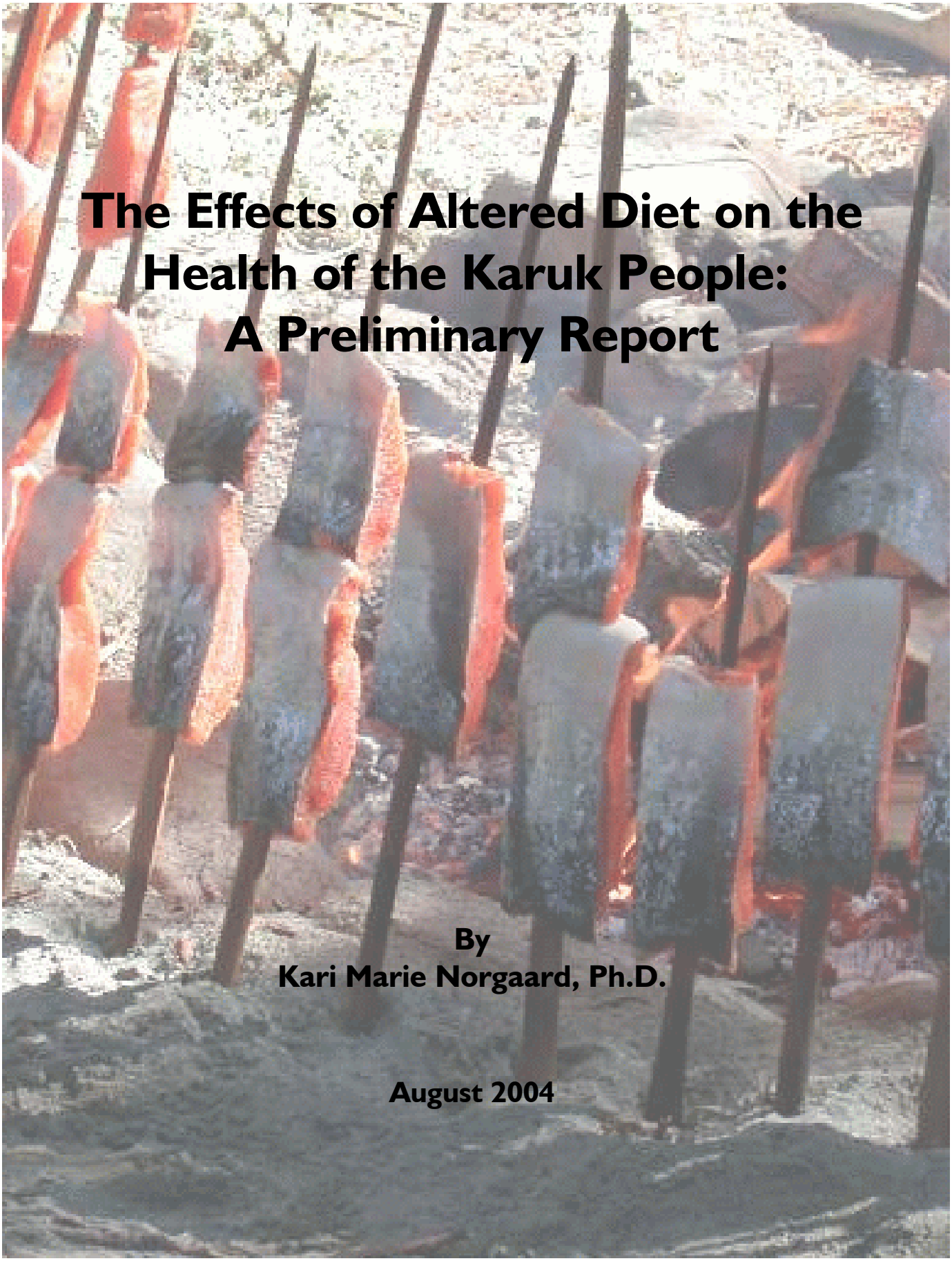

The Effects of Altered Diet on the Health of the Karuk People: A Preliminary Report

By
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Front Cover and Opening to Chapter One: Salmon Bake, California Indian Basketweaver's Association
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Opening to Chapter Three: Eureka Billboard, Salmon Stroich.
Opening to Chapter Four: Ron Reed and Marv George in Edinburgh Scotland, Kari Norgaard.
Opening to Chapter Five and Appendix B: Spring Chinook Salmon, Will Harling.
Opening to Summary and Conclusions: Green Sturgeon in the Salmon River, Karuk Tribe.
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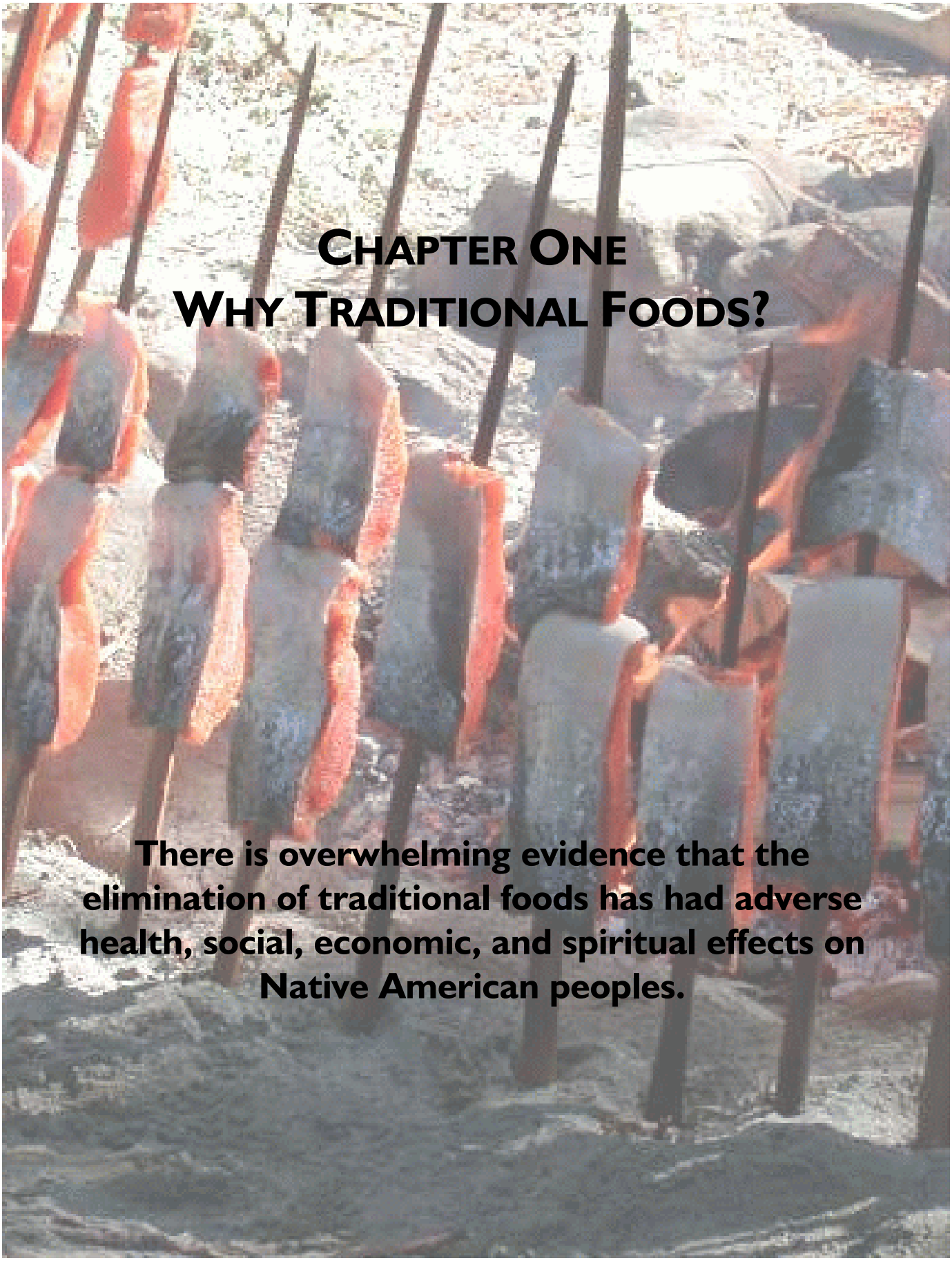


Chapter One
Why Traditional Foods?

There is overwhelming evidence that the elimination of traditional foods has had adverse health, social, economic, and spiritual effects on Native American peoples.

Introduction
Why Traditional Foods?

- The diet of the Karuk people has shifted dramatically since European contact with forces of assimilation and **in the past generation due to denied access to traditional foods.**
- There is overwhelming evidence that the elimination of traditional foods has had **adverse health, social, economic, and spiritual effects** on Native American people.
- Traditional foods are **higher in protein, iron, zinc, omeg-3 fatty acids and other minerals and lower in saturated fats and sugar.**
- Environmental Justice laws **require** that federal agencies **identify and address adverse affects to human health or the environment of their actions on minorities and low-income populations**.

