Ecology of Food and Nutrition, Vol. 27, pp. 259–282
Reprints available directly from the publisher
Photocopying permitted by license only

CHANGE IN THE USE OF TRADITIONAL FOODS BY THE NUXALK NATIVE PEOPLE OF BRITISH COLUMBIA

HARRIET V. KUHNLEIN

INTRODUCTION

Native People in North America have experienced tremendous changes in all aspects of their lifestyles since the periods of contact with Europeans (Taylor 1972; Johnson 1975; Duff 1969). Dietary patterns have been particularly prone to change with the major influences being restrictions in use of the traditional land-and sea-resources base, and the introduction of marketed foods (Schaeffer & Steckle 1980).

Although it is clear that Native People, as a population group, are among the least advantaged peoples in contemporary North America with respect to health and other standard measures of quality of life, it is not clear how changes in dietary patterns in the last 150 years have influenced this. Precontact diets, in general, were composed of foods from plant and animal species in the near environment with some items made available through trade with neighboring groups. The precontact diet can only be assumed to have been reasonably adequate in all nutrients because survival, reproduction, and a rich cultural life are evident. However, it is accepted and substantiated with archaeological records that for many native cultures in North America, there were periodic food shortages that were climaticaly determined (c.f. Martin & Plog 1973; Cassidy 1980).

Native People in North America today seldom experience a lack of "food," as reflected in consumption of energy, protein, carbohydrates, or fat. Yet recent documentation on current native diets has invariably shown low consumption of many other essential nutrients (folate, iron, calcium, vitamins A and D, and others), the best sources in food markets being more expensive items. The consumption of foods rich in energy but poor in many essential nutrients has resulted in high-risk status for several measures of nutritional health (Kuhnlein 1984; Lee 1971; Desai & Lee 1971; Butte et al. 1981). The most pressing health issues for Native People throughout North America center on infant morbidity and mortality, infection, dental caries, obesity, diabetes, alcoholism, and mental illness (Ackerman 1980). All of these conditions are influenced directly or indirectly by the food system, dietary intake, and nutrient availability.

It is apparent, then, that health conditions of Native People have changed since European contact and that the food system and nutrient availability for any particular group also changed. It is timely and important for native groups to recognize the potential of the most beneficial aspects of their traditional and contemporary food systems to improve nutritional status and to utilize these, along with other public health tools, for the alleviation of current health problems.

Native groups that have been successful in retaining at least some access to their environmental resources for traditional food supplies have the possibility to

promote these foods. However, the extent of current use of traditional foods is modified by many factors: population dynamics; legislation on use of land and sea resources; exposure to alternative food choices through food markets, education, and the media; and new demands on personal time and energy that reduce the time available for traditional foods events.

An important step in promoting the use of traditional food resources by any native group is the documentation of knowledge of these resources by elderly people who can still recall the time when the foods were a prominent part of the diet. Tracking changes will give insights into how the traditional food system can best be utilized at the present time.

Although much has been written about the influence of food on the history of various regions of the world, there are few reports on qualitative changes in dietary patterns for a specific cultural group as a result of "modernization." Pelto and Pelto (1983) have written an overview of diet and delocalization of food supplies in the past 250 years, and Pelto et al. (1981) have explored changes in use of specific foods in the food system of West Finland during this century. Food and nutrient consumption of urban Blacks who migrated to Milwaukee, Wisconsin, from southern U.S. states were reported to change with degree of acculturation to the northern environment (Jerome 1980). To date, however, there have been few published discussions of changes in food use and health of Native Indian People of North America since European contact. The few works that do exist have been qualitative and usually generalized for many cultural groups.

The purpose of this paper is to examine the factors influencing change in traditional food use by a specific group of Indian people, the Nuxalk native community of British Columbia. An overview of the factors contributing to changing food patterns of the Nuxalk are presented. This is followed by a report of a detailed study on the declining use of traditional Nuxalk foods, and an analysis of three factors that contribute to use of traditional foods: taste appreciation, availability according to presence in the near environment, and harvesting time.

The Nuxalk of Bella Coola, British Columbia

The people of the Nuxalk Nation own lands reserved under federal legislation of approximately 25 km^2 located at the mouth of the Bella Coola River on the eastern end of Burke Channel, a deep sea inlet (Figure 1). This coastal area was utilized by Native People from early times, and several villages were discovered for the European world by Captain James Cook and Sir Alexander MacKenzie late in the 1700s. Native People from nearby villages (Kimsquit, South Bentinck, and throughout the Bella Coola Valley) settled on the reserved lands in the late 1880s. Today there are about 675 Nuxalk people registered as band members living in 125 homes on the reserve and another 200 living in other parts of the Bella Coola Valley or areas more distant. The total population of the Valley is approximately 2,000, with the majority being people of European descent (Bella Coola Museum Assoc. 1979).

The Bella Coola Valley is about 60 km from the mouth of the river to the head, and about 4 km at the widest part. An inner coastal climate is maintained with an average annual precipitation of 165 cm. The greatest amount of the precipitation falls from October through December, primarily as rain, with only a few snowfalls in the valley each year (mean precipitation was 264 mm/month in 1978). There are usually about 250 frostfree days per year; the lowest tem-

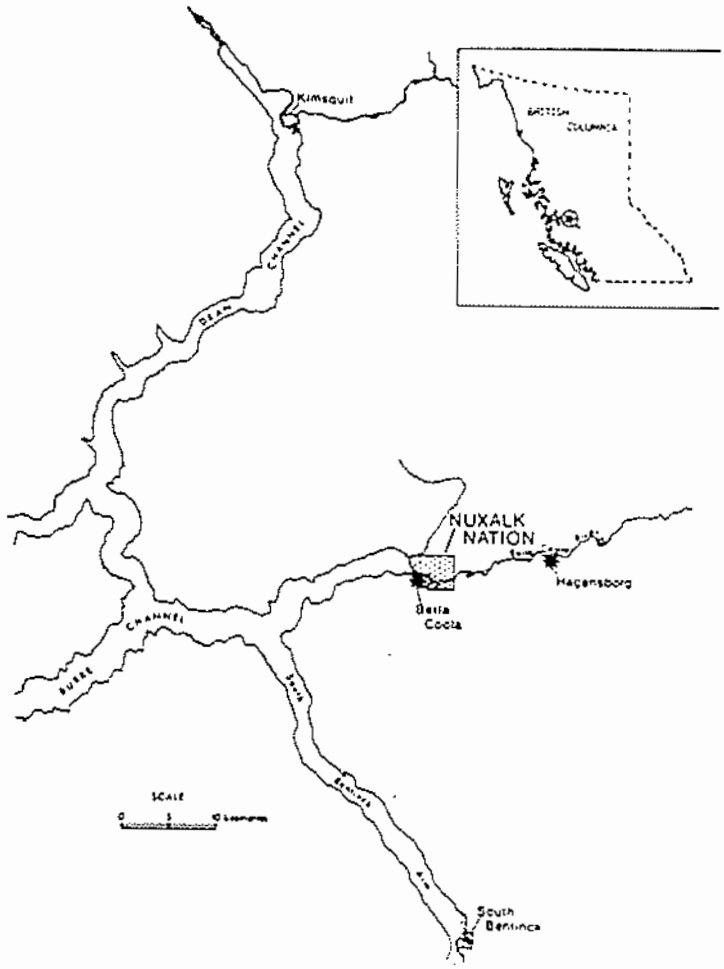

FIGURE 1. MAP OF NUXALK AREA

peratures occur in January. In 1978, the lowest temperature was -7° C and the highest, 25° C (Bella Coola Museum Assoc. 1979). High mountains of about 2,000 m line the entire valley, and in some regions there is constant shadow for several winter months.

The traditional Nuxalk diet emphasized fish and other seafoods, berries, roots, greens, the inner bark of trees, and fats of marine origin (Kuhnlein 1984). Today, the effective environmental resources for these foods are the reserve area, especially the Bella Coola River, and the sea. The largest land mass of reserve area located on the north side of the river is not currently accessible to everyone because it is necessary to use a boat to cross the river. There are few cleared trails in the dense "bush," and the northwest corner of the reserve is on a steep mountainside (Lepofsky et al. 1984).

