil horizons (Bm) are reddish yellow or yellowish brown, with an average depth of 20 cm having occasional leached (Ae) surfaces. Soil pH ranges from 6 to 7 in value with surface soil horizons slightly more acidic than underlying deposits (Epp and Fenger 1978:8). The soils in this area are closer to neutral than most areas of the Stikine Plateau and thus more likely to yield preserved faunal remains.

Figure 5 compares the yearly distribution of precipitation and temperatures at Telegraph Creek at 165m within the Boreal Forest Zone and at Cold Fish Lake at 1200 m in the Subalpine Zone.

The large valley of the Nass River allows westerly winds to penetrate the Coast Mountain barrier, resulting in increased precipitation locally in the Skeena Mountains and deep snow accumulations. The higher peaks also block out cold arctic air from the north moderating winter temperatures in this region.

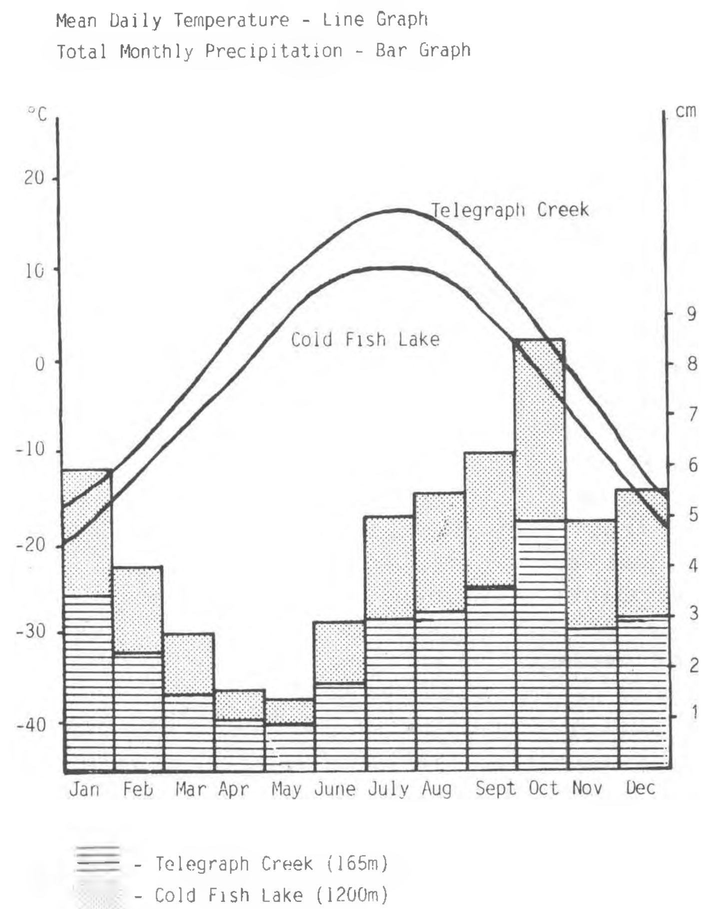


Figure 5. Comparisons of temperatures and precipitation at Telegraph Creek and Cold Fish Lake (data from Canada, Department of Transport 1967 and Pojar 1976)

Due to warmer temperatures and increased precipitation, the Boreal White and Black Spruce Zone of the Stikine Plateau is replaced by the Sub-Boreal Spruce zone at elevations of 300 to 900 metres (1000 to 3000 ft.) in the Skeena Mountains. Although the major tree species are the same in both zones their productivity is greatly increased within the Sub-Boreal Zone. Within the subalpine zone climatic modifications are also felt, so that the Spruce - Willow - Birch Zone north of 57° latitude is replaced by the Subalpine Fir Zone at 900 to 1500 metres (3000 to 5000 ft.) in the Skeena Mountains (Krajina 1965, 1969, Valentine et al. 1978:159).

Paleoclimate

Post glacial paleoclimatic data for northern British Columbia are only available from the Atlin region where palynological profiles have been dated (Anderson 1970). Since the Atlin region, located within the Yukon Plateau area, has a very similar climate at present, in terms of temperatures and precipitation, to that of the Stikine Plateau, it would seem logical to assume that the paleoclimates of the two neighbouring areas were also similar.

Within the northwestern corner of British Columbia, deglaciation proceeded in an irregular fashion. The palynological profile from Atlin indicates that tundra shrubs were established by 11,000 years ago. The existence of a late glacial lake in the area of the middle Stikine and its three northern tributaries, the Tahltan, Tuya, and Tanzilla Rivers (Valentine et al. 1978: Figure 1.3.2) and the presence of drumlin-like features in the topography of the plateau areas marking the northward retreat of glacial ice (Holland 1976:48-54) suggest that the middle Stikine area was ice free earlier than the Atlin region. The geothermal potential of volcanic activity in the area during the late Pleistocene may possibly have stimulated early deglaciation in the Stikine area.

The Atlin pollen profile indicates that during early post glacial times the climate of the region was two to three degrees Centigrade cooler and somewhat drier than at present. By 8,000 years ago the climate was similar to that of today. A postglacial maximum has been proposed for the region between 8,000 and 2,500 years ago with mean July temperatures up to one degree higher than present and precipitation at the same level as today or somewhat higher. Climatic fluctuations in the Atlin region appear to have differed from other areas of the province in terms of moisture regime, being moister when other areas were drier during the postglacial thermal maximum (Clague 1981:23).

While in southern British Columbia the late postglacial climate became cooler and wetter than earlier periods, late postglacial cooling in the Atlin region was marked by reduced precipitation. A cool dry period occurred between 2,500 and 750 years ago while alpine glaciers in the nearby Boundary Ranges of the Coastal Mountains were expanding. Within the last 750 years precipitation and temperatures have increased to values comparable to those prior to 2,500 years ago (Clague 1981:25). The latest advance of alpine glaciers in the Mt. Edziza complex in the Tahltan Highland, occurring prior to 1340 ± 130 radiocarbon years ago, extended no more than one to two kilometres (J. Souther: personal communication) from their present position.

V THE RESOURCE BASE

The Stikine Plateau Area, with its mosaic pattern of environmental zones, provides habitats for a wide range of plant and animal species which were available for exploitation by the Tahltan people. This chapter presents and describes these various resources according to the class to which they belong. For each major resource exploited, a brief summary is provided of the habitat, characteristics, seasonal availability and abundance.

Mammal Resources

All of the ungulates, bears, and a variety of medium sized herbivores which inhabit the study area were traditionally (and still are today) valued as primary or supplementary sources of food and raw materials. The Stikine Plateau area is one of the last remaining natural areas in North America to support such diverse as well as abundant populations of large game animals. Since the turn of the century, people from various parts of the world have been drawn to the Stikine to hunt large game trophies and guide outfitting came to be an important means of livelihood for many Tahltans.

Largely due to the wilderness nature and remoteness of the area, little in the way of environmental studies or wildlife inventories has been carried out in the Stikine area until very recently. A wildlife inventory, conducted in Spatsizi Park in 1976, by B.C. Parks Branch, indicates that the ungulate potential of the area is excellent. Wintering ranges in the park, extremely important for winter survival and productivity, compare favourably with the very best ungulate ranges in other areas of the province (Osmond-Jones et al. 1977:32). Based on accounts by local Tahltan people, it is assumed that wildlife potential of other plateau areas within the Stikine drainage with similar topography and climate is comparable to that of the Spatsizi.

Caribou

The woodland caribou (Rangifer tarandus osborni) which occurs in the Stikine Plateau is not involved in large scale migrations. Its movements primarily involve shifting from alpine tundra to winter forage within forested zones. In May caribou move above treeline where calving takes place on high exposed ridges in late May through June. Females and young form small nursery bands which remain on ridges and in alpine meadows throughout the summer where they feed on tundra grasses, sedges, horsetails, flowering plants, and leaves of willow and birch. Males descend into forested areas during the summer and remain until September at which time they shed velvet from their antlers.

Males and females come together in large bands in alpine areas by the end of September for the rutting season. In late fall caribou may move back to forested areas along subalpine creeks and lakes at lower elevations in order to shed antlers. Males shed their antlers between November and March, while pregnant females do not shed their antlers until after parturition in June. In January, while the snow cover is soft, caribou move up to tree line to feed on birch-lichen communities. Later in the winter, in February to March when the snow cover in open areas becomes crusted, caribou move down to timbered areas in the subalpine zone along river valleys to feed on mosses and lichens under the soft snow cover (Osmond-Jones et al.1977:36-43).

During flights in September 1976, Hazelwood and Hatler observed a minimum number of 1200 caribou in Spatsizi Provincial Park and estimated the population of Spatsizi Plateau area at about 2,000 animals (Osmond-Jones *et al.*1977:36). The woodland caribou weighs up to 700 pounds (320 kg) (Cowan and Guiget 1956:384), with an average weight of 400 pounds (180 kg) for adults.

Moose

Largest of the American deer family, the moose also moves seasonally from alpine to forested habitats. Two sub-species of moose occur in the Stikine Plateau area. *Alces alces andersoni*, weighing 900 to 1200 pounds (410 to 500 kg) inhabits most of the area south of the Stikine River and east of the Tuya, while *Alces alces gigas*, a larger variety weighing up to 1800 pounds (820 kg), occurs to the northwest of these two rivers. Preferred food consists of young growth of deciduous trees and shrubs including aspen, birch and willow as well as marshy plants and balsam fir (Cowan and Guiget 1956:376).

The moose is a solitary browser which frequents ponds, swamps, lakes, and streams in the alpine and subalpine zones in summer when it feeds mainly on aquatic vegetation. Moose gather in small groups in late September and during the rut in October. They may be found in early winter, when the snow cover is soft, feeding near timberline on south facing slopes. Later, when the snow becomes crusted, they move into forested areas along the major river valleys. Antlers are shed in December and January. Young are born in June along watercourses where they can be protected from wolves. Guide outfitters estimate the moose population of the Spatsizi Plateau area at about 2300 animals (Osmond-Jones *et al.* 1977:53).

Natural cycles of abundance and decline in populations of large game animals such as moose are poorly understood. It appears that moose inhabited the Stikine Plateau in earlier times but dramatically declined from 1800 to 1877 (Emmons 1911:71). Moose populations have increased over the last one hundred years while caribou populations have declined. Whether these changes in population are related to small scale shifts in the climate and vegetation of the area or to other factors is unknown at the moment.

Mule deer

The mule deer (*Odocoileus hemionus hemionus*) inhabits broad valleys of the middle and upper sections of the Stikine River and its major tributaries, keeping to lower elevations in winter and ascending valleys in summer. It prefers burnt over areas where it browses on aspen, willow, serviceberry, mountain juniper, balsam fir, herbaceous plants, and grasses in spring. The mule deer mates in October to November with fawns born in June. Antlers are shed during early winter. Males weigh 180 to 400 pounds (82 - 180 kg) while females weigh 120 to 160 pounds (54 - 73 kg) (Cowan and Guiget 1977:369). Deer are not plentiful in the Stikine River area at present (Osmond-Jones *et al.* 1977:56, B.C. Fish and Wildlife Branch 1980). They provide an additional or occasional source of meat, however.

Woodland Buffalo

The woodland buffalo (*Bison bison athabascae*) formerly inhabited portions of the Stikine Plateau (Teit 1956:68, Thorman n.d.). A skull of recent origin has been found in a bog near Atlin (Cowan and Guiget 1956:388). The buffalo grazes on grasses and forbes and has an estimated weight of 2000 to 2200 pounds (900 - 1000 kg).

Mountain Goat

The white, wooly mountain goat (*Oreamnos americanus columbiae*) inhabits rough rocky crags on mountains above timberline and steep rocky canyons along the Stikine. It grazes on a variety of alpine grasses and forbes, all tree and shrub species except spruce, and seeks alkaline earth licks during summer. Mating takes place in November to December. Young are born in May to June. Females and young form small gregarious bands while males are solitary. This goat weighs 250 to 300 pounds (114 - 136 kg). Its horns are not shed but increase in size annually (Cowan and Guiget 1956:392). Goats do not move any great distance within their home range. A minimum population of 521 goats has been observed within Spatsizi Park, although not all ranges were surveyed (Osmond-Jones et al. 1977:43). Excellent goat habitat occurs throughout the Stikine Plateau area.

Sheep

The habitat of sheep (Ovis dalli stonei) is the alpine meadows above timberline where it grazes on grasses, forbes, and dwarf willow. It uses distinct summer and winter ranges within the alpine zone. It seeks out rough, rocky terrain as protection from predators and may be found feeding with goats. Sheep are gregarious, although male and female bands are separate except during the rut which takes place from mid-November to mid-December. Their horns are not shed, increasing in size annually. Mature sheep weigh 250 to 300 pounds (114 - 136 kg) (Cowan and Guiget 1956: 399). A minimum of 279 sheep has been observed in Spatsizi Park, although much of the best sheep habitat has not been surveyed. Since females mate with mature dominant rams, excessive hunting of these in recent years has had an adverse effect on reproductive capability and a serious decline in sheep populations has resulted (Osmond-Jones el al. 1977:47).

Black Bear

The black bear (Ursus americanus cinnamomum) occurs in the Stikine Plateau area in both black and brown phases. It ranges from salmon streams at low elevations to higher elevations within a generally wooded habitat. It has an omnivorous diet consisting of fish, berries, seeds, grasses, insects and small mammals. This bear hibernates in dens from November to March. Females bear young only every other year with one to four cubs being born in mid-winter during hibernation. Weights of adult bears vary greatly, ranging from 125 to 600 pounds (57 - 273 kg) (Cowan and Guiget 1956: 289, 293).

Grizzly Bear

The grizzly (Ursus arctos horribilis) frequents a variety of seasonal habitats including alpine meadows, coniferous forests at higher elevations and salmon streams at lower elevations. It has an omnivorous diet of grasses, roots, berries, insects, fish, small mammals, and larger game when the opportunity provides. The grizzly also hibernates from November until March with one to four cubs born in mid-winter in alternate years. Although adults may weigh up to 1100 pounds (500 kg) the average adult weight is 450 pounds (205 kg) (Cowan and Guiget 1956: 295-6). The study area provides much of the best wilderness habitat for grizzlies remaining in North America. The Spatsizi Plateau has an estimated potential for 250 grizzlies based on comparison of habitat, range size and density with studies in other areas (Osmond-Jones et al. 1977:59-60).

Beaver

The American beaver (Castor canadensis sagittatus) is a large aquatic rodent which inhabits smaller streams and lakes in forested areas. Houses are constructed of sticks, logs and mud, about 12 feet (4 m) in diameter and rising to four feet (1.3 m) above waterline. The beaver feeds on leaves and bark of aspen, poplar, willow and some conifers as well as marshy plants. Adults have an average weight of 40 to 60 pounds (18 - 27 kg). Water levels in streams are controlled by the construction of dams which are constantly repaired and quite often stream habitat is changed to the detriment of fish species such as salmon. Winter food supply is cut in autumn and left on the stream or lake floor near the lodge (Cowan and Guiget 1956: 170-174). Beaver are abundant in the Stikine Plateau particularly in the subalpine zone.

Marmots

Marmots are gregarious animals living in colonies in open meadows near rockslides in the alpine and subalpine zones. They are active from May to September, feeding on a variety of herbaceous plants near streams and seepage sites at the heads of tributary valleys. They live in underground burrows where they hibernate for seven to eight months. Females bear yearly litters of four or five in May. Two species of marmots are found in the study area. One species (Marmota monax petrensis) is found only south of the Stikine River. The second and larger species (Marmota caligata) known as the whistler, weighs up to 30 pounds (14 kg). The latter species includes two varieties; M.c. oxytona, of dark grey-brown pellage, occurs throughout the area; M.c. caligata, paler in colour, is restricted to the north and west of the Stikine and Tuya Rivers (Cowan and Guiget 1956:115-125).

Marmots were exploited in early fall, from mid-August to mid-September, when animals had accumulated stores of fat just prior to hibernation.

Groundsquirrel

The large arctic groundsquirrel (Spermophilus undulatus plesius) is abundant in the Stikine Plateau which is within the southern limit of its distribution. Weighing two to four kg, this animal lives in colonies in bushy meadows of alpine and subalpine valley bottoms. It is active from March to September and feeds on a variety of vegetation (Cowan and Guiget 1956:128, Osmond-Jones et al. 1977:67).

Hares

The rabbit or snowshoe hare (Lepus americanus macfarlani) of the Stikine Plateau prefers a semi-open mixed forest habitat where it makes runways among deciduous thickets and nests in protected depressions. It feeds mainly on deciduous vegetation, resorting to conifers for food as well as protection during heavy snowfalls. Hares provide prey for all carnivorous fur bearing animals. Adults have an average weight of three pounds (1.5 kg). Females bear up to four litters per year of two to four young each. Periodic increases in hare populations occur every seven to nine years (Cowan and Guiget 1956:100). It changes colour from dark grey-brown in summer to white in winter.

Porcupine

The porcupine (Erethizon dorsatum nigrescens) prefers an open coniferous forest habitat with areas of broken rock or cliffs. It feeds on green vegetation, especially pine, and makes dens in rocky clefts, small caves, hollow stumps, or at the base of large, low limbed conifers. It has an average weight of 15 pounds (6 kg). Single young are born once a year (Cowan and Guiget 1956:245).

Carnivores

Among the wide variety of carnivores which occur in the Stikine area, lynx was the only species which was traditionally used as a source of food and even its consumption was restricted by many regulations (Teit 1956:82, n.d.). A few carnivores, such as marten, fisher, and fox were captured for their fur only. The use of most carnivores was restricted by a variety of taboos or association with supernatural powers which could only be controlled and used by shamans.

Lynx

The lynx (Lynx canadensis canadensis) is a medium sized cat weighing up to 35 pounds (16 kg). It frequents old burns and natural clearings along the forest edge in a mixed deciduous and coniferous forest habitat, from valley bottoms to mountain tops. Its diet consists almost entirely of hare, with the occasional bird, rodent, or young ungulate. Lynx populations vary directly with hare populations (Cowan and Guiget 1956:342).

Wolf

The wolf (Canis lupus columbianus) frequents a variety of habitats from deciduous river bottoms to high plateaux above timberline. It feeds on all kinds of large and small animals, competing with people for many of the same resources (Cowan and Guiget 1956:280). It often hunts and travels in packs of up to 30 (Osmond-Jones et al. 1977:63), and is extremely cunning. Tahltan traditions (Teit 1919:240-251) indicate that wolves were once tamed and trained as hunting dogs, and that they gave people knowledge and good luck in hunting. Neither wolves or dogs were used as food (Teit 1956:82). Teit (1956:67) notes that the skins of the wolf or the dog were never used for clothing, robes or bedding, the hair being considered poisonous.

Coyote

The coyote (Canis latrans incolatus) frequents open areas in burnt over coniferous forests and alpine meadows. Its diet consists of small rodents, birds, insects, and fruits and young of larger animals on occasion. This carnivore is smaller than wolf with long heavy pellage, variable in colour (Cowan and Guiget 1956:277). The coyote does not appear to be abundant in the Stikine Plateau area. There are no references to its traditional usage. Its Tahltan name refers to its close similarity and relationship to the domestic dog.

Red Fox

The red fox (Vulpes fulva abietorum) is a slender dog-like carnivore with a long bushy tail and long fine pellage, variable in colour, with black, silver, and red cross phases. Its habitat is natural clearings as well as lake shores and river banks close to the protection of trees and bush. Its diet consists of birds, small mammals, insects, fruit, and berries (Cowan and Guiget 1956:285). Foxes were captured by means of hide snares and their skins used for robes and bedding.

River Otter

The river otter (Lutra canadensis evexa) occupies a riverine habitat along larger rivers, where it feeds mainly on fish. It travels in water, making dens along the banks (Cowan and Guiget 1956:330). Considered to have strong supernatural powers, the river otter was never taken for food or its skin. Only very powerful shamans were able to obtain and control otter spirits (Emmons 1911:75, Teit n.d.).

Marten

The marten (Martes americana actuosa) frequents a variety of habitats including deciduous and coniferous forest and talus slopes. Its diet consists of rodents, squirrels, rabbits, fish, birds, and insects. Females bear one litter, averaging three per litter, each year. Females are sedentary while males range over several square kilometres. (Cowan and Guiget 1956:300). Marten were captured by means of deadfalls and there skins were used in making warm winter robes (Teit n.d.).

Fisher

The fisher (Martes pennanti columbiana) is a large marten which inhabits mixed forest areas. It preys on rabbits, grouse, porcupine, rodents, insects, fruit and berries. It has one litter of two or three per year (Cowan and Guiget 1956:305). Fisher were captured and used the same as marten.

Weasel

The small slender weasel (Mustela erminea richardsoni) changes from winter white to brown in summer. It occupies a variety of habitats at lower elevations and has a broad diet of small mammals and birds. Associated with strong supernatural powers, the weasel was not used for food or for skins traditionally. It could only be obtained and controlled by powerful shamans (Emmons 1911:76, Teit n.d.).

Mink

The mink (Mustela vison energumenos) inhabits deciduous forest along stream and river banks. Semi-aquatic in habits, it feeds on fish, amphibians, birds and mammals (Cowan and Guiget 1956:320). Like the weasel, the mink had supernatural powers, and was not used for food or for its skin, except by shamans (Emmons 1911:76, Teit n.d.)

Wolverine

Inhabiting the subalpine forest, the wolverine (Gulo luscus luscus) feeds on all larger mammals and birds, competing with people for many of the same resources. It resembles a short legged bear with a bushy tail (Cowan and Guiget 1956:322). The wolverine was captured by means of deadfalls and the furs used for making robes, on occasion. Its flesh was not eaten; Tahltan tradition indicates that wolverine was once a cannibal, but today only eats corpses (Teit 1919:249).

Small Bodied Mammals

A variety of small bodied rodents, shrews, and bats occur throughout the Stikine Plateau area (Cowan and Guiget 1956, Osmond-Jones et al. 1977:68, Swarth 1922) and are listed below. None of these were used for food or their skins due to their small size, the nature of their diets, their foul odour, or bad habits, except during times of extreme stress (Teit 1956:82, n.d.)

Cinereus shrew	Sorex cinereus cinereus
Wandering shrew	Sorex vagrans obscurus
Navigator shrew	Sorex palustris navigator
Pygmy shrew	Microsorex hoyi intervestus
Little brown bat	Myotis lucifugus alascensis
Least chipmunk	Eutamias minimus caniceps
Red squirrel	Tamiasciurus hudsonicus columbiensis
Northern flying squirrel	Glaucomys sabrinus alpinus
Deer mouse	Peromyscus maniculatus borealis
Wood rat	Neotoma cinerea occidentalis
Northern bog-lemming	Synaptomys borealis dalli
Siberian lemming	Lemmus sibericus helvolus
Tundra redback vole	Clethrionomys rutilus dawsoni
Mountain heather vole	Phenacomys intermedius intermedius
Meadow vole	Microtus pennsylvanicus drummondi
Long-tailed vole	Microtus longicaudis littorale
Muskrat	Ondatra zibethica spatulata
Jumping mouse	Zapus princeps saltator Zapus hudsonius hudsonius

Reptiles

No reptiles occur within the study area due to its northern latitude and cold climate (B.C. Fish and Wildlife Branch 1979, Osmond-Jones et al. 1977:68).

Avian Resources

The geographical setting of the study area is such that the avifauna is represented by a wide range of birds which frequent a variety of local habitats as seasonal or year round residents. Many birds of coastal and more northern influences pass through the area during spring and fall migrations. The 149 different species of birds which have been observed in the Spatsizi Plateau (Osmond-Jones et al. 1977:15-32) are listed in Appendix 1. Since most of these have also been observed in the Telegraph Creek area of the Stikine River valley (Swarth 1922), it is probable that these, and possibly other, species of birds occur in varying numbers in similar habitats throughout the study area.

Upland ground birds, including three species of grouse and three species of ptarmigan, are year round residents of the Stikine area and of all bird species were of greatest economic importance. The blue grouse (Dendragapus obscurus), largest of the grouse family, inhabits coniferous forests, old burn areas, and subalpine forest clearings. At higher elevations in winter it feeds on balsam fir, while in spring it descends to lower elevations to feed on pine and spruce. The spruce grouse (Canachites canadensis) feeds on spruce and pine needles within the coniferous forest. The ruffled grouse (Bonasa umbellus) is found at lower elevations than other grouse in deciduous woodlands where it feeds on berries, fruit, and deciduous leaves of aspen, poplar, and willow. Grouse are readily available and easy to locate during spring mating season when the male "drumming" can be heard from a distance.

The three species of ptarmigan (Lagopus lagopus, L. mutus, and L. leucurus) are somewhat smaller than grouse, with an average weight of a little less than one kilogram. They inhabit open meadows and rocky tundra in the alpine and subalpine zones. Their plummage varies from white in winter to rusty red or mottled brown in summer.

Migratory waterfowl are most abundant in the many lakes, marshes, and streams of the Subalpine Willow Birch and Boreal Spruce zones in May and October during spring and fall migrations. Ducks and geese are said to be fat and good eating in the spring when coming from southern feeding grounds.

Amphibians

Only four species of amphibians have been observed within the study area (Carl 1973, Osmond-Jones et al. 1977:68). These include the boreal toad (Bufo boreas), the northern wood frog (Rana sylvatica), the western spotted frog (Rana pretiosa), and the long toed salamander (Ambystoma macrodactylum).

These species inhabit swamps, lakes, streams, or the moist woods along their banks or margins. They require an aquatic environment in which to reproduce. They spawn in spring, the salamander laying only ten eggs, while the boreal toad lays 16,000 eggs. Young hatch as tadpoles and metamorphose over three months into adults. Amphibians eat a variety of soft bodied insects, larvae, small molluscs, crustaceans, and fish. They are prey for a variety of larger birds and fur bearing carnivores (B.C. Fish and Wildlife Branch 1980:3).

Amphibians were not used as food due to the supernatural qualities associated with them. Tahltan oral traditions indicate that giant toads once inhabited certain areas of the country (Teit 1921:345) and that people were afraid of toads because they used to steal people (Teit 1921:341). A salamander seen along one's path was interpreted as an omen of death within the family (Teit n.d.).

Insects

Insects were not used as food (Teit 1956:86). Tahltan oral tradition describes how the consumption of ants leads to death (Teit 1921:253), and how mosquitos originated from the brains of cannibal giants (Teit 1921:351). The kinds of insects which occur in the Stikine area are generally considered a nuisance to human comfort and preservation of food and are most effectively dealt with by means of smudges. The pitch of alpine fir can be used to soothe and heal insect bites (Teit n.d.).

Fish Resources

The numerous lakes, streams, and rivers within Tahltan territories produce a variety of different fish resources. The fish species which occur in the study area are listed in Table 3, along with average weights, distribution and spawning periods. The anadramous salmon, which ascend the major rivers in large annual runs, are naturally the most abundant and reliable fish resource available. Fresh water fish are available year round and can be procured at any time, although they are generally most abundant during spawning times. Whitefish and char (<u>Salvelinus</u>) spawn in October to November, while most others including trout and grayling spawn is spring from March until June.

Many of the telegraph operators at isolated stations along the Telegraph Line, during the early part of this century, soon realized the importance of adopting the native life style in order to survive in the bush. Lawrence (1965:66,73) noted that in late May thousands of trout congregated along the banks of Tedideeche creek during the spawning period. The Tahltan name of this creek means "catch them with your hands". Lawrence was able to catch and dry 400 trout in just a few days.

Salmon

The large, predictable runs of anadramous salmon provided a reliable resource for the Tahltan people. Large quantities of salmon were dried during the season of the runs and stored for later use. In contrast to Pacific drainages further to the north, where salmon runs occur during a more restricted period of time (O'Leary 1977, Schalk 1977), runs of the five species of salmon in the Stikine are quite dispersed over time from the end of May until October.

The first chinook run reaches the Telegraph Creek area of the Stikine about the end of May, with several more runs through June and July. Chinook populations spawn in tributaries of the main stem Tahltan and Little Tahltan Rivers, as well as further up the Stikine into the Grand Canyon and Tuya River. Being the first salmon of the season, chinook, also referred to locally as "kings" due to their large size (40 - 50 lbs [18 - 23 kg] is common), are particularly enjoyed fresh, although many are also dried.

The sockeye salmon is the species of greatest economic importance to the Tahltan. Runs begin in the Telegraph Creek - Tahltan River area in mid-June and continue through August. There are at least four major runs, spaced about seven to ten days apart, which proceed to major spawning grounds at Tahltan Lake. Sockeye are eaten fresh throughout the season and dried in quantity for storage. The majority of sockeye are still silver blue with firm flesh when they reach the Tahltan river. Only stragglers, at the end of each run or the last run of the season, have turned red in colour and have distorted heads.