The Karuk people are currently denied access to a significant percentage of their traditional foods. If these foods are obtainable they are available in reduced quantity and quality. Most glaring is the loss of several entire runs of salmon and the considerable decrease in all salmonid populations. The term "traditional food system" includes the foods available to a particular culture and their accepted patterns for their use within that culture. Since time immemorial Karuk people have relied directly on the land and rivers for food. Salmon, eel, sturgeon, steelhead trout, acorns, wild plants, nuts, seeds and game were a plentiful and healthy source of food for generations (Bell 1991, Davis and Hendryx 1991, Salter 2003). Table 1 provides a partial list of foods in the traditional Karuk diet.[1]

The notion of a traditional food system also incorporates the socio-cultural meanings given to these foods and the way each food is acquired, processed and used by age and gender groups within a given culture. Finally, the term recognizes the chemical composition of the foods as well as

[1] This list was generated using Barbara Davis and Michael Hendryx Plants and the People: The Ethnobotany of the Karuk Tribe (Siskiyou County Museum, Yreka, CA, 1991) and Daniel E. Moerman Native American Ethnobotany (Timber Press, Portland OR, 1998). Note however that since much traditional knowledge has been lost, information about other food sources may be lost. If you know of a food that should be listed here please contact the author or the Karuk Tribe. Note also that this table does not include plants used as herbs, medicines or spices. For a more complete listing of these uses see Plants and the People.

the nutrition and health consequences of all of these factors for those who consume these foods (Kuhnlein and Chan 2000, 596).

Table 1. Traditional Foods in the Karuk Diet

"Common Name"/Food Type	**Karuk Name**	**Latin Name**
Fish and Meats (Aquatic, Riparian, Up-slope)		
Chinook Salmon	**áama**	**Oncohynchus tshawytcha**
Coho Salmon	**ishyâat**	**O. kisutch**
Steelhead	**sáap**	**O. mykiss**
Trout	askuup	O. mykiss
Suckers	chámuxich	Catostomus rimiculus
Pacific Lamprey	**akraah**[1]	**Lampetra tridentata**
Klamath River Lamprey	**akraah**	**L. similis**
Green Sturgeon	ishxíkihar	Acipenser medirostris
White Sturegon		A. transmontanus
Black Tail Deer	púufich	Odocoileus hemionus
Roosevelt Elk	íshyuux	Cervus occidentalis
Squirrel (Western Grey)	áxruuh	Sciurus griseus
Black bear	vírusur	Ursus americanus
Mussels ("freshwater clams")		Anodonta oregonesis
		Gonide angulata
		Margaritifera falcata

NOTE: Table 1 continues on pages 3 and 4. Items in bold constituted a high percentage of calories or protein and are thus key elements in the traditional Karuk diet. Endnotes appear at the end of Chapter One.

These traditional foods are higher in protein, iron, omeg-3 fatty acids, zinc and other minerals and lower in saturated fats than the market foods that make up the present day Karuk diet. Nutritional data show that these foods produce stronger hearts, blood and muscle tissue. Omeg-3 fatty acids have been linked with a number of significant health benefits including reduced risk of heart attacks, strokes, Alzheimer and improved mental health and improved brain development in infants. Furthermore, acorns and salmon – two of the primary components of the traditional diet – together make a complete protein.

Table 1. CONTINUED Traditional Food in the Karuk Diet

"Common Name" /Food Type	Karuk Name	Latin Name
Acorns (Up-slope)		
Tan Oak	**xunyêep**	**Lithocarpus densiflora**
Dwarf Tan Oak	xunyêep	L. densiflora
White Oak	axvêep	Quercus garryana
Sadler's Oak	yávish	Q. sadleriana
Canyon Oak	xanpútip	Q. chrysolepis
Black Oak	xánthiip	Q. kelloggii
Nuts/Seeds (Up-slope)		
Sugar Pine	úus	Pinus lambertiana
Ponderosa/Jeffrey Pine	sárum	P. ponderosa var. jeffreyi
Chinquapin	sunyíthih	Castanopsis chrysophylla
California Bay	paah	Umbellularia californica
Hazel	athithxuntápan	Corylus cornuta
Dogbane	apsunmunukich'ímkaanva	Apocynum pumilum
Soft Chess	ikrávapuh	Avena sativa
Ripgut grass	aktipanára	Bromus diandrus
Wild Rye	purukuri	Elymus glaucus
Tar Weed		Madia sp.
Sunflower	imkanvaaxvâah	Amsinkia intermedia
Wild Oat	ikrávapu	Avena fatua
Slender Hairgrass	ikravapuhíshnaanich	Deschampsia elongata
Common Plantain		Plantago major
Narrow Leaf Plantain		P. lanceolata
Bulbs and Tubers		
Wavy Leaf Soap Plant	imyúha	Chlorogalum pomperidianum
Narrow Leaf Soap Plant	táas	C. agustifolium
Wild Garlic	xanáchyuh	Allium bolanderi
Wild Onion	xanáchyuh	A. acuminatum
Firecracker Plant	ixyunihatáyiith	Dichelostemma ida-maia
Golden Lantern	xávin	Calochortus ambillis
Western Tiger Lily		Lilium occidentale
Tiger Lily	mahtáyiith	L. pardalinum
Queen Anne's Lace	upva'amáyav	Perideridia gairdneri
Wild Turnips		
Mushrooms		
Matsutake mushroom		Tricoloma magnivelare

Table 1 CONTINUED Traditional Foods in the Karuk Diet

"Common Name" /Food Type	**Karuk Name**	**Latin Name**
Fruits/Berries (Up-slope)		
Greenleaf Manzanita	**fath'úruhsa**	**Archtostaphylos patula**
Parry Manzanita	**fáath**	**A. manzanita**
Pinemat Manzanita	apúnfaath	A. nevadensis
	chusukamfas	A. canescens
Straggly gooseberry	yufívkuunich	Ribes divaricatum
Sierra gooseberry	axrátip	Ribes roezlii
Thimbleberry	xapúxraah	Rubus parviflorum
Blackcap raspberry	atúruupveen	R. leucodermis
Dewberry (California blackberry)	ataychúrip	R. vitifolius
Wood Strawberry	uxnáhich	Fragaria californica
Western Chokecherry	púrip	Prunus virginiana
Toyon	pusyaah[3]	Heteromeles arbutifolia
Serviceberry	afíshiih[4]	Amerlanchier pallida
Boxwood (Mt. Huckleberry)	mahpúrith	Paxistima myrsinites
Wild Grape	aay	Vitis californica
Salal	puríthkaamsa	Gaultheria shallon
Madrone	kusrípish[5]	Arbutus menziesii
Red Huckleberry	mîithipar	Vaccinium parvifolium
Evergreen huckleberry	púrith	V. ovatum
Herbs and Greens (Riparian, Up-slope)		
Indian Rhubarb	káaf	Darmera peltata
Watercress		Nasturtium officinale
Miners Lettuce	chishíhiich	Montia sibirica
Cow Parsnip	ihyívkaanva	Heraculeum lanatum
Curly Dock	absunxara'ímkaanva	Rumex crispus
Poison Sanicle	ikxas	Sanicula bipinnata
Nevada Pea	kustítik	Lathyrus lanszwertii
Angelica	ishmúchar[6]	Angelica tormentosa
Common Plantain		Plantago major
Narrow Leaf Plantain		P. lanceolata
Hawksbeard	araráfuuk	Crespis acuminata
Gum Plant	imkáanva	Grindelia robusta

The act of acquiring foods means exercise that in turn keeps people in good physical condition. Furthermore, traditional food has great cultural, religious and social values for Karuk people. Food has been an integral part of daily activities and celebrations. Activities of gathering and preparing

traditional foods are important for social structure. These events form an important social "glue" by providing opportunities to bring people together to work, socialize and pass down values and information from one generation to the next. Hospitality and caring for elders are serious social obligations that involve food. Thus, overall benefits of traditional foods include better nutrient density, the availability of key essential nutrients, physical activity during harvesting, lower food costs, the prevention of chronic disease by consumption of more nutritious food, and "multiple socio-cultural values that contribute to mental health and cultural morale" (Kuhnlein and Chan 2000, 615; Cantrell 2001).

Although the Karuk used many food sources at one time or another, salmon were the single most important food source. Salmon are estimated to have made up close to 50% of the energy and total protein in the pre-contact diet of the Karuk (Hewes 1973). Also of primary importance were Tan Oak acorns. Davis and Hendryx describe Manzanita berries as the most important plant food source after acorns (1991). While earlier generations ate from the land, limited access to traditional food forces the present Karuk population to get most of their food from stores and government commodities. These changes represent a major dietary shift. For example, whereas earlier generations are estimated to have eaten over a pound of salmon per person per day (Hewes 1973), the current Karuk population consumes on average less than five pounds per person per year – a ninety- fold reduction. Even the availability of salmon for ceremonial purposes is severely limited (Ron Reed, personal communication).

The loss of traditional food sources is now recognized as being directly responsible for a host of diet related illnesses among Native Americans including diabetes, obesity, heart disease, tuberculosis, hypertension, kidney troubles and strokes (Joe and Young 1993). The rate of diabetes in the Karuk Tribe is now almost double the U.S. national average. Indeed, diabetes is one of the most significant health problems facing Native peoples today (Olson, 2001). Diabetes is described as a new disease among Indian peoples and is the consequence of drastic lifestyle and cultural changes that have occurred since World War II (Joe and Young 1993). Numerous studies outline how Type II diabetes is becoming a major problem in societies and cultures in which health status is influenced or generally shaped by outside socio-cultural, political and economic forces – a description that fits the Karuk people all too well. Type II diabetes has therefore, been described as a disease of "modernization" and "civilization" (Joe and Young 1993, 7).

Not only do native people have amongst the highest rates of Type II diabetes in the world, they are also more likely to suffer the serious complications associated with the disease including heart disease, kidney failure, blindness and limb amputations (see Table 6). The rate of heart disease in the Karuk Tribe is estimated to be three times the U.S. average. Heart disease is a leading cause of death for members of the Karuk Tribe and Native Americans generally. While rates of heart disease are decreasing in the general U.S. population, they are on the rise for Native Americans. Rates of strokes are also higher for Indian people. Other associated conditions such as obesity result from decreased nutrition. Obesity is an issue not only of altered diet, but also more sedentary lifestyle with the move away from subsistence gathering practices. Nationally high rates of infant mortality for Native peoples are also linked in part to nutritional deficits. Nutritional data indicate that women with diets containing adequate protein experience fewer spontaneous abortions, premature births and healthier infants. Indian Health Services reports that the infant mortality rate for Native Americans is 21 times the national average (CRIHB 2004). Finally, as a result of the high prevalence of these diseases, Native people in the U.S. have an average 6 years lower life expectancy than the general population and the lowest median age in the United States (ibid). Given the dramatic change in diet and high incidence of diabetes and heart conditions in the Karuk Tribe, high incidence of the conditions mentioned above are suspected within the Karuk Tribe as well.