There are several common health problems on the reserve, which have also been documented for the entire native population of British Columbia. These are

obesity, diabetes, infant mortality and morbidity, alcoholism, and mental illness (Pacific Region Medical Services 1982). Problems with intake of iron, folate, and vitamin A have been documented in adults (Nuxalk Food & Nutrition Program 1984). The poor state of dental health for Indian children in Bella Coola and other parts of the province were reported by Pacific Region Medical Services in 1980.

FACTORS INFLUENCING CHANGE IN THE USE OF TRADITIONAL FOODS

A number of factors have contributed to a declining utilization of the native food system. As will be discussed below, the use of some foods decreased more dramatically than others during this century, but the net result is undoubtedly that of decline. In general, plant-food use has declined more precipitously than the use of seafoods. The most salient factors contributing to changes in the use of the traditional Nuxalk food system are discussed in the following sections.

Legislation Restricting Use of Food Resources

The legislation that affects food-resource use by all Native People in British Columbia originated either with the federal or the provincial government. One of the most significant pieces of legislation was the establishment of the system that defined "reserved lands" for registered "Status Indians" in the 1890s, under the authority of the British North America Act of 1867 and the Indian Act of 1876 (Department of Indian & Northern Affairs 1980; McDonald 1984). All of the Native People in the Bella Coola Valley were allocated a reserve of approximately 25 km2, as previously described. By the 1890s, fatal diseases introduced by European contact had decimated the population to a fraction of its former level, so that there were less than 500 individuals for the land under this allocation (Duff 1969). In recent years, there have been continuing efforts by the administration of the Nuxalk Nation to renegotiate an increased land allocation to restore formerly held resources that would more adequately support the growing population.

By the 1930s, property rights in the rest of the valley (not on reserve lands) were appropriated by the Crown, and parcels of land were gradually sold to other settlers. Today, many of the original plant-gathering areas of the Native People are on private property and not accessible because of trespassing laws.

Provincial legislation, which restricted off-reserve food harvesting, included the following:

(1) The Provincial Game Protection Act of the 1880s. This act established a fixed season for hunting deer, mountain goat, moose, game birds, etc., and also restricted native hunting techniques, such as the use of snares and traps.

(2) The Dominion Fishery Act of the 1870s and the Provincial Fisheries Acts of the 1880s and later. These established policed fishing seasons, prohibited the use of native technology (dipnets, spears, etc.) on nonreserved lands, and finally established the food fishing licensing system for "Status Indian" people. Tribal ownership of fishing grounds off reserved areas was lost, often to commercial canneries.

(3) The Provincial Forestry Act initiated in the 1920s. This act made it illegal to remove any products of the forest on Crown lands and particularly restricted the harvest of tree bark for food or other home use. Horticultural techniques that promoted the production of berries, such as controlled burning and brush slashing, were also prohibited off reserved lands.

These acts of legislation have been discussed in detail elsewhere (McDonald 1984) and will not be described further here. It is clear that the food resource base of the Nuxalk people was severely restricted from that known in the pre-contact period by the enforcement of these legislative acts.

Demographic Changes

The Nuxalk occupied at least 45 villages in former times along the length of the Bella Coola River and in the South Bentick Inlet and Dean Channel regions. McIlwraith (1948) estimated that the former population of the Bella Coola Valley alone must have been "in the thousands". When Alexander MacKenzie made his pioneering voyage across the country, reaching the Pacific through the Bella Coola Valley in the summer of 1793, he described the local food supply as plentiful for the population in the several villages he encountered along the river (MacKenzie 1801).

By the 1850s, the severe decline of the native population due to smallpox, tuberculosis, and venereal disease was evident. In the early 1920s all the remaining Nuxalk from the surrounding areas were resettled in one village at the mouth of the Bella Coola River. In the 1920s the Nuxalk population reached a low point of slightly less than 300 people (Duff 1969). Since then, the population has been increasing by 2% to 3% each year, depending on whether the calculation is based on the reserve-resident or the total federally-registered population. Neither of these methods includes nonregistered Nuxalk, primarily women and children living off the reserve who have a non-Nuxalk husband or father. If these individuals were also enumerated and included in the population increase estimations, the rate would be slightly higher than 3%.

Some migration occurs from the reserve, especially to urban areas. Perhaps 5% of the registered Nuxalk population makes such a move in any given year. However, traditional foods are often available to urban Nuxalk, either because they visit the reserve during the harvesting season, or through gifts from family members who are living on the reserve. Therefore, the traditional food system reaches close to 900 people today.

The first non-Indian village in the valley was a Norwegian community that was settled in 1894 (Kopas 1974). Since that time the non-Indian population has increased rapidly through inmigration so that the current non-Indian population is about 1,300 people out of a total valley population of 2,000 (Bella Coola Museum Assoc. 1979). The impact of the non-Indian population on the traditional Nuxalk food system is not well defined. However, it is assumed that the effects are mainly indirect, operating through the interruption of food harvesting rather than through competition for traditional food supplies. These indirect effects are logging and other plant, fish, and game habitat destruction, commercial and sports fishing that reduce fish supplies, and trespassing restrictions on former food-harvesting areas. The size and organization of the non-Indian community has also been responsible for bringing commercial foods, alcohol, and other goods and services into the community.

Availability of Foods New to the Nuxalk System: Marketed Foods and Gardening

After European contact in the 1790s, there was a gradual influx of European goods into Nuxalk villages. Fur trading with distant forts began. In the mid-1800s the first Hudson's Bay Company post was established in the Bella Coola Valley (Kopas 1974). The introduction of molasses, rice, salt, tea, sugar, flour, and whiskey occurred, along with a myriad of household, farming, and hunting implements. The impact of the first marketed goods on native life cannot be underestimated. The Hudson's Bay Company and a series of general stores supplied staple foods to the area (personal communication, Nuxalk elders). Gradually, produce and a large array of marketed foods were offered for sale in the valley.

At the present time, the major center for purchasing foods in the valley is the Co-op in Bella Coola, which has been in operation since the mid-1960s, and a smaller "general store" in Hagensborg, a village 20 km east of Bella Coola. There is one weekly delivery of fresh and packaged foods via the 480 km of primarily unpaved road from the city of Williams Lake. Additionally, there is a minor supply of fresh eggs, chicken, beef, milk, and baked goods from the valley. A reasonable supply of frozen, canned, and packaged foods with stable shelflives is available in both stores. Three or four small restaurants in the valley provide standard menus of marketed foods.

Home gardens are popular in the Bella Coola Valley with Native and non-Native People alike. The concept of gardening was eagerly received in native areas of the west coast well before 1850, and seed potatoes, onion sets, and packaged seeds were part of early trading posts. Today, the most popular garden foods in the valley are potatoes, onions, carrots, lettuce, pumpkins, peas, stringbeans, and beets. Of these, potatoes are grown in the largest quantity (unpublished observations).

Traditional Nuxalk plant foods were not propagated or "gardened," *per se*, although wild root beds were known to have been "tended" to keep them free of weeds and were regularly harvested by families (Turner & Kuhnlein 1982). Similarly, berry-harvesting areas, trap lines, and choice fishing sites were used on a sustained-yield basis by particular families before the establishment of the reserve lands and the enforcement of trespassing restrictions during this century (Nuxalk elders, personal communication). Today, trap lines are still maintained by families, but recognition of family privileges in access to specific harvesting areas does not occur, except with respect to home garden sites.

It is clear that availability of marketed foods and the practice of gardening have a significant impact on the foods used by the Nuxalk. An interview survey completed in 1981 established that reserve-resident families, with an average size of 4.5 persons, spent an average of Canadian $111 per week in the grocery section of the Bella Coola Co-op. Thirty-seven percent of families had home gardens, which yielded a mean of 65 kg of produce per garden during that year.

Acceptability of Native and Non-Native (New) Foods: Education, Social Contact and the Media

Many factors have influenced Nuxalk views about the acceptability of traditional native foods and the newer introduced foods. In essence, the changing patterns of use were toward a declining use of foods in the traditional food system and an increased general use of the introduced foods.

The increased availability of new foods has already been discussed, as has the legislative and land-use restrictions that effectively reduced the availability of native foods. Government data on the fish populations in the Bella Coola River (Manzon & Marshall 1980) indicate that during the last 15 years there has been a clear decline in number for all species. This has been attributed to a combination of overharvesting and spawning habitat disturbance, primarily by logging near river banks. The decline in wildlife is generally thought to result from overhunting.