Only small numbers of pink (humpback) and chum (dog salmon) ascend the Stikine as far as the Tahltan River. Arriving in

Table 3. Fish Species Occurring in Study Area.[1]

Common Name	Scientific Name	Average Weights	Distribution	Spawning Period
Anadramous				
Sockeye salmon	Oncorhynchus nerka	7 lbs. (3.2 kg)	Stikine River to Tahltan L. Skeena and Nass Headwaters Tatsamenie Lake (Sheslay R.)	July-Aug. Sept.-Oct. July-Aug.
Chinook salmon	Oncorhynchus tshawytscha	20 lbs. (9 kg)	Stikine-Tahltan-Tuya Sheslay-Nahlin Rivers	June-July June-July
Coho salmon	Oncorhynchus kisutch	9 lbs. (4 kg)	Stikine-Iskut Sheslay-Nahlin	Sept.-Nov. Sept.-Nov.
Pink salmon	Oncorhynchus gorbuscha	4 lbs. (1.8 kg)	Iskut-lower Stikine	Aug.
Chum salmon	Oncorhynchus keta	10.4 lbs. (4.7 kg)	Iskut-lower Stikine	Aug.
Steelhead trout	Salmo gairdneri	8 lbs. (3.6 kg)	all river systems	April-May
Fresh water				
Rainbow trout	Salmo gairdneri	1-2 lbs. (450-900g)	all systems except Dease Lake	May-June
Cutthroat trout	Salmo clarki clarki	1-2 lbs. (450-900g)	Stikine, Nass, Skeena	April-May
Dolly Varden	Salvelinus malma	5 lbs. (2 kg)	all river systems	Sept.-Oct.
Lake trout	Salvelinus namaycush	5-10 lbs. (2-5 kg)	Tuya, Dease, upper Nahlin R., Cold Fish Lake	Sept.-Oct.
Arctic grayling	Thymallus arcticus	3 lbs. (1.3 kg)	Stikine, Dease, Nahlin	May-June
Longnose sucker	Catostomus catostomus	3 lbs. (1.3 kg)	all river systems	May-June
Burbot (Ling)	Lota lota	3 lbs. (1.3 kg)	Skeena, Dease, Cold Fish Lake (Spatsizi)	Feb.-March
Mountain whitefish	Prosopium williamsoni	2 lbs. (900 g)	Skeena, Nass, Stikine Dease	Oct.-Nov.
Round whitefish	Prosopium cylindraceum	1-2 lbs. (450-900g)	Dease, Nahlin	Sept.-Nov.
Lake whitefish	Coregonus clupeaformis	3-5 lbs (1.3-2 kg)	Dease, Skeena	Sept.-Nov.
Northern pike	Esox lucius	10 lbs. (4.5 kg)	Dease Lake	May-June
Northern squawfish	Ptychocheilus oregonensis	3-5 lbs. (1.3-2.2 kg)	Skeena system	May-June

1. Data from Carl et al. 1959. Aro and Shephard 1967, Osmond-Jones et al. 1977, Dept. of Fisheries and Environment, Whitehorse office.

August, they are eaten fresh and dried along with sockeye. Runs of coho pass up the Stikine during September and October. Iskut River provides the major spawning area for Stikine coho, although small runs ascend as far as the Tahltan River. Coho are very much enjoyed fresh, and, with the cooler temperatures of fall, are often preserved by freezing. The anadramous steelhead trout is also taken during predictable migrations to and from the sea. Runs in the Stikine River occur mid-March through April and again in September.

Physical obstructions and velocity barriers prevent access of anadramous salmon and trout to well over 50% of the Stikine drainage as seen in Figure 6. Many of these obstructions have been caused by recent (during the last 10,000 years) volcanic activity in the Mt. Edziza and Iskut River areas (Souther 1970:55). It is quite probable that in earlier prehistoric times salmon runs were much larger and more extensive in the Stikine watershed. The lakes forming the headwaters of the Iskut River may have provided spawning habitat for large numbers of salmon.

The entire Tuya River drainage provides

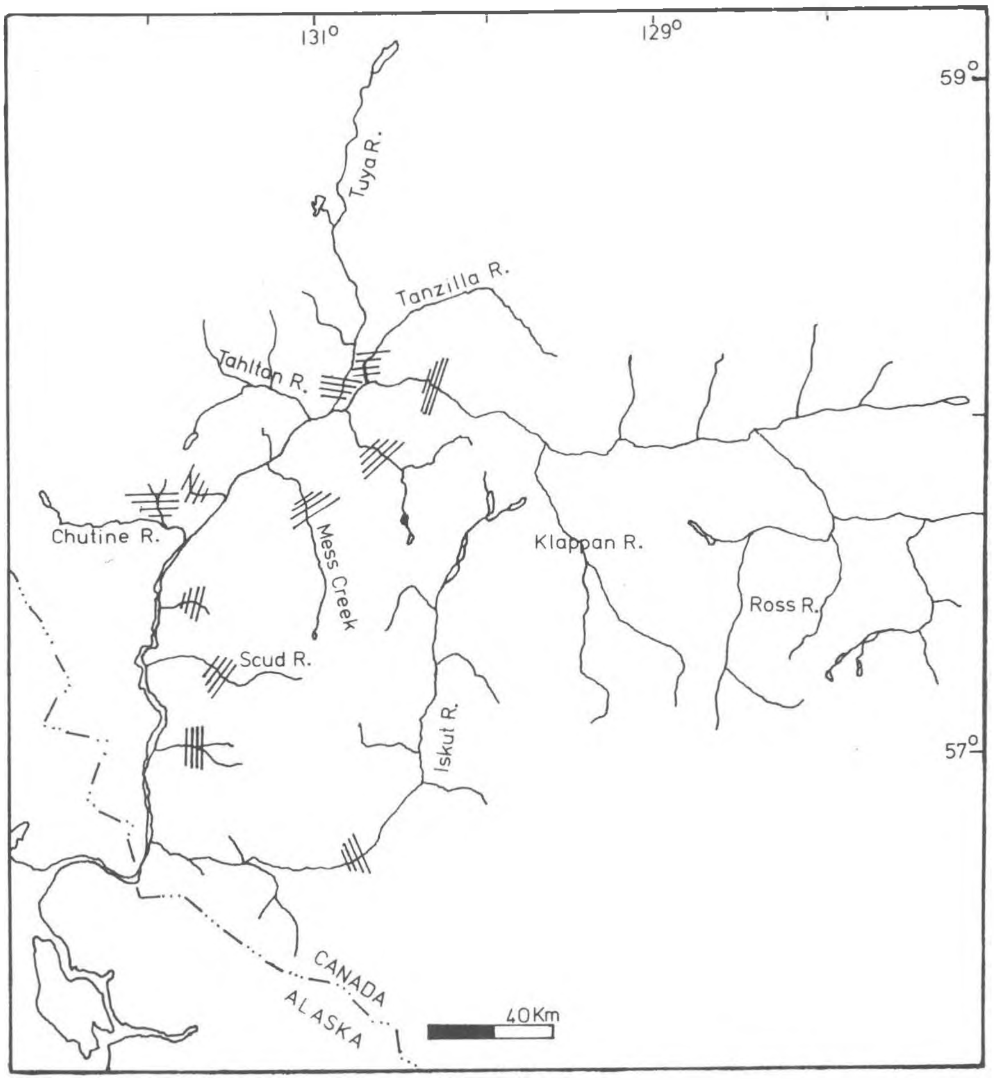


Figure 6. Location of barriers impassable to salmon within the Stikine watershed (after Canada, Dept. of Fisheries and Environment)

excellent spawning habitat (Gould n.d.) and the Federal Department of Fisheries and Environment are presently considering clearing of the blockage on the lower portion of the river and a salmon enhancement program. Archaeological survey indicates that the use of an ethnographic village at the mouth of the Tuya River extends back to prehistoric times. Chinook salmon spawn in the accessible portion of the lower Tuya River and further into the canyon of the Stikine River. Although still difficult of access, further archaeological survey of the Tuya River system may provide evidence of prehistoric fishing sites and use of salmon in this drainage.

Salmon resources were also available to the Tahltan in other parts of their traditional territories besides the Stikine drainage. In the Taku River system, sockeye ascend the Sheslay River at least as far as Tatsamenie Lake from June to August. Chinook are most abundant in the Nahlin River in May and June. Coho are found in both the Sheslay and Nahlin drainages from July through October (Aro and Shepard 1967:324). Several large fishing villages have been recorded at strategic locations on the Sheslay and Nahlin Rivers and tributaries.

Sockeye salmon also ascend the Skeena and Nass Rivers to upper tributaries within Tahltan territories, and several fishing villages have been recorded for the headwaters of both rivers. Fifteen to twenty thousand sockeye ascend the Nass to spawn in Bowser Lake; 60,000 spawn in Kwinageese Lake; about 12,500 spawn in Damdochax Lake; and 97,500 sockeye spawn in Meziadin Lake (Aro and Shepard 1967:275). Runs to the upper Nass and Skeena Rivers occur in September and October. Many of the conflicts recorded (Duff 1959, Teit n.d., Thorman n.d.) between the Tahltan and the Kitwancool ("Nass River people") may have resulted from attempts to gain access to valuable salmon resources in the area between Bowser and Meziadin Lakes.

The abundance of most salmon spawning populations in the Stikine and Taku drainages is still poorly documented. One day spot surveys of spawning chinook in the Tahltan River sporadically from 1956 to 1975 have recorded 200 to 800 in Little Tahltan River and as many as 2,700 in Tahltan River main stem (Dept. of Fisheries and Environment n.d.)

Major exploitation of Stikine River salmon since 1895 has been by Alaska commercial gillnet fisheries operating in the vicinity of the mouth of the Stikine River. Average catch statistics, presented in Table 4, indicate that the high exploitation rate by commercial fisheries during the first half of this century has caused a serious decline in all Stikine River salmon stocks. Restrictions on gear and fishing time have been imposed recently in order to rebuild some stocks (Dept. of Fisheries and Environment n.d.).

Table 4. Average Catches of Stikine Salmon by Alaskan Gillnet Fisheries.[1]

Year	Chinook	Sockeye	Coho
1933-40	N/A	56,561	78,431
1941-50	5,132	33,421	66,059
1951-60	21,378	20,161	50,669
1961-70	7,089	21,571	21,621
1971-77	7,296	19,462	15,484
Largest Catch	61,144 (1952)	80,686 (1941)	125,658 (1941)

1. Dept. of Fisheries and Environment Office, Whitehorse.

A sockeye enumeration weir has operated since 1959 at the outlet of Tahltan Lake, the principal spawning ground of Stikine River sockeye. Tahltan Lake escapement was estimated to account for 90% of sockeye production. Counts have averaged 17,000 since 1959. Gillnet catches and escapement figures between 1959 and 1964 indicate an average exploitation rate of 68% of Stikine sockeye by commercial gillnet fisheries (Dept. of Fisheries and Environment n.d.). Available figures on exploitation and escapement of Stikine River sockeye since 1959 are presented in Table 5. A small commercial fishery was started up in the Telegraph Creek area in 1975 but was limited by marketing problems. A commercial fishery on the lower Stikine within Canadian waters was made possible by the introduction in 1979 of an organized marketing system involving brine barge storage and aircraft transportation of catches to canneries in Prince Rupert.

Table 5. Estimates of Exploitation and Abundance of Stikine River Sockeye 1959 to 1980.\

Year	Tahltan Lake Weir Counts	Tahltan Food Fishery	Canadian Commercial Gillnet Catches	Alaska Commercial Gillnet Catches	Total
1959	4,311	3,000 average	--	20,258	27,569
1960	6,387	"	--	13,652	23,039
1961	16,619	"	--	21,608	41,227
1962	14,598	"	--	27,515	45,113
1963	1,780	"	--	9,997	14,777
1964	18,353	"	--	20,301	41,654
1965	1,471	"	--	21,419	50,890*
1966	21,580	"	--	36,710	61,290
1967	38,801	"	--	29,226	71,027
1968	19,726	"	--	14,606	37,332
1969	11,706	"	--	19,211	33,917
1970	8,419	"	--	15,120	26,539
1971	18,523	"	--	18,143	39,666
1972	52,354	"	--	51,735	107,089
1973	2,877	"	--	21,501	27,378
1974	8,106	"	--	2,434	13,540
1975	8,159	1,982	270	--	10,411
1976	24,111	2,911	733	18	27,773
1977	42,960	4,335	1,976	48,374	97,645
1978	22,488	3,500	1,500	56	27,544
1979	10,211	3,000	10,534	2,158	25,903
1980	11,018	2,100	18,819	13,919	45,856

\ Data from federal Dept. of Fisheries and Envir. office in Whitehorse, Yukon.

* includes an estimated 25,000 fish unable to pass landslide barrier

Plant Resources

Although the study area is located within the Boreal Forest Region of Canada, the boreal black and white spruce zone in the Stikine Plateau area is restricted to lower elevations (below 3,000 feet or 900 meters) along major river valleys. The forest cover is characterized by a mosaic growth, or open mixture of trembling aspen, white spruce, and lodgepole pine, with birches and cottonwood, along with alders and willows along river banks, and alpine fir and black spruce at somewhat higher elevations (Rowe 1972:B25).

Due to the dry interior climate, grassland communities are found in many areas throughout the Stikine Plateau; shrub and moss-lichen communities predominate extensive areas of the alpine and subalpine zones, providing excellent habitat for the diverse fauna of the area. Over 370 species of vascular plants and more than 200 species of mosses and lichens have been recorded (Pojar 1976) for Spatsizi Park; most of these from the alpine and subalpine zones.

Within the traditional subsistence economy plant resources were used for food, medicines, and raw materials. The various species of trees and other plants used as sources of materials for technological purposes are listed in Appendix 2 along with a summary of their uses. Wood and bark from trees growing in the Stikine area were essential resource materials for the building of structures and other facilities, and for the manufacture of a variety of tools and implements. Procurement and uses of these resources are discussed in detail in Chapter 6. Appendix 3 lists approximately 80 edible plant species which occur in the Stikine River area.

VI TECHNOLOGY OF RESOURCE EXPLOITATION

This section describes the methods, tools, and facilities used by the Tahltan people to procure, process, and store the different kinds of resources available within their territories. Data on traditional methods and technology of resource exploitation are not available in equal detail. Some aspects of traditional subsistence activities have been recorded in detail through direct observation and oral accounts by current Tahltan elders during the course of the present research and used to supplement data gathered from early ethnographies.

The Tahltan maintained a complex technology in order to exploit large quantities of seasonally abundant resources. Procurement strategies emphasized the use of a variety of complex tended and untended facilities such as fences, weirs, traps, snares, and nets which could be adapted for a wide range of different kinds of resources. Efficient harvesting also required a detailed knowledge of habits and characteristics of the different species of animals, fish, birds, and plants available.

Hunting Techniques

The Tahltan used several different techniques for hunting mammals and birds. Facilities such as caribou fences, snares, traps, and nets were used to capture gregarious species during periods of aggregation as well as more dispersed and solitary animals. Dogs and implements such as bows and arrows and spears were also used in hunting.

Fences and Drives for Caribou

In fall, and again in late winter/early spring when there is a thick crust on the snow, caribou move in large groups between alpine tundra and forested valleys. At these times of the year caribou were easily captured by means of fences erected at strategic points along well known migration routes. In open areas, fences three to four miles long, but sometimes as long as eight or ten miles, extended from river banks to prominent headlands. They were constructed of posts, interlaced with deadfall and branches. Openings were left at regular intervals along the fence in which hide snares were set. Several families cooperated in driving caribou towards the fences. After struggling with the snares, caribou became severely weakened and were easily dispatched with a spear.

Each clan had several fences. They were the communal property of the clan in whose territory they were built. The snares in the fence were made and set by individuals. The meat was shared among all the families which used and helped to maintain the fence. The skins belonged to the persons owning the snares in which an animal was caught, but skins might be given away to anyone in need (Teit n.d.).

When a herd of caribou was sighted in a different area, snares were set between trees growing a suitable distance apart. Swift runners drove the caribou between two flanks of people towards the patch of timber where the snares were set. Caribou were also driven through defiles in the hills where good shooters were stationed. They were sometimes chased into patches of deep snow where the animal became stuck and speared. Caribou were not killed in open water at river crossings, being difficult to retrieve (Teit n.d.).

Use of Snares

Snares were used to capture a wide range of different animals and birds. Large, thick snares, made of four strands of unsoftened caribou or moose hide (rawhide or babiche), twisted and looped to form a strong noose, were used to capture larger animals. Snares were set in fences and in a line between trees towards which caribou were driven. They were also set along trails which moose, deer, sheep, or goats were known to frequent. Bears were commonly captured with thick snares attached to heavy tossing poles which prevented their escape.

Several smaller mammals were also captured by means of snares. Lynx were caught by means of hide snares attached to tosing poles which were set along trails or in areas where they hunted rabbits. A dead rabbits was often placed close by as bait. Beaver were often caught with snares, with stone weights attached, which were set in shallow waters along pathways to the beaver's dam or to the shore. The area around the snare was sprinkled with castoreum stored in containers made of caribou antler (illustrated in Emmons 1911:73).

Large numbers of marmots and groundsquirrels, or gophers, were hunted from mid-August to mid-September when they were fat just prior to hibernation. They were captured by means of hide snares set at the entrances to underground burrows.

Rabbits were most commonly captured with snares made of twisted sinew. These were attached to willow springpoles along runways (shown in Figure 7). During periods of extreme cold or heavy snowfall in winter, small pine trees were cut down close together to form a kind of corral. Rabbits were allowed to make runways and to feed on the pine for two or three days. Then snares were set along the runways.

Grouse and ptarmigan were generally caught with snares of twisted willow bark or sinew of caribou or moose. Snares were attached to a bent willow or a pole stuck into the ground along trails used by grouse. In hunting ptarmigan, snares were set in a line in a patch of shrub willows. Bunches of ptarmigan were chased towards the snares by women and children while singing a coaxing song to them. Ducks and geese were also caught with snares set in shallow waters of marshes and lakes (Teit n.d).

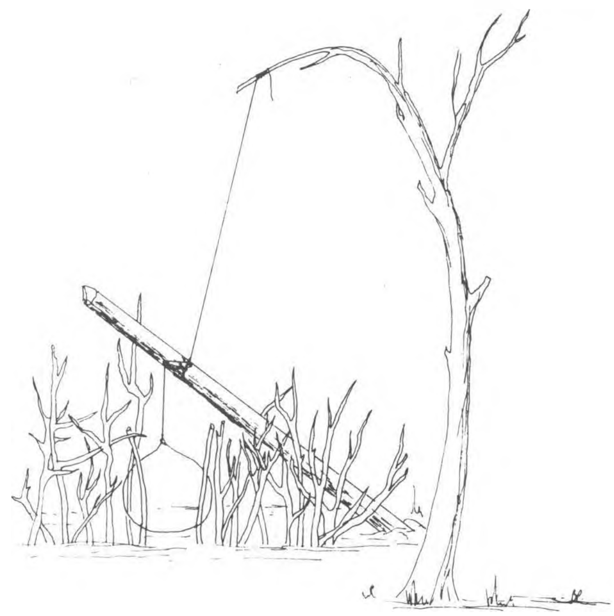


Figure 7. Snare with tossing pole used for rabbits

Snares made of twisted sinew or fine strips of babiche, used for capturing birds and smaller mammals such as rabbits and marmots, were stored on rectangular shaped wooden reels with deep notches. Having a suply of snares ready for use, it took little time to set several of them.

Nets

Nets were commonly used to capture beaver. Beaver nets were made of babiche, four to seven metres in length, with a 12 to 15 cm mesh just large enough for the head of the beaver to pass through. Nets were set in either clear water or under the ice in winter across well travelled routes from the beaver's house to its dam or to feeding areas. When set under the ice, several holes were made in the ice in a straight line. The net was spread out by pushing a long pole under the ice, to which the end of the net was attached. The ends of the net were secured to poles

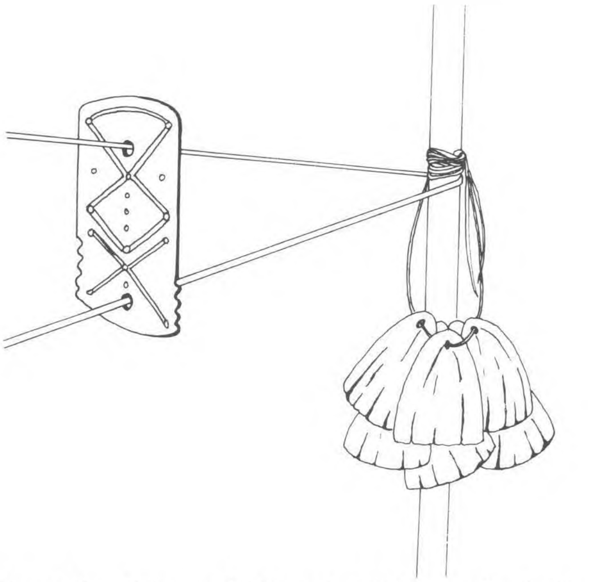


Figure 8. Bone swivel and rattle used at the end of beaver net

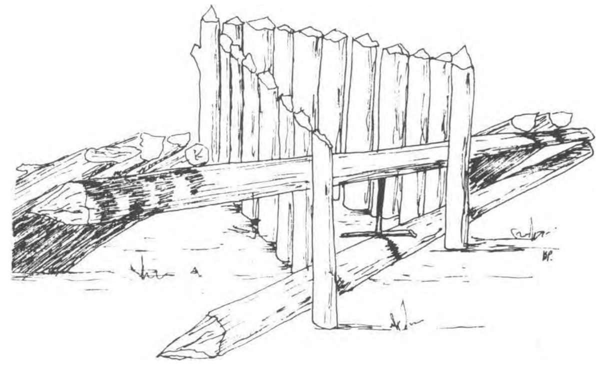


Figure 9. Deadfall trap used for carnivores

set into the ice or to opposite banks of the stream. A long, strong, drawstring, looped through the outer meshes of the net around the four sides, passed through a bone swivel, as shown in Figure 8, with the ends tied to a stout pole. A wind charm, or rattle, made of several split halves of dried caribou or moose hooves, was also tied to the pole to give warning when a beaver was enmeshed. When a beaver was caught, the two ends of the drawstring were pulled through the bone swivel to close the net and bring the beaver to the surface. The hunter often made a temporary camp on the shore while waiting for a beaver to get caught in the net. The beaver's dam might be opened up or its house broken into to bring the beaver into the net (Emmons 1911: 74-75, Teit n.d.).

Traps

Deadfall traps, similar to that shown in Figure 9, consisted of several large poles arranged to trap an animal under a heavy weight after the balancing lever had been triggered. Traps were used to capture solitary carnivores such as marten, wolverine, and fox which were used for their fur only. Animals were attracted to the trap by means of bait such as rotten fish eggs, castoreum, or a dead rabbit or grouse placed inside the corral arrangement.

Stalking

Large, solitary animals such as moose, deer, sheep and goats were generally stalked and killed with bow and arrows or spears (described under hunting implements below). Knowledge of seasonal habits and location of animal beds and trails was used to locate animals. Hunters usually worked in pairs when stalking.

Use of Dogs

Formerly, dogs were used a great deal in hunting. Although small in size, measuring about 40 cm high and weighing only about five kg (Crisp 1956:38), they were trained to track animals and keep them at bay. Particularly useful in hunting bears and keeping them at bay until they could be speared or shot with bow and arrow, these dogs gained reknown as the Tahltan Bear Dog. In winter, bears in their dens were sometimes located with dogs, where they were speared. Dogs were also used in hunting porcupine. This slow moving animal is easily killed with a club.

Hunting Implements

Bows

Good bows were made of young alpine fir (Abies lasiocarpa) wood, although temporary bows were also made of young spruce (Picea glauca) and birch (Betula sp.). They were about one and a half metres in length and five cm thick, slightly tapered at the ends. The bow was carved flat on the inner surface and rounded on the outer surface. In its manufacture, the middle part of the bow was heated and rubbed with beaver castor to toughen the wood. The whole length of the bow was covered with a caribou or moose hide covering which was tied at intervals along the front or outer surface of the bow to keep it in place. Formerly no skin covering was used, until a man once broke his bow while it was fully drawn and the end flew back and pierced him so that he died (Emmons 19211:65-66, Teit n.d.).

Bow strings were made of wet sinew from the back of caribou which was twisted and rolled on the thigh. Occasionally bow strings made of babiche were used. Good bows were only strung when nearly ready to shoot.

Bow points, made of goat or sheep horn, caribou bone or antler, or obsidian, were attached to the upper end of the bow with sinew lashing (see Figure 10) and thus used as a spear for dispatching wounded animals. The bow point was longer than arrow points but not as long as regular spear points. It had a proportionately narrow base and shallow notches (Emmons 1911:65-66. Teit n.d.).

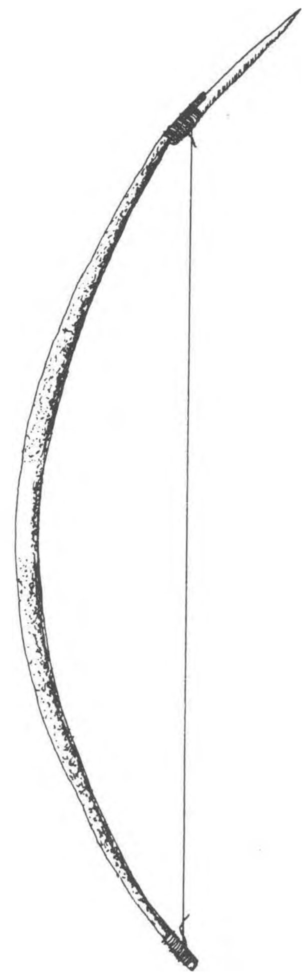


Figure 10. Tahltan bow with antler point (1.5 m long)

Arrows

Teit (n.d. fieldnotes) indicates that all arrow shafts were made of saskatoon berry wood (Amelanchier alnifolia) and were about 75 cm (2 1/2 ft) long. Sandstone abraders were used to smooth arrow shafts. Shark skin, obtained in trade from the Tlingit, was also used to smooth shafts. Shafts were painted red and black with various designs and also oiled with fish oil. The end of the arrow was feathered. Two feathers were used on arrows for birds and small game, while three feathers were considered best for large game. Feathers were secured with a sinew lashing. Hawk, owl, and grouse tail feathers were used (Emmons 1911:67, Teit n.d.). Tahltan tradition indicates that the use of wing feathers of the golden eagle on arrows, as taught by the wolf people, was believed to bring good luck in hunting (Teit 1919:250).

Arrow points of bone, antler, and obsidian were used. Both leaf shaped and notched points were used. Points were

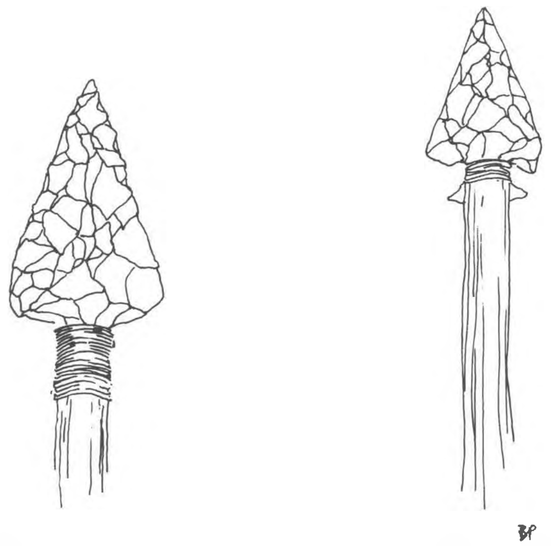


Figure 11. Attachment of point to arrow shafts

Figure 12. Blunt headed arrow for birds and small game

usually set into the split head of the shaft and secured with fine sinew lashing and spruce gum (see Figure 11). Sometimes they were lashed to the arrow shaft without seizing so that after entering the animal the point detached itself and worked into the flesh. No shell points, foreshafts, or poison were used on arrows (Emmons 1911:67, Teit n.d.).

Arrows for grouse, ptarmigan, waterfowl, rabbits, and other small game were carved from a single piece of wood with blunt heads as shown in Figure 12.

Quivers

Quivers for carrying arrows were made of dressed caribou or moose hide in the form of a single cylindrical pouch. It was sewn along the sides and the small round piece at the bottom. It usually held ten to twelve arrows. Feathers lined the bottom, three or four inches deep, so that the arrow points were not damaged. Some quivers were decorated with designs in quill or bead work, fringed, and painted with red ochre. It was carried on the back by means of a strap, while the bow was carried in the hand (Emmons 1911:67, Teit n.d.).

Spears

Spears were used for both hunting and warfare. The spear point was made of goat horn or obsidian. It was similar to the bow point, but much longer, fitted into the end of a stout shaft about two metres long, and lashed with hide rope. Cases for protecting the points were made of wood, split in half, hollowed out to conform to the shape of the point, and grooved on the outside to accommodate the hide lashing (Emmons 1911:67-68, Teit n.d.).

Skinning and Butchering Game

Larger animals, such as caribou and moose, are skinned and butchered into major body parts at the kill site. Small animals, such as beaver, marmots, and ground squirrels, are generally brought back to the the camp (either a temporary camp or a more permanent habitation site) for skinning and butchering. Animals are skinned before cutting them open. This ensures that hair is kept away from the meat and that excess blood does not get on the hair or fur.

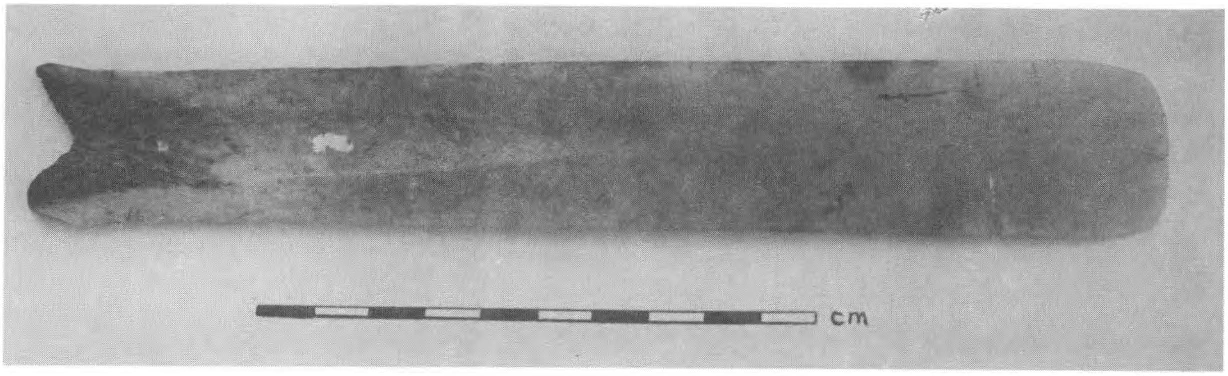


Figure 13. Bone skinning knife

Knives

The traditional skinning knife is made of caribou antler, a rib of caribou or moose, or a longitudinal flat section of lower leg bone of caribou, moose, or bear, which is sharpened at one end and sometimes serrated (see Figure 13). These are often decorated with incised lines and geometric patterns, and coloured with red ochre.