Salmon were the most important food and the basis of the prosperous subsistence economy of the Karuk people. Therefore it should come as no surprise that the destruction of the fishery has resulted in both poverty and hunger. For Karuk people food security has been an ongoing problem since European contact. The Karuk, Hupa and Yurok were, until relatively recently, the wealthiest people in what is now known as California (McEvoy 1986). The basis of this wealth was the abundance of natural resources, most prominently salmon (ibid). Indeed since the destruction of their resource base the Karuk people have now become some of the poorest in California (U.S. Census Bureau 2000, KTOC 2004). With the destruction of the once abundant salmon population it is no longer possible for people to subsist on these foods. Ron Reed, traditional fisherman and cultural biologist for the Karuk Tribe notes the impossibility of feeding the current tribal population from the one existing fishing site at Ishi Pishi falls: "We had over 100 villages up and down the Klamath River, with fishing sites associated with each village. Now we are trying to feed our people off one fishery. Its not possible." Other important food sources including Tan Oak acorns, Manzanita berries and mushrooms are currently in limited supply due to lack of burning and other

factors such as resource competition with non-Indian groups. In the absence of salmon and other foods from the land people must purchase foods in grocery stores. Yet existing poverty means that covering basic needs is a real issue for many community members. Rates of hunger and food insecurity in the region are extremely high.

Communities are defined as food secure when all members have access to nutritionally good, safe and culturally acceptable food through local non-emergency sources at all times. Recent U.S. Department of Agriculture studies show that while roughly 90% of the US population is food secure, only 78% of Native Americans in the United States are food secure (U.S. Department of Agriculture, 1999). Difficulty in meeting basic needs in turn results in overwhelming physical and psychological stress. Although there are differences from tribe to tribe, the overall suicide rate for Native Americans is 1.5 times the national average. Suicide in Native Americans is identifiable not only by the high rate but by the pattern of youth suicide (rates are highest for those under 35) rather than amongst older age groups as with non-Indians in the US.

The evolution of health and disease among Native Americans have been termed an "unnatural history" (Campbell 1989). For this reason, present day Karuk health and diet must be examined and understood in its historical and political context, beyond the mere cataloging of isolated, individual determinants and outcomes. It is for this reason that diabetes researcher Kue Young writes that "resolution of the major health problems of Native Americans requires redressing the underlying social, cultural and political causes of those problems" (1997, 164).

For Indian people in the United States generally there have been rapid changes in the diet and lifestyle over the past centuries (Jackson 1993). For Karuk people these changes have occurred even faster – in most families significant changes in diet have occurred in just over one to two generations. Rugged terrain and remote location meant that it was not until the European discovery of gold in the mid-1800's that major social disruption occurred for Karuk people (Bell 1991, Norton 1979). This invasion was followed by damage to the fishery due to over fishing (McEvoy 1986). Rapid changes in diet accompanied these social and ecological disruptions, as will be described in Chapter Two.

The present situation in which Karuk people face serious health problems resulting from denied access to their traditional food fits within the framework of what is known as "environmental justice." For the past several decades it has been recognized that poor people and people of color are most likely to pay the price of various forms of environmental degradation (Bullard 1993). For some

this has meant exposure to environmental hazards such as mercury contamination, herbicide exposure or air pollution. For others the frame of environmental justice has referred to the denied access to traditional resources or unequal access to decision making regarding the use of local resources. Both definitions apply to the present situation in which the Karuk people face alarmingly high rates of diseases as a consequence of the loss of their traditional foods and continue to be disenfranchised through decision making processes that fail to acknowledge their fishing rights and rights to religions freedom.

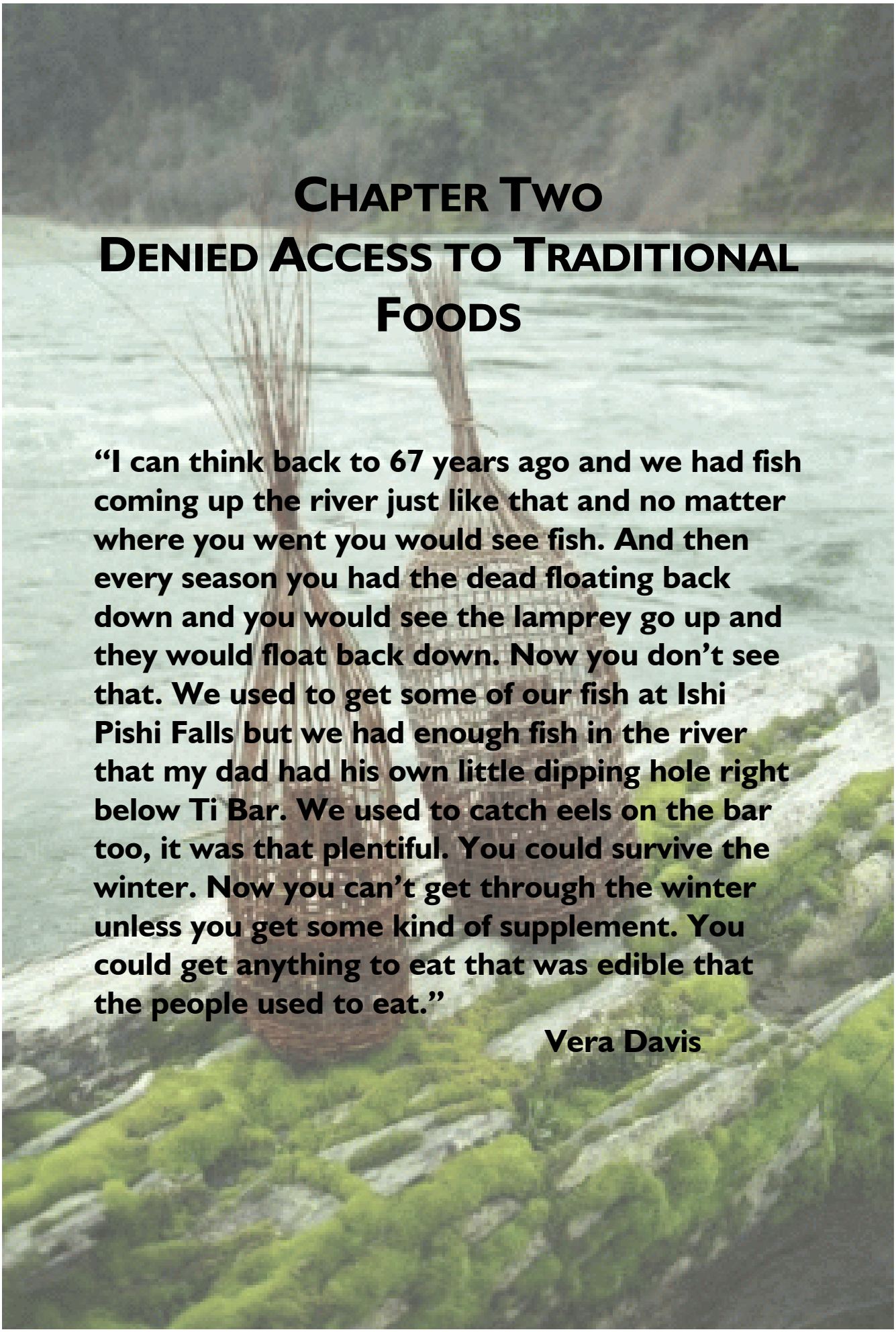
Currently environmental justice laws require that federal agencies identify and address adverse affects to human health or the environment of their actions on minorities and low-income populations, as well as the equity of the distribution of the benefits and risks of their decisions (Executive Order 12898). Furthermore, California State law SB115 requires the state conduct programs and policies that substantially affect human health or the environment in a manner that ensures the fair treatment of people of all races, cultures and income levels. SB 115 also requires the state to identify and consider differential patterns of consumption of natural resources among people of different socio-economic classifications. And the State of California also has trust obligations to ensure that its Sovereign resources are available for trust protected uses. Fishing has always been such a use.

The central thesis of this report is that Karuk people face significant and costly health consequences as a result of denied access to many of their traditional foods. Not only does a traditional diet prevent the onset of conditions such as obesity, diabetes, heart disease, kidney trouble and hypertension, a traditional diet of salmon and other foods is one of the best treatments for such conditions. This study will provide an overall description of the present health and economic situation of the Karuk Tribe, describe dietary changes from traditional to present day, review causes of the altered diet and document some of the many significant health benefits of the traditional Karuk diet. This is a preliminary report. Much more research is needed to fully document the extent of the current health crisis connected to lack of traditional foods. Chapter Two will lay out a preliminary assessment of the traditional foods that are currently in limited supply. This chapter will provide an overview of some of the reasons why access to these foods is presently denied the Karuk people. Chapter Three will summarize the health consequences of this change in diet, including estimates of current health conditions in the Tribe. Lack of traditional food impacts Karuk people not only due to decreased nutritional content of specific foods, but due to the overall

impact the absence of these foods has on the subsistence and local economy. Chapter Four will describe the issue of food scarcity, poverty and socio-economic effects of denied access to traditional foods. Finally, the acquisition, preparation and consumption of traditional food has important cultural and spiritual impacts. Chapter Five will discuss the impacts of the loss of these activities. This report concludes with appendices that describe how figures were calculated and recommendations for further research.