A recent survey of the availability of traditional Nuxalk plant foods in the reserve area also demonstrates that there is a limited availability of these foods (Lepofsky et al. 1984). Although some of the foods are still plentiful, the time, energy, and work needed for their harvest and preparation must be offset by other values, such as cultural appreciation and taste, to make their use worthwhile for Nuxalk people. (Data on availability, taste appreciation and harvesting efficiency for the Nuxalk foods are treated in the final section of this chapter.)

Formal education has had a significant impact on changing the pattern of use of traditional foods. In the early days of this century, forced attendance at boarding schools in the southern parts of the province meant that eating foods from home was a rare event; the common fare was foods familiar to the school master and, most likely, items that were low-cost and easily stored. The Nuxalk elder women who attended these institutions invariably describe their shock at having to eat "nothing but White Man's food, day after day" at the boarding schools. Education programs in health and home economics have rarely, if ever, tailored classes for native students to include the nutritional virtues or techniques of the preparation of traditional foods. The revival of interest in Indian culture and native-administered education programs will perhaps make this information available in both public schools and those administered on reserves.

Social contact with non-Native People has obviously contributed new ideas about foods and their preparation and introduced countless new foods into Indian homes. Among native families in Bella Coola it is possible to find such diverse foods as hamburgers, Italian spaghetti, and Chinese "stirfried" vegetables with tofu. It is difficult and unnecessary to distinguish the separate impact on food practices of personal social contacts with non-Natives from the effects of various media. Suffice it to note that all of the foods advertised on national radio and television, and most of the foods advertised in national magazines, are available for purchase in the Bella Coola Co-op today.

As well as enhancing acceptability of new foods, social contact with non-Native People has also contributed to a decreased acceptability of native foods. Anecdotal information from band members related how impressed school children are when their non-Native classmates make negative comments about home-packed lunches of native foods, such as dried fish, fish sandwiches, ooligan grease, and the like. Such negative reinforcement of traditional foods has encouraged children to request marketed foods for their lunches.

Employment: Concerns for Time, Money and Energy

The introduction of wage labor has had several effects on food use. With monetary income, people could afford to purchase marketed foods. In addition, the time and effort demanded by such employment detracted from that available for harvesting and preparing traditional foods. From the first years of wage-labor opportunities, the employment for reserve resident men has been primarily in fishing

and logging industries. Commercial fishermen are away from the reserve during the season when the most productive river fishing can be done at home. However, these men still retain knowledge and expertise in fish harvesting, which contributes to the availability of fish in the village. Most commercial fishermen use their food fishing licenses to bring fish home on their return from commercial fishing excursions. They also provide access to the traditional shellfish and other seafoods that are not found in the reserve area. Many Nuxalk men know how to net fish from the Bella Coola River; the technology has been effectively transferred to younger generations so that this important food resource is still available to reserve families.

Men employed in logging have less access to the traditional foods harvested by Nuxalk men (fish and game). When they are seasonally employed, they generally do not have the time, energy, or resources to fish or hunt for the family. The majority of the traditional foods are harvested from April to October—the time when the logging industry is at its peak. Because the loggers are usually away from home at this time, fish and game for family consumption are harvested by other members of the community.

Employment for reserve resident women in the first decades of this century was primarily in the fish canneries that were located, at various times, in Tallio, Kimsquit (two former Nuxalk villages), and Bella Coola. Women, and often children, worked long hours in the canneries from June until October. It is not surprising that a decline in the use of traditional plant foods occurred in this period in that there was no time during the crucial summer months to harvest or preserve wild plant foods. One can only reflect on the nutritional impact this dietary loss had when disease rates were at their peak, and work for all members of the family was arduous. In addition, because nearly all able women worked in the canneries, the generational transfer of knowledge of plant harvesting areas and technology was certainly affected.

Another form of employment for women, which continues today, is the repair of fishing nets. This work is seasonal and intense, but has allowed women to work closer to their homes. Today Nuxalk women do not work in canneries since these no longer exist in the area. Other sources of employment are local shops, restaurants, schools, and other services. The reported rate of unemployment for women in Bella Coola is 4% compared to 19% for men. The average yearly income in 1981 was Canadian $9,892 for men and $5,782 for women (Census of Canada 1981). These figures, however, do not reflect the proportion of men to women in the workforce, nor the fact that many are employed only seasonally.

Nuxalk women today do not harvest large quantities of traditional plant foods, even though these are available and appreciated, and the women may not be otherwise employed. Although it might be expected that plant foods could be purchased, in an earlier study (Kuhnlein 1984) it was found that less than 50% of reserve resident Nuxalk families had fruits or vegetables, apart from potatoes, in their 24-hour dietary recall during the summer when these foods are most available and least expensive in markets. Nutrients abundant in fruits and vegetables, such as vitamin A, folate, vitamin E, and calcium, were most often lacking in the contemporary Nuxalk diet records. In the precontact diet, plant foods such as fruits, greens, and tree bark, were important supplementary sources of nutrients, and provided variety in a diet generous in fish, game, and fats. Today, variety and energy in the diet are primarily from refined grain products, such as baked goods and other highly processed foods with low nutrient density. Marketed

fruits and vegetables are used less often because they are expensive, have limited seasonal availability, and are generally less accepted.

In summary, it appears that employment of women, as well as other sociocultural factors, has affected the transfer of knowledge from older to younger women on how to harvest and prepare traditional Nuxalk foods. This, in turn, has had an impact on the quality of family diets. Knowledge on how to cut and preserve fish, as well as how to harvest and prepare plant foods, is held by only a small proportion of the younger generation of adult women.

STUDIES ON THE CHANGING USE OF NUXALK TRADITIONAL FOODS: EFFECTS OF TASTE, AVAILABILITY, AND TIME NEEDED TO HARVEST

In this section, the extent of use of traditional foods by Nuxalk families during the last 60 years is described. The data were collected by interviewing Nuxalk women (homemakers) in three age groups, categorized as "grandmothers," "mothers," and "daughters." For each food, a taste appreciation score was determined. Information on current availability and the amount of time required to harvest each item was tabulated from data collected previously (Lepofsky et al. 1984). Subsequently, the data sets on food use, taste appreciation, availability, and harvest time were treated statistically to examine relationships among them.

Methods

Sixty-one women were interviewed, all of whom had Nuxalk parentage and were born in Bella Coola, or, in the case of the eldest women, in the other Nuxalk villages before resettlement in Bella Coola in the 1920s. All of the women had spent their early childhood years in Nuxalk villages and most of their adult years as well. Some women, especially the "grandmothers," had lived in boarding schools in their teenage years; others had lived in other parts of the province for various periods of time during their adult lives. At the time of the interviews in 1982-83, all were residents in the Bella Coola Valley and were responsible for meal preparations for their families.

Twenty women designated as "grandmothers" were born between 1904 and 1930; 21 women, designated as the "mothers," had birthdates from 1931 to 1950; and 20, assigned the label "daughters," had birthdates from 1951 to 1963. The "grandmothers" interviewed included all of the women in this age category in Bella Coola; the numbers of "mothers" and "daughters" interviewed represented about half of the valley-resident Nuxalk women in these age categories.

The interviews were conducted by two Nuxalk women, usually in the home of the interviewee. Questions were asked about each one of the 70 food items known to have been a part of the traditional Nuxalk food system. Identification of the foods was enhanced by using the common English names of species, as well as the Nuxalk name and color photographs. To avoid undue length of interviews, questioning centered on species (sockeye salmon, clover rhizomes, red huckleberry, etc.) rather than on prepared food items.

With respect to food use, women were asked to recall the frequency of using each food in fresh or preserved states during two or three life periods: mid-childhood, early married life, and the present. Many "daughters" were classified

in only two life periods in that they were in the early-married stage at the time of the interview. Each woman designated a specific decade that represented that period of her food-use recall. Values for fresh and preserved food use scales are presented in Table 1. This table also shows the steps of a five-point "hedonic scale" that women were asked to use to score each food for general taste appreciation.