Rib bones of caribou and moose, sharpened along one edge, were traditionally used for butchering meat. Knives with obsidian blades were also used, especially for butchering and skinning large game. The blade was hafted into a short handle of wood, horn, or antler, by means of sinew or hide lashing (Emmons 1911:68, Teit n.d.).

Skinning and Butchering Large Animals

If a large animal is captured and killed late in the day during the winter, with not enough daylight to complete the work of butchering, only the lower limbs of the animal are skinned out since they freeze very quickly. The animal is then completely covered with a mound of snow; the heat of the animal is thus retained so that it will not freeze overnight. The hunter returns early the next morning to carry out skinning, butchering, and transporting back to camp.

After skinning out the legs, the skin is cut from the anus to the throat along the mid-line of the belly, and then around the throat to the back of the neck. From the mid-line of the belly the skin of one side is separated from the body around to the back using the long skinning knife. By leaving a small amount of flesh (one cm) attached to the skin, the animal is skinned more quickly, with less danger of cutting the skin, and makes defleshing of the hide somewhat easier at a later stage. The animal is then rolled over onto the side already skinned and the skin is separated form the other side starting again from the belly section.

After the skin is completely removed, the animal is butchered into large sections by disarticulating major joints. First the forelegs and then the upper limbs are disjointed. The head is cut off by separating two of the middle cervical vertebrae. The abdominal cavity is opened and the intestines are removed and cleaned. Other organs are removed and the interior of the cavity is washed with snow or wiped out with leafy branches. Two longitudinal sections or 'sides' of ribs are cut away by separating ribs from vertebrae and breast bone at joints. The back is separated into three or four transverse sections.

With the body of the animal cut into more compact sections, the hide is used as a temporary toboggan to transport it back to the camp or village. The hide of large animals is cut into two equal pieces. Holes are cut at intervals along the edge through which a hide rope is passed. Placed with hair side down, sections of the animal are packed on the skin which is laced up tightly. The bundle is thus easily pulled along the snow in the direction of the hair. It slides downhill easily and the hunter may even ride on top. If animals are killed when there is little or no snow on the ground, sections are packed on the back in large pack bags made of tanned skin or of netted babiche (Emmons 1911:51, Teit n.d.). Unless restricted by great distance, the entire animal is taken back to camp and put to some use or other.

Meat for drying is cut in strips, 10 to 20 cm wide and 30 to 40 cm long, mainly from the shoulders, hind quarters, and back sections, and placed on poles suspended about two metres above the campfire.

Skinning and Butchering Small Animals

In skinning small game animals such as beaver, marmots, and ground squirrels, the lower limbs (hands and feet) are cut off. A cut is made along the mid line of the belly from anus to chin. Using the bone skinning knife (Figure 13) the skin is separated from the flesh and fat first on one side around to the back and then the other. Working around the legs and tail, these are slipped out of the skin, or in the case of the beaver a cut is made around the base of the tail. The skin is separated from the head by cutting around the ears, eyes, and mouth, at which point the entire skin is removed form the body. The skinning of a beaver takes between a half and one hour, while the skinning of marmots and ground squirrels takes only a few minutes.

Small game animals such as beaver and marmots are split for drying whole in such a manner as to remove the backbone and other larger bones and leave the belly flesh intact. The head and sometimes the tail of the animal is removed. With the body of the animal lying on its belly or ventral surface, meat is cut away from the dorsal surface of the backbone, pelvis, and ribs, to about the midline of the ribs. A longitudinal cut is made on both sides of the rib cage at this mid point. Legs are disarticulated from the pelvis and shoulder blades. The backbone, with attached pelvis and sections of ribs, and shoulder blades are removed along with the guts, leaving the legs, frontal sections of ribs, and breastbone attached to the intact belly flesh. The flesh is spread out straight with small sticks and suspended above a smoky fire so that it turns in the wind as seen in Figure 14.

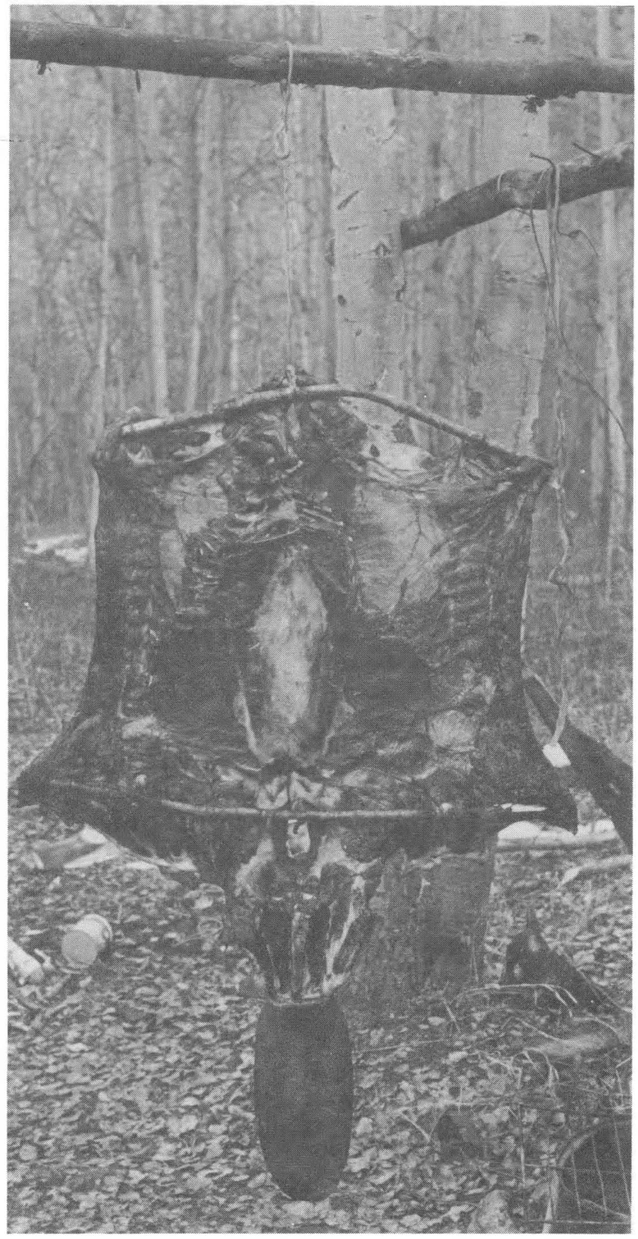


Figure 14. Split beaver hanging to dry over the campfire

Use of Animals For Raw Materials

Besides their primary use as food, animals also provided raw materials for the manufacture of many tools and implements used by the Tahltan as well as clothing and a variety of other items. Table 6 summarizes the major uses and relative value of the raw materials provided by different kinds of animal resources. Caribou and moose are comparable in terms of their importance and usage within the traditional subsistence economy. All parts of these animals were used in some way, either as food or as raw materials.

Use of Skins

Moose and caribou skins, tanned in the manner described below, were particularly important for making articles of clothing, the styles of which are described in detail by Teit (1956), as well as a variety of bags which were used as containers for storage

Table 6. Uses and Relative Value of Raw Materials Provided by Animal Resources.

Resource	Raw Material	Uses (Emmons 1911, Teit n.d.)	Value Score
caribou/moose/ deer	skin (tanned)	clothing, containers for storage and transportation	.5
	babiche	snares, fish and beaver nets, snowshoe netting, cordage	
	sinew	thread for sewing, snares, twine	
	antler	skinning knives, butchering knives, hide scrapers,	
	bone	awls, points, barbs, wedges, bark pryers, digging sticks, handles	
sheep/goats	skin	bedding, rugs, water containers	.4
	hair	cordage for fish bags	
	sinew	thread, snares, twine	
	horns	bowls, spoons, snowshoe brakes, spear points, handles	
bears	skin	bedding, rugs	.3
	bone	variety of tools including hide scrapers	
	teeth	tools, charms, necklaces, headdresses	
beaver	skin	bedding, rugs, headgear	.3
	teeth	smalltools such as drills and knives	
	castor	scent used as bait	
porcupine	quills	used in decorative embroidery	.1
marmots/gophers	skins	clothing, robes	.2
hare	teeth	small tools	
lynx/fox/marten	skins	robes, headgear	.1
birds	feathers	feathering arrows, lining parfleches, ceremonial uses	.2
	bones	small tools, implements	
salmon	skin	containers for storing meat, fat	.1

Figure 15. Bone awl used in sewing

and transportation of goods. Sewing is done with sinew from the back and legs of moose or caribou, and sometimes from sheep or goats. Very fine fibres of this tendonous tissue are separated and rolled on the thigh to produce long threads. The Tahltan did not traditionally use bone needles for sewing. Bone awls, similar to the one shown in Figure 15, are used to make tiny holes in the skin through which the stiff sinew thread passes easily.

The skins of moose and caribou were also used in the manufacture of babiche. Hides were defleshed, dehaired, and scraped on both sides but were not softened by tanning and dressing. They were cut when wet into one continuous narrow strip with a knife made of an obsidian blade or flake hafted into a handle of wood, bone, or antler. Babiche was used for making nets, snares, ropes, snowshoe netting, and netted game bags.

Hide Processing

Throughout North America where the hunting of mammals provided the major subsistence base, furs and hides were processed by all groups and used for a variety of purposes. Yet there are very few detailed accounts of the entire hide working process or the tools and facilities used in each stage. As curator of Ethnology at the U.S. National Museum in the 1880's, Otis Mason reported on the hide processing tools housed in the museum at that time and compiled descriptions of the process, gathered from the literature to date. The brief and summary nature of most of the accounts prompted him to secure a more detailed description of Navaho skin dressing from a friend, Dr. Shufeldt, working with the U.S. Army in the Navaho area at the time (Mason 1889:574).

A study of available accounts of hide working indicates that, while some variation in techniques and different materials are used by different groups, the process, facilities, and kinds of tools used are similar throughout large areas of North America. Among the ethnographies on Indian tribes in British Columbia, one of the most detailed accounts of hide processing is provided by Emmons for the Tahltan Indians (Emmons 1911:80-84). The statement made by Emmons in 1911 that "practically the same methods of treatment are employed today as in the past, and while an occasional iron tool may be found in use, implements of bone and stone, aboriginal in form and workmanship, are preferred" is as apt today in 1982 as it was at the turn of the century. While carrying out ethnoarchaeological investigations among the Tahltan people over the past few years, this author has the opportunity to observe the continued use of traditional methods and tools by Tahltan women in processing hides, which are described here.

The hides of moose, caribou and deer were defleshed, dehaired and softened thoroughly on both sides for use in the manufacture of clothing, bags and cordage. The skins of goats, sheep, bear and other fur bearing animals were dressed in a similar manner on the flesh side only for use as robes, bedding and rugs.

While the procurement, skinning and initial butchering of large game animals is largely carried out by men, the entire process of hide preparation is carried out exclusively by women, as is true throughout most of North America where hunting procures a major portion of the subsistence base (Driver and Massey 1957:343-4). Girls learn the art of hide processing about the age of 10 - 12 from their mother or aunt by way of observation, imitation and continued participation with them.

Traditionally, most hide working was done at spring and fall hunting camps, shortly after large numbers of animals had been captured. Today, hide processing is carried out in the yard beside or behind houses in the village. Depending on the number of hides being processed at a time, hide working activities may require up to 200 square metres of activity area. Hides procured during mid-winter may be left frozen in the snow, which keeps them fresh, until they can be worked on in warmer spring weather. By mid-March daytime temperatures become comfortable for extensive outdoor hide working which continues until June when attentions turn to preparation for the summer fishing season.

Defleshing/Dehairing

Skins are easier to deflesh when they are fresh, with about one cm. of flesh left adhering to them. In early spring hides are covered with snow to keep them damp. Skins which have dried out are soaked in water and rolled up for a few days to soften them up again. The traditional method of defleshing and dehairing hides (Emmons 1911:81, Teit n.d). employed by Tahltan women was similar to that used by other groups. The skin was draped over a post about a metre high which was firmly planted in the ground in a slanting position. all particles of flesh are removed with an instrument made from an upper leg bone of moose, caribou, or bear as shown in Figure 16. The scraping end of the tool is serrated. The skin is scraped with a downward motion and with some pressure on the tool.

Having been kept rolled up for several days while damp, the hair on the skin naturally tends to loosen. The hide is draped over a large smooth post which rests against a tree. The hair is scraped off with a lower leg bone of moose or caribou, from which a thin longitudinal section has been removed to give two edges, one of

Figure 16. Bone scrapers for defleshing and scraping hides

Figure 17. Beamer for removing hair from large hides

which is sharpened, as seen in Figure 17. This beamer is used with two hands in a similar manner as a spokeshave with a downward movement.

Today most women prefer to remove the flesh and hair from skins while they are stretched on the stretcher frames. A thin strip of hair (5 cm. wide) is removed from around the entire outer edge of the hide so that slits can be made (3-5 cm. long) at regular intervals along the edge. The hide is then attached to a square or rectangular stretching frame made of poles with corner bracing by means of hide rope. The frame may be twice the area of the unworked hide, thus requiring up to 25 metres of hide rope, approximately one cm. wide. The hair is generally cut off the hide with a metal knife and takes one to two hours. The stretcher frame is turned and the flesh is removed with a knife or the traditional serrated bone deflesher. The animal hair may be found piled in close vicinity to the work area. Moose hair has been observed used as filling or stuffing within a cloth cover for mattresses. Hides which have been defleshed during the fall or winter are covered with bear grease in order to preserve them until they can be worked again. Defleshing takes one to two hours.

Scraping

After the hair and flesh have been removed from the skin, it is soaked in water. In the evening it is laced onto the stretching frame and allowed to freeze overnight. At first light the next morning the hide is scraped while still frozen to remove remaining hair and the outer cuticle of skin, as shown in Figure 18. While this outer cuticle of skin can be scraped off dry in warmer weather, it is much easier to remove when frozen in early spring. This process takes three to four hours. Traditionally the heavy chisel-like fleshing implement (Figure 16) was used for scraping off the cuticle. Presently, metal files with curved and sharpened ends are frequently used for this purpose.

Soaking

The traditional tanning agent still used for softening hides is the brain of the animal being worked. One moose brain is sufficient to tan a large moose hide. The brain is tied up in a small bag and cooked slowly in water until it permeates the water, giving it a 'soapy' feel. This is added to the water in a large container in which the folded hide is placed until the hide is completely covered. Today metal washtubs are used for soaking hides. Formerly large vessels for soaking hides were made of birch or spruce bark, sewn together with spruce roots and glued with pitch. These were placed in pits dug into the ground of the same size, approximately one metre in length and a half metre deep. A cover is placed over the container to keep out dirt, and the top is weighted

Figure 18. Scraping frozen hides

down to keep dogs from getting at the hide. Women are very careful to keep the hide clean at all stages, since dirt which got on the hide during the working process would leave the hide black and be difficult to remove if it became impregnated. The hide is soaked in the brain water for at least four days. Every day it is taken out of the water to be wrung and stretched.

Wringing

A wringing post, one to one and a half metres high, is made by chopping down a small poplar tree 10 to 15 cm in diameter. Formerly trees were chopped down with stone axes hafted and used in a similar manner to modern steel axes (Teit n.d.). The top of the post is cut to a point. One end of the wet hide is attached to the post by looping the slits along the edge over the point in alternate directions. A small pole, approximately one and a half metres in length and five to seven cm in diameter, with bark removed, is looped through the slits in the opposite end of the hide. The hide is wrung by turning the pole in one direction, as shown in Figure 19, until the hide is twisted into a tight knot close to the wringing post. The pole is secured against the post and left for a few minutes so that the brain water drips out of the hide into a container below. The pole is unwound and then turned in the opposite direction. The same process is repeated, looping the pole through the other side or length of the hide so that most of the moisture is wrung out of the hide. The 'soapy' brain water is retained and used again.

With one end of the hide looped over the wringing post the hide is pulled out at the sides and ends to stretch it while still damp. The hide is then hung over a pole (5 - 10 cm in diameter, 3 metres long) suspended from two tress. This pole also has the bark removed to keep the hide clean. The hide is left to dry slowly over

Figure 19. Wringing the hide

a couple of hours. Drying too quickly will leave the hide hard and stiff. Approximately one hour is spent wringing and stretching each hide. The process of soaking, wringing, and stretching is repeated three to four times before the hide is soft and pliable. Several hides are usually processed at the same time during this stage. A woman might process 20 to 30 hides during the year to fulfill average needs of her family for softened hides.

Dressing

When the hide is soft and pliable and ready to be dressed, it is attached to the stretching frame while still damp. Care is taken to keep the hide clean. With the frame resting at an angle against a pole suspended at two metre level from two trees, the top corners of the hide are attached first, holding the rest of the hide up off the ground, then the bottom corners are attached. Hide ropes in manageable lengths are laced through the slits along the edge of the hide and pulled around the frame. Stretching the hide into the proper shape is very important. After the four sides have been attached to the frame the ropes are then tightened all around until the skin is tight when pushed against with some force. The hide is left on the stretcher until almost dry. Dressing is done on clear days since it is important that the hide does not get wet again from rain before the entire process is completed or it will become stiff and hard. The frame is put in a shady place so that the hide will dry slowly. Hot sun will dry the hide too quickly and make it stiff.

With the frame leaning against the pole in almost vertical position, one half on the hide is dressed at a time using a stone tool, which has a dulled working edge, hafted to a pole handle approximately one metre in length, as shown in Figure 20. This tool is usually made from a coarse grained basalt pebble, the manufacture of which is described below. The dressing tool is used with two hands, one grasping the hafted stone pushes with some force against the skin, the other hand grasping the end of the handle pulls towards the body as illustrated in Figure 21. The tool is worked against the hide in a downward or sideways motion. This dressing action completes softening of the skin by taking off remaining cuticles of flesh, thins it, and makes it more porous so that smoke can penetrate it. The stretching frame is turned so that all edges and both sides can be worked. Approximately two hours of continuous effort is required to dress a small hide (young moose, deer or caribou), while four hours are needed to soften a large moose hide by a woman of full strength. Dressing may take up to twice as long for older women or when it is done at a more leisurely pace. Hides taken from

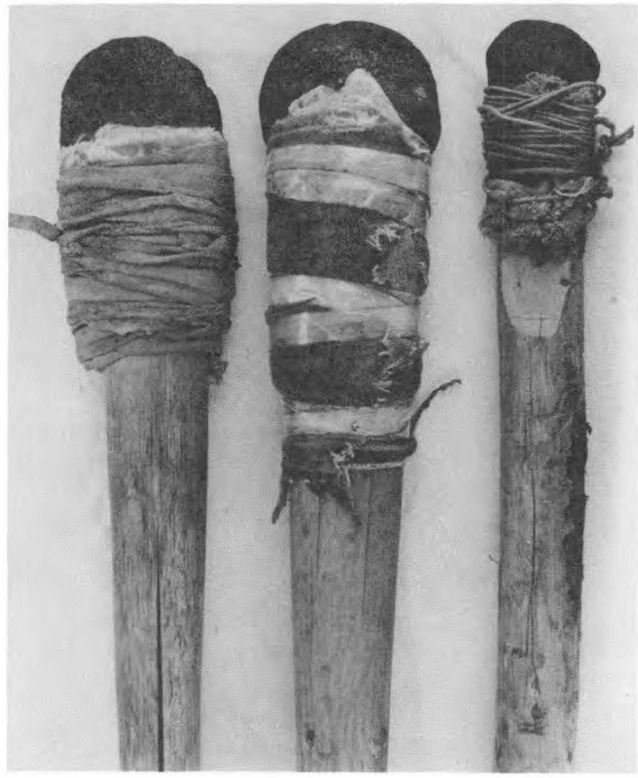


Figure 20. (right) Hafted stone tools used for dressing hides

Figure 21. (below) Dressing the stretched hide

animals killed in the fall are thicker and take longer to process at all stages. After removing the dry soft hide from the stretching frame, the outside edges are trimmed off and the hide is ready to be smoked.

Smoking

Smoking preserves the hide and keeps it from becoming hard when wet. A cylindrical shaped frame of light willow poles is constructed over a small fire pit, which averages 50 cm in diameter and 60 cm in depth, for smoking hides as shown in Figure 22. The frame is high enough so that the hide will not touch the ground (approximately two metres high). Smoking is done on a clear day when there is no breeze to take away the smoke and takes about two hours or more depending on how deep or rich the colour is desired. Dry pine cones and the inside white wood of a rotten cottonwood log are used for smoking, giving the hide a rich golden brown colour.

Figure 22. Hide smoking frame and pit

Manufacture of Stone Dressing Tools

Although anthropologists tend to assume that stone working traditions are no longer being employed in contemporary Canada, recent observations by this author indicate that Tahltan women are still manufacturing their own stone dressing tools. These tools are made of a coarse grained basalt which is abundant in the Stikine area. Relatively thin pebbles, oval or elongated in shape, are collected by women during the course of other procurement activities and kept until needed for manufacturing new tools. This kind of behavior in procurement of raw materials has been described by Binford as an embedded strategy (Binford 1979:259).

The manufacture of new tools and resharpening of old ones are carried out at the beginning of the hide dressing stage, so that several tools are hafted and ready for use. Dressing stones are manufactured using a bipolar technique, similar to that described by earlier ethnographers (Emmons 1911, Teit 1900) and scholars who are currently conducting replicative experiments (Flenniken 1980, Hayden pers. comm.). The basalt pebble is held edgewise on a large anvil stone and is struck with a hand held hammer stone. If the pebble is well struck each half can be used as a tool. Using direct percussion, flakes are removed from the edges by means of a hammerstone or by striking the split pebble directly against the anvil stone as seen in Figure 23. Flaking thus creates a dulled working edge. A sharp edge is considered undesirable for softening hides since it would tear the skin. All tools have cortex remaining on their dorsal surfaces. The manufacture of a new tool takes about ten minutes.

Dressing stones appear to have a long life span. Two or three hides can be dressed with a tool before it requires resharpening. Although the stone material is abundant and the method of manufacture fairly simple, many stone dressing tools appear to be highly curated. Several tools observed in 1979 and 1980 are reputed to be over 100 years old. When first starting to work on hides, a woman is given her first tools by an aunt or her mother. These are kept and handed down again as heirlooms. With continued use and resharpening, tools become smaller in size and may differ in shape from newly manufactured tools. Measurements of several stone hide working tools are presented in Table 7.

Table 7. Measurements of Several Stone Hide Working Tools (mm).

	Length	Width	Thickness
1.	124	72	18
2.	139	78	22
3.	136	81	30
4.	120	80	18
5.	110	82	32
6.	110	69	32
7.	126	73	28
8.	117	75	20
9.	110	74	21
10.	114	75	18
11.	113	74	22
12.	115	91	18
13.	120	80	12
14.	123	78	20
15.	110	56	19
16.	112	69	17
17.	112	58	16
18.	110	75	24
19.	108	78	16
20.	98	75	10
21.	89	69	18
22.	127	71	18
23.	138	86	24
24.	130	92	26
25.	141	61	22
26.	120	62	16
27.	163	75	20
28.	78	69	18
Range	78-141	56-91	10-32
Average	117	74	20

All of the split pebble tools observed being manufactured and hafted into pole handles are used in dressing or softening of hides during the initial processing of large skins as described above. However, within every woman's workbag or collection of tools there are one or two smaller stone dressing tools which are best described as cortex spall or flake tools. These are hand held and used for dressing smaller skins which require little work to soften them. They are also used to resoften articles of clothing or robes after washing or cleaning. Traditionally, clothing was washed in urine. After drying, they were often whitened with chalk and then rubbed with the hand held dressing stone (Teit n.d.). The two types of stone tools used for dressing skins are illustrated in Figure 24. The middle tool in Figure 24 still has tiny bits of skin adhering to it, although it has not been used for forty years. After continued use, tools generally develop highly polished edges. Hand held dressing stones traditionally used in conjunction with a chalk whitening agent probably had a much shorter use life than tools used in the initial processing of hides.

Ethnographic observations on the manufacture and use of stone tools in hide processing activities are useful for interpretation of tools found in archaeological contexts. Based on brief descriptions provided by Teit (1900, 1909) and Morice (1893), Ham (1975) identified cortex spall tools from sites in the Chilcotin River area as hide working tools and indicates that they have a wide distribution in archaeological sites in the southern interior plateau area. Coulson (1971) conducted an analysis of 577 cortex flake tools from the Fountain Site (EeR1 19), a winter village site above the Fraser River in the vicinity of Lillooet, B.C. Although their use as hide working tools was only tentatively suggested, many of the attributes recorded for these tools (Coulson 1971:17-22) are very similar to those of tools observed by the present study.

Figure 23. Flaking the hide dressing stone

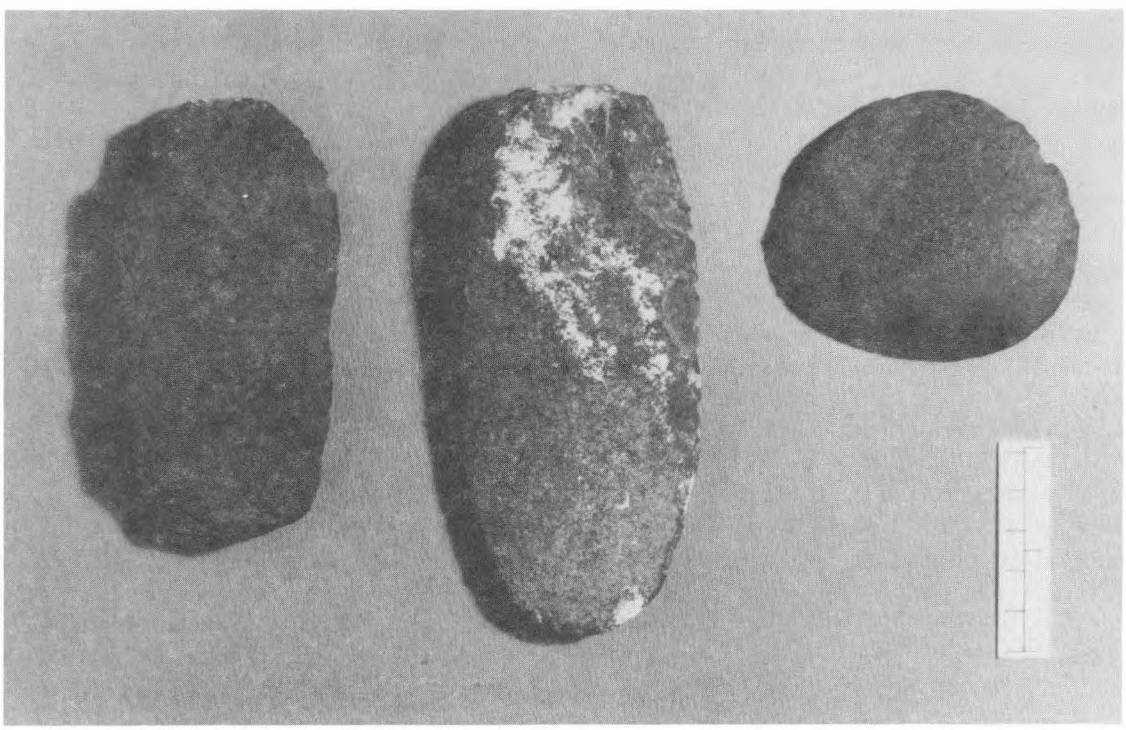


Figure 24. Two types of hide dressing stones

Fishing Techniques

The Tahltan used a variety of methods to procure anadromous salmon and fresh water fish, including the use of weirs, basket traps, gill nets, dip nets, gaffs, and spears, depending on the location of fishing activities and the quantities taken.

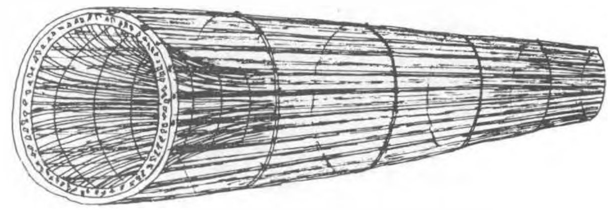


Figure 25. Cylindrical basket trap used for salmon

Weirs

Weirs were used to capture large quantities of salmon and fresh water fish during periods of migration to spawning grounds. They were constructed in shallow waters of rivers and streams along which fish passed.

Weirs were constructed of light spruce poles placed horizontally three to four inches apart and lashed to more stout vertical poles with red willow withes. Withes when soaked in water and heated over a fire become very pliable so that tight knots can be made. Teit (1906:344-345) observed a weir at the turn of the century composed of a fence with two boxes for constraining the fish. Finely balanced twigs attached to the entrace of the first box close after the fish pass through. The fish, unable to escape, pass on to the second box where they are taken out with a gaff hook. Several hundred fish could be caught in the weir in a few hours.

Gaffs

The gaff was and still is a popular fishing implement (see Figure 26). It was generally used in swift shallow streams and at weir locations. It consisted of a light pole about five metres long armed with a detachable hook made of caribou antler (Emmons 1911:86), which was attached to the shaft by means of one metre of hide line. Gaffs in current use (shown in Figure 27) are similar in construction except that hooks are made of iron.

Basket Traps

Long cylindrical basket traps, similar to that shown in Figure 25, were used at narrow river passages for catching large numbers of fish. They had inverted cones at the mouth of the trap through which the fish passed. The traps were weighted down in the water with rocks placed inside. When filled with fish, they were lifted up by means of strong ropes attached at several points. Basket traps were particularly useful for catching salmon at sites in the lower portion of the Grand Canyon of the Stikine, a few miles above Telegraph Creek.

Gill Nets

Gill nets made of twisted sinew, babiche, or shredded willow bark were used for fishing in lakes. These were about two metres wide and six to ten metres long with a mesh size of five cm. Carved wooden floats were attached to the thicker upper net rope and suitable sized rocks, often wrapped in hide, were attached to the lower line.