Notes from Table 1

1. It is unclear whether 'akraah' refers to Pacific, Klamath River, or both species of lamprey (Lampetra spp.)
2. Tan Oak and Dwarf Tan Oak are the same species, but different varieties, and perhaps called the same thing: 'xunyêep'
3. The name of the berry for Toyon is 'pusyaah', whereas the name for the plant is 'pusyîip'.
4. The name of the berry for Service berry is 'afíshiih', whereas the name for the plant is 'afíshiip'.
5. The name of the berry for Madrone is 'kusrípish', whereas the name for the plant is 'kusrípan'.
6. The name of the leaves for Angelica is 'ishmúchar', whereas the name for the plant is 'mahimkanva'.



Chapter Two
Denied Access to Traditional Foods

"I can think back to 67 years ago and we had fish coming up the river just like that and no matter where you went you would see fish. And then every season you had the dead floating back down and you would see the lamprey go up and they would float back down. Now you don't see that. We used to get some of our fish at Ishi Pishi Falls but we had enough fish in the river that my dad had his own little dipping hole right below Ti Bar. We used to catch eels on the bar too, it was that plentiful. You could survive the winter. Now you can't get through the winter unless you get some kind of supplement. You could get anything to eat that was edible that the people used to eat."

Vera Davis

CHAPTER TWO

DENIED ACCESS TO TRADITIONAL FOODS

"Eels, they're disappearing too. There was a time when I was a teenager when I would go down there and get 150 of them, smoke em up and have some for the year. But this year I probably got, maybe 50 or 60 of them all year. When you're getting only 2 and 3 at a time you can't put em up cause you just eat them, right there on the spot. Its nice to be able to have that, save it for the winter when you need that really good food."

Bill Tripp, Traditional Karuk Fisherman

- There are at least 25 traditional foods to which Karuk people currently have denied or limited access. These foods represent **upwards of 50% of the traditional Karuk diet.**
- Whereas historic fish consumption for the Karuk Tribe is estimated at **450 pounds of salmon per person per year or 1.2 pounds per day.**
- Fish consumption for the Tribe in 2003 is estimated at **less than 5 pounds per person per year.**
- A significant percentage of tribal members rely on commodity foods in lieu of salmon and other traditional foods. These foods are of much less nutritional value.
- **Denied access to traditional foods** is a primary reason for the altered Karuk diet today.

The Altered Karuk Diet of Today

There are at least 25 species of plants, animals and fungi that form part of the traditional Karuk diet to which Karuk people are currently denied or have only limited access. Furthermore, the foods that were most central in the Karuk diet, providing the bulk of energy and protein: salmon and tan oak acorns, are amongst the missing elements. The result is that Karuk people are currently denied access to foods that represented upwards of 50% of their traditional diet. Whereas historic fish consumption for the Karuk Tribe is estimated at 450 pounds per person per year, fish consumption for the Tribe based on the tribal fish catch in 2003 is estimated at less than 5 pounds per person per year. Populations of salmon, steelhead, and green and white sturgeon runs have declined dramatically during the last century (McEvoy 1986). In addition runs of Pacific and Klamath River Lamprey are significantly reduced. Other foods for which access is denied or limited include

candlefish, acorns, huckleberries, wild mushrooms, Indian rhubarb, watercress, wild turnips, mussels (several species, also known as "freshwater clams"), crayfish and deer (see Table 2 below).

Table 2 Preliminary List of Traditional Foods for Which Access is Denied or Limited

"Common Name" and Food Type	Karuk Name	Latin Name
Aquatic		
Chinook Salmon	áama	Onchorynchus tshawytcha
Coho Salmon	ishyâat	O. kisutch
Steelhead	sáap	O. mykiss
Pacific Lamprey	akraah	Lampetra tridentata
Klamath River Lamprey	akraah	L. similis
Green Sturgeon	ishxíkihar	Acipenser medirostris
White Sturegon		A. transmontanus
Mussels ("freshwater clams")		Anodonta oregonesis
		Gonide angulata
		Margaritifera falcata
Riparian		
Indian Rhubarb	káaf	Darmera peltata
Watercress		Nasturtium officinale
Wild Turnips		
Upslope		
Black Tail Deer	púufich	Odocoileus hemionus
Roosevelt Elk	íshyuux	Cervus occidentalis
Squirrel (Western Grey)	áxruuh	Sciurus griseus
Tan Oak	xunyêep	Lithocarups densiflorus
Dwarf Tan Oak	xunyêep	L. densiflora
Hazel	athithxuntápan	Corylus cornuta
White Oak	axvêep	Quercus garryanna
Canyon Oak	xanpútip	Q. chrysolepis
Black Oak	xánthiip	Q. kelloggii
Red Huckleberry	xánthiip	Vaccinium parvifolium
Evergreen huckleberry	púrith	V. ovatum
Mountain Huckleberry	maxapuris	Paxistima myrsinites

The most extensive study of pre-contact fish consumption by tribes of the Pacific Northwest was published by Gordon Hewes in 1973. Hewes used daily caloric and protein requirements and existing historical records to calculate pre-contact fish consumption estimates for several dozen tribes from Northern California up to Alaska. For the caloric computation Hewes used the daily caloric requirement of 2000 calories per day, the figure of 1000 calories per pound of salmon and

estimated (conservatively) that one half of calories came from salmon. This yielded a general figure of 365 pounds of salmon per person per year or about 1 pound per day. He then made a similar calculation for protein:

> Instead of basing our estimate on calorie demands we may take another minimal dietary requirement for protein. The daily protein intake of a normal individual cannot fall much below 60 grams without jeopardizing his health. Using 16 percent as the protein factor in salmon flesh (actually higher in the better portions) we find that 305 pounds per year would satisfy the native consumer if all or nearly all of protein were obtained from salmon. These two crude estimates are an indication of the order of magnitude of the total salmon and/or fish consumption of the area. There are data indicating that the actual consumption of salmon by natives in some parts of the area were much higher per capita than we have assumed above . . . (1973, 134-138).

Hewes combined these ballpark estimates with historical figures and other information about each tribe to provide more specific figures. For the Karuk, Hewes lists an estimate of 450 pounds of salmon per person per year or 1.2 pounds per person per day (see Table 3 below).

Table 3 Estimated Present and Historic Fish Consumption

Estimated Historic Fish Consumption (Pre-contact)*

Population	Total for Tribe	Per Capita (pounds per person per year)
1,500	675,000	450

Estimated Present Fish Consumption from Tribal Catch (2003-4)

Population	Total for Tribe	Per Capita (pounds per person per year)
3,300	<1,000 fish	< 5 (average fish estimated at 15 pounds)

Decline in Fish Consumption
By 2003 the Karuk diet contained only 1.1% the amount of salmon consumed in "pre-contact' times

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

The destruction of the resource base of the Karuk people and the absence of traditional foods has been accompanied by the substitution of government rations or commodities, which as Karuk tribal member and traditional Karuk fisherman Ron Reed describes, "people are pretty much forced to eat:"

> A healthy riverine system has a profound effect on the people on the river. I have six children. If every one of those kids went down and fished and caught a good healthy limit like it was back in the 80's, you could pretty much fill a freezer and have nice good fish all the way through the year. But now, without a healthy riverine system the economy down here on the lower river is pretty much devastated. All the fishing community is devastated by the unhealthy riverine system. Instead of having healthy food to eat – fish– we are relegated to eating commodity foods that the government gives out. That's our subsidy: high starch foods, things that aren't so healthy that the Karuk people are pretty much forced to eat.

As medical anthropologist Brooke Olson makes clear, the conditions experienced by the Karuk reflect larger widespread patterns of treatment of indigenous people in the United States: "During the past few centuries, many Native peoples have not only had their territories reduced or changed altogether, but they have also been given rations of lard, sugar, coffee, and have access to other such foods high in sugars and carbohydrates, which are deleterious to maintaining proper nutrition and weight . . ." (Olson 2001, 167). Food rations programs have had problems from the beginning. As Yvonne Jackson notes in her historical review of diabetes, diet and health for Native people, "unfortunately many problems plagued the ration program. As early as 1928 commodity or rations programs have been identified as problematic and inadequate" (Jackson 1993, 386).

Why Have Karuk Diets Altered?

The diets of all peoples and cultures change over time. This fact can be seen as "natural." For the Karuk people however, diet has shifted dramatically in the course of two generations through what can only be understood as very "unnatural" conditions. Forces working to shift the Karuk diet began with European contact. Genocide and forced assimilation over the past century have led to a loss of traditional knowledge of relationships with the land (including preparation and acquisition of traditional foods) and a change in the tastes and desires of people. Yet despite these dramatic earlier events, the testimony of elders about foods they ate until recently indicate that considerable changes

have also occurred within the last generation. These most recent changes are largely due to denied access to traditional foods.

The notion of "denied" or "reduced" access refers to declines in species abundance due to habitat destruction, resource consumption by non-Indians and forced changes in management practices. These will be discussed in detail below. The process of assimilation whereby Karuk people were forced to leave behind cultural practices is also significant. Experiences of boarding schools, the broader dominant educational system and general exposure to a dominant culture that does not place value on Native life ways have led to loss of knowledge, forced behavior changes and the presence of shame and stigma around traditional practices including food consumption. Furthermore, the provision of commodity foods as a replacement food source has meant that successive generations are raised with a new set of tastes. While factors such as changes in food tastes may appear to suggest that in fact, there is no demand for traditional foods, it must be understood that the process by which the dietary tastes of Karuk people changed was itself neither "natural" nor voluntary.