The Use, Taste, Availability, and Harvest Time Requirements of Traditional Foods

The results for traditional Nuxalk foods are given in Tables 2 and 3. Following the scientific name and the common English name of each food, the number of women who recalled using the food at any point is given. As anticipated, some foods were used by more women than were others, ranging from one ("western dock") to 61 (coho salmon, among other species). All of the salmon species were used by more women than many foods in the roots or greens groups. Within the groups of salmonids, the coho, sockeye, and steelhead were used by all 61 women. Springs, dog salmon, hump salmon, and trout were used by more than 50 of them. The most popular species of berries were also used by more than 50 women. These were wild strawberries, wild raspberries, blackcaps, thimbleberries, salmonberries, soapberries, grey blueberries, and red huckleberries. The least used groups of foods were the roots, greens, tree foods, and tea plants. In general, foods used by few women were used only by the most elderly before the present time. In fact, the "grandmothers" used more species of traditional foods than either the "mothers" or "daughters."

Also shown in Tables 2 and 3 are the mean use scores for each food. These are given separately for fresh and preserved foods. Two scores are given for each—a score for use at the present time, and the maximum use score, which was derived averaging only the highest scores given by each woman to represent her use

TABLE 1
Scales for Fresh and Preserved Food Use and for Taste

A. Frequency Scales for Foods used FRESH in Season:
1. Not used
2. ≤ Once/month (once or twice a season)
3. ≤ Once/week but ≥ once/month (now and then)
4. ≥ Once/week (lots)

B. Frequency Scales for Foods used PRESERVED out of Season:
1. Not preserved
2. ≤ Once/month (just a few meals' worth stored)
3. ≤ Once/week but ≥ once/month (now and then)
4. ≥ Once/week (lots)

C. Hedonic Taste Appreciation Scale:
1. Terrible (definitely don't like this food)
2. Poor (edible, but that's all)
3. Fair (could eat it, it's O.K.)
4. Good (enjoy it)
5. Best (no improvement possible)

TABLE 2
Use and Taste Appreciation of Nuxalk Traditional Foods: Fish and Game

Scientific Names	Common Names	n/61[1]	Highest = 4.0		Highest = 5.0
			Fresh Use[2] Present/Maximum	Preserved Use Present/Maximum	Taste Score[3]
Salmonids					
Oncorhynchus gorbuscha	humps, pinks	51	3.2/3.7	2.9/3.4	3.6
O. keta	dogs, chums	56	3.3/3.6	2.9/3.4	3.7
O. kisutch	coho, silver	61	3.6/3.8	3.3/3.6	4.1
O. nerka	sockeye	61	3.9/4.0	3.8/4.0	4.5
O. tshawytscha	spring, chinook, king	60	3.6/3.9	3.4/3.8	4.3
Salmo gairdneri	steelhead	61	3.3/3.7	2.3/2.6	4.1
Salmo spp., Salvelinus spp.	trout	54	2.8/3.3	1.9/2.0	3.8
Other fish					
Clupea pallasi	herring-roe	60	3.3/3.6	3.1/3.3	4.4
Ophiodon elongatus	ling cod	54	2.6/3.2	1.9/2.4	3.9
Platichtys stellatus	flounder	43	2.0/3.0	1.2/1.4	3.6
Sebastes ruberrimus	red cod, snapper	56	2.6/3.2	2.0/2.4	4.0
Thaleichthys pacificus	ooligans	61	3.6/4.0	3.3/3.8	4.2
Sebastes spp.	rock cod	46	2.5/3.2	2.0/2.4	3.9
Shellfish/other seafood					
Cucumaria spp.	sea cucumber	6	1.2/2.3	1.2/1.7	4.0
Haliotis spp.	abalone	39	2.0/2.6	1.8/2.3	4.1
Mytilus edulis	mussels	33	1.7/3.0	1.2/1.5	3.8
Neptunes spp.	crab	61	2.9/3.4	1.7/1.8	4.5
Phoca spp.	seal	47	2.1/3.2	1.3/1.6	3.4
Strongylocentrotus spp.	sea urchin	42	2.8/3.5	1.1/1.1	4.2
Several genera	clams	60	3.0/3.5	2.5/3.2	4.1
Game					
Alces alces	moose	56	2.9/3.4	2.6/3.1	3.9
Anas spp.	duck	59	2.5/3.5	1.7/2.3	4.1
Canachites spp., Dendragapus spp.	grouse	43	2.0/3.1	1.3/1.5	3.7
Odocoileus spp.	deer	58	2.2/3.7	1.9/3.4	4.3
Oreamnos americanus	mountain goat	36	1.2/3.3	1.1/2.4	4.1
Sylvilagus spp., Lepus americanus	rabbit	41	1.7/3.2	1.2/1.5	3.8

See notes, page 281.

TABLE 3
Use, Taste Appreciation and Ease of Harvest of Nuxalk Traditional Foods: Plant Foods

Scientific Names	Common Names	n/61[1]	High = 4.0		High = 5.0		
			Fresh Use[2] Pres./Max	Preserved Use Pres./Max.	Taste Score[3]	Reserve Availability Score[4]	Ease of Harvest Score[5]
Tree foods							
Populus trichocarpa	black cottonwood-inner bark	20	1.3/3.4	1.2/1.3	4.3	43.3	30
Pyrus fusca	wild crabapple-fruits	38	1.5/3.4	1.3/2.6	3.8	17.3	5
Tsuga heterophylla	western hemlock-inner bark	16	1.1/2.8	1.1/2.1	3.9	334.9	30
Berries							
Amelanchier alnifolia	saskatoons	45	2.2/3.4	1.6/2.6	3.9	2.6	5
Arctostaphylos uva-ursi	kinnikinnick	16	1.5/3.0	1.2/1.9	3.5	<0.1	20
Cornus unalaschensis	bunchberries	24	1.7/3.2	1.1/1.5	3.7	36.3	10
Crataegus douglasii	black hawthorne	9	1.8/3.3	1.3/1.6	3.6	<0.1	1.5
Fragaria vesca	wild strawberries	55	2.2/3.5	1.3/1.8	4.2	0.1	30
Gaultheria shallon	salal	32	1.3/3.0	1.5/3.1	3.9	<0.1	8
Ribes bracteosum	stink currants	37	1.6/3.5	1.4/3.1	4.0	14.0	5
R. lacustre	swamp gooseberries	14	1.6/3.2	1.2/1.8	3.5	9.1	20
R. divaricatum	wild gooseberries	44	1.6/3.2	1.2/2.1	3.6	10.5	12.5
R. laxiflorum	wild blue currants	22	1.7/3.3	1.2/2.1	3.8	10.6	20
Rosa nutkana	wild rose-hips	25	1.9/3.2	1.5/1.6	3.6	17.8	5
Rubus idaeus	wild red raspberries	59	2.6/3.7	2.2/3.2	4.3	9.2	30
R. leucodermis	blackcaps	55	2.1/3.8	1.9/3.4	4.5	<0.1	20
R. parviflorus	thimbleberries	61	2.4/3.7	1.6/2.4	4.0	88.0	10
R. spectabilis	salmonberries	61	2.7/3.8	1.8/2.6	4.3	141.6	5
Sambucus racemosa	red elderberries	44	1.6/2.9	1.6/3.0	3.6	100.8	3
Shepherdia canadensis	soapberries	60	2.8/3.4	2.9/3.6	4.2	<0.1	20