After a ban was placed on Indian use of weirs for catching salmon in the early part of this century, gill nets were adapted for use in the back eddies of larger fast moving rivers during the 1920's. People continued to tie their their own nets of various mesh sizes using spools of twine obtained from the Hudsons's Bay Company. Although plastic netting needles are most common today, netting needles and gauges carved of wood are still in use. Presently, second hand nets obtained from commercial fisheries are cut down to suitable size for river nets, generally 10 to 12 metres long. Gill nets are set out into the river by means of booms, large spruce or pine poles about

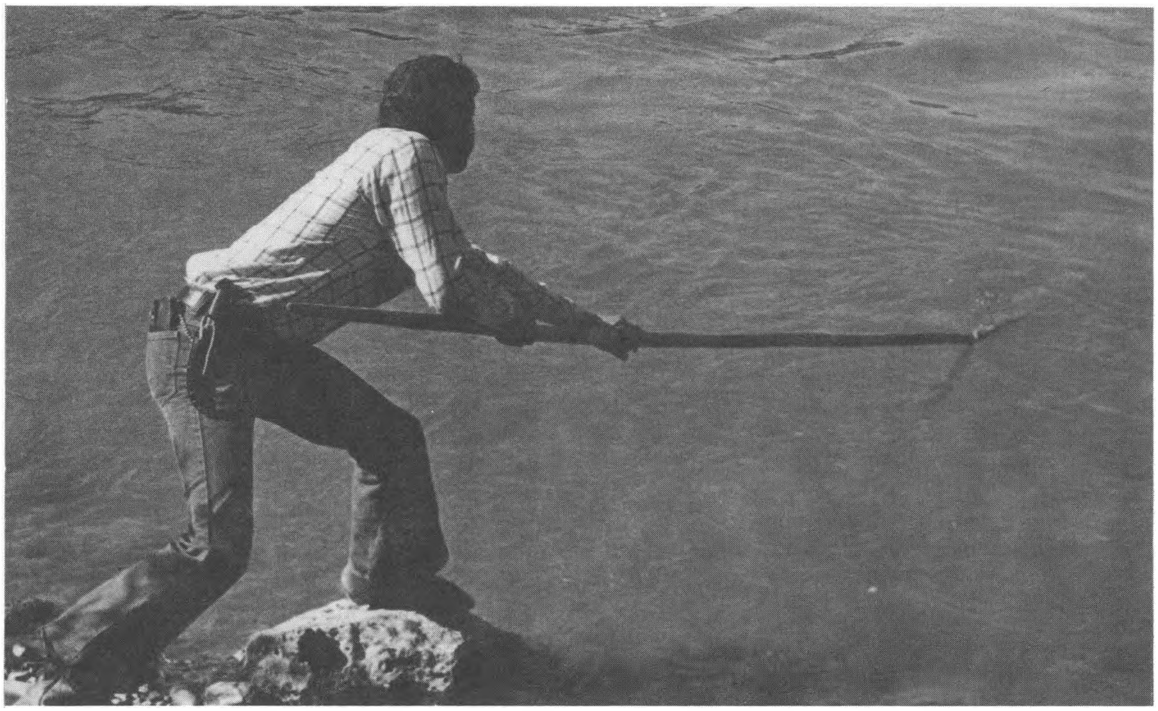


Figure 26. Gaffing salmon in shallow waters

Figure 27. Gaff pole with detachable hook

nine metres in length. Nets are run three or four times a day during the peak sockeye runs, since any more than 200 lb. of fish in a net makes it too heavy to haul in.

Dip Nets

Dip nets, similar to the one shown in Figure 28, were made of the same materials as gill nets for use along creeks and at weir locations.

Spears

For lake fishing through holes in the ice a three pronged spear was used. It consisted of a 15 foot long (4.5m) pole to which is attached a central bone point and two wooden arms with bone barbs at either side as shown in Figure 29. All attachments are made with sinew lashing. Salmon eggs were used as bait to attract fish to the hole where they were speared. Holes in the ice were cut with chisels of antler or horn (Emmons 1911:87, Teit n.d.).

Another type of spear consisted of a blade made of mountain goat horn, about seven cm long, pointed at both ends and sharpened along one edge. A line of twisted sinew or hide passed through a hole about the center and was secured to a four metre pole. One end of the toggle like blade fitted into a socket in the end of the shaft. When the blade was driven into a fish it was released from the end of the pole, and the strain on the line tended to turn the blade at an angle to prevent its withdrawal from the fish (Emmons 1911:87).

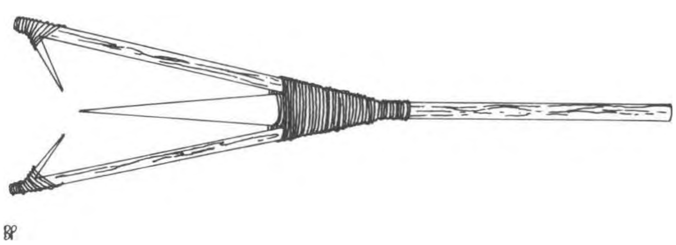


Figure 29. Three pronged spear used for ice fishing

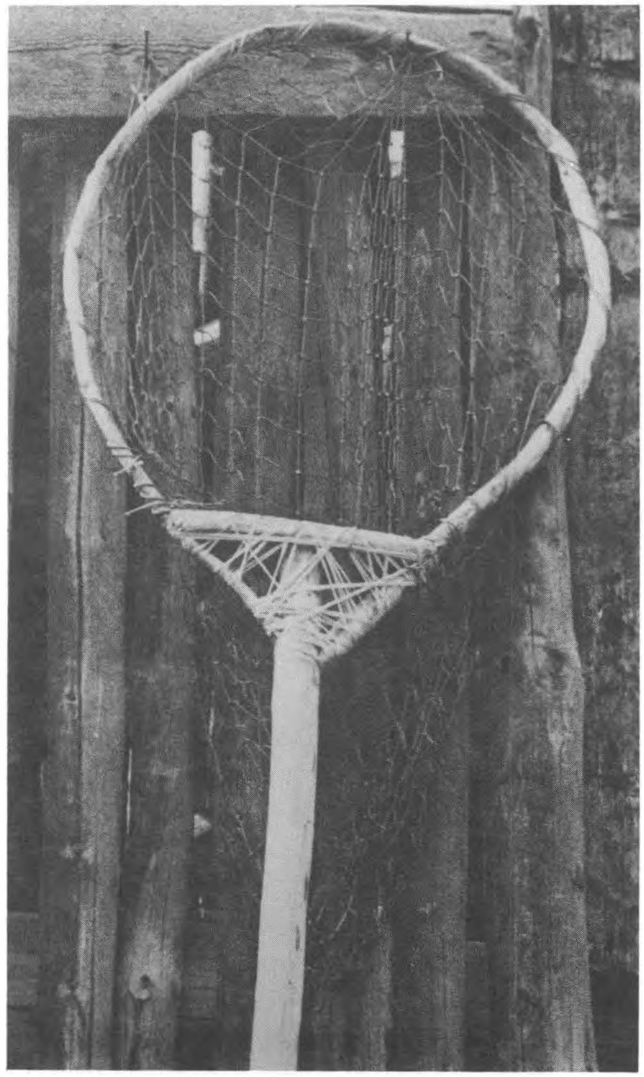


Figure 28. Dip net used in fishing

Hooks and Lines

Long lines of shredded and twisted willow bark with a series of hooks attached were set out from lake shores for catching freshwater fish. They also had several floats and small sinker stones attached. Individual lines with a single hook, float, and sinker were attached to poles about two metres long which were either hand held or set in the bank along creeks or lake shores. The hooks attached to these lines had bone barbs lashed to short wooden shanks and were baited with salmon eggs or bits of meat.

Processing of Salmon

While the actual procurement of salmon is carried out by men, butchering and preparation of salmon for drying is the responsibility of women. Salmon are eviscerated along the river bank as soon as they are taken out of the water. A slit about five to seven cm long is made from ventral to dorsal surface just forward of the tail. This slit gives a good hold on the slimy fish for completion of gutting as well as for carrying back to the smokehouse and for suspending either on nails or small poles.

With the fish laid on its side or back, a cut is made from each gill to the tip of the lower jaw. A slit is then made from the anus to the throat and the guts are taken out in one piece and thrown back into the river. Blood is scraped away from the inside of the cavity and the fish is scrubbed clean in the stream or river. The fish is then hung on a tree nearby to dry partially while the rest of the catch are being eviscerated.

With larger fish, such as some of the larger sockeye and the spring salmon, the heads may be cut off and strung on a pole through the eye. No part of the fish is discarded except the guts. Fish heads are considered a delicacy, and all bony parts of the fish not consumed by people are fed to the dogs. Larger fish may also be butchered by a second method. After cutting off the head, a slit is made from the anus along two sides of the belly to the throat area, giving a separate belly piece. After eviscerating and cleaning, the salmon are carried to the smokehouse where they are hung on poles or nails close to the smudge until the outside skin and flesh is dry to touch, usually several hours or one day.

The next stage in processing the salmon is splitting them for drying on the racks. Placed on a workbench, the fins are cut off the fish and put into a scrap bucket for the dogs. After the heads are cut off, a cut is made along both sides of the backbone which is thus removed along with the tail. Heads, backbones, and tails are hung to dry on separate poles about two cm in diameter.

The salmon is then placed on an A frame cutting board as seen in Figure 30. Starting from where the backbone was removed, a large fish knife, generally with a curved blade kept very sharp, is used to split the flesh of each side through to the belly edge but leaving the flesh attached to the skin at this edge. The flesh is then spread out like leaves in a book and scored so that the air and smoke can more effectively dry the whole salmon (as seen in Figure 31). If the fish is especially large or fat, thin fillets are cut from the side before splitting. These are called 'enacaga' and eaten as snacks when thoroughly dried.

The split salmon is hung over one of

Figure 30. Splitting salmon on the A-frame cutting board

the lower rack poles close to the smudge with the flesh side up. The salmon are inspected several times a day to check for fly eggs and shifted on the rack pole to ensure even drying. If fly eggs are found, they are cut out immediately or the fish will spoil very quickly. The low fires in the smokehouses are tended during the day and a good smoke is produced with green willow, aspen, cottonwood, or alder.

When the fish are partially dry--somewhat hard and dry to the touch--they are suspended on poles and hung from a higher rack in the smokehouse. As the fish become dry in about two weeks they are suspended from the highest rack in the smokehouse until the end of the season.

At the end of the fishing season, the dried salmon are brought down from the racks in the smokehouse, taken off the poles, and piled outside as shown in Figure 32. They are tied up in bundles of 15 to 20 fish according to variety, and transported to storage facilities.

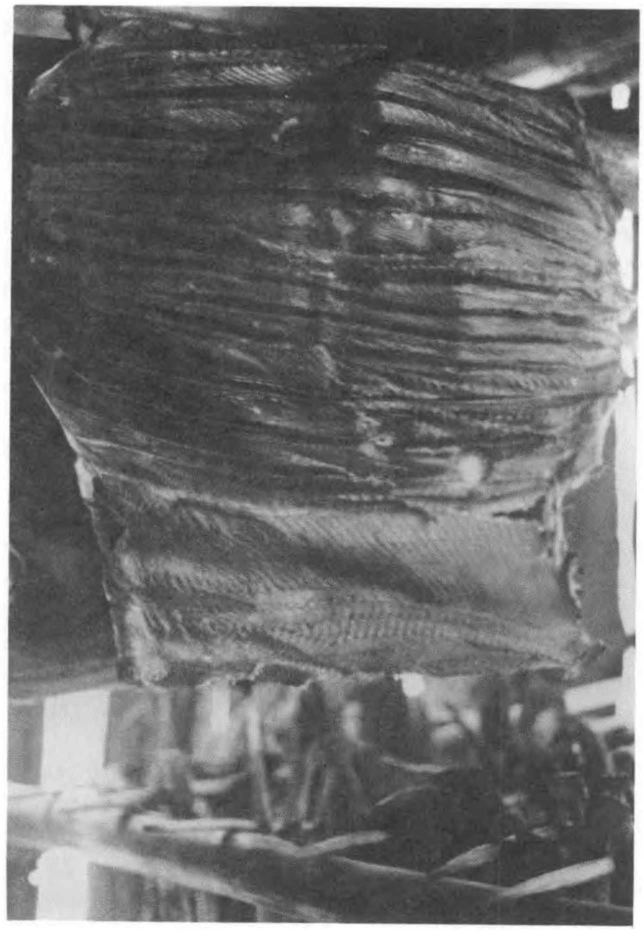


Figure 31. (right) Scored salmon hanging to dry

Figure 32. (below) Bundling dried salmon for storage

Butchering knives

Knives used in recent years for butchering fish have curved steel blades, averaging 12 to 14 cm in length. Metal was introduced to the Tahltan by Tlingit traders prior to direct European contact. Today people do not remember how knives with blades of obsidian were manufactured or used, only that they were. However, some information on the construction of knives was gathered by Thorman at the turn of the century from a Tahltan elder named "Gilyeh". As shown in the reconstruction, Figure 33, Thorman notes that obsidian flakes were set into a curved bone or wooden handle and sealed with conifer pitch. Sinew lashing was also used to secure the handle (Thorman n.d.). Similar in shape to knives in current use, this type of knife was probably used for butchering and splitting salmon for drying. Fish knives were mainly used by women and may have been manufactured by them as well. Based on replication experiments and ethnographic analogy, Flenniken (1980) argues that microlithic knives retrieved from the Hoko River site in Washington were made and used by women for processing fish.

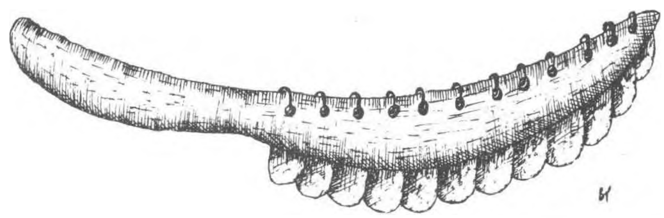


Figure 33. Reconstruction of knife with obsidian flakes (based on Thorman n.d. notes and sketches)

Use of Edible Plants

Surveys on hunters and gatherers indicate that in northern latitudes and highly seasonal climates edible plants were either exceedingly scarce or not important in the aboriginal diet of the groups who lived there (Hayden 1981a:357). Indeed, there is a general lack of attention paid to the use of plant foods in many ehtnographies on northern groups. From the major ethnography published on the Tahltan (Emmons 1911), based on field work at the turn of the century, one would get the impression that very little use was made of plant resources. Under food, Emmons notes that "the soapberry was dried in the form of cakes for winter use. Certain roots as well as the inner bark of the black pine are also eaten" (Emmons 191:62-63).

Perhaps this lack of information concerning plant foods was due to a widely held belief that plant foods were unimportant among northern groups, or the fact that an ethnographer spent a limited period of time carrying out fieldwork, or only during the summer season when attention was turned to other activities such as fishing. Field work carried out by Teit (n.d. fieldnotes) as well as the present research indicates that the Tahltan used a variety of different plants for food and for medicinal purposes.

The use of plant foods was probably much more extensive in prehistoric times than it is possible to document for the historic period. It is quite likely that the use of many traditional plant foods was quickly dropped in favour of starch foods such as flour, sugar and rice, introduced by Europeans during the first gold rush in 1874.

While plant foods may represent a small proportion (less than 10%) of the total diet when measured in terms of weight or volume, it is suggested that they were highly valued for their significant contribution to the diet in terms of essential nutrients, vitamins and minerals, as well as variation in taste, texture, and colour. Plant foods are divided into major categories of green vegetables, roots and bulbs, fruits and berries, and cambium.

Green Vegetables

Included in this category are a wide variety of plants whose young shoots, tender stems, or leaves are available from early spring through early summer. These were generally gathered with the hands into birch bark baskets. Occasionally a small knife with obsidian blade or flake may have been used to cut the larger stems. Young tender shoots of such plants as bullrushes, cattails, solomon's seal, horsetails and other ferns appear in damp habitats as the snow melts in April, providing a welcome change to the diet. The tender stems of wild rhubarb and fireweed could be procured somewhat later in May and early June. Wild rhubarb stems are still relished and gathered in quantity today. Shoots and stems were usually eaten raw after peeling off the outer fibres. They were always eaten fresh, not being preserved for later use.

The tender leaves of nettles, dock, fireweed, petasites, sorrel and chenopodium (a native of the area but related to the European introduced lambs' quarters) were gathered in spring and early summer. Most of these were boiled before eating and eaten fresh. The leaves of dock and mountain sorrel, commonly called sour grass, still gathered today, appear to have always been favorite green vegetables. While passing through the headwater valleys of the Stikine in 1824, Black noted that the Indian groups there were gathering sorrel in large quantities (Black 1955:117).

Roots

Under the general category of roots are included bulbs, corms, tubers and rhizomes, those plant parts which are analagous to roots and found in the ground. Roots were usually gathered in spring when they were tender and while the earth was still damp and easy to dig in. Simple, straight, wooden digging sticks, without handles, were used to aid in gathering roots. The end was sharpened and often firehardened (Emmons 1911; 49, Teit n.d.). It appears that the bulbs of the bracken and other ferns, as well as the roots of silverweed, sweet vetch, Pedicularis, and perhaps Oxytropis, were all traditionally used by the Tahltan.

The roots of sweet vetch (Hedysarum alpinum), gathered in May and June and again in the fall, appear to have been a favorite plant food and are still gathered today, especially by young boys who often go out on hunting expeditions on their own. It is simply peeled and eaten raw. Black observed large quantities of these being gathered and eaten by the Indian groups whom he met in the headwater valleys of the Stikine in 1824 (Black 1955:33-34).

Fern rhizomes were gathered in early spring or fall. They are found along the lower Stikine, the Iskut River and other damp habitats at low elevations. These starchy rhizomes were baked in small pits dug in sandy soil, and lined with bark. The rhizomes were placed in the bottom and covered with bark and earth. A small fire was made on the top and the rhizomes were baked or roasted for several hours or overnight. They were often eaten with bear grease (Teit n.d.).

Other roots and bulbs such as rice root were often boiled before eating. They were also wrapped in birch bark and baked in hot ashes (Teit n.d.).

Fruits and Berries

Approximately 25 different species of berries or fruits are available in the Stikine River area throughout the summer and early fall. They are found in a variety of habitats at different elevations, from the dry river terraces along the middle Stikine to alpine meadows. The gathering of wild berries is still an important subsistence activity today; quantities of berries are gathered for making jams and preserves. An average of 60 litres of blueberries are gathered in a day of picking by groups of five or six people during expeditions of several days. Berry gathering activities do not appear to be regarded as work, but are considered in terms of outings enjoyed by all and welcome break from summer fish processing. While travelling, or during other activities, people often stop to feed on fresh berries directly from the bushes for up to 20 minutes at a time.

Formerly berries such as strawberries and raspberries, which ripen in July, were only eaten fresh, being too juicy to preserve. Saskatoons and soapberries, which ripen in late July and August, were collected in large quantities and dried for later use. Cranberries and blueberries which are most abundant in subalpine zones, become available in late August and September. These were also dried in large quantities or preserved in bear fat.

Cambium

The sap or cambium, inner bark saturated with sap, of pine, poplars, and sometimes spruce and alpine fir, was collected in May and early June. Bark pryers of caribou antler tines were used to remove bark from trees. The sap was scraped into temporary bark cups and always eaten fresh. Sap scrapers were made of shoulder blades of sheep and other animals (Teit n.d.). Cambium was an important spring time food and is still enjoyed today. The scars on older trees, from which sap has been scraped, are clearly visible in many wooded areas.

Another nutritious source of vegetable food was used during the winter, when fresh plant foods were not available. Caribou stomach contents, consisting of fermented mosses and lichens, were regularly boiled and eaten during the winter (Teit n.d.).

Plants with Medicinal Uses

Several plants were not so much used as a food as for medicinal purposes. Some of the better known and commonly used remedies are described here (from Teit n.d. and personal field observations).

The pitch of pine, spruce and alpine fir was commonly chewed soft, heated on rocks, and used as an antiseptic on open sores and wounds. Bark of spruce and alpine fir was dried, powdered and used externally to stop bleeding. The bark of these two trees was also sometimes boiled and drunk for chest colds. Spruce needles were crushed and put on bad burns. The pitch of alpine fir was also used for mosquito bites, and smeared around the eyes to prevent snow blindness.

Branches and berries of juniper were boiled and the decoction drunk as a tonic for cleansing the liver and blood. The leaves of Labrador tea were boiled and drunk as a tea for colds. The bark and sap of the mountain ash (Sorbus sitchensis) were boiled and the decoction drunk for lung troubles. The roots of the water lily (Nuphar polysepalum) were mashed and boiled and a poultice made for congestion and chest pains.

One of the most popular medicinal plants is Artemisia telesii, commonly known as 'caribou leaves'. The leaves were mashed with a little water, heated on rocks, and used as a poultice on cuts and open wounds. There are many stories told describing the miraculous healing power of this herb, which is still commonly used today. The leaves were also boiled and the decoction taken internally for infection, colds, and stomach ache.

The leaves and flowers of yarrow (Achillea millefolium) were crushed, heated, and mixed with water into a poultice which was also used on cuts and wounds. In making a poultice with yarrow or caribou leaves these were sometimes mixed with pine or spruce pitch to combine the antiseptic and healing powers for bad wounds.

Technological Uses of Plant Resources

Wood and bark from all major tree and shrub species were used in building habitations and other structures, facilities such as weirs, traps, and fences, and in manufacturing of tools and implements. The technological uses of different plant resources are summarized in Appendix 2. The tools used in woodworking activities are described below.

Major camps and villages were located within forested areas where building materials were abundant. Firewood was also a basic requirement at all times of the year. Several cords of wood were needed for cooking and heating shelters during winter months. Sometimes trees were allowed to die by completely stripping bark from around them. This practice provided a supply of dry standing timber in subsequent years which was easier to chop for firewood.

Collection and Use of Bark

The collection of bark was an important springtime activity. It was carried out in May and June while the bark was saturated with sap and easy to peel off trees and poles. The bark of several different kinds of trees was collected during the same period and put to a variety of uses (Thorman n.d.).

Large sections of waterproof bark were collected principally from spruce and alpine fir trees. Trees 8-14 inches (20 - 35 cm) in diameter and free of lower limbs were found in the forest where they were protected from winds. The required tree had a bole 10 to 14 feet (3-4.3 m), smooth from the base to the first set of limbs. Incisions were made at the top and bottom of the section around the tree and down one side. Bark pryers of wood or antler were used to ease the bark off the tree bole. The bark was laid open and flattened, then folded for packing. Because it was saturated with sap the bark was not damaged by folding. Lengths of bark weighed over 125 pounds (56 kg) and were heavy to pack, requiring the cooperation of several men (Thorman n.d.).

Lengths of bark in the green state were laid on the roofs of smokehouses as well as other shelters and lashed to supporting poles with willow withes, or ropes of willow bark or spruce root. Life of the bark on a roof was up to five years before it needed replacing. Usually a new layer was placed on top (Thorman n.d.).

Rectangular pieces of bark were also used for lining cache pits. Canoes were constructed of spruce bark on a rib frame of light poles. The bark was treated with resin and grease (Teit n.d., Thorman n.d.).

Birch bark was collected and used in the green state to make baskets sewn together with spruce roots. These were used for cooking with hot stones in water and as containers for food and water (Emmons 1911:48, Teit n.d.). Larger containers for soaking hides or for boiling food were made by lining a pit, up to a metre in length, with birch or spruce bark. Birch bark was also used for a variety of temporary cups, bowls, and trays.

Bark from willow as well as other shrubs, was collected in spring and twisted into twine and rope of varying thicknesses.

Sections of root from the wide spreading laterals, just below the surface of the ground, of spruce and alpine fir, were collected in spring, split and used as rope for binding. They were more water resistant than bark rope.

Woodworking Tools

Axes

Large, stone axes (as shown in Figure 34) used for chopping trees were hafted at right angles to a straight pole handle and used in the same manner as modern axes. Although most axes were made of common fine grained basalt, the best axes were made of jadite imported from the Tlingit (Teit n.d.).

Adzes

Adzes were usually made of common basalt. Pebbles of suitable size and shape were split by percussion with a hammer stone, shaped by flaking around the edges with an antler tine flaker, and rubbed with a sandstone abrader. Fine and coarse sandstone is found in various parts of the country. Sandstone abraders were also used

Figure 34. Stone axe used for chopping trees (20cm long)

for shaping and smoothing tools and implements of wood, bone, antler, and horn. Adzes were hafted to the distal end of a curved wooden handle (Teit n.d.).

Hammerstones

Small hammerstones were commonly suitable hand sized pebbles with one end smaller than the other. Stone hammers of suitable flat stone were lashed to a pole handle with withes and used for driving stakes and posts into the ground (Teit n.d.).

Wedges

Wedges used for splitting wood were made of wood, horn, or antler (Teit n.d.).

Drills and Awls

Holes in wood were usually drilled with sharp pointed teeth from a variety of animals, hafted into short handles. Awls, also used for making perforations, were of various sizes and made from goat horn or of bone from a variety of different animals (Teit n.d.).

Knives

Two kinds of knives were used for fine working of wood, as well as horn, antler, and bone. The curved knife (shown in Figure 35) was used for carving and incising and had a blade consisting of the incisor of beaver, porcupine, or marmot. The second kind of knife (see in Figure 36) had a straight blade of flaked obsidian and was used for whittling and thinning wood. Both kinds of blades were hafted into short handles of wood, bone, or horn by means of hide lashing (Emmons 1911:55, Teit n.d.).

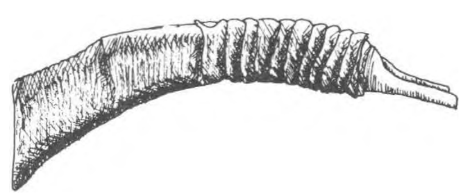


Figure 35. Curved knife with beaver incisor

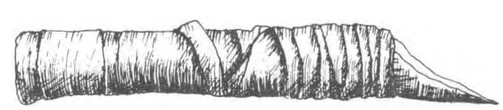


Figure 36. Straight bladed knife

Shelters and Other Structures

Habitation structures varied in size and manner of construction depending on location, time of year, and length of occupation as well as the number of people using them. A variety of other structures, such as sweat lodges, grave houses, and raised caches, which were built in the vicinity of camps or villages, are also described in this section.

Smokehouses

Large, permanent house structures, often measuring 12 m in length, were built in the summer fishing villages and used both as shelters and for drying large quantities of salmon. One of the earliest descriptions of the Tahltan smokehouse was recorded by Muir in August 1879. At the fishing village at the mouth of the Tahltan River

> they were camping in large booths made of poles set on end in the ground, with many binding cross pieces on which tons of salmon were being dried. The heads were strung on separate poles and the roes packed in willow baskets, all being well smoked from fires in the middle of the floor. The largest of the booths near the bank of the river was about 40 feet square. Beds made of spruce and pine boughs were spread all around the walls, on which some of the Indians lay asleep, some were braiding ropes, others sitting and lounging, gossiping and courting while a baby was swinging in a hammock.
>
> (Muir 1915:76-77)

Smokehouses standing at the Tahltan-Stikine confluence today (Figure 37) are the largest, oldest, and most traditional in their construction of all the smokehouses in current use. They resemble closely smokehouses photographed at the same location at the turn of the century (Emmons 1911: Plate XVIII, Jenness 1932:371). The structural framework consists of four corner posts with two central higher posts at either end. These are rudely hewn spruce or pine poles about 25 cm in diameter, notched at the top to hold the beams which extend the length of the house and support the roof. The walls are generally pine poles, from six to ten cm in diameter, placed vertically into the ground or resting on a large base log set between the major support posts on all four sides. The wall poles were formerly fastened to horizontal support poles and side beams by means of red willow withes (*Cornus stolonifera*), spruce roots (*Picea glauca*), or ropes made of shredded and twisted willow bark.

The roof frame consists of several rafter poles, about 10 cm in diameter, laid from the ridgepole to the two side beams. Across these are laid smaller poles lengthwise about every 30 cm. These are all lashed together with willow withes. Strips of spruce bark, 30 to 40 cm wide and 1.5 to two m long make a waterproof covering. These bark slabs are held in place on the roof by lashing long thin willow poles on top of them. Willow and other leafy branches are laid against the wind side of the house to stop the wind from blowing dust inside. The doorway consists of a narrow opening at one or both ends with a moveable or hinged door made of poles or split boards.

Additional interior posts support cross beams on which rest the main drying rack poles. These are generally about two m above the floor. From the roof are suspended rack poles at two or three levels from which the fish are hung during the process of curing. Houses have at least four hearth areas, one in each quadrant. In recent times, day to day activities such as food preparation, eating, and other tasks are carried on within only a few smokehouses, since shelters in the form of cabins or tent frames are constructed at most camps. Fine weather conditions allow many activities to be carried on outdoors and much use is made of outdoor hearth areas.

Detailed data were recorded on the construction, age, and use of 23 smokehouses at contemporary fishing camps.