Four general processes have influenced the rapid change in the Karuk diet over the past 150 years. These are direct genocide in which people and knowledge were lost, activities that disrupted subsistence relationships between Karuk people and the land, boarding schools and other institutional processes that led to forced change in diet, and destruction of the resource base. This last process, denied access due to destruction of the resource base, is the primary reason for the altered Karuk diet today.

So called forced and voluntary forces go hand in hand. For example, at the same time as the prevention of traditional burning practices has led to deceased habitat for Tan Oaks, the pressure to assimilate to the dominant culture's food tastes has led to decreased consumption of those Tan Oaks that are available. Overall, as Yvonne Jackson notes " Contemporary food choices of American Indians reflect historical ties as well as many changes. A decrease in available variety and quantity of wild animals and plants parallels the loss of traditional lifestyle. Thus, although some individuals in some tribes still eat at least a limited amount of traditional foods, purchased items have generally replaced traditionally hunted, gathered or cultivated foods" (1993, 390).

Historical Influences: Genocide and Forced Assimilation

> "The years during relocation and establishment of the reservation system were very difficult ones for many reasons. Tribes had great difficultly adapting to the new life thrust upon them. Demoralized and disillusioned, the Indians suffered from malnutrition, disease and despair. Family life changed dramatically, as did the types of foods eaten and the ways of procuring and preparing foods"
>
> Yvonne Jackson in Diabetes as a Disease of Civilization 1993, p. 388.

Major shifts in the Karuk diet began during the gold rush, some 150 years ago. With cultural contact new foods might have merely supplemented rather than replaced traditional foods were it not for factors of relocation, forced assimilation and damage to the resource base by the direct and indirect activities of non-Indians. The arrival of miners, the military, and settlers into Karuk territory was accompanied by direct genocide in which many people and much knowledge of traditional foods was lost (Norton 1979). The presence of gold miners and others also restricted the supply of some food sources including fish and wild game – although they did not initially destroy these populations. Furthermore, violent social dislocation including the outright killing of three-quarters of the tribe, the relocating of villages and attempts to move people onto reservations all interfered with everyday food gathering activities during this time (Lowry 1999, Norton 1979, Bell 1991).

A second force influencing dietary change that dates from the time of European contact is the disruption of traditional subsistence relationships with land, especially practices of burning. White settlers and miners did not understand the role of fire in the forest ecosystem. Karuk people have been forcibly prevented from setting fires needed to tend the forest and create proper growing conditions for acorns and other foods since the gold rush period (Margolin 1993). Disruption of these relationships has led not only to decreased food supplies over time but the loss of traditional ecological knowledge. More recently, the rights of Karuk people to fish have been contested as well. During the 1970's the Federal government forcibly denied Karuk people the right to continue their traditional fishing practices (Norton 1979). Karuk fishing rights have yet to be acknowledged by the U.S. government.

A third historical factor behind the rapid shift in diet was the period of forced assimilation through boarding schools and other institutional processes. Experiences in boarding schools, as well as exposure to the general educational system and dominant culture have played a significant role in the loss of knowledge, forced behavior changes and the development of stigma around traditional food consumption. Karuk children who were separated from families at young ages were taken to

boarding schools in Oregon and elsewhere for the specific purpose of assimilation to the dominant culture. Part of this experience was the denial of traditional foods and culture and substitution of so called "Western" foods. Not only was this generation of children denied access to their traditional foods, the foods provided were often inadequate even by Western standards. In her historical review of causes for the dietary shifts of American Indians Yvonne Jackson reports that "A survey team in the 1920's reviewed 64 of the 78 Indian boarding schools and concluded that diet was the primary inadequacy. The schools were reported to serve large amounts of starch and meat but only small amounts of vegetables, milk, eggs and fruit. They recommended a marked increase in the quantity, quality and variety of food for all the Indian children" (1993, 388).

At present the most significant factor behind the Karuk's altered diet is denied access to traditional foods, due in turn to the ongoing destruction of the resource base. This issue will be discussed at length in the next section.

Present Situation: Lack of Access to Traditional Foods

> In the late fifties, early sixties there were numerous different types of salmon, and large like 50 pounds. I've seen salmon that weighed up to 70 pounds that people used to catch pretty regular, but now you get a big fish its maybe 30 pounds. There's not the runs that there used to be. You had to be a pretty powerful fisherman even to catch them. At one time each fisherman would have a hole and they would get all the fish they needed. Nowadays we fish the whole river and we still don't get enough fish.
>
> Harold 'Littleman" Tripp, Traditional Karuk Fisherman

> I remember when I was 10 years old going eeling, there was a platform down at Boise Creek, all the eels that came out of that, I just couldn't believe it. And now we can hardly get an eel. And that was 60 years ago. There was eels…you could have any amount of eels you wanted. There was a lot then and they are almost nonexistent.
>
> LaVerne Glaze (quoted in Salter 2003, p.36)

Today the assimilation of Native people to American mainstream lifestyles and food habits is being accelerated by an absence of traditional food (Olson 2001). Of the forces behind the altered Karuk diet, the primary one operating at present is lack of access to traditional foods. The dramatic decline in eel and salmonid populations that once supplied over half the Karuk diet has occurred within the lifetime of most adults alive today. Karuk elders and even younger adults describe extreme reductions in the availability of salmon and other important aquatic food sources:

> There ain't no eels. There used to be a lot of eels. There were so many eels that when they started swimming back the whole river stunk. There were so many dead eels that you couldn't eat hogs or bear that had been eating them. We used to see dead fish like we saw dead eels. They made their spawning process in the river and they died off. Then they floated down the sides of the creek.
>
> Earl Aubrey (quoted in Salter, 2003 p.36)

> There were fish there year round . . . [Now] we go to meetings and we argue about how many fish we're gonna get this year and how many fish are those guys gonna get. Well, they're not talking about fish; they're talking about fall Chinook salmon. End of list. They don't count, they don't bother to count; they don't fight or argue over any of the other species. Why? Not an issue, because they're not there.
>
> Leaf Hilllman (quoted in Salter 2003, p.44)

One dramatic indication is the difference in the number of fish caught between father and son as young men on their very first day dip net fishing at Ishi Pishi Falls. Harold Tripp and his son Bill, both, traditional Karuk fisherman, describe the number of fish caught their first day at the falls. Whereas Harold caught many fish on his first day, a generation later Bill caught only one very important fish:

> Harold: I started when I was 16, first time I dipped I caught 87 fish. But there was a lot of fish then, see, that would have been in 66. The river was a lot bigger and there was a lot more fish.
>
> Bill: First time I dipped I was just practicing behind Dad. It was the first day of Pikiavish, I asked Dad if I could fish before him. There wasn't any fish yet that year, they usually come in two months earlier, but they just weren't there. I threw it in there and I got one. I got the first fish of the year, the only one caught that day.

Causes of Denied Access

According to both Karuk observations and scientific literature, a number of factors contribute to deny or limit access of Karuk people to their traditional foods today (see Table 4 below). Within Table 4, factors limiting food availability are organized according to where the foods are found: aquatic, riparian or "up-slope." For example, forces affecting aquatic species include population decline due to decreased water quantity, water temperatures, changes in flow patterns (due in turn to upstream dams), loss of spawning habitat, resource competition by non-Indians and the associated fishing restrictions. Riparian areas, both along the river corridors and creeks, are similarly affected by decreased water quantity, increased temperatures and changes in flow patterns.

These areas may also be impacted by logging and other up-slope activities. The abundance of plant and animal foods in up-slope areas have been reduced by the absence of burning, logging practices, habitat loss from invasive species, herbicide use, resource competition by non-Indians and hunting restrictions. Limited physical access to foods due to increased growth of brushy species. In such cases foods may be available but inaccessible due to the density of brushy species. In other cases species may be available or even abundant, but concerns exist as to food quality due to fear of contamination. Aquatic contamination of "freshwater clams" and crayfish by upstream fertilizers

Table 4 Some Causes of Denied Access

Habitat	Example of Traditional Food	Causes of Denied or Reduced Access Include (but are not limited to)
Aquatic	Salmon, Eel Freshwater Mussels	Decreased Water Quantity Denied Access to Spawning Habitat Water Quality (Contamination) Changes in Flow Patterns Resource Consumption by Non-Indians Fishing Restrictions
Riparian	Indian Rhubarb	Decreased Water Quantity Decreased Water Quality Changes in Flow Patterns
Upslope	Acorns Deer, small game	Lack of Burning Logging Habitat Loss from Invasive Species Herbicide Contamination Resource Consumption by Non-Indians Hunting Restrictions

and pesticides are one such example. In some areas forestry herbicides is a concern for the consumption of deer and other small game (Ando, et al 2003, Payne 1988).

Decreased Water Quantity/Altered River Temperatures

> The runs take their time coming up the river now, especially if the weather is hot. Last year was a bad year. We had more fish than we've had in a long time, but by the time they got to the falls they were at the point they normally look when they hit the dam. They were that sad. They were black, they were faded out. They were fighting the heat of the water. They were going from creek to creek, staying where the water

> was cooler, but they were traveling. They were in sad shape. The meat was almost white when it should have been red. Plenty of the fish died. The water was just too warm for them. When the water gets to where it is now, it's like a stale pond. The water is not getting the flow it should have. It has to have the flow. When it gets this low it doesn't have the oxygen it needs for the things that live in it.
>
> Earl Aubrey (quoted in Salter 2003, p. 36)

Lack of water in the Klamath river has led to increased crowding and spread of diseases, overall elevated river temperatures and the absence of the deep pools that serve as thermal refugia. Warm water affects salmon populations and indeed many species in the riverine ecosystem. Warmer water is stressful (and ultimately fatal) for salmonids as it holds less dissolved oxygen. In their Coho listing decision in 1997, the National Marine Fisheries Service found that "the most important cause of impairment of Coho Salmon probably is excessively high summer temperatures in tributary waters (National Academy of Sciences 2004, 7). "Causes of extreme temperatures include diversion of cold flows for use in agriculture, flow depletion that leads to warming of cool water and destruction of riparian vegetation that leads to loss of shading" (National Academy of Sciences 2004, 7). Furthermore water quantity in tributaries has also decreased, resulting in less flow into the main rivers.