Vaccinium alaskense	watery blueberries,	43	2.5/3.7	2.2/3.2	4.1	9.1	10
V. membranaceum	mountain bilberries	17	2.4/3.5	2.2/3.2	4.3	0.7	10
V. ovalifolium	grey blueberries	55	2.5/3.7	2.2/3.0	4.1	18.1	10
V. parvifolium	red huckleberries	60	2.6/3.8	2.1/2.8	4.1	18.3	8
Viburnum edule	highbush cranberries	26	1.5/3.6	1.4/3.2	3.9	6.7	4
Root foods							
Dryopteris filix-mas, D. expansa	fern-rhizomes	6	1.3/2.8	1.0/1.0	4.3	6.4	10
Fritillaria camschatcensis	"rice root" - bulbs	12	1.4/2.8	1.0/1.1	3.8	<0.1	60
Polypodium glycyrrhiza	licorice "root"	6	1.7/3.0	1.0/1.2	3.8	0.9	10
Potentilla pacifica	silverweed-roots, cinquefoil	18	1.4/3.4	1.1/1.6	4.2	26.4	20
Pteridium aquilinum	bracken-rhizomes	2	1.0/3.5	1.0/2.0	3.5	8.0	15
Trifolium wormskioldii	clover-rhizomes	37	2.0/3.4	1.1/1.7	4.3	16.0	30
"Greens"							
Chenopodium album	lamb's quarters	5	2.8/3.6	1.4/1.4	4.0	N/A	5
Epilobium angustifolium	firewood-shoots	2	1.5/4.0	1.0/1.0	4.0	1.2	15
Heracleum lanatum	cow-parsnip, or wild rhubarb	45	1.9/3.6	1.0/1.0	3.6	1.2	5
Porphyra perforata	seaweed	60	1.0/1.0	2.9/3.3	4.4	<0.1	N/A
Rubus parviflorus	thimbleberry-shoots	55	2.3/3.7	1.1/1.2	4.0	88.0	15
R. spectabilis	salmonberry-shoots	31	2.0/3.5	1.1/1.1	4.0	141.6	15
Rumex acetosella	sorrel	18	1.9/3.4	1.0/1.0	3.7	0.5	10
R. occidentalis	Western dock	1	2.0/3.0	1.0/1.0	1.0	N/A	5
Urtica dioica	young stinging nettles	14	2.1/3.1	1.0/1.0	3.9	N/A	5
"Tea"							
Ledum groenlandicum	Labrador-tea	50	2.7/3.2	2.6/3.1	4.0	8.1	2.5
Rubus spectabilis	salmonberry-bark tea	4	2.5/3.5	1.8/3.3	4.5	141.6	15
Aralia nudicaulus	sarsaparilla-tea	3	1.3/2.7	1.0/2.3	4.0	7.8	10

See notes, page 281.

experience. For both scoring systems, 4.0 was the highest possible score, with 1.0 indicating the food was not used. In all cases, the present use score was less than the maximum use score, which demonstrates that no traditional Nuxalk foods are used presently as often as they had been used in the past. By noting foods with a score of 1.0 in the preserved food column, it is possible to identify foods that were never used in the preserved state (i.e., both preserved-present and preserved-maximum scores are 1.0). This is the case for fern rhizomes and several greens. One can also identify foods no longer in use at the present time that had been used earlier. ("fresh present" and/or "preserved-present" are 1.0, but "fresh-maximum" and/or "preserved maximum" have scores greater than 1.0). The foods in this category are bracken rhizomes, sarsaparilla tea, riceroot, and licorice rhizomes.

The mean taste scores are also shown, with 5.0 being the highest possible score and 1.0 the lowest. These scores were requested only from women who were familiar with the foods; that is, if a food was recalled as having been used during at least one of the lifetime periods. Although this interviewing technique did not result in low taste scores from women who never used a food because they felt they would not like it, it simplified the interviewing and coding processes. The mean taste scores ranged from a high of 4.5 (sockeye, crab, blackcaps, and salmonberry bark tea) to a low of 3.4 (seal).

The interviewers also asked if taste appreciation for any of the foods had changed during the lifetime of the interviewee, and whether they would have assigned a different taste score in earlier days. The only food for which taste score changed was licorice fern rhizome. This food is considered a children's treat, and many women said that they did not like it as much now as they had formerly.

Many foods with high taste scores were used with high frequency in the past (maximum scores were from 3-4) and still have high scores—especially the salmonids. Other foods highly appreciated for taste are no longer used very often, particularly clams and several types of berries. The influence of availability and harvesting time were examined to try to explain this anomaly.

Availability scores for plant foods on the reserve were derived from detailed ecological data as presented in Lepofsky et al. (1984). The computation of these scores used quantitative data on the presence of the species within defined habitats on the reserve. It was possible to derive "time-to-harvest" scores for the plant foods; these are given as the amount of time needed by one person to harvest 240 ml of food from a harvesting site of high-food density. From these scores, the most abundant and most easily harvested species were determined. The abundant plant species (scores greater than 40) were cottonwood, hemlock, thimbleberry, salmonberry, and elderberry. Of these, the inner bark of cottonwood and hemlock are the most time-consuming to harvest (30 minutes). The berries of thimbleberry and salmonberry are less time consuming (10 and 5 minutes, respectively) than the shoots of these species (15 minutes). Elderberries are the least time consuming to harvest (3 minutes), but of all the berries, their taste score is among the lowest (3.6).

Availability scores of less than 1 were given to nine plant species not found in the study area, but that were important Nuxalk foods. Kinnikinnick, blackcaps, and soapberries are available only in the more easterly parts of the valley or on the plateau. Seaweed is harvested at outer coast sites and is brought to Bella Coola as a dried product. Salal, hawthorn, and riceroot were present in other Nuxalk villages or in the Bella Coola Valley but outside the reserve.

These scores are presented to show how different plant foods within the traditional food system vary with respect to their taste appreciation, availability, and harvesting time. Many of the foods with taste scores greater than 4.0, high maximum use scores (3-4), good availability, and low harvest times have decreased use scores at the present time—grey blueberries, red huckleberries, silverweed roots, and thimbleberry shoots among others. Statistical studies on the interrelationships of these factors are reported in the last section.

DECLINING USE OF NUXALK TRADITIONAL FOODS FROM 1920 TO 1980

Since each woman recalled the frequency of use of each food during two or three decades of her lifetime, all decades from 1920 to the present time were included. Calculations on the use of each food were made by averaging the response from all women who recalled a particular decade. For this, a score of 1.0 was given if the food was not used by the individual during the decade. The range of the number of responses during the decade periods varied from 11 in the 1920s to 23 in the 1960s. All 61 women recalled the present time designated as the 1970 to the 1980s. There were too few recalls of the 1910-1919 period ($n = 3$) for their inclusion in statistical analyses; therefore, these responses were not plotted.

Foods were grouped into six categories: river fish (the salmonids and ooligans) (8 foods); other seafoods (12 foods); game (6 foods); berries (22 foods); greens (9 foods); and roots (6 foods). Group means were computed and plotted as shown in Figures 2 and 3.

In Figure 2, it can be seen that use of river fish has been maintained at a high frequency since the 1920s. On the average, fresh river fish were used at frequencies between 3 and 4, indicating that they were used more often than once per month but less than once per week (see Table 1). The average use was maintained from a weekly to a monthly basis. Fresh use of river fish declined slightly during the 1950s onward. The use of preserved river fish declined the most in the 1960s and remained at a stable level to the present time. All eight species are often used on the reserve today, with the exception of trout, which is rarely preserved (present preserved score = 1.9; present fresh score = 2.8; see Figure 2). The river fish are the most available species of seafood to the Nuxalk people.

The category "other seafoods" included shellfish and those species of seafoods not available in the Bella Coola River ($n = 12$ species). On the average, their use was maintained at a lower frequency than the more available river fish. Fresh use of the "other seafoods" was steady at a mean score of 2.6 until the 1960s, when it declined to a score of 2.2, and then declined further to 2.0 (present level). Use of preserved seafoods varied during the earlier decades of this century and has been maintained at a mean score of 1.6 at the present time. Herring roe is the most popularly used of these seafoods. Crab, clams, sea urchin, and abalone are highly appreciated foods, with taste scores greater than 4.0. Current use, however, is less than once a month, fresh or preserved. This is presumably due to a lack of availability.