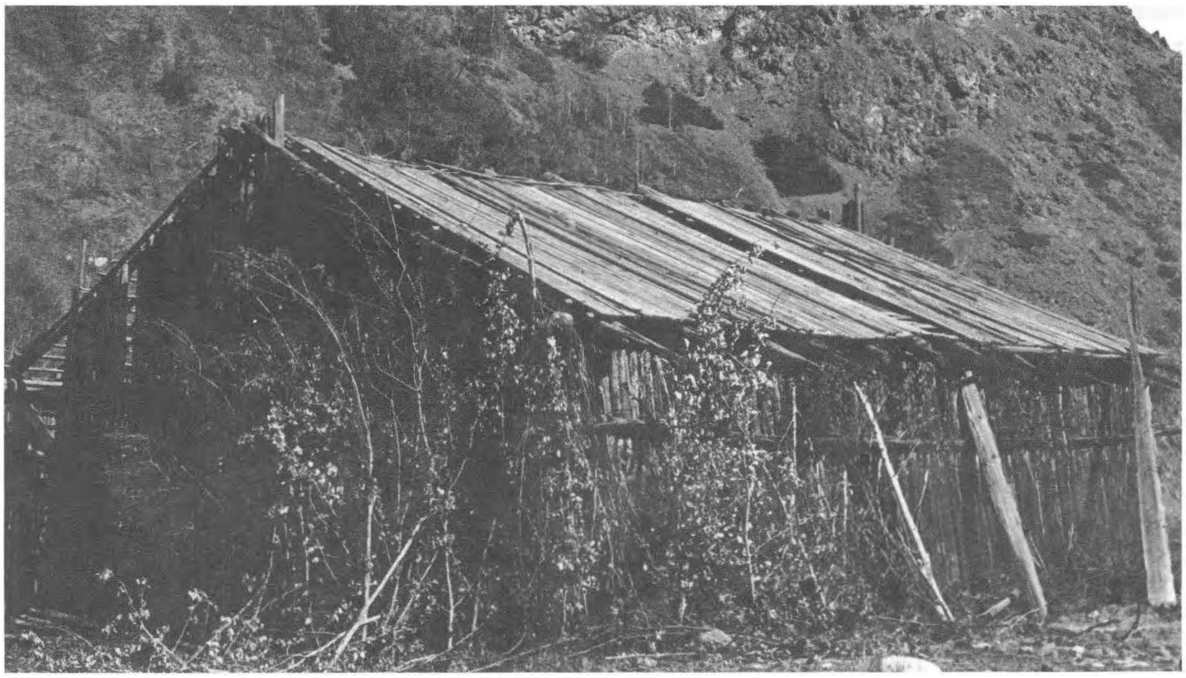


Figure 37. Traditional style smokehouse at Tahltan-Stikine confluence

The approximate age, and dimensions of these are summarized in Table 8. Smokehouses in current use range in size from 16 square m to 72 square m floorspace. Size and capacity of structures are related to age and the number of people using the facilities. Based on observations of recent use, it is estamated that the traditional smokehouse measureing 12 m per side, with a floorspace of 144 m^2 would have been occupied by four nuclear families, comprising a corporate or extended family group of approximately 25 people.

There has been a trend in recent times to build smaller structures which are used by smaller or nuclear family units. As other methods of preserving salmon have become popular, smaller quantities of fish are being dried in the smokehouse, although there is a renewed interest in traditional methods of fish processing and drying recently as confirmed by the construction of several new smokehouses in the last few seasons.

Observations have been made on the process of constructing a new smokehouse in recent seasons. Although modern tools such as chainsaws and hammers, and nails are used in construction, the new smokehouses, such as No. 18 seen in Figure 38, incorporate many of the traditional elements of the larger and older smokehouses, including the large flat rocks which serve as foundations for major support posts, corner bracing, horizontal wall pole braces, and various rack features. In preparation for the construction of smokehouse No. 18, over 200 poles were cut and hauled. The actual building of the house was carried out in five days by three adult men. Details of smokehouse construction such as these are useful for reconstructing the work effort required for building the larger traditional smokehouse. Based on average diameter of poles used in current houses, it is estimated that the aboriginal house measuring 12 m per side would have required 800 poles to be cut and hauled. Using stone tools and traditional materials, the construction of the aboriginal house would have required the cooperative work effort of several adult

Table 8. Tahltan Fish Camp/Smokehouse Survey.

Location	Smokehouse No.	Approximate Age	Dimensions (in meters)
A Tahltan Stikine Confluence	1	50 yr. +	7.20 x 8.00
	2	50	8.25 x 8.75
	3	40	6.40 x 6.45
	4	50	5.75 x 5.75
B Tahltan Village	5	30	4.40 x 5.60
C Ten Mile Flat	A2 remains	40	4.50 x 7.00
D Nine Mile Flat	6	50	4.45 x 5.60
	7	40	5.20 x 8.75
E Seven Mile Flat	8	40	6.30 x 6.30
F One Mile Flat	9	1976	4.00 x 5.50
	10	15	3.80 x 5.10
	A1	unknown	4.50 x 6.75
G 1/2 mile north of T.C.	11	1973	3.45 x 5.25
	21	1979	4.65 x 5.75
H Casca	12	1974	5.10 x 5.30
I The Point	13	40 yr. +	3.80 x 9.00
J Hyland (Deep) Creek	14	1975 rebuilt	4.70 x 7.30
	15	50	4.00 x 7.30
K Dodjatin Creek 6 Mile Camp	16	20	5.40 x 6.50
	17	40	4.50 x 7.60
	18	1978	3.70 x 4.85
	19	1976	5.00 x 6.30
	22	1979	4.20 x 4.80
	23	1979	4.25 x 4.85
L Tsikhini Creek	20	40 +	approx. 5 x 6

men and would probably have taken two to three weeks for completion.

The dry interior weather conditions assure relatively long term preservation of wood structures. With regular maintenance well-built structures are still standing and functional fifty years after their original construction. After structures are abandoned for regular purposes, many of them become storage areas for a while and subsequently collect a variety of discarded items such as old nets, floats, sinkers, axe heads, dip net and gaff poles, old clothing, bits of skin hide, tump lines, etc. After

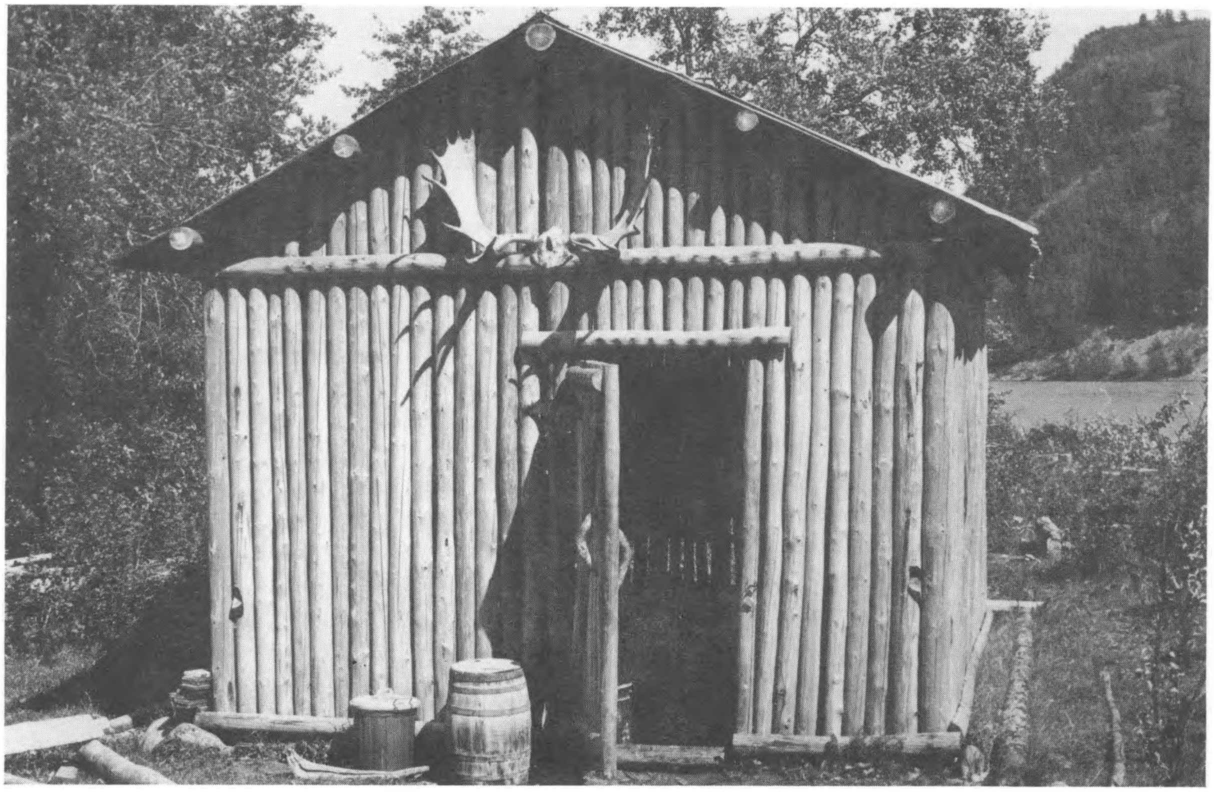


Figure 38. New smokehouse at a contemporary fishing camp

collapse, structures undergo more rapid decay with an organic layer building up on the smokehouse floor.

Winter Houses

Large permanent houses, of double lean-to style, were constructed at major winter camps which were returned to on a regular basis (Thorman n.d., Teit n.d.). The house consisted of two rectangular or arc-shaped lean-tos open to each other and a central fireplace. In constructing the shelter, the surface soil was scraped away to a depth of 35 to 45 cm. Along the two sides, a back stop of one or two logs was built to the surface of the ground. On the top log were laid poles reaching to a ridgepole supported by two grounded posts. The flanks or ends were filled in with vertical or angled poles. The roof was covered with bark which had been stripped from trees ahead of time in the spring. Where the bark reached the ground was covered with a fill of forest rubble and earth. The roof was also covered with coniferous branches so that when the roof became heavily laden with snow it could be shaken off. These large structures were solidly built and required minimal maintenance, with perhaps a new post or the roof bark being replaced periodically (Thorman n.d.). Based on observations of houses used in historic times, it is estimated that these structures averaged eight to ten m in length and five to six m in width, and housed 15 to 25 people. Teit (n.d.) notes that large lean-to style shelters over 30 m in length were used as communal houses during the protohistoric period at a site on the east side of the Tahltan River near the Stikine.

Temporary Shelters

Shelters in warm weather or for short stops while travelling were built in the single lean-to or teepee style. These were built more simply than the larger permanent structures, with only a few poles and posts, and covered with bark, boughs, or untanned hides (Thorman n.d.).

For just an overnight stop while travelling, people often sleep in the open, cutting spruce of fir boughs to make a thick bed under a large conifer tree with the campfire close by.

Menstrual Lodges

Small lean-to shelters, large enough to accommodate one person, were used by women during menstruation and when giving birth. Young pubescents were isolated in these small lodges for up to a year during puberty training. Constructed in the same manner and with the same materials as other lean-to shelters, these lodges were located up to 100 m away from other habitations in camps or villages (Teit n.d.).

Gravehouses

Several styles of gravehouses were popular in prehistoric and early contact days. These contained boxes or trunks with the charred remains of the cremated dead. Grave houses were usually located on knolls or high terraces overlooking major villages. The older, traditional Tahltan style of gravehouse consisted of a crib of logs on top of which the remains were placed (Emmons 1911:36). In the decayed state, there would be nothing to indicate the size of these structures, although charred bone, as well as some grave goods would survive.

Two other styles of grave house are typical of Tlingit houses and probably adopted from the Tlingit in late prehistoric times. One of these was square in shape with a four sided peak roof, and one or two windows. The remains of a grave house of this style have been recorded in the old village at Tahltan. The roof has fallen over with walls collapsed to expose a metal trunk with some recognizable charred bones inside. The other grave house was rectangular in shape with a gabled roof. Grave houses were decorated with carved or painted family totems on the front as illustrated in Emmons (1911:34, 36). Rectangular grave houses are still standing in the Telegraph Creek graveyard today (see Figure 39) and maintained on a regular basis.

Sweat Lodges

Sweat lodges, consisting of a dome shaped frame of willow poles, were constructed beside stream banks in the vicinity of all camps and villages. Some were large enough to accommodate ten people at a time. Small boulders were usually heated in a fire outside the lodge and then placed in a shallow depression in the center or to one side of the lodge. The frame was covered with bark or hides and steam was produced by pouring water on the heated rocks (Emmons 1911:38-9, Teit n.d.). Sweat lodges were used for general and regular cleansing as well as ritual purification. Sometimes men and women bathed in separate lodges and sometimes they bathed in the same lodge (Teit n.d.).

Caches

Raised log caches appear to have been introduced in historic times along with the construction of log cabins. These were built on posts above the ground so that wild animals and dogs could not get at them. They were entered by means of notched pole ladders which were removed and left on the ground when not in use. These caches, used for storing food and other gear, were located to the rear of each house in the village (Emmons 1911:38), and used in some locations up until very recently.

Dog Kennels

At least in historic times, dog kennels consist of low log structures, approximately two m in length and sometimes square, which are partially banked with earth or dug into slopes and give the appearance of small caves with only the front logs showing as seen in Figure 40. These are found in the vicinity of houses and might easily be mistaken for some other kind of structure or feature.

Figure 39. Gravehouse at Telegraph Creek

Figure 40. Dog houses built into a slope

Methods of Cooking and Preparing Foods

Three principal methods of cooking food included roasting, baking in hot ashes, and boiling in birch bark baskets with hot stones. Fire was made with a drill stick on a flat base of wood with very fine wood shavings or bracket fungus used as tinder. Women generally used bow drills (Emmons 1911:49).

Sections of fresh meat from large game were usually roasted over the campfire on willow or poplar poles. With both ends sharpened, the pole was driven into the ground so that it leaned over the campfire at an angle. The heads of large animals such as caribou, moose, and bear, were roasted by suspending them over the campfire with an antler hook, which was attached to a horizontal pole supported above the fire.

Small game, such as rabbits and birds, were roasted whole on small poles over the campfire as shown in Figure 41. Fresh fish were also roasted whole, being secured to the split end of a pole with red willow withes. Dried fish and meat were often toasted lightly over the campfire before eating.

Fresh fish and salmon roe were often cooked by wrapping them in bark and baking in hot ashes at the edge of the campfire. Rabbits, gopher, and birds were also baked in ashes, after gutting but with skin or feathers left on. Blood of large game animals was collected into birch bark containers and baked close to the fire until solid (Teit n.d.).

Chunks of meat or fish were commonly cooked by boiling in water in birch bark vessels with hot stones. Organs, such as liver and heart, from larger animals, as well as brains, hooves, and bear feet were always cooked by boiling before eating. Pits, about 60 by 70 cm, dug into the ground and lined with birch bark or spruce bark, were used for heating water and cooking large quantities of food with hot stones (Teit n.d.).

Some special foods were prepared by

Figure 41. Roasting meat over the campfire

putrefaction rather than cooking. Salmon heads were buried in small pits, dug in the ground and lined with leafy branches and leaves of fireweed, for five or six days until they formed a head cheese. This was washed and eaten without cooking. Salmon eggs, placed in bark containers, were also buried in pits until a cheese formed (Teit n.d.).

Layers of fat from the larger game animals were pounded, boiled, and stored for winter use in bladders, stomachs, and intestines of large animals. Berries gathered in late summer and early fall were often mixed with the fat of bear caught at the same time.

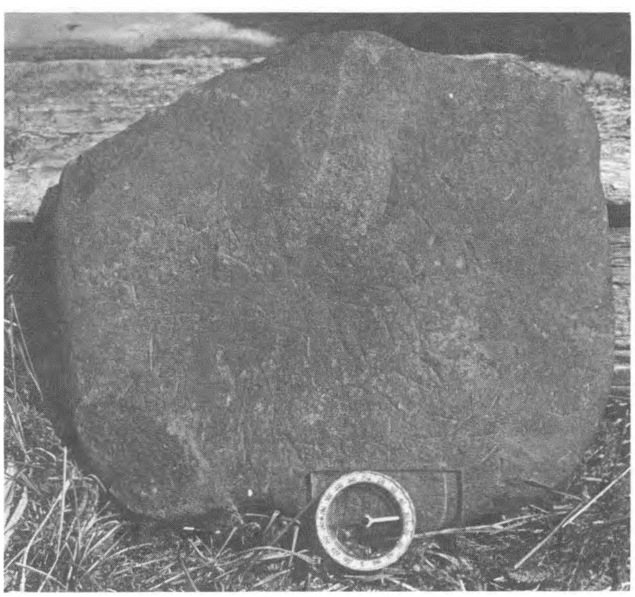
Berries were most often preserved by boiling in birch bark vessels, and then mashed and spread out in bark trays to dry slowly into thin cakes. These were rolled up and stored in baskets. Dried berry cakes were often stored in cache pits along with dried salmon and meat. Dried berries were soaked in water before using.

Suitable sized stones with one end a little larger served as pestles or hammerstones to break marrow bones on large flat mortars (shown in Figure 42). Marrow was often stored in large animal bladders. Dried meat or salmon (with bones) was pounded up on large mortars, mixed together with fat, and stored in animal stomachs (Teit n.d.).

Trays and bowls made of wood or birch bark were used for serving food. The Tahltan carved dishes and spoons from sheep and goat horn, as seen in Figure 43.

Figure 42. (below) Flat mortar stone used for breaking marrow bones and pounding dried fish and meat

Figure 43. (right) Carved spoon of sheep horn (30 cm long)



Storage Facilities

Cache pits, similar to the one shown in Figure 44, located in the vicinity of major camps and villages, were formerly used for storing quantities of dried food for periods of several months to two or three years. The Tahltan term for cache pits is "duwe'ged", meaning hidden in a safe place (Thorman n.d.). Thorman indicates that there were no less than 1500 pits from the Tuya River to a point four miles above Telegraph Creek, with an equal number along the Tahltan River up to and including Tahltan Lake. These pits were mainly used for storing large quantities of dried salmon. Tahltan elders indicate that pits were located in other areas, even up to timberline, and that quantities of dried meat, berries, and rendered fat were also stored in cache pits.

Rectangular pits, up to three by two by two m in size, were dug in well drained areas with a hoe implement made of wood. The level floor of the pit was lined with dry boughs and small poles, and overlaid with dried leaves and branches to a depth of 30 cm. On this was laid a layer of dried spruce bark with the edges and ends turned up. Bundles of dried fish or other food were placed on the bark lining of the pit. They were then covered with a layer of bark on top. Only half the pit was filled with fish or meat, the rest being filled with dried branches, leaves, and poles, and covered with a mound of earth. Approximately two hundred dried salmon could be stored in a single pit. The work of preparing and filling the cache pits was done collectively by men, women, and children.

Figure 44. Cache pit used for storing dried foods

VII A SEASONAL MODEL OF TAHLTAN SUBSISTENCE AND SETTLEMENT PATTERNS

Introduction

Subsistence behavior of hunter-gatherer groups is here viewed as the result of a set of decisions which resolve specific interrelated problems and is best understood by means of a systems approach. The basic considerations in systems analysis are almost identical to those of decision making (Churchman 1968 in Jochim 1976:8). These include:

1) the total system objectives: the fulfillment of subsistence needs,

2) the environmental constraints under which the system is operating,

3) the resources available and their characteristics,

4) the components of the system: technology and activities,

5) the management of the system: means of ensuring economic stability.

In reconstructing traditional Tahltan subsistence and settlement patterns each of these basic considerations is discussed in detail.

Subsistence Requirements

The objective of the subsistence economy as a system is defined as the fulfillment of basic subsistence requirements of food, shelter, and clothing. It is generally agreed that the primary objective of subsistence activities of all hunter-gatherer groups is fulfillment of energy needs of the group, measured in Calories. The caloric requirements of a group of people will vary with the climate of the environment occupied. Hassan (1981:18) estimates an average consumption of 2200 Calories per person per day for hunter-gatherer groups in temperate areas, while groups in cold climates would require 3000 Calories per person per day. In calculating average caloric requirements of the Tahltan, a figure of 2600 Calories per person per day will be used. This figure represents an average between caloric needs during warm summer months and those for maintaining activity levels during cold winter months in a highly seasonal environment.

Besides supplying energy requirements, the diet must also provide adequate levels of other nutritional elements such as proteins, vitamins, and minerals to maintain population health. Table 9 presents average daily requirements of various nutrients for a population group composed of a cross section of individuals of different ages. Secondary goals related to diet involve the desire for variety and good tasting foods. From the Tahltan emic position, taste in fish and animal foods is generally related to fat content.

Living in a cold winter environment, the Tahltan people require hides and furs for warm clothing, robes, and bedding. While these may be provided by a variety of animal species inhabiting the Stikine Plateau, they are most efficiently procured from animals also used as food.

Raw materials are also required for the construction and manufacture of structures, facilities, tools, and implements. While structures and most facilities are generally made with wood and bark, many tools and implements, and facilities such as snares, are made from raw materials obtained from food animals, including hides, bone, antler, horn, and teeth.

In fulfilling basic needs of food and raw materials, there is generally a desire to limit the effort expended or minimize the cost of resource exploitation. In cold climates, this factor includes the need to limit the amount of time spent exposed to inclement weather conditions. A group must also strive to maintain a level of security to minimize risks of suffering from seasonal and periodic longer term fluctuations in resource abundance and environmental stress.

Table 9. Average Daily Requirements of Proteins, Vitamins, Minerals.*

Proteins	50 gm (1 gm/kg body weight)
Calcium	1 gm
Phosphorus	1 gm
Iron	15 mg
Vitamin A	5000 International Units
Thiamine	1.1 mg
Riboflavin	1.5 mg
Niacin	15 mg
Vitamin C	50 mg
Vitamin D	400 International Units

Source: Recommended Dietary Allowances, Food and Nutrition Board, National Research Council, 1968

Resource Attributes

While the environment supports a wide variety of exploitable resources, different kinds of resources have different potentials for fulfilling subsistence needs. Different animal species vary greatly in overall size, weight, fat content, and caloric yield, as well as kind and quantity of raw materials which they provide. These factors combined with abundance and efficiency of exploitation determine which resources are commonly used. Teit presents the food preferences of the Tahltan as follows.

> The flesh of the following animals was considered good food; the caribou, moose, buffalo, sheep, goat, bear (of all kinds), lynx, beaver, marmot, porcupine, ground squirrels, and hare or rabbit. Tree squirrels and muskrats were eaten occasionally especially if food was scarce but they were not considered very good food. Squirrels did not have enough fat. The flesh of the otter, marten, mink, fisher, wolverine, wolf, dog, bush rat and mouse was not eaten. Only in cases of direct necessity did people eat flesh of these animals, and the last resource was the dog. Of birds, grouse of all kinds, ducks of all kinds, geese, swans, and few other large birds were eaten. Fresh water fish of all kinds such as salmon, trout, grayling, white fish, pike etc., were eaten. No reptiles (sic, should be amphibians) and insects of any kind were eaten. Any person who ate anything unusual or different from the food eaten by all was laughed at and spoken about.
>
> (Teit 1956: 81-82)

A variety of plant foods was also eaten by the Tahltan although perhaps not to the same extent as groups living further to the south.

Table 10 presents the average Caloric yield of most of the resources commonly exploited by the Tahltan people. Average live weights and percentage of edible meat for most species have been drawn from data presented by White (1953:397-8). Some of the species which occur in the Stikine Plateau differ in size from those in other areas, so weights of these have been adjusted accordingly. Caloric values for different kinds of resources have been estimated from tables provided by Department of National Health and Welfare (1951). Fat content of various species is

Table 10. Calculation of Average Caloric Values for Individual Resources.

Resource	Average Live Weight (kg)	Edible %	Portion Weight	Cal/kg	Calories/ Individual
moose	400	50	200	2700	540,000
caribou	180	50	90	2700	243,000
mule deer	90	50	45	2700	121,500
sheep	90	50	45	2700	121,500
goat	90	50	45	2700	121,500
black bear	135	70	94.5	3500	330,750
grizzly	200	70	140	3500	490,000
beaver	20	70	14	3000	42,000
porcupine	6.7	70	4.7	2500	11,750
marmot	6.7	70	4.7	2500	11,750
gopher	.9	70	.6	2500	1,500
hare	1.35	50	.67	1500	1,012
lynx	13.5	50	6.75	1500	10,125
sockeye	3.2	80	2.5	2000	5,000
chinook	9.	80	7.2	2000	14,400
coho	4.	80	3.2	2000	6,400
steelhead	3.6	80	2.9	2000	5,800
trout/ freshwater fish	1.35	60	.8	1500	1,200
goose	3.6	70	2.5	3000	7,500
ducks	1.1	70	.77	2300	1,770
grouse	.9	70	.63	2000	1,260
ptarmigan	.67	70	.47	2000	940
green vegetables			1.	350	
roots			1.	700	
berries			1.	600	

reflected in caloric value per kilogram.

Fat content is one of the most important and desirable attributes of any food resource. The amount or thickness of the layer of fat on the back, in the abdominal cavity, or around the kidneys, is one of the first things a hunter mentions when describing a recent kill. Fat content and hence overall weight of an animal varies seasonally. Generally, mammals attain their highest weight and fat content in fall, especially hibernating animals such as bears and marmots, which put on layers of fat to last through the winter. In ungulates, females attain their highest weight and fat content in spring before giving birth, while males have the highest fat content just before rutting. Fish species have the highest overall weight and fat content prior to spawning.

Mammal species are most desirable and most intensely exploited at times when they have the highest fat content and are in prime condition. In fall, large quantities of fat from the larger game animals are rendered and stored for winter use. Experience in a highly seasonal environment indicates that the individual naturally craves fat in the diet during cold winter months. Fats of these wild game animals provide high energy yields, are easily digestible, and very tasty. Dried fish and meats are rendered much more palatable by dipping them in prepared fat.

Most of the animal species exploited for food are herbivorous in their dietary habits, or omnivorous in the case of bears. Except for the lynx, fur bearing carnivores are not exploited as food resources. When skinned out these animals consist mainly of bone and sinew with very little flesh or fat on them. Carnivores, being higher on the food chain, are less abundant, and more dispersed within a forest environment. Being very intelligent and wary of human odours, carnivores are difficult to capture. Neither were the various small bodied mammals such as shrews, bats, or rodents, small birds, or amphibians, used as food resources. These animals are also widely dispersed throughout the environment and difficult to procure in abundance. The high cost of procurement of these animals in relation to their low energy yield would restrict their use as a food resource when larger bodied animals are abundant and easier to procure.

Different resources vary not only in their caloric yield but also in content of other nutrients. In a diet composed predominantly of animal flesh, there is no lack of proteins since fish and meat provide a range of 150 to 250 grams of protein per kilogram of edible flesh. The five essential amino acids are found in comparable amounts in the proteins of both fish and animal species (Rostlund 1952:3).

Both fish and animal flesh contain comparable amounts of B vitamins, thiamine, riboflavin, and niacin. Fish, and particularly salmon, are good sources of vitamins A and D (Rivera 1949:34, Rostlund 1952:4). Vitamins and minerals are highly concentrated in fish liver and roe as well as organ meats of animal species. These are preferred parts and enjoyed as delicacies by the Tahltan. Chemical analyses of dried salmon indicate that there is little or no decrease in nutritive value when flesh is processed by aboriginal methods of drying (Rivera 1979:35).

Plant foods, including roots, berries, and green vegetables, traditionally used by the Tahltan, although low in caloric yield, provide high levels of minerals and vitamins, particularly vitamin C, which is generally lacking in animal flesh. The drying of large quantities of berries during the summer while they are available extends the supply of important vitamins over winter months when vegetable foods are unavailable. Another important source of vitamins used during winter months was caribou stomach contents, consisting of fermented mosses and lichens.

Different animal species vary in the kind and quantity of useful raw materials which they provide. The large ungulates, moose and caribou, are not only the preferred food resource but also provide the most valuable materials for the manufacture of clothing, facilities, tools, and implements. Table 6, in Chapter VI, indicates the relative value of each animal resource in terms of non-food yields. The value scores represent an approximate percentage of the total body weight which might be used as raw materials. In the case of moose and caribou, Tahltan elders indicated that nothing was ever wasted.

The relative importance of different animals for providing food and raw materials is reflected in the number of names by which a single animal species is called. The Tahltan identify animals as forming families composed of individuals of different sizes and ages. Often animals are referred to with kinship terms such as grandfather, or older brother, strengthening the identification of people with animals and the importance of treating them with respect. Morice (1903) recorded eight different names for marmot, while I have recorded seven names for caribou, and five for sheep. Moose, goat, and bear are also referred to by several names.

Seasonality and Resource Availability

In fulfilling needs, the subsistence economy must operate within the constraints of the environment which the group occupies. The environment defines what kinds of floral and faunal resources are available for exploitation. As presented in Chapter V, the Stikine Plateau supports a diversity and relative abundance of flora and fauna. Potential resources are not evenly distributed in space or time, however. The environment of the area is characterized by elevational differences in biogeoclimatic zones. Most animal species are adapted to different ecological niches within these zones. The environment is also characterized by marked seasonality. Seasonal changes in temperature, precipitation, amount of sunlight, and period of plant productivity also affect changes in weight, fat content, times of breeding and birthing, and degree of aggregation and dispersal of fish and mammal populations.

Seasonality is probably the most important single factor contributing to the patterning of subsistence activities and settlement locations of aboriginal hunter-gatherers occupying temperate and high latitudes. As Shalk (1977) has pointed out in discussing anadromous fish resources, seasonality influences the structure of the resource base in terms of its temporal and spatial distribution, abundance and diversity. Any attempt to formulate a model of subsistence patterns for a group or to interpret and understand specific site usage must take into consideration the seasonal variability in the resource base being exploited.

Figure 45 presents the relative location, with respect to ecological zones, and the seasons in which different resources of the Stikine Plateau are most abundant and available for exploitation.

Detailed knowledge and understanding of the environment, characteristics of each resource, and seasonal variation in abundance and availability were necessary to the aboriginal hunter for making decisions about how, when, and where different resources were to be exploited. This knowledge is reflected in the Tahltan division of the year, as shown in Table 11. The year is divided into a number of seasons which correspond approximately to our lunar calendar months and starts with October. These divisions are named after the dominant weather condition or the habits of animals.

Table 11. Tahltan Divisions of the Year.