> What is I see is the water change. We just ain't got it. It's just not here. The springs that used to be here. The little creeks, the side lanes and all that's just all dried up. Even in the wintertime they're dried up. They will run water for a little time and dry up.
>
> Earl Aubrey (quoted in Salter 2003, p. 34)

Here the presence of dams, logging, road building and absence of fire are implicated in the decreased quality and water temperature concerns. The National Academy of Sciences report on endangered and threatened Fishes in the Klamath River Basin found that, "Coho habitat has been seriously degraded in the tributaries. Lack of cover and impairment of substrate through deposition of sediment are common" (2004, 7) and that "Logging and its associated road-building have greatly increased erosion on the steep and fragile slopes of the watershed and have reduced shading of small tributaries, thus increasing water temperatures" (ibid, 294). Yet in the Spring water temperatures from the dams have been found to damage young fish because they are too cold, decreasing growth rates and thus overall survival (Kier Associates 2004).

Blocked Habitat from Dams

> The dams are stand alone as the ones responsible for the continued demise of all the fish species. Who could we blame for the demise of the eel population, the lampreys? We got no ocean fisheries out there catching them. White people don't catch them because they don't like them. Who is catching all these eels? Where are they going to? It used to be you could go down and fill a 55-gallon drum with them in half a night. Now you can spend a week down there at the height of the run, if you could figure out when that is – which chances is you couldn't because there really is no peak in the run anymore. You're lucky if you can detect when the run is anymore, let alone when the peak is. So what's responsible for their demise?
>
> Leaf Hilllman (quoted in Salter 2003, p. 45)

The series of dams from Iron Gate upriver block access of fish and other species to some 350 miles of spawning habitat in the "upper basin." The National Academy of Sciences report notes that "Barriers to passage caused by dams and diversions are important to Coho salmon. The mainstem dams on the Klamath river block spawning movements . . ." (2004, 7).

Changes in Flow Regime Due to Upstream Dams

The presence of Iron Gate and other upstream dams has also altered the flow pattern of the Klamath river. These altered flow patterns are reported to have impacts to fish and other populations by creating "side channel stranding" of juvenile fish and changing flood regimes.

> When I was young, the water flow would begin rising about two o'clock in the afternoon. This was due to the Copco Dams operating on a schedule of 12 hours on and 12 hours off. In this situation, Iron Gate helped the fish due to evening out the flow, this helped out the spawning. With uneven water flows gravel bars would be exposed which trapped and killed young fish.
>
> Norman Goodwin (quoted in Salter 2003, p. 37)

> If you're raising this water every day then dropping it, you could go along the shore when you're swimming and you see schools of these little bitty fish, thousands of them all along the river banks. When this river raises every day, then drops these fish are caught because they are right along the shore where they are safe. These were baby salmon and steelhead. There was everything. I don't believe it really affected the eels because I've seen eels like in the sand, sandbars, y'know where the sand is wet. They would be in there. But these little fellows . . .they did it every day.
>
> Grant Hilllman (quoted in Salter 2003, p. 39)

Other tribal members have commented on the way in which changes in flood regimes due to the dams include increased severity of impacts on the river channel.

> Floods will always go on, but the impacts that they have . . . For how many thousands of years . . . you have a place like Katamin sitting there. You might say the place is unstable; that it is unstable around here. Not that slides never happened, I'm saying how many thousands of years of occupancy of these villages can we prove scientifically, about 4,000, if we'd let them dig a hole. And out of that 4,000 years there's probably been a few floods. And when did all of a sudden about half of Katamin disappear and go down the river? What flood did that? The '55 flood took a chunk, '64 took a huge chunk and even little high waters now threaten to take more. All the floods in the past 4,000 years didn't have that effect on it. The effect has only come about only since those dams have been in operation changing the river morphology, changing the characteristics of the river . . . In the 1700's floods that had water in much higher elevations than these recent floods did not have that effect. When the water receded the river went back to its channel. So you didn't have these catastrophic effects. Now if you have a flood, hell, the effects are catastrophic because of the way the river has been altered so dramatically that . . . the village site at Akins Creek. What I mean is the village site at Red Cap Creek, Katamin, Amikiarum . . . All the village sites I just named have had catastrophic effects from floods, but only since the Sixties. Prior to that '55 got it started, but you've had dams altering this river since before the Fifties. None of those things are coincidences so directly the dams have caused a tremendous impact, but indirectly they've caused a greater than tremendous impact.
>
> Leaf Hilllman (quoted in Salter 2003, p. 49)

Changes in the flood regime including a lack of flushing and thus decreased water quality are implicated in the recent Ceratomayxa shasta juvenile fish kill on the Klamath as progression of infection and mortality of C. shasta are temperature dependent. Furthermore, the California Department of Fish and Game has proposed that the shape of the lower Klamath river channel changed from 1997 – 1998 under the influence of high flows, the result of which was that fish entering the river were unable to proceed upstream under low flow conditions (National Academy of Sciences 2004, 8).

Decreased Water Quality

Decreased water quality is described as a cause of denied or limited access to traditional foods both in terms of impacts on species populations and concerns over contamination of food species. Fertilizers and agricultural pesticides are used heavily in upper basin agriculture. Resident aquatic food species (i.e. mussels) and anadromous species who spend large amounts of time in fresh water (juvenile coho, summer steelhead and lamprey) are most exposed to poor water quality conditions. Across North America, Native people face contamination of food sources (Chan and Receveur 2000, Kuhnlein and Chan 2000). Concern over contamination in the Klamath has prevented at least some Karuk people from harvesting aquatic and riparian food species. Species such as mussels or "freshwater clams" are of particular concern as these are "filter feeders." Freshwater clams are relatively abundant (although less so than in the past) but no longer consumed in quantity due to concerns over bioaccumulation of materials in body tissues. Water contamination studies are currently being conducted under the FERC relicensing process of the upriver dams.

> We used to eat kaaf (Indian Rhubarb), and watercress. Now I'd be scared to eat watercress because you don't know where the water is coming from. And of course we had all the wild turnips. There were lots of crayfish. Now you don't see them any more. We used to eat freshwater clams too.
>
> Vera Davis (quoted in Salter 2003, p. 32-33).

> These mussels here, my mom tells me that they used to have little patches, all the families would have their own patches of these mussels. They used to harvest them and manage them just like they managed everything else – only take a certain size and leave a certain amount to reproduce. They had these patches and through the years they just kind of disappeared.
>
> Ron Reed, Traditional Karuk Fisherman, 2004

> They hold the water back because they're trying to keep their water level in the reservoirs which cuts it short from going into the ocean. Then it just builds up and finally we get our weather and they say, 'Okay, we hit our level,' and they turn it loose. Then they open the gates and all we get is that slush and cow shit and debris from them reservoirs and it's pouring into our water and there is that white foamy stuff on the top of the water and this algae that is so thick you can't even walk in it and it's no good for the fish. It's no good for the wildlife. It's no good for nothing.
>
> Earl Aubrey (quoted in Salter 2003, p. 35)

Another water quality issue is the presence of high nutrient levels which stimulate algal blooms that in turn elevate pH and depress dissolved oxygen levels. Both high pH and water temperatures lead to un-ionized ammonia which is in turn toxic to fish (California Dept. of Water Resources 1986).

In up-slope areas the use of forestry herbicides may pose a health risk to people who hunt deer or small game in the areas where they are used, especially given the fact that forestry herbicide Garlon is not registered for use on food crops and has no drinking water safety limits. Garlon is the most frequently used herbicide in Humboldt County (Department of Pesticide Regulation 2002).

Siltation due to Logging, Road Construction and other Up-slope Activities

Increased sediment run-off from upland areas into creeks and rivers leads to higher water temperature in streams. This sediment also fills in deep pools that otherwise provide thermal refugia within the river systems.

> The vegetation protects the water. Wherever there's trees they do a great deal for the water because they give it the proper shade. They give it the proper habitat that it needs to keep flowing. Take that away from it-you got a little spring that comes out of the ground, it's running, sure, it's producing the same amount of water that it always did, but it hits the heat and the trees are all gone, the bushes are all gone. The sun sucks it all up.
>
> Earl Aubrey (quoted in Salter 2003, p. 35)

The National Academy of Sciences report cites a combination of logging and fires as an important recent disturbance: "Logging and its associated road-building have greatly increased erosion on the steep and fragile slopes of the watershed and have reduced shading of small tributaries, thus increasing water temperatures" (2004, 294).

Lack of Burning on Up-slope

The practice of burning created good conditions for the growth of many important food species, especially Tan Oaks and Manzanita. Furthermore, stands which had been burned were open enough for people to access them in order to gather. In the absence of burning over the past century brush fields have expanded and Tan Oak habitat decreased. Elders have reported that species such as huckleberries are present but not producing in large quantities due to shading (LaVerne Glaze, personal communication). The traditional practice of burning was beneficial for fish and other

species in a variety of ways. For example, the National Academy report describes how large fires may have exacerbated the effects of logging in the basin. "Almost 30% of the [Salmon River] basin has burned in the last 25 years, and most fires have occurred in the logged portions of the basin. These catastrophic fires, coupled with extensive logging that follows fires ("salvage logging"), have greatly increased the number of logging roads and increased the frequency of landslides" (2004, 294; see also California Department of Fish and Game 1979, Elder et al. 2002)).