The game species were used slightly more than "other seafoods," on average, in both fresh and preserved conditions. Although frequency-of-use of preserved game foods was maintained at around 2.0 for some time, it has fallen to 1.6 at

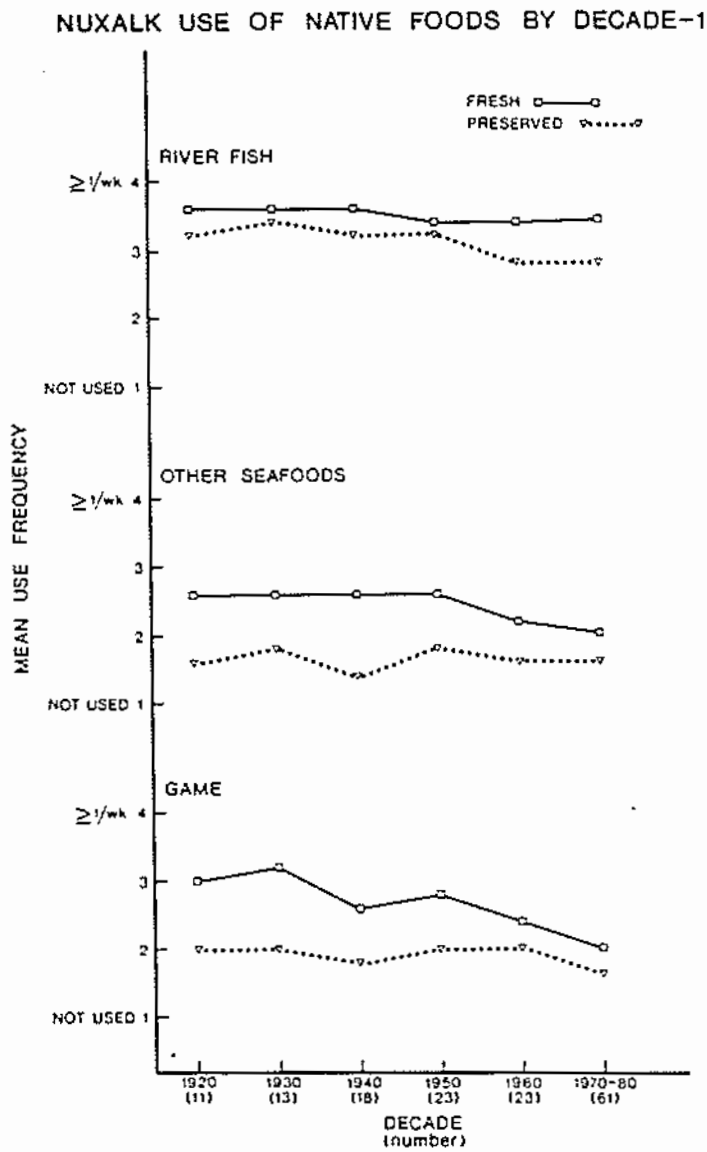

FIGURE 2.

the present time. Frequency of fresh use declined more dramatically, from a high in the 1930s (3.2) to the present low (2.0).

During the 1930s, probably because of the Depression and lack of money to buy marketed foods, there was an increase in use of preserved river fish and other seafoods, as well as fresh game. The advent of home freezers in the 1950s facilitated storage of seafoods and game. This may be one reason why use scores of the preserved products of these foods did not decline more precipitously, and the scores of preserved products came closer to those of the fresh products.

Use by reserve families of wild berries in both fresh and preserved form has declined steadily since the 1920s (see Figure 3). The mean fresh use (n = 22 species) was 3.0 in the 1920s and is currently 2.0. The frequency score for preserved berries declined from 2.5 to 1.8. These scores indicate that for the 22 kinds of fruit, families had been using at least one kind of fruit several time per week throughout the year. Now, however, they are used only occasionally. Many berries received taste scores of 4.0 or greater, but today only a few types of berries have preservation-use scores of 2-3; the two blueberries, bilberries, wild raspberries, red huckleberries, blackcaps, and soapberries. These and others are used more often in a fresh state.

Greens and roots were rarely preserved by the Nuxalk people during this century. Seaweed is the only exception, and is still often used dried. Wild clover rhizomes and cinquefoil roots were the roots most often preserved in the 1920s and 1930s, which was accomplished by storing them in boxes of soil in root cellars. Today, there is no storage of native root foods, and fresh use is limited to once to twice per year, primarily wild clover, cinquefoil, or rice root. Of the greens, many people now occasionally use cow parsnip stalks, as well as the young bush shoots of thimbleberry (2.3) and salmonberry (2.0).

These figures represent food use as practiced by the 61 women interviewed in the study, who were equally distributed into three generation groups. They represent the collective knowledge of contemporary Nuxalk women but not necessarily that of women in former times. The data for the 1920s, for example, denote use in Nuxalk families when the eldest women were in their youth. If all three generations alive in the 1920s could have been represented, it is very likely that the scores would have been higher, and for some food groups, even greater slope of declining use would be seen.

Life circumstances influenced traditional food use scores so that any individual woman may not have been consistent in her food use over the decades. For example, one elderly woman who uses a great quantity of traditional foods today did not do so during the 1930s when she was employed full-time during the summer. Another elderly woman currently uses much less traditional food than in earlier decades because she no longer has the stamina for the work of food harvesting and preparation. Despite these individual differences, the general trends are for the eldest women to have reduced their use of fresh and preserved traditional foods over time, and for the youngest women to be using less of these foods than the older women.

Most of the legislation that affected native food resource use was already in effect at the time the eldest women in this study recalled food use in their childhood years. However, more rigorous enforcement of the legislation, especially concerning game and other seafoods, occurred during this century. Effective harvesting of plant foods off the reserve was clearly curtailed by the Forestry Act of the 1920s. Plant foods on the reserve were used with decreasing frequency because of lack of access (women's employment; relocation to Bella Coola from outlying areas; few roads and trails on the reserve), and also because the population expansion during this century increased the competition for the foods that were accessible. Although there have been no marketed fish products of a quality comparable to the native resources available in Bella Coola, marketed meats, fruits, vegetables, fats, refined staples, etc., have all contributed to decreasing use of native game, berries, greens, and root foods.

It is interesting to compare the patterns of use in Figure 2, (foods traditionally harvested by men) with that in Figure 3 (foods traditionally harvested by women).

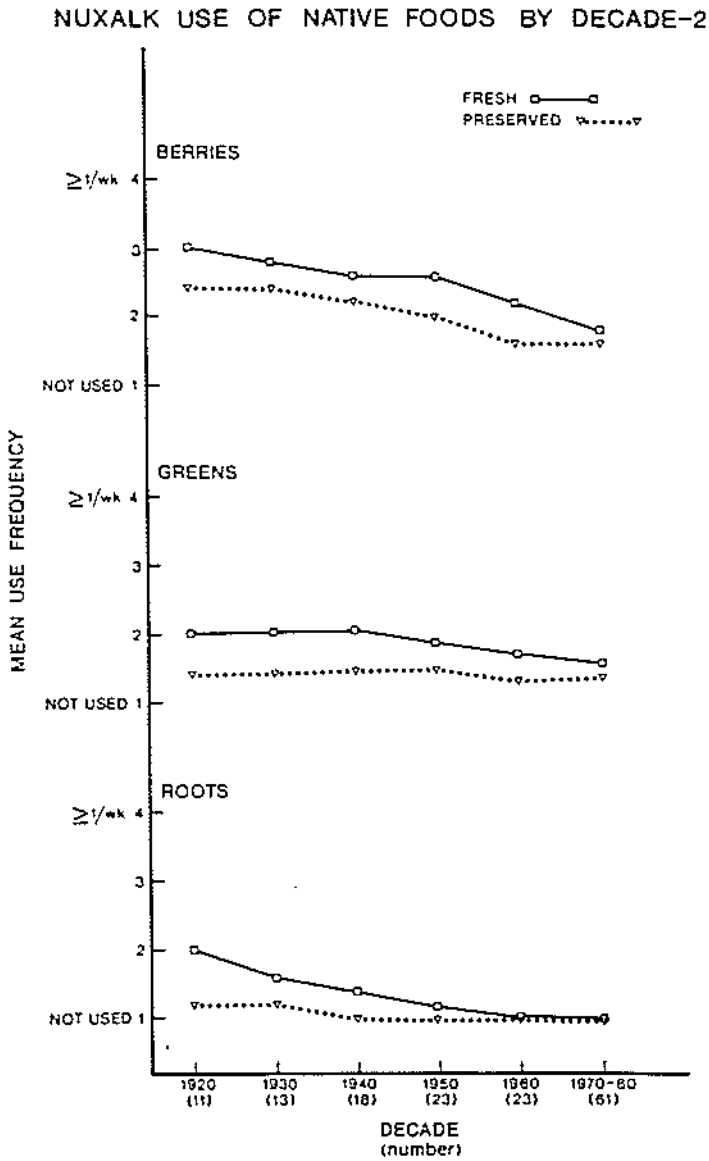

FIGURE 3.