Month	Tahltan name	Meaning
October	men ten chidle	little lakes freeze
November	men ten cho	big lakes freeze
December	gah uraθe	rabbits chew on bark
January	tsatsestlia	bad weather month
	hayo diza	middle of winter
February	Itsi isa	windy month
March	ta ten childe	thin crust on snow
April	ta ten cho	thick crust on snow
	tli men etsehi	dogs run about
May	Ihaz isa	animals come out, travel around
June	Eyaz isa	young are born
July	Echich isa	animals shed
August	dediye isa	groundhog month, animals getting fat
September	hostetl isa	animals in prime, ready to hibernate

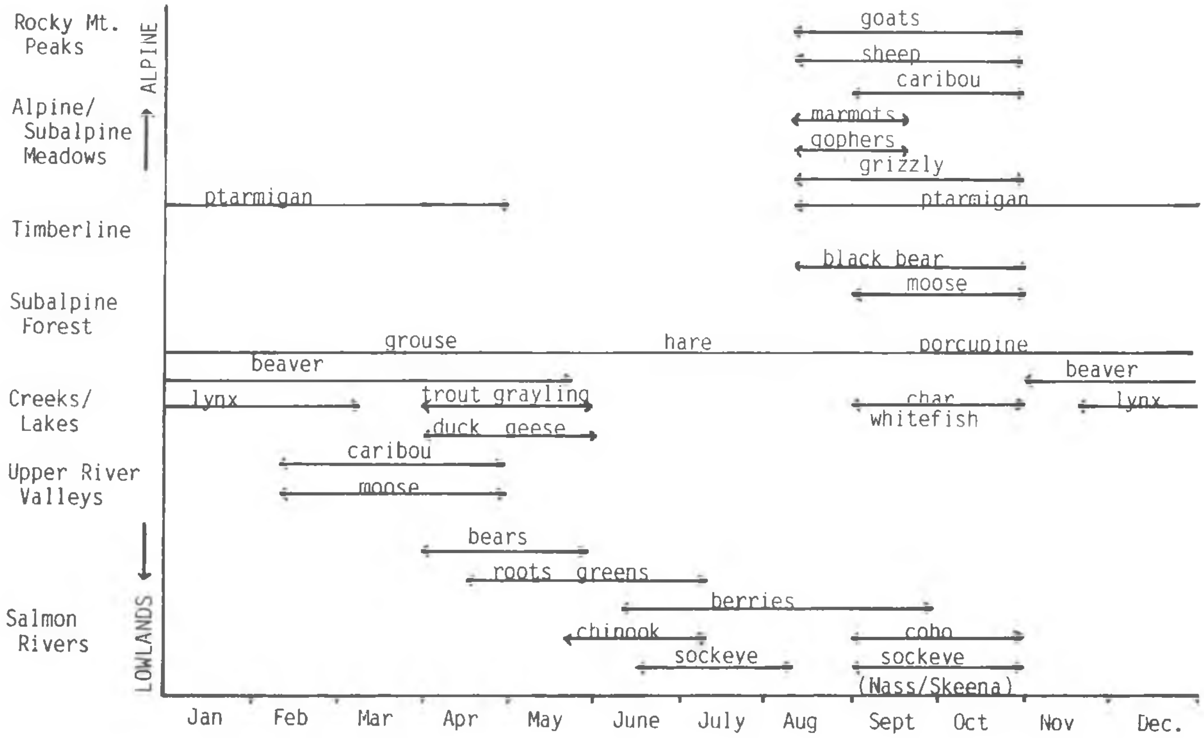


Figure 45. Chart indicating seasonal abundance/availability of resources

Technological Efficiency

Cold temperatures and stormy weather restrict animal and human populations in midwinter. It is the least reliable and least efficient time of year in terms of successful resource exploitation. To cope with this period of insecurity and insure themselves against the risk of starvation, Tahltan people preserved and stored large quantities of foods during periods of abundance so that they could be used when weather conditions prohibited procurement of fresh supplies.

In presenting a circumpolar perspective on hunter-gatherer groups in arctic and subarctic environments, Graburn and Strong (1973:77) emphasize the importance of strategic hunting for procuring large quantities of food resources at specific times and locations where resources are most abundant with a minimum amount of energy output. Stratigic hunting requires the development and use of a complex technology to ensure efficient food production. In an analysis of food getting technologies of a large sample of groups, Oswalt (1976) defined complexity according to techno-unit values, based on the number of distinct parts used in manufacturing a tool, utensil, or facility. His analysis indicated that hunter-gatherer groups living in arctic and subarctic environments have the most complex technologies, with particular emphasis on the use of a wide variety of complex tended and untended facilities including fences, weirs, traps, snares, and nets. Food production becomes more efficient when tools, implements, and facilities are manufactured and prepared at leisure in advance of procurement activities or within the warmth of a shelter in winter. The technology used by the Tahltan in exploiting different resources is described in Chapter VI.

The Seasonal Round of Subsistence Activities

As demonstrated by Flannery (1968), predictable, seasonally abundant resources are given first priority in scheduling of subsistence activities. The major runs of salmon in the Stikine Plateau area are predictable in terms of timing and abundance. The arrival of different runs at a particular location are generally predictable to within a few days. Overlapping runs of different species of salmon in the Stikine River system increase the reliability of sufficient abundance to provide both a secure food income and the potential for a relatively large population aggregation.

From mid June to mid August, approximately 100 to 150 people, comprising four to six extended families, congregated at permanent fishing villages. Village sites were generally located at major creek and river confluences and at outlets of lakes where large runs of salmon passed on their way to spawning grounds and could easily be caught in weirs and basket traps. Some major ethnographically recorded fishing villages and camps are plotted on the maps Figures 46 and 47, and listed in Table 12. While many of these are quite isolated and difficult of access, all locations which have been investigated by means of survey have archaeological remains in evidence of their use in prehistoric times. Sites 15 to 20 in Figure 47 are recorded ethnographically as Tlingit fish camps. Increased trade between the Tahltan and coastal Tlingit during the protohistoric

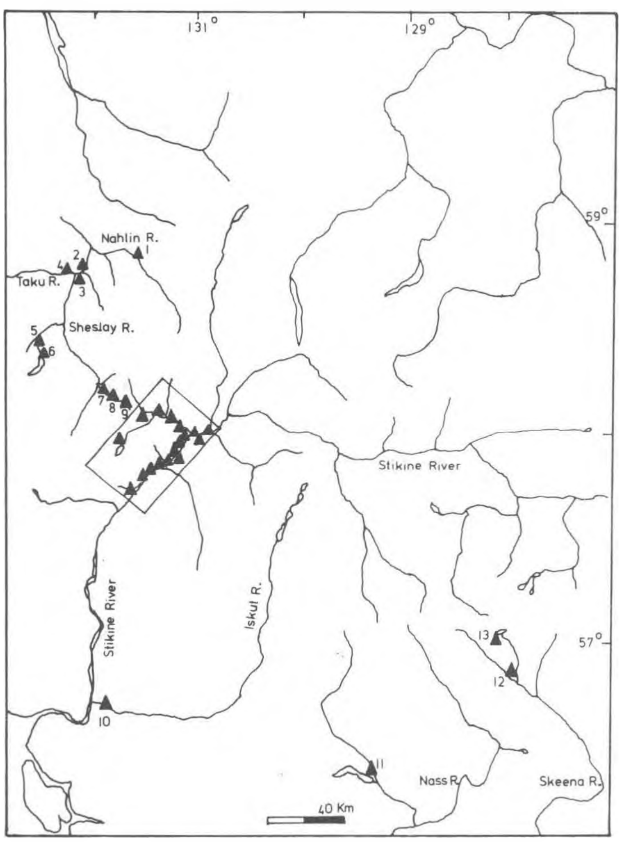


Figure 46. Salmon fishing villages in Tahltan territories (inset area expanded in Figure 47)

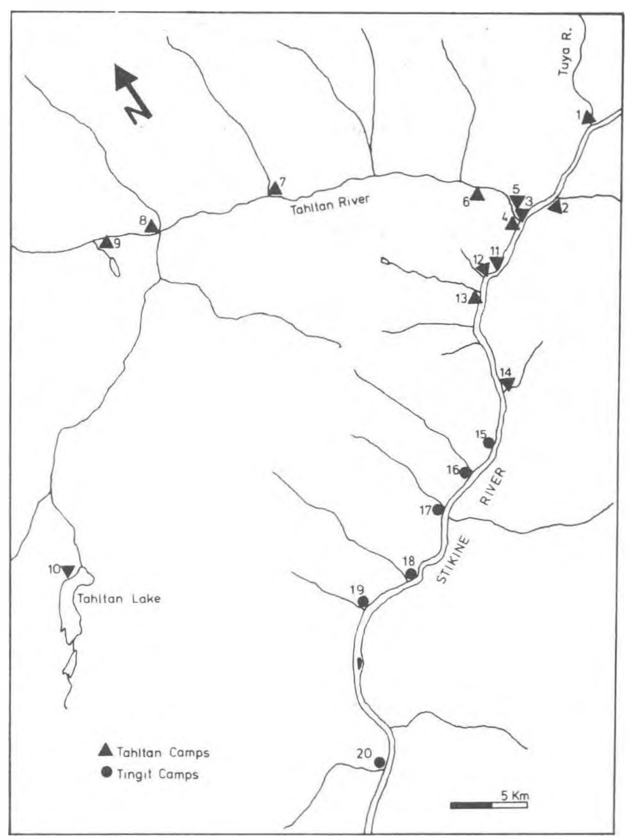


Figure 47. Salmon fishing villages on the Stikine River system

Table 12. Salmon Fishing Villages in Tahltan Territories.*

No.	Name Recorded	Location	Reference
Part A Fishing Villages on Other River Systems			
1.	Moeyan	on the headwaters of the Nahlin River	Teit n.d.
2.	old camp	on northwest side of Nahlin River	Tahltan elders
3.	Naalin	on south side of Nahlin River, two miles above confluence with Sheslay R.	Teit n.d.
4.	Tagun	on Taku River, prominent during mid 19th century and war with inland Tlingit	Tahltan elders
5.	old village	on Tatsatua Creek	Tahltan elders
6.	old village	at outlet of Tatsamenie Lake	Tahltan elders
7.	Kaketza (Sheslay)	confluence of Egnell Creek and Hackett River (Salmon Creet)	Teit n.d.
8.	fishing camp	on Hackett River (Salmon Creek) close to Copper Creek	current elders
9.	fishing camp	on Hackett River (Salmon Creek) a little below Hatchau Lake	Teit n.d. Tahltan elders
10.	Saksina	the Iskut River, above the Stikine	Teit n.d.
11.	Owidza	on the Nass headwaters, near Bowser Lake	Teit n.d., Tahltan elders, Duff 1959:30
12.	Kluetondon	on creek of same name running into the Skeena	Teit n.d. Thorman n.d. current elders
13.	Klueyaza	at outlet of lake by same name	current elders
Part B Fishing Villages on Stikine River System			
1.	Hose Garn	Stikine-Tuya River confluence	Emmons 1911:18,32 Thorman n.d.
2.	very old village	south bank of Stikine, a few miles above Tahltan confluence	Emmons 1911:32

Table 12 (continued).

No.	Name Recorded	Location	Reference
3.	Titcaxhan	Tahltan-Stikine confluence, east bank	Teit 1956:47
4.	Teetcharani	Tahltan-Stikine confluence, west bank	Emmons 1911:32
5.	Tsaqudartse	Tahltan River, close to Stikine	Emmons 1911:32 Teit n.d.
6.	Owanlin	Tahltan River, three miles above Stikine	Teit n.d.
7.	Thludlin	Tahltan River, 12 miles above Stikine	Emmons 1911:16,32
8.	old village	Tahltan Forks	Teit n.d.
9.	Saloon (Sagu)	Little Tahltan River, below confluence of Saloon Creek	Royal Commission 1915, local informants
10.	Guna	Tahltan Lake	Thorman n.d.
11.	old village	Stikine River, close to eleven mile creek	local informants
12.	Tuxtatoni	Stikine River, at mouth of ten mile creek	Teit n.d.
13.	Tsetake	Stikine River, at nine mile creek	Emmons 1911:32 Teit n.d.
14.	Chicanada	south bank of the Stikine, 5 miles above Telegraph Creek	Thorman n.d., Emmons 1911:32, Teit n.d.
15.	Nakishan	Tlingit camp on Stikine, 2 miles above Telegraph Creek	Thorman n.d.
16.	Klegohin	at present Telegraph Creek, Tlingit Camp	Thorman n.d.
17.	Tlingit camp	Stikine River, 3 miles below Telegraph Creek	Thorman n.d.
18.	Dodjatin Creek	six miles below Telegraph Creek	Thorman n.d.
19.	Kittishan	eight miles below Telegraph Creek	Thorman n.d.
20.	Tlingit camp	Shakes Creek	Thorman n.d.

*numbers refer to locations in Figures 45 and 46.

period was facilitated by intermarriage between the two groups, resulting in the formation of an additional Tahltan clan which claimed fishing and hunting rights on the lower Stikine. Several Tlingit families ascended the Stikine to dry salmon and berries in the dryer interior climate.

At village locations, large communal houses, constructed of spruce and pine poles with gable roofs covered with spruce bark, were used as shelters and for drying large quantities of salmon for storage. Although built by men, these smokehouses are referred to as belonging to women of the clan. While these houses required a great energy investment in their construction, in the dry interior climate they remain standing and functional for over 50 years with a minimal amount of maintenance.

Many preparatory activities were carried out during the first two weeks prior to the arrival of the major sockeye runs. The collection of bark and roots, from a variety of tree species, in June was a major activity in which everyone participated. Men collected the large, heavy strips of spruce bark used for covering house roofs and lining storage pits, while women gathered spruce roots and the bark of smaller trees such as birch, willow, and poplar, used for making baskets, twine, and cordage (Thorman n.d.). While men were involved in constructing a new smokehouse or repairing older ones, building weirs, basket traps, and gaff poles, women were busy manufacturing nets, baskets, tools, and other utensils which they used during the fishing season.

During the peak season of the runs, men were responsible for maintenance of procurement gear and facilities and the procurement of salmon, or bringing it to shore. Once on the shore, women took charge of butchering and preparation of salmon for the drying process. Children helped with the gathering of firewood, carrying of water, and packing of fish, as they became able. Each extended family, occupying a separate smokehouse, would process between 1600 and 2000 salmon during the season. Summer was also a time of ceremonies, feasting, and trading. At the close of the fishing season, bundles of dried salmon were stored away in the numerous cache pits in the vicinity of the village to be used later in winter or in times of emergency.

In mid August families dispersed from the large village sites in the major river valleys to smaller seasonal camps in alpine areas, as illustrated in Figure 48. These camps were located near the heads of the many small tributary creek valleys of rivers such as the Tahltan, Klappan, and Mess Creek. Each extended family of about 25 people occupied a separate camp for a period of two to four weeks. From these camps located at timberline, at the ecotone between alpine meadows and subalpine forest, several kinds of resources were exploited. At this time of the year, when several important resources were abundant and available at the same time, small work groups formed along sexual lines. Women and children were involved in snaring marmots, ground squirrels, and ptarmigan, as well as gathering large quantities of berries, during daily trips in the vicinity of the camp. Small groups of four to six men and boys made expeditions to hunt larger game animals such as sheep, goats, and caribou, in alpine areas where temporary camps of one to several days duration were made.

Marmots and ground squirrels live in large colonies in localized areas in alpine and subalpine meadows. Although they are active for about five months, they are fattest just prior to hibernation in late September. Easy to snare, they provide a reliable and efficient food source when procured and dried in quantity and also provide skins for making warm clothing.

Although bears are not so numerous, their large size, high fat content in early fall, and predictable behavior at this time of the year (competing with people for many of the same resources) make them a highly desirable food resource. Bears were generally taken with snares set in the general vicinity of the camp, although they were also killed with bow and arrows whenever encountered. Tahltan elders indicate that women also participated in the hunting of bears, sometimes out of necessity

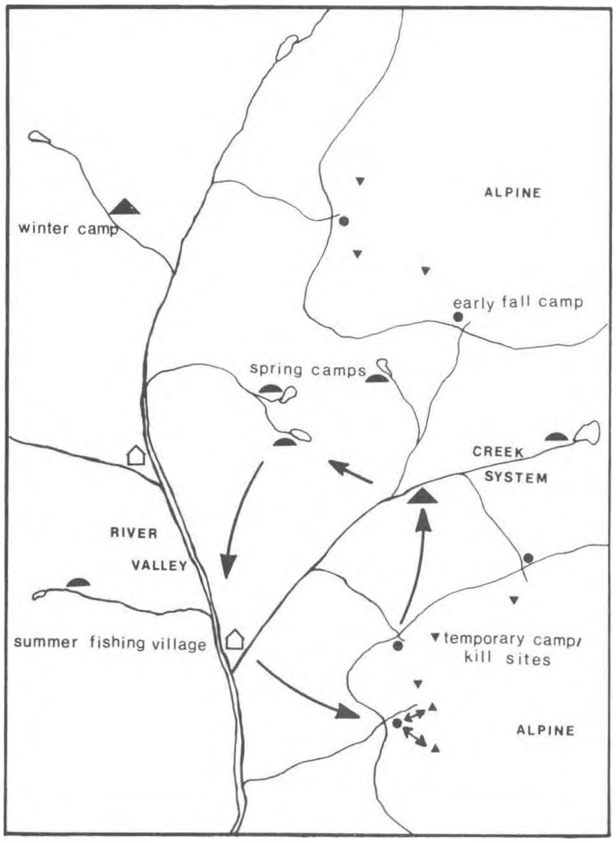


Figure 48. Schematic representation of major seasonal moves and settlement locations

to protect themselves and their children during other gathering activities.

Sheep and goats form small gregarious bands in the alpine zone. Although wary of hunters, they could be taken with snares set along their trails or stalked with bow and arrows. Their high fat content in fall as well as the non-food materials which they provide make them a highly desirable resource in early fall. They are largely inaccessible or conflict with other resources options at other times of the year.

Large quantities of food gathered in early fall were processed and stored for later use. As many as 200 to 300 marmots and gophers were split and dried for storage. Dried gopher meat was often stored in the dry leathery skins of salmon after the flesh had been eaten. The flesh of two or three bear and several sheep or goats would be dried on poles over the campfire. Large quantities of fat were rendered and stored for winter use. Dried meat, berries, and rendered fats were stored in cache pits in the vicinity of early fall camps at timberline, or were transported to major fall and winter camps, located in the middle to upper reaches of major river valleys, as illustrated in Figure 48.

Moose and caribou are present in the environment year round, and could be hunted at any time. Patterns of seasonal movement of both species are quite predictable. They are most efficiently hunted when animals aggregate in larger groups during fall just prior to rutting and again in late winter-early spring. Moose were commonly captured by means of large snares set in their trails or by means of stalking with bow and arrow.

The woodland caribou of the Stikine Plateau provided the Tahltan with a reliable staple food resource. Having predictable seasonal movements from alpine tundra to forested valleys during fall and late winter, caribou were most commonly captured by means of rawhide snares set at intervals in fences, often several miles long, constructed at strategic locations along their migration routes. Both men and women of several extended families cooperated in driving caribou into snares. While the meat from animals caught in the snares was shared among the group of people hunting together, hides of the animals belonged to the women who had made the snares in which they were captured.

Caribou and moose were important not only for their meat but also for their hides which were dressed for making of clothing, babiche for snares and cordage, sinew for thread and twine, as well as antler and bone for the manufacture of a variety of tools and utensils. While men skinned and butchered large animals such as caribou into major body parts, women prepared meat for drying and storage and also processed the skins. Each extended family of about 25 people would procure and process between 20 and 30 caribou or moose per year in order to meet its needs for meat and hides. Large quantities of dried meat and rendered fat were stored in cache pits in the vicinity of fall and winter camps for later use.

Major fall and winter camps were located within the protection of forested valleys, where firewood was abundant, and in the vicinity of caribou yarding areas or migration routes where fences were constructed. Abundant resources at these locations and the need for cooperation in capturing and processing animals allowed larger groups of 50 to 100 people to come together. The approximate location of several fall/winter camps and caribou fences are plotted on the map, Figure 49. Camps were generally located about a kilometre from fences. Two or three camps might be found along very long fences. In some localities major village sites may have been occupied in both summer, during salmon fishing season, and in midwinter.

Smaller mammals and ground birds are generally more dispersed throughout the landscape and are not so greatly affected by seasonal changes in abundance and availability, so could supplement the diet at any time during the year. Smaller animals and birds were generally captured by means of snares, traps, or nets.

Stores of preserved and dried foods were relied upon extensively during midwinter when weather conditions were bad and hunting poor. Fresh supplies of food were hunted whenever weather conditions allowed, including moose, caribou, beaver, hare, grouse, and porcupine, as well as ice fishing in the lakes. Leisure time in winter was spent in repair and manufacture of tools, snares, netting, ropes, robes and clothing.

A variety of resources became abundant and available again in spring. In late April families dispersed to smaller seasonal camps located near good fishing lakes and streams, as illustrated in Figure 48. Women and children of an extended family remained at these camps to gather large numbers of trout and grayling. Over a thousand fish would be dried on temporary drying racks and stored for later use. Rabbits and grouse were snared in the vicinity of the camp. Women and children also gathered a variety of vegetable foods. Roots, leaves, tender shoots and stems, and cambium of

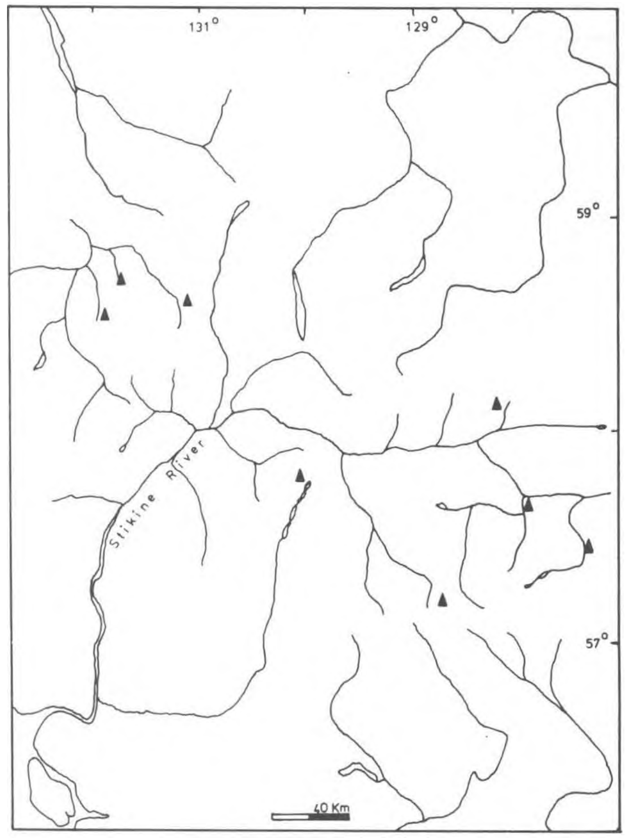


Figure 49. Approximate location of several winter villages and caribou fences

several different plant species were all gathered and eaten fresh in spring.

Several species of migratory waterfowl were abundant in April and May in the many small lakes and marshes. Bears were also hunted in spring after coming out of their dens. Men often dispersed in pairs or small groups to hunt beaver in the small lakes and tributary streams. As many as 40 beaver could be caught by two to four men of an extended family in a period of two to three weeks. The trapping of large numbers of beaver in spring helped to keep streams open to spawning grounds of salmon and other fresh-water fish. Beaver were split and dried whole over an open campfire. Supplies of dried fish and beaver meat were transported back to major winter sites for storage or to summer fishing villages for use during the summer.

In summary, the diverse plant and animal species supported by the Stikine Plateau area vary in their potential for fulfilling basic subsistence requirements for food and sources of raw materials. Resources are abundant and available for exploitation at different times of the year and in different ecological zones. The Tahltan were traditionally semi-nomadic in their yearly round of subsistence activities, with a pattern of aggregation at summer and winter village sites, located in areas of abundant and reliable resources, and dispersal in smaller family groups during spring and early fall.

Annual runs of anadromous salmon provided a reliable, staple food source which permitted several extended families to congregate at permanent fishing villages along major rivers for about two months in summer. In early fall families dispersed to separate camps in alpine areas where women and children snared large numbers of marmots and ground squirrels and gathered berries while men hunted larger animals including sheep, goats, and bear. Several families gathered at major fall and winter camps, located within the protection of forested valleys, to cooperate in captureing caribou in long fences with snares, during predictable movements from alpine tundra to forested river valleys. Caribou and moose were staple resources which provided not only meat but also raw material for manufacturing clothing, babiche, and a variety of tools and utensils. In spring families moved to smaller camps near lakes and streams to procure fresh-water fish, migratory waterfowl, vegetable foods, and beaver.

The Tahltan maintained a complex technology to ensure efficient harvesting of abundant and reliable resources. Procurement techniques emphasized the use of facilities such as fences, snares, traps, and nets, which could be adapted for a wide range of different fish and animal species. The procurement of raw materials for manufacturing of tools and implements, snares, and cloting, was largely carried out during the course of other subsistence activities. Large quantities of seasonally abundant food resources were processed and stored in cache pits in the vicinity of major camps and villages for use during midwinter or times of emergency.

VIII ECONOMIC STABILITY

As discussed in Chapter 7, traditional Tahltan subsistence and settlement patterns were largely determined by seasonal variation in resource abundance and availability. Periodic stress due to fluctuations in climate and cycles of abundance and decline of animal populations also influence the strategies which hunter-gatherers use in adapting to their environment.

Strategies for coping with fluctuations in resource abundance affect the range and intensity of resources exploited, technological complexity, degree of mobility, settlement patterns, and importance of food sharing and storage behaviour. Strategies for dealing with variation in resource abundance and availability also influence site characteristics such as size and location of sites, length and intensity of occupation, and presence of facilities for processing and storing resources.

Fluctuations in Resource Abundance

When compared with other world biomes (Hassan 1981:11) the Stikine Plateau has a moderate animal biomass. The upland plateau areas provide excellent habitat for large ungulates. The animal resources of the Stikine area are predominated by K-selected species. These are large bodied, slow maturing species which regulate their numbers close to carrying capacity (Pianka 1970, Hayden 1981b). Since they have slow rates of population increase, Hayden suggests that K-selected species are more vulnerable to overexploitation (Hayden 1981b:525).

Pianka (1970) suggests that environments characterized by K-selected species tend to be more stable than those which are characterized by r-selected or small bodied, fast maturing, rapidly reproducing species. However, periodic fluctuations in animal populations are well documented for subarctic and boreal forest environments.

Like the well known hare, various species of the grouse family are also subject to cyclic fluctuations in population with gradual build up in population over a seven to ten year period, followed by a sudden decline (Guiget 1955:4). Evaluation of population indices (Keith 1963) for several species of northern birds and small mammals indicate persistent intervals of eight to eleven years in fluctuations of abundance and decline of resources such as hare, species of grouse, and many fur bearing animals which depend on these as prey. Hare and lynx fluctuations appear more violent than grouse and other furbearers. Peaks in abundance of various species do not all occur at the same time following an approximate order of grouse, hare, lynx, fox, coyote, fisher, mink, and marten. Cyclic species tend to persist in scattered nuclei of favorable habitats and to disperse from these as populations increase (Keith 1963:177-120). What Keith has termed the ten year cycle is apparently restricted to the northern coniferous forest and ecotones in North America.

Other resource studies (Burch 1972, Waisberg 1975) indicate that large ungulates such as caribou and moose also experience periodic fluctuations in abundance, with cycles ranging in the order of fifty to over a hundred years. Fluctuations of this order are less dramatic and not so easily detected within a single human lifetime as those of small mammals. Although moose are reputed by biologists to be relative newcomers to northwestern British Columbia, Tahltan elders have indicated that moose were present in the Stikine area in earlier times, but became scarce in the early 1800's and began to increase in numbers again in the 1870's (Emmons 1911:71).

Strategies For Maintaining Economic Stability

Since the subsistence economy forms the primary interface between people and their environment, successful adaptation or survival of a group depends on the stability of its economic system. All groups experience periodic stress due to fluctuations in climatic patterns and cycles of abundance and decline in resources (Colson 1979:18, Hayden 1981a:413). The severity of stress and the actual occurrence of starvation suffered by different groups may depend on their ability to adopt means of coping with periodic fluctuations.

There are many historic accounts of starvation in the Hudson's Bay Company records. Although located on major transportation routes, trading posts were not always located in areas of abundant resources. Traders were generally unfamiliar with the local environment, resources, and successful methods for exploiting them, and relied on enlisting native trappers to provision the posts. In some cases, such as Robert Campbell's attempt to establish a post on Dease Lake, local native groups were unwilling to cooperate in provisioning the fur trade posts (Campbell 1958). In addition, during the fur trade period many aboriginal groups were forced out of relatively rich and stable territories into more marginal environments (Yerbury 1980:335) or held territories which were being encroached upon by other groups (Yerbury 1981). It is suggested that many of the incidents of starvation by arctic drainage Athapaskan groups were due to increased attachment to and dependence on fur trading posts and a lifestyle which diverted people away from traditional means of coping with seasonal or periodic stress.

Although the Stikine area experiences periodic fluctuations in resource abundance, there are few accounts of starvation among the Tahltan. Periods of severe starvation are largely a result of factors such as epidemics of introduced diseases creating dramatic disruptions in regular patterns of food gathering and storing activities. In some stories which describe people going hungry or the decline of a particular resource in a certain place, these are usually attributed to the breaking of taboos or other social regulations. These stories are usually told with the aim of teaching a moral lesson, and maintaining adaptive social behaviour.

From the ethnographic literature, Colson has identified several devices or strategies commonly adopted by hunter-gatherer groups to cope with periodic stress (Colson 1979:21). The incorporation of these strategies into traditional Tahltan subsistence practices can be identified as important factors for maintaining economic security.

Probably the most effective strategy for coping with periodic stress and fluctuating cycles of abundance in animal populations was the maintenance of techniques for exploiting diverse species. The Tahltan people exploited a wide range of different kinds of resources available within a variety of different ecological zones in the environment. The Stikine Plateau is one of the few areas in North America with such a diversity of large game animals. Although the Tahltan relied on caribou and moose as staple resources, all large game animals were extensively used for food and raw materials.