Depletion of Resources by other non-Indian Cultural Groups

Karuk people are denied access to traditional foods due to direct competition of resource use by other ethnic groups. Whereas long standing cultural traditions existed for regulating and sharing fish and other resources both within the Karuk Tribe and between neighboring tribes, the entry of non-Indian groups into the region led to conflict and dramatic resource depletion (McEvoy 1986).

> We used to eat freshwater clams too. We used to get clams where we got our eels and fish in one little area there. There was more water in the creeks, now they are all drying up. I don't like people draining these streams for irrigation. I don't think people have a right to drain any stream or spring dry. There were fish in all of the big streams. Now there is no water in these creeks because of greediness. People taking all the water away from the river.
>
> Vera Davis (quoted in Salter 2003, p. 33).

Mushrooms are another important food source that has been depleted by non-Indian users in recent times. When Matsutkes mushrooms were "discovered" to be in the area, large numbers of people came to harvest them. Mushroom patches were significantly reduced. Patches that were within walking disatance for Karuk elders were often destroyed first.

Regulation by Outside Agencies

> We had supplies from the river the year round. We hadn't been told that we couldn't get our fish any time of the year. That was put there for us by the Creator and when we were hungry we went to the river and got our fish.
>
> Vera Davis (quoted in Salter 2003, p.32).

A final overall reason for denied access to traditional foods is the regulation by outside agencies – in turn a response to depleted populations, but one controlled largely by non-Indians. These

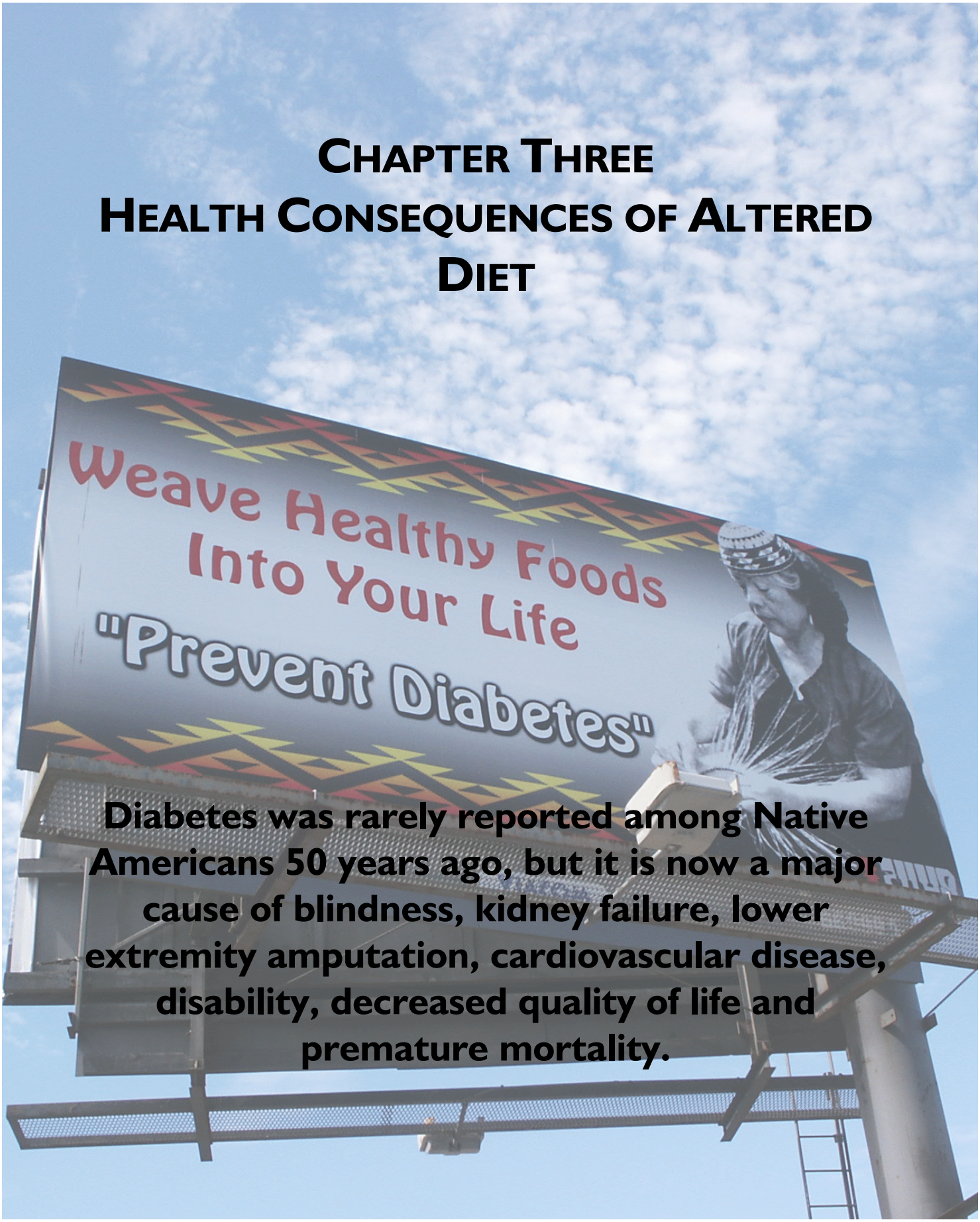
regulations have often failed to take into account the Karuk as original inhabitants and the subsistence nature of Karuk harvests. As a result they have attempted to balance the subsistence needs of Karuk people with recreational desires of non-Indians from outside the area (e.g. fishing). Vera Davis notes the imbalance and injustice of this view, "Now I don't think that no one has a right to tell us when we can do it when you have people who pay hundreds of dollars to come in, kill the venison and get the horns. I don't think that is fair because this is our livelihood." (Vera Davis quoted in Salter 2003, p. 32). Even more dramatic is the outright refusal of recognition of the Karuk fishery.

Regulations affect not only fishing but also hunting and mushroom gathering. Tribal Vice-Chairman and Ceremonial Leader, Leaf Hillman describes this situation: "The act of harvesting a deer or elk to be consumed by those in attendance at a tribal ceremony was once considered an honorable, almost heroic act. Great admiration, respect and celebration accompanied these acts and those who performed them. Now these acts (if they are to be done at all) must be done in great secrecy, and often in violation of Karuk custom, in order to avoid serious consequences." Outside regulations create a situation in which, as Hillman notes, the bottom line is that "it is a criminal act to be a Karuk Indian in the 21st century:"

> In order to maintain a traditional Karuk lifestyle today, you need to be an outlaw, a criminal, and you had better be a good one or you'll likely end up spending a great portion of your life in prison. The fact of the matter is that it is a criminal act to practice a traditional lifestyle and to maintain traditional cultural practices necessary to manage important food resources or even to practice our religion. If we as Karuk people obey the "laws of nature" and the mandates of our Creator, we are necessarily in violation of the white man's laws. It is a criminal act to be a Karuk Indian in the 21st century.
>
> – Leaf Hillman, 2004

Denied access to traditional foods at the hands of non-native agencies has significant cultural and spiritual impacts as well. These will be discussed in Chapter Five.

Chapter Three
Health Consequences of Altered Diet



Diabetes was rarely reported among Native Americans 50 years ago, but it is now a major cause of blindness, kidney failure, lower extremity amputation, cardiovascular disease, disability, decreased quality of life and premature mortality.

CHAPTER THREE:

HEALTH CONSEQUENCES OF ALTERED DIET

"For the past three centuries, extensive (and sometimes forcible) sociocultural changes have impacted on the lifestyle and culture of Native Americans. Each cycle of experience with non-Indians in each historic period has left an imprint on the health picture of American Indians."

Jennie Joe and Robert Young *Diabetes As A Disease of Civilization*

- The loss of traditional food sources is now recognized as being **directly responsible for a host of diet related illnesses among Native Americans** including diabetes, obesity, heart disease, tuberculosis, hypertension, kidney troubles and strokes.
- Traditional diet has been found to be an important factor in **both the prevention and treatment of diabetes.**
- The estimated diabetes rate for the Karuk Tribe is **12%, nearly twice the U.S. average.**
- The estimated rate of heart disease for the Karuk Tribe is **39.6%, three times the U.S. average.**
- Nutritional factors contribute to at least **four of the ten** leading causes of death for Native peoples
- The CDC reports that **diabetes is associated with severe and costly complications** such as blindness, kidney failure, lower-extremity amputations and cardiovascular disease, disability, decreased quality of life and premature death that continue to affect American Indians disproportionately.
- The costs of diabetes is estimated to be **$47,240 per patient** over a 30 year period.

The loss of traditional food sources is now recognized as being directly responsible for a host of diet related illnesses among Native Americans including diabetes, obesity, heart disease, tuberculosis, hypertension, kidney troubles and strokes (see e.g. Joe and Young 1993, Olson 2001). Identified health consequences of altered diet for the Karuk people include high rates of Type II diabetes, heart disease and hypertension. These health consequences stem from changes in the specific nutrient content of traditional foods such as salmon and acorns, as well as decrease in the physical benefits of exercise associated with their gathering. Mental, emotional, cultural and spiritual health

benefits of eating and harvesting traditional Karuk foods exist as well. These will be addressed in Chapter Five.

Of the series of diet related disease that have skyrocketed in Native communities, one of the most significant is diabetes. Diabetes is a condition where there is too much glucose (sugar) in the blood. Diabetes usually begins with insulin resistance, a condition in which fat, muscle, and liver cells do not use insulin properly. People who are overweight or not physically fit are at greater risk for diabetes. The overall prevalence of diagnosed diabetes in the U.S. increased from 4.9% in 1990 to 6.5% in 1998. But for native people these increases were even greater: from 5.2% to 8.5% during the same eight year time period – this rate of change reflects a 63.5% increase (Mokdad et al. 2001). In 2003 the Center for Disease Control (CDC) reported that the overall age-adjusted prevalence for American Indian and Alaska Native adults was more than twice that of U.S. adults (CDC, 2003). It is also important to note that American Indian women face diabetes and associated secondary conditions with much greater frequency than do men (Olson 2001).