Knowledge and skill in fishing have been retained by Nuxalk men through their employment, but game hunting and harvesting of plant foods has not been associated with wage labor. For many Native People today, harvesting of plant foods and game is associated more with recreation or cultural activity than with necessity, whereas the harvesting and preservation of fish is regarded as an economic necessity as well as a culturally valuable activity.

Statistical Relationships Among Use and Taste, Availability, and Harvesting Time of Traditional Foods

The declining use of foods within the traditional food systems of the Nuxalk people is the result of several factors, as discussed earlier. The quantitative impact of each of these factors on the change process is difficult to determine, but the scoring system described above can be used to examine the relative influence of three parameters—taste appreciation, availability, and time required for harvesting. Statistical analysis of these three variables in relation to frequency of use helps to define their effects (if any) on the process of dietary change.

Correlation analyses were conducted. First, the variables of taste, availability, and harvesting time were correlated with the use frequency of fresh and preserved foods. Following this, multiple regression analysis was carried out in an attempt to explain the separate effects of these variables on variation in use of fresh and preserved traditional foods by contemporary Nuxalk women.

Foods were first grouped into two broad categories—plant or animal foods, then into smaller subgroups for more detailed analysis. The scores for use, taste, availability, and harvest time were structured so that higher numbers represent greater amounts. A simple availability score for fish and game species was used for this analysis, where 1.0 indicated "not available for harvest" on the reserve and 2.0 indicated "available for harvest." The species in the latter category are: each of the salmonids, ooligans, duck, grouse, deer, and rabbit. It was not possible to devise scores for harvesting time for fish and game from the available data. First, correlations were computed for all plants combined and all fish and game combined. The correlations of plant foods and fish-game foods (fresh use) with taste, availability, and harvesting time (plants only) are given in Table 4. It can be seen that there was a low but significant ($p < .001$) relationship for taste for the plant foods, and for availability of animal foods. The relationship of taste to use for the fish-game group was less pronounced than the plant foods, but still significant ($p < .001$). Harvesting time and availability has a negligible relationship with present use for plant foods.

Results of the more detailed study on the correlations of use with taste are given in Table 5. A further breakdown of food groups, using both fresh and

TABLE 4
Correlations: Use Frequency with Availability, Harvesting Time and Taste Scores

	Pearson		Kendall	
Food Group/Variable	r	p<	tau	p<
Fish and game (fresh, present)				
Availability	.32	.001	.31	.001
Taste	.19	.001	.17	.001
All plants (fresh, present)				
Taste	.20	.001	.18	.001
Harvest time	.10	.008	.09	.004
Availability	−.06	.055	−.06	.016

preserved forms, was examined in relation to taste. The seafoods, both fresh and preserved, had a significant correlation ($r = 0.51$, $p < .008$). Of the plant foods, use frequency of berries showed the strongest relationship with taste, both fresh and preserved products ($r = 0.72$ and 0.65, respectively). Use of preserved greens was significantly associated with taste ($tau = 0.58$, $p < .008$). (Statistical tests were not done for game, roots, tree foods, or teas because of the small size of the cells.)

These results show that for plant foods, taste correlated most strongly with use, in contrast to the effects of availability and harvest time. This relationship was stronger for berries than for greens. Availability was a stronger variable than taste with respect to use of animal foods. However, for seafoods, taste showed a strong relationship to both fresh and preserved use. If the time to harvest the plant foods had a significant effect on use, a negative correlation coefficient (r value) would indicate that greater use was associated with fewer minutes to harvest. As can be seen in Table 4, this was not the case.

Although taste scores correlate with use frequencies for several of the food groups, one could ask whether taste preference leads to enhanced use, or whether declining use contributes to decreased taste appreciation. Zajonc and others have considered the effects of stimulus exposure on attitude in considerable detail (Harrison 1977). The Nuxalk women all reported that their taste appreciation for specific foods over their lifetime has not changed (except for licorice root), even though they may have changed their use of the foods.

Regression Analysis

To identify the variables that contribute significantly to variation in the frequency of present use of traditional Nuxalk foods, scores for taste, availability, and harvest time were used with present food-use scores computed from 70 food observations from the 61 women in the study. Scores were computed only if a food was used. The pattern of food use was such that for any woman, use scores on traditional foods were not independent (i.e., if she used one traditional food, she used several and often to a similar degree).

TABLE 5
Correlations: Use Frequency with Taste Scores

	Pearson		Kendall	
Food Group/Variable	r	p<	tau	p<
Seafoods (n = 20)				
Fresh	.51	.008	.38	.007
Preserved	.51	.008	.33	.016
Berries				
Fresh	.72	.001	.51	.001
Preserved	.65	.001	.49	.001
Greens (n = 12)				
Fresh	.17	.293	.27	.116
Preserved	.34	.140	.58	.008

Multiple regression analyses (Table 6) are presented for the plant food group (fresh and preserved), the fish-and-game group (fresh and preserved), and for the largest subsets within these groups, seafoods and berries. Even the highest R^2 values were relatively low (R^2 = .192 and .164 for fresh and preserved seafoods, respectively). For both fresh and preserved fish and game, availability was the primary predictor, followed by taste appreciation. This was also true for fresh and preserved seafoods.

With the plant foods, only 5.4% and 6.5% of the variation in use of fresh and preserved products was accounted for by the variables tested. For the plant group as a whole, as well as for berries in particular, taste contributed significantly to

TABLE 6
Multiple Regression Analyses Including Taste Scores, Availability Scores, and Harvesting Time Scores: Determinations of Frequency of Food Use

Food Set/Variable	Predictive Value (R^2)	Standardized Regression (Beta)	Significance (t)
All fish/game (n = 26) (fresh)	.123	—	
Availability	—	.297	.000
Taste	—	.178	.000
All fish/game (preserved)	.114	—	
Availability	—	.301	.000
Taste	—	.147	.000
Seafoods (n = 20) (fresh)	.192	—	—
Availability	—	.395	.000
Taste	—	.185	.000
Seafoods (preserved)	.054	—	—
Availability	—	.369	.000
Taste	—	.164	.000
All plants (n = 42) (fresh)	.054	—	—
Taste	—	.205	.000
Availability	—	.129	.002
Harvest time	—	−.045	.278
All plants (preserved)	.065	—	—
Taste	—	.240	.000
Availability	—	−.120	.037
Harvest time	—	.033	.562
Berries (n = 22) (fresh)	.092	—	—
Taste	—	.309	.000
Availability	—	−.031	.648
Harvest time	—	.051	.000
Berries (preserved)	.062	—	—
Taste	—	.219	.001
Availability	—	−.152	.030
Harvest time	—	.028	.691

their values regarding frequency of use, followed (in importance) by harvesting-time requirements for fresh plant use. For preserved plants, generally, and berries specifically, taste and availability were significant predictors of use, but harvesting-time requirements were not.

Multiple regressions were also carried out for game foods, roots, and greens. Of these items, only greens had a significant R^2 value ($R^2 = .114$), due almost wholly to the contribution of harvesting time.

The explanation for the relatively low R^2 values remains to be determined. It is often assumed that food use is highly dependent on taste appreciation, availability, and the work involved in food harvesting and/or preparation. But here, these factors explain only a small portion of the variation among Nuxalk families. Nuxalk traditional foods are not being used to their full potential, in spite of the fact that they are still reasonably available, their flavor characteristics are appreciated, and harvesting times are apparently not prohibitive.

Other factors that could be examined are differential prestige values of foods and preferences for the marketed foods that have displaced traditional foods, as well as cost and convenience factors.

It would be worth studying the extent of women's knowledge of and skill for harvesting and preparing traditional animal and plant food species, and their understanding of the nutritional and cultural benefits their use would contribute. Very likely, the education of Native People, especially the younger generation, as to how to best make use of the traditional food system would enhance the dietary intake of traditional foods by reserve-resident families, and then by diffusion, their off-reserve family members as well.

SUMMARY

The use of traditional native foods by the people of the Nuxalk Nation has been declining during this century. The factors responsible for this decline are multifaceted and interwoven, with political, demographic, economic and personal elements all playing roles. Current dietary and life-style patterns involve heavy consumption of marketed foods, many of which are rich in energy, but with low micronutrient density.