Several smaller mammals such as marmots, ground squirrels, and beaver were also used as staple foods as they became seasonally available. Hare, porcupine, and lynx were taken whenever available to supplement the diet. Migratory waterfowl were exploited seasonally while several species of ground birds could be snared on a year round basis to supplement the diet. A variety of fresh water fish were taken on a year round basis in the many small lakes and streams, while larger quantities were procured during spawning periods. Several species of salmon, abundant during the period of the runs, provided a reliable and predictable staple resource which could be stored for later use.

Although meat and fish constituted approximately 90 to 95% of the diet by volume, a wide variety of edible plants were also used for food as well as medicinal purposes.

Based on a survey of a large number of

hunter-gatherer groups, Hayden indicates that the range of items avoided grows as naturally occurring resource diversity increases (Hayden 1981a:399). Among the Tahltan there were very strong taboos against the use of most carnivores, amphibians, and a variety of small bodied mammals such as mice and voles, and smaller birds. Carnivores, being less abundant and dispersed throughout the environment as well as wary of hunters, are difficult to capture in numbers. They have little flesh on them after being skinned out. While smaller mammals and birds are more numerous, they are also difficult to capture in numbers. These were generally inefficient food resources to use on a regular basis.

Many of these animals were associated with qualities which could be handled by shamans only or by hunters who had acquired them as spirit helpers. Some carnivores were used for their fur only as products of prestige and wealth. Nevertheless, knowledge of the characteristics and habitats of these animals was continuously passed in so that in cases of extreme resource stress they could be used for food.

Storage of seasonally abundant food resources was another important means by which the Tahltan coped with seasonal and periodic fluctuations in resource availability. In their seasonal round of subsistence activities, all resources found in any abundance were harvested in large quantities and processed for storage and later use. This type of strategy required both cooperative work effort and the use of a complex technology. The use of a procurement technology based on snaring and trapping, adaptable for a wide range of fish and animal species, allowed for efficient harvesting of large numbers. The initial outlay of energy for construction of facilities such as smokehouses, fences, weirs, traps, or storage pits was spread out over a long period of time and large amounts of energy procured and processed by means of them.

Reliable and abundant salmon runs allowed the aggregation of 100 to 150 people in large summer villages. Members of several extended families cooperated in the construction of weirs, basket traps, and smokehouses. Several thousand salmon could be captured and processed in a period of six weeks. The large, well built smokehouses, essential for processing and drying of such large quantities of salmon, would remain standing and functional for over 50 years, with minimal maintenance. Storage pits located in the vicinity of the fishing villages were used to store large quantities of salmon for use later in the winter or in times of emergency. In contrast to storage facilities used in the large winter houses on the Northwest Coast, the underground storage pits, called 'duweged', meaning 'hidden in a safe place', were true caches. In the dry interior climate of the Stikine Plateau, fish and meat could be preserved in a palatable state in these for about three years.

Major fall and winter camps were located in the upper reaches of major river valleys where several extended families also cooperated in the construction and maintenance of long caribou fences. As many as 20 to 30 caribou might be captured at a time in these, during seasonal movements from alpine areas to forested river vallys. Large quantities of meat and raw materials were processed and stored at these camps for later use. Snares, traps, and nets, used in the vicinity of other seasonal camps for procuring a variety of different resources could be used for two or three seasons.

With a complex technology for procuring large numbers of seasonally abundant resources, the limiting factor on the amount which could be stored for later use was the amount of time required to process them. The butchering and processing of foods was the responsibility of women and required cooperation among them.

Many of the regulations and dietary taboos pertaining to women served to reinforce the need for cooperation in food production and ensured constant food reserves in dried form. At menarche, and throughout child bearing years, Tahltan women were isolated in smaller huts (a short distance from others) during menstruation and when giving birth. The isolation of women excluded them from food production for a few days every month or for an entire year in the case of pubescents (Emmons 1911:104, Teit 1956:129). Although such an institution required considerable investment in terms of time and energy on the part of the entire group it ensured cooperation among several related women. Isolation of a woman for a few days every month required that other women, usually an aunt, mother, or sisters, cared for her children and carried out regular activities of hunting, snaring, processing food, and cooking. Menstruants and pubescents were not allowed to handle or eat fresh meat or fish. This meant that there must always be a supply of dried fish or meat on hand. These dietary taboos on women, who were responsible for the preparation and drying of foods as well as their exchange and distribution, ensured that the entire group always had sufficient stores of dried food on hand during periods of bad weather or scarcity of resources.

Food sharing was another means of coping with variation in resource availability. Tahltan people emphasized the importance of food sharing among all members of the extended family which cooperated in subsistence activities. While individuals contributed to food production according to their age and ability, all were entitled to an equal share of the food produced by the whole group. At times when larger groups of people gathered together, such as at caribou hunting camps where the long fences were used, the meat procured from cooperation of the group was shared among all those present. Several of the tales recorded by Teit (1919, 1921) were used to teach the importance of food sharing. Puberty training was an important period of learning to share with others. As boys learned to hunt, trap, and snare, they also learned to share with others. They were never allowed to consume their first kill of any animal but were required to give it to their elders. Young women learned to go without until they had acquired the knowledge of how to process different resources and how they should be shared amongst members of the whole group.

A fourth method of dealing with variation in resource abundance was provided by the extension of food sharing and exchange over a wide network of social relations between groups in different areas established through marriage. The exchange of gifts and food between families in different groups at the marriage of a young couple was continued throughout life. Thus abundant resources from one area were exchanged for resources from another area whenever groups came together at large sites such as fishing villages and major fall and winter camps.

The establishment of trade networks between tribes on a broader regional scale was another important mechanism for dealing with fluctuations in resource abundance. Through marriage alliances with other tribes along their territorial boundaries, the Tahltan maintained peaceful trade relations with the coastal Tlingit as well as Kaska and Sekani peoples further to the interior. In times of resource stress, local manufactured products such as tanned hides, clothing, bags, babiche, obsidian, or carved implements of sheep and goat horn could be exchanged for foodstuffs from other areas. Several trading camps are recorded along the Stikine River, below its confluence with the Tahltan River, to which the Tlingit ascended from the coast. The Tahltan traded with the Kaska at camps located on Dease River and at the confluence of the upper Rancheria with the Liard (Teit 1956), and with Sekani people at a site at Metsantan Lake at the divide between the Findlay and Stikine drainages (Black 1955).

Conservation practices were also an effective means of coping with variation in resource abundance. The procurement and processing of large quantities of a resource during periods of abundance not only provided a commodity of exchange but also served as a selective cropping mechanism to help control fluctuations in animal populations. In situations where resource abundance was low in particular areas, the Tahltan did not hunt in these areas for a period of years so that the animal populations could build up again (Teit n.d.). This kind of resource conservation was facilitated by flexibility in group size, composition, and mobility as well as the concepts of land ownership maintained by the Tahltan people. Hunting territories were not owned by individual families but held in common by matrilineal clans. Through marriage, males from other clans were recruited into the workforce of a particular group, bringing with them knowledge of topography and animal populations of other areas. During conditions of declining resource populations in one area, strong social alliances allowed families to hunt with groups in other areas for a while.

Other conservation practices also operated to maintain economic stability. The Tahltan held a great respect for the animals which they hunted. Animals were not bothered needlessly nor killed if they could not be used. A variety of rituals were involved with hunting, processing of animals, and the disposition of their remains. The religious beliefs which defined the close relationship between the people, their environment, and the animals within it ensured conservation of the resource base which the Tahltan people depended on.

Perhaps the most important factor contributing to economic survival and stability was the overall flexibility of the system. Since the environment was constantly changing with the seasons and the resource base was never the same from one year to the next, Tahltan people were continuously acquiring and exchanging information in order to make decisions about who should go to which camp, how long to stay, and how much of any one resource should be preserved for later use. As Brody (1981) points out in his study on the Beaver people of the Peace River area of British Columbia, flexibility is the major factor in the survival of traditional subsistence activities up to the present, even in the face of encroachments on traditional territory.

In summary, the traditional Tahltan subsistence economy incorporated several strategies for coping with seasonal and longer term fluctuations in resource abundance in order to ensure constant and reliable levels of food and raw materials to meet subsistence needs. These strategies influenced settlement location and site characteristics. The Tahltan exploited a wide range of larger and smaller mammals, birds, fish and plant species available within their environment. Procurement and habitation sites are therefore located in a variety of different ecological zones from low lying terraces along major rivers to alpine meadows and ridges. Sites were occupied on a seasonal basis and vary in size depending on the kind and quantity of resources procured and processed. Large sites are located in areas where larger groups of people aggregated to procure and process quantities of reliable and predictable resources such as salmon and caribou.

The storage of large quantities of seasonally abundant resources was one of the most important strategies for maintaining economic stability. Storage behaviour is manifest at major camps and villages by presence of smokehouse structures or drying rack features in conjunction with hearths, concentrations of processing tools, and storage pits. Underground pits used for storing dried foods are highly visible in the archaeological record.

Cooperation in food production and food sharing behaviour are also manifest in site characteristics. At larger village sites multi-family smokehouse and/or habitation structures reflect the existence of corporate groups, consisting of several nuclear families cooperating in food production activities. At other seasonal camps where smaller temporary shelters are occupied for shorter periods of time by a corporate group, these are clustered together around a common hearth and processing area.

Exchange of food and goods between families at larger aggregation sites results in the deposition of a wide range of lithic and faunal remains from resources procured from a variety of different localities. Trade goods are expected to be more concentrated at large aggregation sites located along major travel routes where trading activities are taking place than in any other sites to which they may be dispersed. Evidence of trade becomes more highly visible with the introduction of nonperishable items at sites with protohistoric and historic components.

Conservation practices employed to cope with declining resources would be difficult to document in terms of settlement patterns. However, they may have resulted in a visible break in occupation of sites in a particular area while families hunted with other groups in different areas. Such flexibility in group composition is expected to produce homogeneity in tool kits associated with specific activities at the range of sites where those activities are taking place.

IX ARCHAEOLOGICAL CORRELATES OF SEASONAL SUBSISTENCE STRATEGIES

Ethnographic and environmental data have been used to reconstruct traditional Tahltan subsistence and settlement patterns. This section summarizes seasonal subsistence strategies and the archaeological remains expected to be found at different types of sites occupied. The seasonal model of subsistence activities forms the basis for discussing factors affecting the formation and visibility of archaeological sites.

Site Formation Processes

Archaeological remains represent the transformation of energy through the cultural system. The flow of energy transformation resulting from procurement, processing, storage, consumption, and discard of wastes can be illustrated in a behavioral chain model (Schiffer 1976). Table 13 presents a behavioral chain model for the traditional Tahltan salmon procurement strategy, which has been studied in greatest detail.

Several factors related to the formation of sites associated with the procurement and processing of salmon become evident upon examination of the model. The complex and sophisticated technology traditionally used for the procurement of salmon leaves little or no evidence in the archaeological record, since tools and facilities were all made of organic materials. The most visible remains associated with fishing activities result from tools and facilities used for processing and storage of salmon.

The greatest concentration of lithic remains are produced by manufacture and use of small flakes for butchering knives in processing activities carried out by women as described above in chapter 6, and suggested by Flenniken (1980). Since smokehouses served as living quarters and as facilities for processing salmon, floors within these structures were swept regularly of accumulated debris. It is expected, therefore, that lithic debris would be located in or near hearths, against walls or just outside of smokehouse floor spaces.

Notable smokehouse features which would be found as remains in an archaeological context are clearly visible in the floorplans of older smokehouses No. 1 and 4, shown in Figures 50 and 51. These features include rock outlines with larger flat rocks serving as foundations for the major support posts and wall base. In the case of smokehouse No. 1, wall poles sit directly on a large base log, while in No. 4 poles sit in the ground outside of the base log, so that their positions would be marked by post moulds archaeologically.

Hearth areas are generally located in the middle of each of the four corners in the large houses, although they are also located in areas between. There is no regular effort made to remove and deposit hearth ash outside the house, so that deposits often build up in the hearths and become scattered and trampled into the earth floor.

Plans were also drawn for the remains of two former smokehouse structures. The floorplan, shown in Figure 52, represents the remains of a smokehouse at least 40 years old which was torn down a few years ago. Scattered hearth ash is clearly visible on the surface, and there is not yet any vegetation growth on the floor area. The floorplan in Figure 53 represents the remains of a smokehouse structure of unknown age. The rock outline of the structure is clearly apparent although patches of grass and herbs and two small pine trees have developed inside the area. Although windblown silts have been deposited on the floor area, slight traces of hearth ash can still be detected.

Table 13. Behavioral Chain Model for Salmon.

Activity	Location	Social Unit	Tools/Facilities	Time/Frequency	Expected Remains
procurement	river bank	2-4 men of each household	weirs, traps gaffs, spears	2-4 hr/day	--
gutting	river bank	women	obsidian knives	av. 3-7 min/ fish	obsidian blades flakes
transport	river bank to smokehouse	men/women/ children	branch	av. 2 min/ fish	--
cook/consume fresh fish	smokehouse or outdoor hearth	women	obsidian knives wooden stakes bark baskets boiling stones	30 min/meal	obsidian flakes hearth/burnt bones/boiling stones
splitting fish	smokehouse	2-4 women of each household	obsidian knives	5-10 min/fish 2-4 hr/day	obsidian blades/ flakes scales/small bones
gather/cut firewood	vicinity of smokehouse	men/women/ children	axe	1 hr/day	lost or broken axe
tend fires and monitor fish	smokehouse	women	hearths	1 hr/day	hearths
pack fish in bundles	smokehouse	women	willow ropes	several hours end of season	--
prepare storage pits	vicinity of village	men/women/ children	wooden hoes axes	several hours end of season	pits
transport fish	smokehouse to storage pits	men/women	tumplines	several hours end of season	--

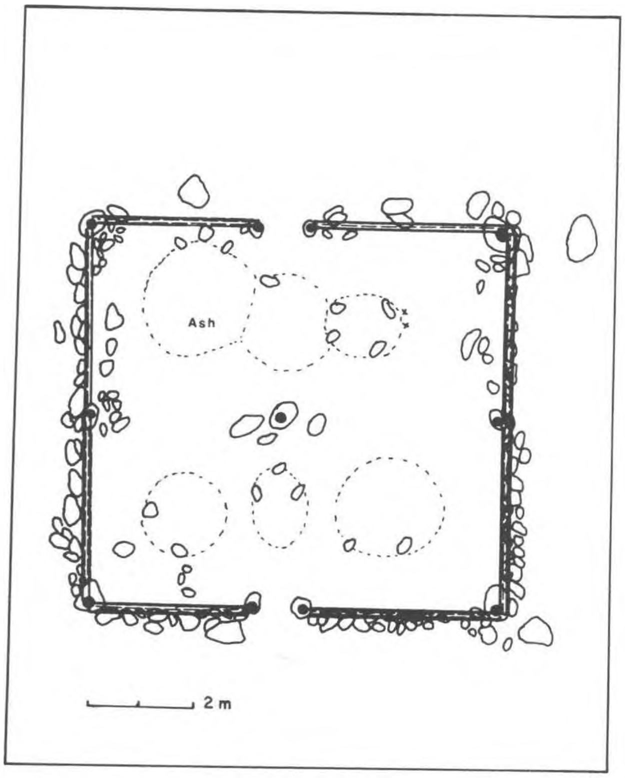


Figure 50. Floorplan of smokehouse No. 1

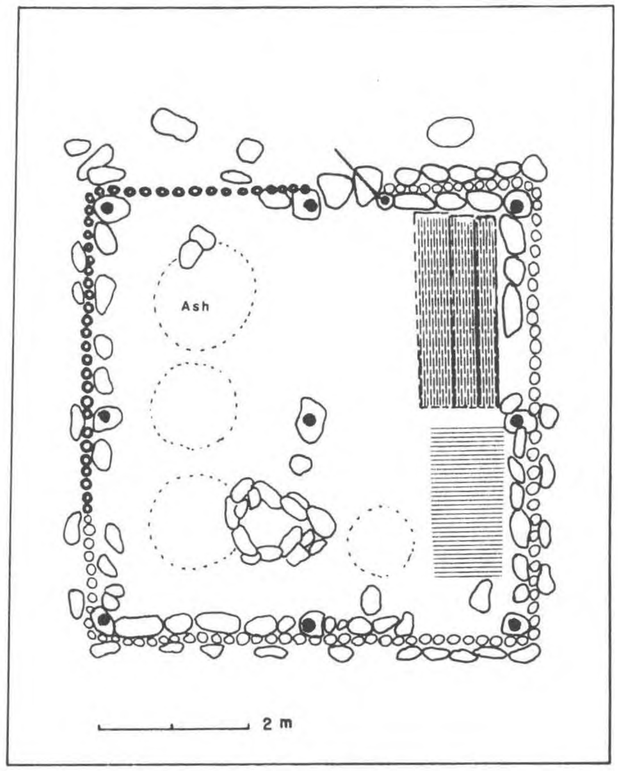


Figure 51. Floorplan of smokehouse No. 4

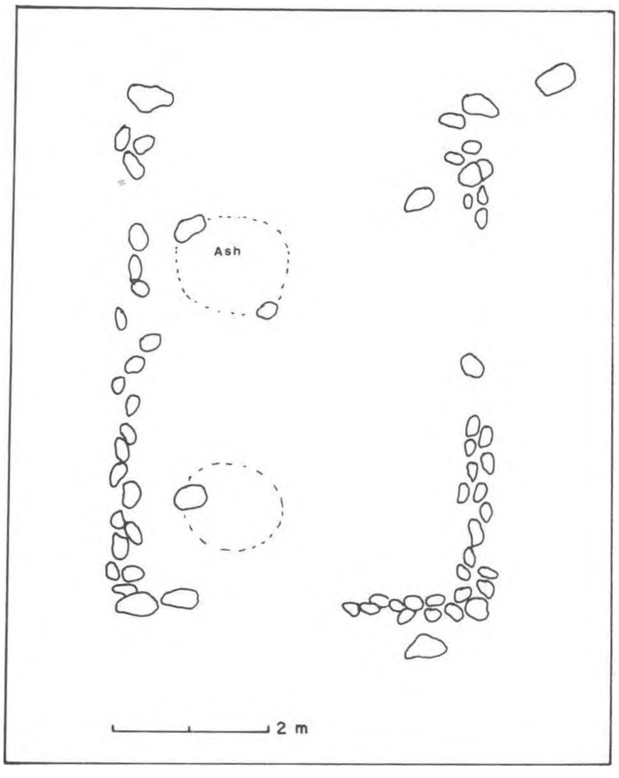


Figure 52. Floorplan of smokehouse remains A2

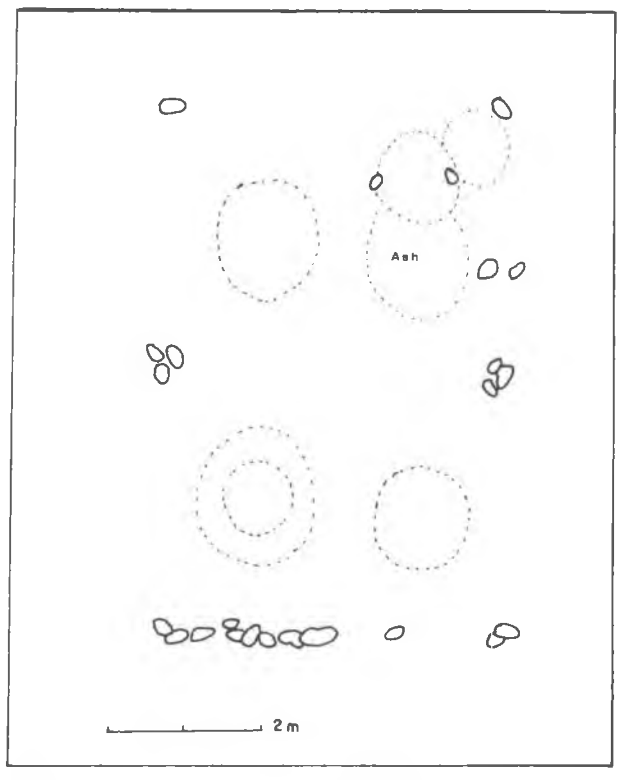


Figure 53. Floorplan of smokehouse remains A1

Analysis of soil samples collected from floors of several smokehouse structures along the Stikine River indicate that these consist of windblown silts mixed with river deposited silty sands derived mainly from basalt, schist, and quartzite rocks. Sediments range in colour from very dark grey brown to yellowish brown (Munsell codes 1OYR 3/2 and 1OYR 5/4). Surface sediments become crusted with constant dripping of oils out of the fish during the drying process, and subsequently become compacted in thin layers. Although chemical analysis was not carried out, it is expected that phosphates, resulting from the breakdown of these fatty deposits, would become concentrated in the soil floor with increased amount of fish processed and length of time the structure was used.

Observations on butchering practices, preparation and consumption of fresh fish during the summer, and processing of salmon for drying and storage, as described in Chapter 6, indicate minimal deposition of fish bones in processing areas or facilities. Soil analysis revealed that small quantities of bone fragments 2mm or smaller in size are trampled into smokehouse floors, along with fish scales. Fish scales found in archaeological context could yield such data as species taken, age and size of fish, and season of procurement.

Cache pits, used for storing dried salmon and other preserved foods, are highly visible in archaeological context. Located in the vicinity of major camps and villages, as seen in the maps presented in Appendix 4, cache pits average 2.5 by 1.5 by 1 m in size. Salmon processed in the traditional smokehouse, occupied by an extended family of about 25 people, were stored in several pits. Thorman (n.d.) noted that the bark lining and other forest materials used in the pits were often burned after food had been removed from them. Charcoal preserved in excavated pits would provide a means of dating use of these pits and occupation of sites in which they are found.

Activities related to procurement, processing, and storage of salmon were dispersed over a relatively large area within the village. Older ethnographic fishing villages (examples are presented in Appendix 4) with archaeological evidence of prehistoric occupation, have an average size of 400 m in length by 100 m in width. Often separate sites recorded during archaeological survey represent different activity areas which formed part of a single village.

Table 14 summarizes the archaeological remains expected to be found at different types of sites occupied during the seasonal round of subsistence activities. This seasonal model of subsistence and settlement strategies forms the basis for presenting some general comments on factors affecting site formation and visibility.

Factors Affecting Visibility of Archaeological Remains

Summer fishing villages, as discussed in detail above, are among the largest and most visible sites occupied during the year. Abundant food resources allowed larger groups of people to aggregate for longer periods of time at summer and winter villages. Permanent shelters and facilities for processing and storing large quantities of resources at major camps and villages are highly visible in the archaeological record.

Since most of the material culture used by the Tahltan was made of organic materials, site visibility also depends on the accumulation of lithic materials from stone tool use over many years. The greatest concentration of stone tools and debris results from butchering and processing fish, meat, and hides in vicinity of habitation structures at major camps. Obsidian quarries and camps where lithic reduction activities take place, such as those in the Mount Edziza area, also yield highly visible concentrations of lithic materials (Fladmark 1982). Tahltan elders indicate that obsidian was collected during late summer-early fall hunting expeditions in alpine areas.

The procurement of plant resources, smaller mammals and birds, or kill sites of individual large game animals leave little or no lithic or faunal evidence in the archaeological record. Small mammals and birds are taken back to camp whole for processing. Although large game animals are skinned and butchered into major sections at the kill site, all parts are transported to the campsite and put to some use.

Teit (n.d.) indicates that there were strict regulations concerning the disposition of bones. Formerly, bones of salmon and most animals were not given to hunting dogs. Dogs either foraged for birds and rabbits or were given choice pieces of meat as a reward after a kill. Bones from large animals were used for manufacturing a variety of tools and implements. Bones of animals such as beaver, lynx, marmots, and bear were either disposed of in water or were burnt in the campfire. In a boreal forest environment with acid solids, where bone preservation is generally very poor, the practice of burning bones in the campfire would contribute to their preservation in archaeological context. Dried fish and meat were often exchanged between groups and transported to the next seasonal camp. Bones from these foods were often thus deposited in different sites from which they were procured or processed.

The costs of transporting materials and tool kits from one camp to another was limited by caching behavior. Many artifacts having specific functions, such as fishing nets and weights, and other items referred to as site furniture (Binford 1979) were left at camps from one season to the next. Observations and accounts indicate that at larger sites, which were reoccupied on a yearly basis, there is often lateral shifting of site use over time. Frequently new structures are built a short distance from old ones which are then used as caching or storage facilities for a time. The cutting of trees for construction or firewood at larger sites render these highly visible for many years after abandonment. Such sites are easily detected from the air or through aerial photography interpretation.

Various types of sites are ranked below according to their degree of archaeological visibility. The order is from greatest to least visibility.

1. Historic villages and camps with standing structures
2. Villages and camps with metals from historic/protohistoric occupation
3. Quarry sites such as those in Mt. Edziza area
4. Camp sites in quarry vicinity where reduction activities take place
5. Major fishing villages, occupied for extended periods of time by large numbers of people
6. Trading camps occupied by large groups of people, generally at locations of resource abundance (may coincide with 5 or 7)
7. Major winter camps, occupied for extended periods of time
8. Seasonal camps of one to several weeks occupation, eg. at fishing lakes, marmot snaring camps at timberline
9. Trail networks
10. Temporary camps
11. Other plant procurement or kill sites

Table 14. Archaeological Correlates of Seasonal Subsistence Strategies.

Season/Length of Occupation	Site Type/ Location	Social Unit/ Group size	Structures/ Facilities	Tools/ Implements	Faunal Remains
mid June-mid Aug. 8 weeks	fishing villages major salmon rivers	several extended families 100-150	smokehouse found. or post moulds hearths/pits for process. cooking and storage	axes/hammer-stones adzes/obsidian flakes, knives boiling stones	fish scales salmon, beaver trout, hare, deer
several hrs/day	plant gathering sites/vicinity of village	6-10 women and children	--	--	--
mid Aug.-mid Sept. 3-4 weeks	camps at timberline	extended family 15-25	outlines of lean-to shelters post mould of drying racks hearths, storage pits	axes/adzes hammerstones obsidian flakes knives boiling stones	marmots, gopher, sheep goat, bear caribou, ptarmigan, salmon scales and bones
several hrs/day	berry gathering sites/vicinity of camps	6-10 women and children	--	--	--
one-several days	temporary camps kill sites/ alpine meadows	2-8 men and boys	hearths	obsidian knives projectile points	sheep, goats caribou, bear
several hrs/day	obsidian quarries/ alpine ridges	several men	--	hammerstones/ extensive lithic scatters	--
Sept.-Oct. 4-6 weeks	base camps subalpine valleys	1-2 extended families	outlines of lean-to shelters/post moulds of drying racks/hearths/pits for soaking and smoking hides/ storage pits	axes/adzes/hide dressing tools/ obsidian flakes and knives boiling stones hammerstones mortar stones	caribou, bear, moose, sheep, goat
several hrs/day	caribou fences/ vicinity of camp	men and women of several families	fence lines	axes, obsidian knives, spear points	--

Table 14 (continued).

Season/Length of Occupation	Site Type/ Location	Social Unit/ Group size	Structures/ Facilities	Tools/ Implements	Faunal Remains
one-several days	temporary camps kill sites/alpine meadows subalpine forest	2-8 men and boys	hearths	obsidian knives projectile points	sheep, goats, bear, caribou, moose
2-4 weeks	fishing camps/ lakes, streams	1-2 extended families	lean-to shelters drying racks hearths	net weights	salmon, whitefish, char
Nov.-early April	winter villages forested valleys close to caribou fences	2-4 extended families 50-100	double lean-to shelters/as base camps above	as base camps above	caribou, moose, fish, hare, birds, beaver, lynx, porcupine, marten
one-several days	temporary camps kill sites/sub-alpine and boreal forest	2-8 men and boys	hearths	obsidian knives projectile points, axes	moose, caribou hare, beaver
mid April-May 4-6 weeks	camps on lakes and streams	extended family 15-25	lean-to shelters drying racks hearths, roasting, cooking pits	axes/adzes net weights obsidian flakes, knives boiling stones	trout, gray-ling, water-fowl, hare, grouse, beaver, bear
one-several days	temporary camps kill sites	2-8 men and boys	hearths	obsidian knives projectile points	bear, beaver waterfowl
May-June several hrs/day	plant gathering sites/vicinity of camps	6-10 women and children	--	flake knives	--
several hrs/day	bark gathering sites/vicinity of camps and villages	several men, women and children	--	flake knives	--

Conclusions

Ethnoarchaeological approaches can provide an understanding of the dynamics of hunter-gatherer subsistence behaviour and site formation processes. These factors are seen as essential for interpreting the significance of different prehistoric sites within the overall pattern of subsistence and settlement strategies. The availability of salmon in the Stikine Plateau area, a reliable resource which could be procured and stored in large quantities, provided the Tahltan with a means of coping with periods of scarcity which other Athapaskan groups occupying Arctic drainages did not have.

A problem for future research would be to determine how early these subsistence patterns are valid. As few areas of the Stikine Plateau have been investigated archaeologically, this issue has not been resolved. However, excavations conducted by Magne (1982) and Smith (1970) suggest that the patterns reconstructed in this study extend back at least a few hundred years. Paleoenvironmental studies have indicated that small scale changes in climate have occurred and that alpine glaciers in the Mt. Edziza area have advanced short distances from their present locations (Souther pers. comm.). As a result, ecological zones may have shifted and plant and animal populations probably varied. Research in the Tahltan area has indicated that the subsistence and settlement strategies utilized provided a means of coping with resource fluctuations. It is thus suggested that similar patterns of land use may have been operating in the area for several thousand years.

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Appendix 1. Bird Species Occurring in the Stikine Plateau Area.

Upland Ground Birds

Blue grouse	*Dendragapus obscurus*
Spruce grouse	*Canachites canadensis*
Ruffled grouse	*Bonasa umbellus*
Willow ptarmigan	*Lagopus lagopus*
Rock ptarmigan	*Lagopus mutus*
White-tailed ptarmigan	*Lagopus leucurus*

Waterfowl

Common loon	*Gavia immer*
Yellow billed loon	*Gavia adamsii*
Arctic loon	*Gavia arctica*
Red throated loon	*Gavia stellata*
Red necked grebe	*Podiceps grisegena*
Horned grebe	*Podiceps auritus*
Whistling swan	*Olor columbianus*
Canada Goose	*Branta canadensis*
Mallard	*Anas platyrhynchos*
Pintail	*Anas acuta*
American wigeon	*Anas americana*
Northern shoveler	*Anas clypeata*
Blue-winged teal	*Anas discors*
Green-winged teal	*Anas crecca*
Ring-necked duck	*Aythya collaris*
Greater scaup	*Aythya marila*
Lesser scaup	*Aythya affinis*
Common goldeneye	*Bucephala clangula*
Barrow's goldeneye	*Bucephala islandica*
Bufflehead	*Bucephala albeola*
Harlequin	*Histrionicus histrionicus*
Black scoter	*Melanitta nigra*
White-winged scoter	*Melanitta deglandi*
Surf scoter	*Melanitta perspicillata*
Common merganser	*Mergus merganser*

Other Birds

Goshawk	*Accipiter gentilis*
Sharp-shinned hawk	*Accipiter striatus*
Marsh hawk	*Circus cyaneus*
Red-tailed hawk	*Buteo jamaicensis*
Golden eagle	*Aquila chryaetos*
Bald eagle	*Haliaeetus leucocephalus*
Osprey	*Pandion haliaetus*
Gyrfalcon	*Falco rusticolus*
Peregrine falcon	*Falco peregrinus*
Merlin	*Falco columbarius*
American kestrel	*Falco sparverius*
American golden plover	*Pluvialis dominica*
Black-bellied plover	*Pluvialis squatarola*
Semipalmated plover	*Charadrius semipalmatus*
Killdeer	*Charadrius vociferus*
Whimbrel	*Numenius phaeopus*
Upland sandpiper	*Bartramia longicauda*
Solitary sandpiper	*Tringa solitaria*
Spotted sandpiper	*Actitus macularia*
Wandering Tattler	*Heteroscelus incanus*
Greater yellowlegs	*Tringa melanleuca*
Lesser yellowlegs	*Tringa flavipes*
Long-billed dowitcher	*Limnodromus scolopaceus*
Sanderling	*Calidris alba*
Least sandpiper	*Calidris minutilla*
Semipalmated sandpiper	*Calidris pusillus*
Western sandpiper	*Calidris mauri*
Northern phalarope	*Lobipes lobatus*

Appendix 1 (continued)

Common snipe	Capella gallinago	Rough-winged swallow	Stelgidopteryx ruficollis
Long-tailed jaegar	Stercorarius longicaudus	Stellar's Jay	Cyanocitta stelleri
Herring gull	Larus argentatus	Gray jay	Perisoreus canadensis
California gull	Larus californicus	Common raven	Corvus corax
Mew gull	Larus canus	Black-capped chicadee	Parus atricapillus
Bonaparte's gull	Larus philadelphia	Boreal chicadee	Parus hudsonicus
Glaucus gull	Larus hyperboreus	Dipper	Cinclus mexicanus
Arctic tern	Sterna paradisaea	Red-breasted nuthatch	Sitta canadensis
Mourning dove	Zenaida macroura	Winter wren	Troglodytes troglodytes
Great-horned owl	Bubo virginianus	American robin	Turdus migratorius
Hawk owl	Surnia ulula	Varied thrush	Ixoreus naevius
Short-eared owl	Asio flammeus	Townsend's solitaire	Myadestes townsendi
Pygmy owl	Glaucidium gnoma	Hermit thrush	Catharus guttatus
Common nighthawk	Chordeiles minor	Swainson's thrush	Catharus ustulatus
Rufous hummingbird	Selasphorus rufus	Gray-cheeked thrush	Catharus minimus
Belted kingfisher	Megaceryle alcyon	Mountain bluebird	Sialia currocoides
Common flicker	Colaptes auratus	Golden-crowned kinglet	Regulus satrapa
Yellow-bellied sapsucker	Sphyrapicus varius	Ruby-crowned kinglet	Regulus calendula
Hairy woodpecker	Picoides villosus	Water pipit	Anthus spinoletta
Downy woodpecker	Picoides pubescens	Bohemian waxwing	Bombycilla garrulus
Black-backed,	Picoides arcticus	Cedar waxwing	Bombycilla cedrorum
three-toed woodpecker		Northern shrike	Lanius excubitor
Say's phoebe	Sayornis says	Starling	Sturnus vulgaris
Willow flycatcher	Empidonax traillí	Warbling vireo	Vireo gilvus
Western wood pewee	Contopus sordidulus	Tennessee warbler	Vermivora peregrine
Olive-sided flycatcher	Nuttallornis boraelis	Orange-crowned warbler	Vermivora celata
Horned lark	Eremophila alpestris	Yellow warbler	Dendroica petechia
Barn swallow	Hirundo rustica	Yellow-rumped warbler	Dendroica coronata
Cliff swallow	Petrochelidon pyrrhonata	Townsend's warbler	Dendroica townsendi
Violet-green swallow	Tachycineta thalassina	Blackpoll warbler	Dendroica striata
Tree swallow	Iridoprocne bicolor	Northern waterthrush	Seiurus noveboracensis
Bank Swallow	Riparia riparia	Common yellow throat	Geothlypis trichas

Appendix 1 (continued)

MacGillivray's warbler	Oporonis tolei	Pine siskin	Carduelis pinus
Wilson's warbler	Wilsonia pusilla	White-winged crossbill	Loxia leucoptera
American redstart	Setphaga ruticilla	Savannah sparrow	Passerculus sandwichensis
Western meadowlark	Sturnella neglecta	Dark-eyed junco	Junco hyemalis
Red-winged blackbird	Agelaius phoeniceus	Tree sparrow	Spizella arborea
Rusty blackbird	Euphagus carolinus	Chipping sparrow	Spizella passerina
Brewer's blackbird	Euphagus cyanocephalus	White-crowned sparrow	Zonotrichia leucophrys
Common grackle	Quiscalus quiscula	Golden-crowned sparrow	Zonotrichia atricapilla
Brown-headed cowbird	Molothrus ater	Fox sparrow	Passerella iliaca
Western tanager	Piranga ludoviciana	Lincoln's sparrow	Melospiza lincolnii
Purple finch	Carpodacus purpureus	Lapland longspur	Calcarius lapponicus
Pine grosbeak	Pinicola enucleator	Smith's longspur	Calcarius pictus
Gray-crowned rosy finch	Luecosticte tephrocotis	Snow bunting	Plectrophenax nivalis
Common redpoll	Carduelis flammea		

Appendix 2. Plants Used in Technology.

Common Name	Scientific Name	Habitat	Uses[1]
Wolf moss	Letharia vulpina	on coniferous trees	boiled in water gives a bright yellow dye
Paint fungus	Echinodontium tinctorium	on limbs of conif.	dried/heated/powdered/mixed with grease as red paint
Bracket fungus	Fomes sp.	live and dead conif. and deciduous trees	as tinder for starting fires
Sphagnum moss	Sphagnum sp.	acid bogs and swamps	carpet birth lodge, line cradles, baby diapers, sanitary pads
Lodgepole pine	Pinus contorta var. latifolia	well drained soil dry ridges	wood - for building house structures pitch - as antiseptic cones - smoking hides
White spruce	Picea glauca	well drained but moist slopes	wood - building house structures bark - roofing material, lining salmon caches, canoes, vessels for cooking and soaking hides roots - rope and cordage pitch - glue
Black spruce	Picea mariana	varied, especially sphagnum bogs	same as white spruce
Alpine fir	Abies lasiocarpa	well drained soil higher elevation	same as white spruce, saplings for bows, pitch as antiseptic
Saskatoon berry	Amelanchier alnifolia	well drained soil	wood - arrows
Juniper	Juniperus scopularum J. communis J. horizontalis	dry exposed slopes	wood - snowshoes, bows, other small carved items bark - twine berries - medicinal
Aspen	Populus tremuloides	well drained but moist soils	mainly firewood, green for smoking fish and meat
Cottonwood	Populus trichocarpa P. balsamifera	moist lake and stream banks	wood - dugout canoes, structures, firewood, rotten inner wood for smoking hides, dried inner bark for tinder

Appendix 2 (continued).

Common Name	Scientific Name	Habitat	Uses[1]
White birch	Betula papyrifera	well drained soil	wood - for carving bows, snowshoe frames, gambling sticks etc. as firewood, gives very hot fire bark - watertight vessels for cooking and carrying food and water, cups, trays, storage baskets
Water birch	Betula occidentalis	moist soils along stream banks	for small carved items, as firewood
Scrub birch	Betula glandulosa	moist soils	withes for binding
Stika alder	Alnus sinuata	moist soils along stream banks	wood - for carving small items, firewood, green for smoking fish and meat bark - boiled, gives brownish red dye
Mountain alder	Alnus tenuifolia	moist stream banks	same as Sitka alder
Willow	Salix sp.	moist soil	withes for binding bark - twine and rope poles for hanging fish and meat during smoking, drying, cooking cooking implements
Red osier	Cornus stolonifera	moist stream banks	withes for ropes and bindings
Dogbane	Apocynum androsaemifolium	well drained soil	rope and cordage, as a seasonal indicator
Wormwood	Artemesia frigida	well drained slope	fumigant and insect repellant
Horsetails	Equisetum sp.	damp stream banks	as 'sandpaper' for polishing wood

1. Emmons 1911, Teit n.d.

Appendix 3. Edible Plants of the Stikine River Area.
(listed in order of taxonomic classification)

Common Name	Scientific Name	Habitat	Part Used	Availability	Reference
Black tree lichen	Alectoria fremontii	on conif. trees	entire	anytime	T2-35
Honey mushroom	Armillaria mellea	forest floor	entire	early fall	T2-40
Chanterelle	Cantharellus cibarius	conif. forest	entire	early fall	T2-42
Shaggy manes	Coprinus comatus	open forest	entire	spring	T2-44
Polypor fungus	Polyporus sulphureus	on conif./decid. trees	entire	fall	T2-47
Horestails	Equisetum arvense	damp areas	young shoots	early spring	T1-42
Lady fern	Athyrium filix-femina	damp forest	young shoots rhizome	early spring fall	T1-44
Wood fern	Dryopteris austriaca D. dilatata	damp forest	rhizome	fall	T1-46
Licorice fern	Polypodium glycyrrhiza P. vulgare	damp forest	rhizome	fall	T1-51
Bracken fern	Pteridium aquilinum	open forest	young shoots rhizome	spring fall	T1-56 T2-48
Onion	Allium schoenoposum	grassy slopes	bulb/leaves	spring	T2-69/ H307
Rice root	Fritillaria camschatcensis	meadows	bulblets	spring	T2-84/ H308
Solomon's seal	Smilacina stellata	meadows	young shoots berries	spring fall	T2-90/ Cr28
Twisted stalk	Streptopus amplexifolius	moist woods	young shoots berries	spring fall	H311 Cr29
Fairy slippers	Calypso bulbosa	moist woods	bulbs	spring	T1-99
Poplars	Populus tremuloides P. trichocarpa P. balsamifera	stream and river valleys	cambium	spring	T2-204

Appendix 3 (continued).

Common Name	Scientific Name	Habitat	Part Used	Availability	Reference
Nettles	Urtica gracilis	stream banks	leaves/buds	early spring	H370
Toadflax	Geocaulon lividum	open woods/ decid.	fruit	early fall	H373
Junipers	Juniperus communis J. scopularum	dry slopes	berries	anytime	T2-51
Pine	Pinus contorta	well drained soil	cambium	spring	T2-57
Cattail	Typha latifolia	marshes	shoots rhizome	early spring	T2-93 H66
Burreed	Sparganium angustifolium	marshes	tubers/stem bases	early spring	Cr2
Arrow grass	Triglochim maritinum	meadows/marshes	leaf bases seeds	spring fall	T1-72 Cr4
Black Current	Ribes hudsonianum	open woods	berries	summer	T2-163
Mt. Ash	Sorbus scopulina	open woods to subalpine	berries	late summer	T2-209
Saskatoon berry	Amelanchier alnifolia	woods to open slopes	berries	summer	T2-180/ H599
Raspberries	Rubus pedatus R. chamaemorus R. arcticus R. idaeus	damp forest bogs/muskeg wet meadows open woods	berries berries berries berries	summer summer summer summer	T2-197-200/ H601-604
Thimbleberry	Rubus parviflorus	open woods	berries	late summer	T2-203
Strawberry	Fragraria virginiana	clearings	berries	summer	T2-185
Chokecherries	Prunus virginiana	open woods	berries	early fall	T2-191
Silverweed	Potentilla anserina	marsh/wet meadows	roots	early fall	T2-187
Wild rose	Rosa acicularia R. nutkana R. woodsii	open woods open woods open woods	fruit fruit fruit	fall fall fall	T2-194

Appendix 3 (continued).

Common Name	Scientific Name	Habitat	Part Used	Availability	Reference
Lupine	Lupinus arcticus	dry slopes	roots if cooked	early spring	T1-162
Milk Vetch	Astragalus alpinus	open slopes	roots of some species edible	early spring	H-647-649 Cr97
Arrowhead	Sagittaria cuneata	marshes, lakes	tubers	fall	T1-68/Cr5
Skunk cabbage	Lysichitum americanum	marshes	roots	early spring	T2-65/ Cr11
Bullrush	Scirpus microcarpus S. validus	marshes/swamps	shoots	early spring	T2-68/ Cr10
Dock	Rumex arcticus R. occidentalis	wet places	young leaves	early spring	H379-80 T1-189
Mr. Sorrel	Oxyria digyna	wet mt. slopes	young leaves	early spring	H383/Cr41
Bistort	Polygonum viviparum	dry meadows	rhizome	early spring	H385/Cr42
Strawberry blite	Chenopodium capitatum	open areas	young leaves	early spring	H393
Spring beauty	Claytonia sp.	damp woods	corns/leaves	early spring	T2-172/ Cr45
Pond lily	Nuphar polysepalum	ponds/lakes	rhizomes	spring	H450
Rockcress	Arabis lyrata	moist slopes	young leaves	early spring	H545
Saxifrage	Saxifraga punctata	mt. stream banks	leaves	summer	H574
Gooseberries	Ribes lacustre R. triste	open woods	berries	summer	T2-164 -66
Crazyweed	Oxytropis maydelliana O. campestris	dry slopes/tundra sandy soil	roots	fall/early spring	H656 N8-9
Sweet vetch	Hedysarum alpinum	spruce forests open slopes	roots	early spring	H668

Appendix 3 (continued).

Common Name	Scientific Name	Habitat	Part Used	Availability	Reference
Giant vetch	Vicia gigantea V. americana	meadows/open woods	seeds	late summer	T1-167 Cr105
Soapberry	Shepherdia canadensis	open woods	berries	summer	H684
Silverberry	Elaegnus commutata	dry slopes	berries	summer	H684
Fireweed	Epilobium angustifolium E. latifolium	meadows/forest stream banks	stems/ leaves/roots	early spring	H686 T2-170
Sweet cicily	Osmorhiza depauperata	shaded woods	roots	early spring	T2-109
Water parsnip	Sium suave	marshes/lakes	roots	spring	T2-113
Wild rhubarb	Heracleum lanatum	woods/meadows	stems/roots	spring	T2-95/ H707
Dogwood	Cornus stolonifera	stream banks	berries	early fall	T2-137
Bunchberry	Cornus canadensis	spruce forest	berries	early fall	T1-129
Crowberry	Empetrum nigrum	heaths/bogs	berries	fall/winter	T2-141 H716
Labrador tea	Ledum palustre L. groenlandicum	bogs/wet meadows	leaves	fall/winter	T2-145
Bearberry	Arcostaphylos uva-ursi	dry slopes	berries	fall/winter	T2-143
Blueberries	Vaccinium caespitosum V. membranaceum V. alaskensis V. uliginosum	alpine meadows woods woods heaths/bogs	berries berries berries berries	early fall early fall early fall early fall	T2-147- 149 H732-734 H732-734
Bog cranberry	Vaccinium vitis-idaea V. ocycoccus	muskeg/peat bogs muskeg/peat bogs	berries berries	fall fall	T2-159/ H731
Red huckleberry	Vaccinium parvifolium	conif. forest	berries	early fall	T1-156/ H733
Wild mint	Mentha arvensis	springs/stream banks	leaves	summer	T2-214/ Cr160

Appendix 3 (continued).

Common Name	Scientific Name	Habitat	Part Used	Availability	Reference
Monkey flower	Mimulus guttatus	springs/stream banks	leaves	spring	Cr170
Elephanthead	Pedicularis sudetica P. langsdorffii	meadows/rock slopes	roots/young shoots	early spring	H822-23 N8-9
Elderberry	Sambucus racemosa	open forest	berries	late summer	T1-125.
High bush cranberry	Viburnun edule	damp woods	berries	fall	T2-135 H842
Yarrow	Achillea millefolium A. borealis	meadows/slopes	leaves/ flowers	summer/fall	Cr185
Mugwort	Artemisia telesii	stream banks	leaves	summer	A-P
Sweet coltsfoot	Petasites frigidus	wet meadows/woods	roots	spring	H913
	P. hyperboreus	wet meadows/woods	roots	spring	
	P. sagittatus	wet meadows/woods	leaves	spring	A-P
	P. palmatus	wet meadows/woods	leaves	spring	
Wild thistle	Cirsium folisum	meadows	roots	fall	T2-119

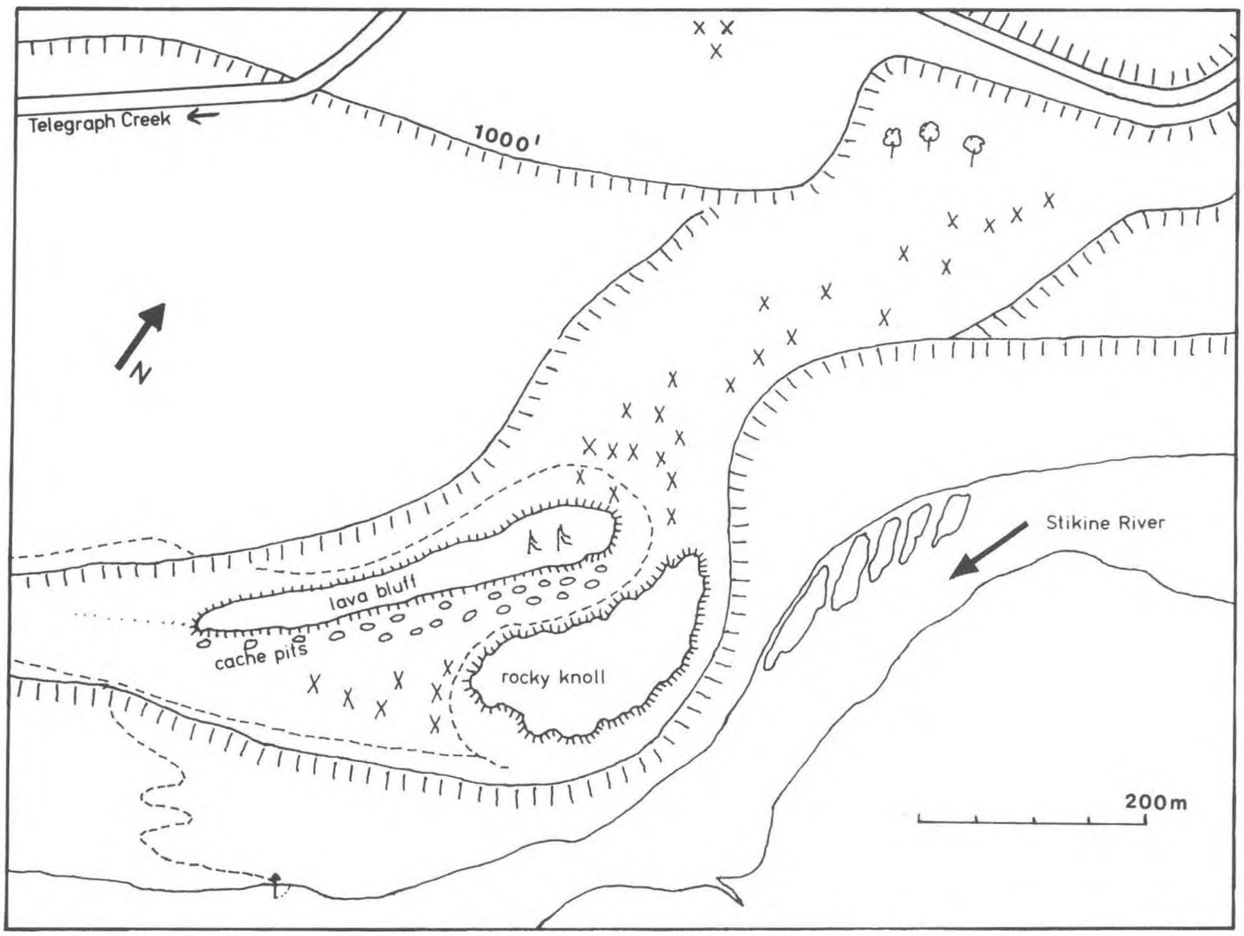
References:

T1 Turner 1975
T2 Turner 1978
H Hulten 1968
Cr Craighead et al. 1963
N Nickerson et al. 1973
A-P Albright coll. verified by J. Pindermoss, U.B.C. Herbarium

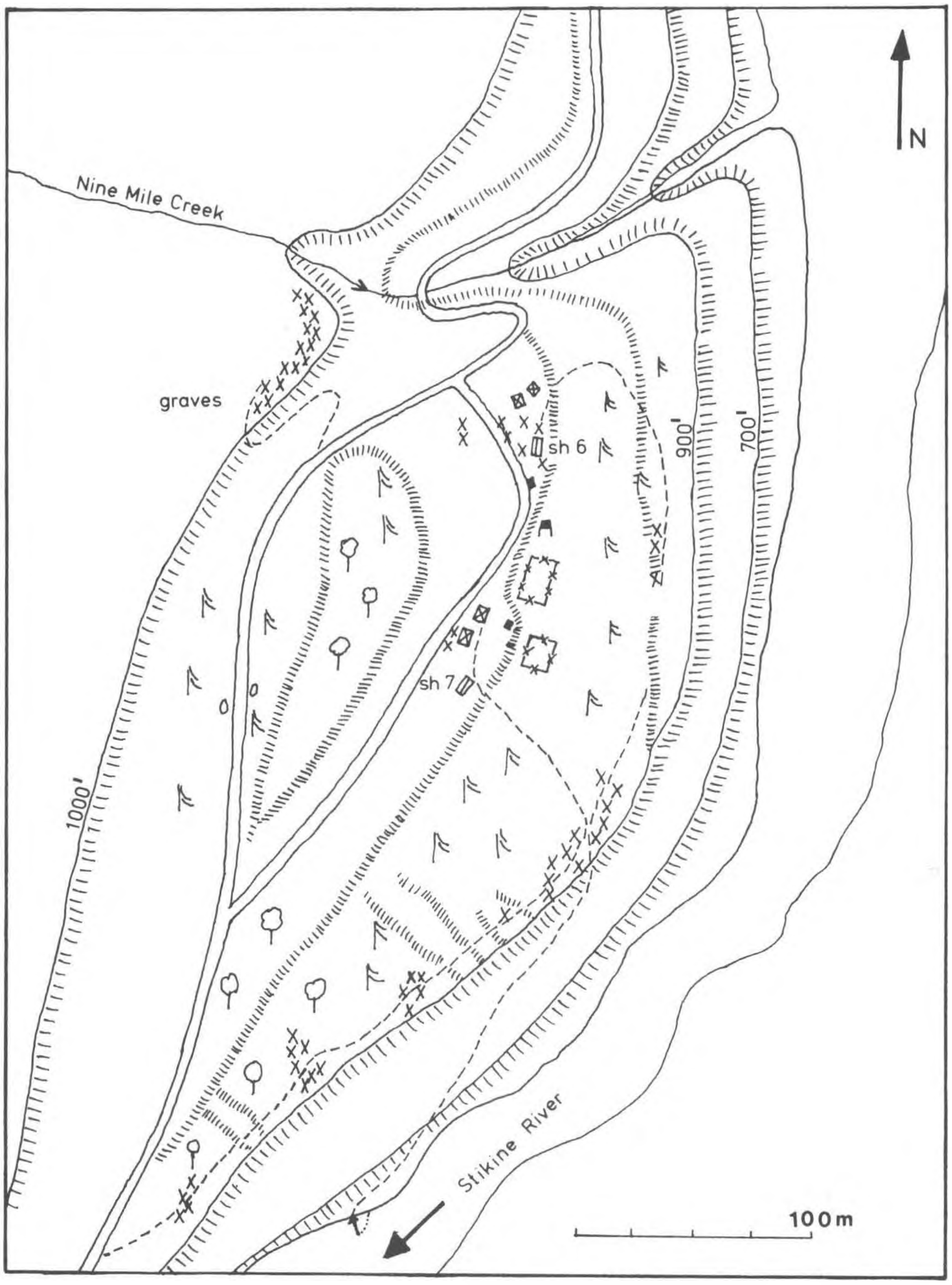
Appendix 4. Maps of Ethnographic Fishing Villages

Legend for Maps

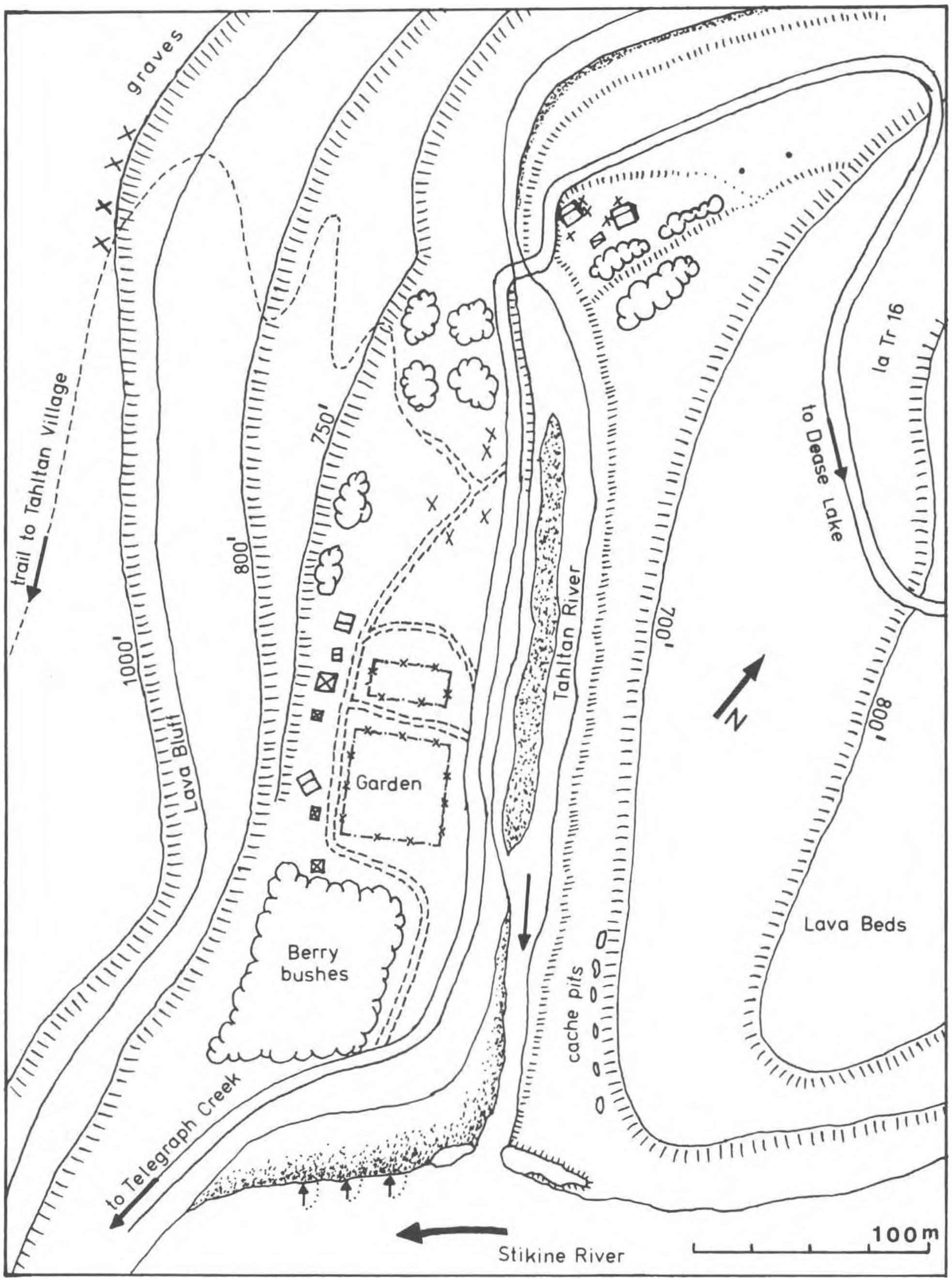
- road
- trail
- direction of river flow
- steep rise
- 900' major contour
- gravel bar/beach
- limit of vegetation
- stand of pine/aspen
- fenced garden
- cabin
- tent frame
- sh 6 smokehouse
- raised cache
- cache pit
- lithic scatter
- house depression or foundation
- gill net boom
- rock pile
- outdoor hearth



Appendix 4a. Eleven mile site on Stikine River



Appendix 4b. Nine mile fish camp on Stikine River



Appendix 4c. Tahltan -- Stikine Confluence

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14.	GLASS AND ICE: A report on the Archaeology of the Mt. Edziza and Spectrum Ranges, Northwestern, British Columbia. K.R. Fladmark.	16.00
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