The Nuxalk traditional food system contained a variety of foods, of which at least 70 species of animals and plants from the environment were utilized. Fresh seafoods in the Bella Coola River, which are seasonally available for harvest on the reserve, are the only traditional foods that are currently used by families at a frequency close to that of the early decades of this century. Other foods, particularly those harvested from native plants, are still available but seldom used by families today.

Correlation studies were carried out to examine the influence of taste appreciation, availability (scored by presence in the reserve area) and time needed for food harvest on frequency of use of traditional Nuxalk foods. Taste appreciation was the most significant factor affecting use, followed by availability for plant foods. For fish and game, availability correlated more strongly with frequency of use than did taste.

Multiple regression analysis revealed that, for both animal foods and plant foods relatively little of the variation in contemporary use could be explained by the three variables tested. The highest correlation was for the subset of traditional

seafoods. Among this group, 19.2% of fresh use and 16.4% of preserved use could be explained by availability and taste. Variation in use of berries could not be satisfactorily explained by any of the three variables. Therefore, factors other than availability, taste appreciation, and time needed to harvest play a prominent role in determining the variation in contemporary use of Nuxalk traditional foods. It is important to note that because the three variables tested do not sufficiently explain use patterns for many traditional foods, they will not serve as a general explanation of the reason that traditional foods are not used to a greater extent by the Nuxalk people.

Native People living in rural, low-income communities have valuable resources in their traditional food systems that can be used to improve dietary quality, health status, and cultural lifestyles. The effectiveness of policies and programs for the health promotion of Native People will undoubtedly be enhanced by consideration of local factors contributing to native food utilization, and the relationships among use of traditional native foods, marketed foods, and well-being.

ACKNOWLEDGEMENTS

This research was carried out with financial support from the Health Promotion Contribution Program of Health and Welfare Canada, and the Social Sciences and Humanities Research Council of Canada. Advice and assistance of the personnel of the Medical Services health clinic in Bella Coola are gratefully acknowledged, particularly the contributions of Sandy Moody and Rose Hans. The interviewers were skillful, tenacious, and committed to the cause—special thanks to Louise Hilland, Sarah Saunders and Emily Schooner. This study could not have been done without the kind and gracious cooperation of the Nuxalk women who agreed to be interviewed. Finally, the UBC staff who contributed many hours to data coding, analyses, and ultimate understanding are also thanked: Sandra Marquis, Frank Flynn and Virginia Green. Assistance with manuscript preparation was made by Dan Lee, Joanne Condruk, and Roberta Crosby. Helpful comments for revision were given by Drs. Pertti Pelto and Dan Perlman.

NOTES - TABLE 2

1. Number of women who recalled using the food at least once of two or three periods. The total number of women in the study was sixty-one.
2. Use frequencies as defined in Table 1 for fresh and preserved use. Highest possible score was 4.0 and the lowest possible was 1.0. Mean use scores were computed only from those women who ever used these foods. (Present) indicates mean use currently by these women. (Maximum) indicates the mean score for the time when the food was used at its maximum level by each woman.
3. Taste scores as defined in Table 1. Highest possible score was 5.0 and lowest possible was 1.0. Taste scores were recorded by women who used the foods (i.e., use frequency >1) - see text.

NOTES ON TABLE 3

1., 2., 3. See Table 2 footnotes.

4. Computed from data published by Leposfsky, Turner and Kuhnlein, 1984. Numbers represent quantitative availability in the reserve area (see text). NA - species present on reserve, but availability could not be computed. <0.1 - not present in study area, but available nearby. Higher numbers indicate greater availability.
5. Minutes needed by one person to harvest 240 ml of food. Published in part by Lepofsky, Turner and Kuhnlein, 1984.

REFERENCES

Ackerman, Alan, editor, 1980. *Food and Nutrition Policy Options for American Indians and Alaska Natives*. Washington: National Sciences Foundation, pp. 21-66.

Bella Coola Museum Association, 1979. *Bella Coola Touring Guide*. Mimeographed manuscript. 15 pp.

Butte, Nancy F., Calloway, Doris H. and Van Duzen, Jean L., 1981. Nutritional Assessment of Pregnant and Lactating Navajo Women. *American Journal of Clinical Nutrition*. 34:2216-2228.

Cassidy, Claire, C., 1980. Nutrition and Health in Agriculturalists and Hunter-Gatherers: A Case Study of Two Prehistoric Populations. N.W. Jerome, R.F. Kandel, and G.H. Pelto, eds. *Nutrition Anthropology* pp. 117-146. Pleasantville: Redgrave.

Census of Canada, 1981. *Enumeration area statistics. Vancouver: Statistics Canada.*

Desai, Indrajit D. and Lee, Melvin, 1971. Nutritional Status of British Columbia Indians. III. Biochemical Studies at Ahousat and Anaham Reserves. *Canadian Journal of Public Health* 62:526-536.

Department of Indian and Northern Affairs, 1980. Indian Conditions. A Survey. Ottawa: Canadian Ministry of Indian Affairs and Northern Development, pp. 969.

Duff, Wilson, 1969. *The Indian History of British Columbia*. Vol. I. The Impact of the White Man. Victoria: British Columbia Provincial Museum.

Harrison, A.A., 1977. Mere Exposure. Berkowitz, L., ed. *Advances in Experimental Social Psychology* Vol. 10 pp. 40-76. New York: Academic Press.

Jerome, Norge W., 1980. Diet and Acculturation: The Case of Black American In-Migrants. N.W. Jerome, R.F. Kandel, and G.H. Pelto, eds. *Nutritional Anthropology* pp. 117-146. Pleasantville: Redgrave.

Johnson, Helen W., 1975. *American Indians in Transition*. Washington: Economic Research Service, U.S. Department of Agriculture. pp. 1-37.

Kopas, Cliff, 1974. *Bella Coola*. Vancouver: Douglas and McIntyre. pp. 139-170.

Kuhnlein, Harriet V., 1984. Traditional and Contemporary Nuxalk Foods. *Nutrition Research* 4:478-809.

Lee, Melvin, Reyburn, Rejeanne and Carrow, Ann, 1971. Nutritional Status of British Columbia Indians. I. Dietary Studies at Ahousat and Anahasm Reserves. *Canadian Journal of Public Health* 62:285-296.

Lepofsky, Dana S., Turner, Nancy J. and Kuhnlein, Harriet V., 1985. Determining the Availability of Traditional Wild Plant Foods: An Example of Nuxalk Foods, Bella Coola, British Columbia. *Ecology of Food and Nutrition* 16:223-241.

MacKenzie, Alexander, 1801. *Voyages from Montreal on the River St. Lawrence Through the Continent of North America to the Frozen and Pacific Oceans in the Years 1789 and 1793*. Reprinted from the original in 1971. Rutland: Charles E. Tuttle, pp. 342-375.

McDonald, James A., 1984. *Trying to Make a Life. The Historical Political Economy of the Kitsumkalum*. Ph.D. Dissertation, Department of Anthropology and Sociology, University of British Columbia.

McIlwraith, Thomas, G., 1948. *The Bella Coola Indians*. Vol. I. Toronto: U. of Toronto Press.

Manzon, C.I. and Marshall, D.E., 1980. *Catalogue of Salmon Streams and Spawning Escapements of Statistical Area 8. Report 219. Vancouver:* Fisheries and Oceans Canada. pp. 1-129.

Martin, Paul S. and Plog, Fred, 1973. *The Archaeology of Arizona*. Garden City: Doubleday/Natural History Press. pp. 318-333.

Medical Services Branch, 1979. *Nutrition Program Manual*. Ottawa: Health and Welfare Canada. p. 1.

Netting, Robert McC., 1977. *Cultural Ecology*. Menlo Park: Cummings. pp. 26-39.

Nuxalk Food and Nutrition Program, 1984. *Nuxalk Food and Nutrition Handbook*. pp. 100-101. Richmond: Malibu.

Pacific Region Medical Services, 1980. *Dental Health Survey of Indian Children in the Pacific Region*. Vancouver: Health and Welfare Canada.

Pacific Region Medical Services, 1982. *Annual Report*. Vancouver: Health and Welfare Canada.

Pelto, Gretel H. and Pelto, Pertti, J., 1983. Diet and Delocalization: Dietary Changes Since 1750. *Journal of Interdisciplinary History* 14:2:507-528.