The presence of diabetes in the Karuk Tribe is estimated at 12% – nearly twice the national average of 6.2%, see Table 5 below.[2] Also of concern is the high incidence of heart disease in the Karuk Tribe, estimated at 39.6% or nearly three times the national average. Higher than average rates of cancers, kidney failure, strokes and other associated conditions in the tribe are suspected but not yet confirmed. Hypertension and hyperlipidemia (associated with diabetes) are among the top ten causes for visits to Karuk Tribal Clinics (Karuk Tribal Clinic 2004).

Table 5 Disease Frequency Karuk Tribe and National Averages

Condition	Frequency in Karuk Tribe	National Frequency
Diabetes (Type II)	12.0%	6.4%
Heart Disease	39.6%	11.5%
Hypertension	35.7%	32%

Data Sources: Karuk Tribe 2004 and CDC 2004.

[2]For details on how rates have been calculated see Appendix A

While the rates of these conditions in the Karuk Tribe are high, they are representative of the situation of American Indian people in the U.S. generally.[3] Furthermore, with the exception of cardiovascular disease and cancer, the risk of death from most causes are higher among Native Americans than the total U.S. population (Young 1997, 147).

Health Challenges Associated with Diabetes

High blood glucose is hard on the human body. The lengthy list of conditions that may be associated with diabetes includes cataracts, glaucoma and diabetic retinpathy leading to impaired vision and blindness, diabetic nephropathy which leads to End Stage Renal Disease (ESRD), increased frequency of cardiovascular associated diseases (including coronary artery disease, stroke, hypertension and lower limb vascular disease that may result in gangrene and lower limb amputation), increased susceptibility to infections, increased rates of periodontal diseases and increased rates of perinatal mortality – see Table 6 below (Gohdes 1995, Joe and Young 1993).

Table 6 Health Conditions Associated With Diabetes, Altered Diet and Poor Nutrition

Obesity
Type II Diabetes
Hypertension
Heart Disease
Kidney trouble
Glaucoma, Cataracts and other Visual Troubles
Limb Amputations
Strokes
Poor Dental Health
Decreased Life Expectancy
Increased Infant Mortality
Increased Spontaneous Abortions and Premature Births

[3] Furthermore, it should be noted that clinical measures of diabetes will under represent cases. This points to the benefits of conducting a larger in-depth study. For example, in one study of the Navajo about one third of women with diabetes history used no medical therapy to control their diabetes (Will et al. 1997, 2106S).

Conditions associated with diabetes often manifest as severe and costly secondary illnesses and complications. Diabetes and these associated conditions of concern are highly correlated with decreased quality of life and reduced life span.

Whereas the risk of most of the conditions in Table 6 is increased by diabetes, obesity is significant because it is frequently a cause of the increase in the incidence of diabetes. Obesity is strongly related to altered diet (Howard et al. 1991). Estimates of the prevalence of obesity in the Karuk Tribe are incomplete, but are believed to follow the pattern of the very high incidence of obesity among American Indians that has developed over the last fifty years. For virtually all Karuk tribal members the traditional diet has been replaced by store bought and/or commodity foods. Unfortunately, as Professor Harriet Kuhnlein, Founding Director of the Centre for Indigenous Peoples' Nutrition and Environment and others note "the market foods derived from plants that are available and used by families of indigenous peoples do not contain high nutrient density, but provide carbohydrates, energy, and nutrients through fortification" (Kuhnlein and Chan 2000, 617; see also Kuhnlein et al. 1994; Receveur et al. 1997; Morrison et al. 1995). A large percentage of Karuk people depend on food rations through government commodity programs. Significant concern has been expressed about commodity foods distributed to Indian people as a cause of obesity (USDA Food and Nutrition Service 1991) since the use of this program is high among Indian populations. Other studies have discussed the poor availability of high-fiber, low-fat foods in commodity food programs and called for change in these programs (Burhansstipanov and Dresser 1994).

Too much glucose in the bloodstream is also hard on kidneys. Diabetes is associated with kidney troubles and after a number of years, high blood glucose can cause the kidneys to stop working. A chronic disease of increasing concern for Native American people in general is End Stage Renal Disease (ESRD) (Joe and Young 1993). In one study ESRD was found to be three times higher among Native peoples than among whites, while the incidence of ESRD due specifically to diabetes was six times higher (Newman et al. 1990). Estimates of frequency of various kidney conditions for the Karuk Tribe are incomplete and more research is needed to establish the rate for these conditions within the tribe.

Another problem is that high blood glucose can cause nerve damage over time, causing people to lose the feeling in their feet or to have painful, burning feet. Nerve damage to the feet can lead to amputations because people may not feel pain from injuries or sore spots on their feet.

Infections can develop which, if untreated, can lead to amputation. Diabetes can also lead to infections in the gums and the bones that hold teeth in place. In the absence of treatment, teeth may become loose and fall out.

Another issues of concern for populations with high rates of diabetes is the potential for high birth weights (infant macrosomia). For example, the Cree of James Bay have the highest ever reported mean birth weight and a high prevalence of infant macrosomia. (Rodrigues et al, 2000). High birth weights occur when the mother's blood has too much glucose. When this happens, the pancreas of the fetus produces more insulin in an attempt to use the glucose. The combination of high blood glucose levels from the mother and high insulin levels in the fetus results in large deposits of fat which causes the fetus to grow excessively large, a condition known as macrosomia. Given the high levels of diabetes in the Tribe, each of the above mentioned conditions are suspected to occur with abnormal frequency in the Karuk Tribe and should be evaluated. Diabetes researchers Joe and Young note that because of these secondary complications, diabetes is a costly disease not only in terms of medical care costs but also in terms of human cost. Of patients with Type II diabetes, 20 percent develop kidney disease, 45 percent develop cardiovascular related diseases and 50 percent suffer from hypertension. And the rates for these conditions are even higher for American Indian people (Joe and Young 1993, 3). Furthermore, the per patient cost of diabetes over a 30 year period is very high. This figure has recently been estimated at $47,240 per patient (Caro, Ward and O'Brien 2002).

Diabetes, Diet and Health

> "Diet plays an important role in the development of common disease among Northern indigenous peoples, i.e. heart disease, cancer, diabetes and iron deficiency. Diet may contribute to or protect from these diseases"
>
> – Ed Nobmnn et al. 1994, 123.

Nutritional factors contribute to at least four of the ten leading causes of death for Native peoples – heart disease, cancer, cirrhosis and diabetes – and the prevalence of overweight, obesity, hypertension and dental cavities" (Jackson 1986). Much research shows that nutrient profiles of wild-animal and plant foods that were the basis of the Karuk diet until relatively recently are highly beneficial. Meats and fish are rich sources of energy, protein, minerals such as iron and zinc, omega-3 fatty acids and important vitamins such as niacin and pyridoxine. Fats and unsaturated fatty acids

are less prevalent in most wildlife meats than in domestic meats. Harriet Kuhnlein notes that "traditional food components of diets of contemporary indigenous people have been shown to be lower in fat and to contain less saturated fat than in the market food used to complement their diets" (Kuhnlein et al. 1991, see also Appavoo et al. 1991., Receveur et al. 1997). On the other hand, poor diet quality has been associated with higher incidences of anemia, ear infections, a variety of other infections and to some kinds of cancer (Kuhnlein and Receveur 1996).

While detailed analysis of the present day Karuk diet has yet to be conducted, there is no doubt that simple sugars have replaced much of the complex carbohydrates that were once present in the traditional diet. Furthermore, protein and micro nutrient content for important minerals has probably decreased, while fat content and calorie density of the diet has most likely dramatically increased. Dietary recommendations for diabetic patients generally include the reduction of total and saturated fats and an increase in complex carbohydrates (Howard et al. 1991), conditions present in the traditional diet of the Karuk (see Table 7 below). Thus, the Karuk diet is not only useful as a preventative of diabetes, it is also an important treatment for this disease.

Table 7 General Nutritional Qualities of Traditional Karuk and Western Diets

Traditional Karuk Diet	"Western" Diet
Low saturated fat	High saturated fat
Complex carbohydrate	Refined sugars
High protein	High carbohydrate
High Omeg-3 fatty acids	Vitamins and minerals must be fortified
Natural source of vitamins and minerals	

Omeg-3 Fatty Acids

One significant element of the high salmon content of the traditional Karuk diet is the presence of omega-3 fatty acids. Omega-3 fatty acids, a type of polyunsaturated fat found in salmon, are considered "good fats." Omega-3 fatty acids have been linked with a number of significant health benefits including reduced risk of heart attacks, strokes and Alzheimer, prevention of osteoporosis, a

Table 8 Potential Health Benefits of Omega-3 Fatty Acids

Improved brain development in infants
Improved mental health
Reduced risk of Stroke
Reduced risk of Heart attack
Reduced risk of Alzheimer's disease
Diabetic treatment
Prevention of Osteoporosis
Reduction of Triglyceride Levels

diabetic treatment, improved mental health and improved brain development in infants (see Table 8). Some researchers believe that increase in prevalence of depression in the United States may be due to major dietary changes that have occurred during the past century, which have resulted in a decreased consumption of omega-3 fatty acids. A number of studies indicate beneficial effects of omega-3 fatty acids on various forms of depression, including one large-scale study that found a connection between people in countries that consume large amounts of fish and low rates of depression (Bruinsma 2000, Hibbeln 1998). Omega-3 fatty acids have been connected to other aspects of brain health in both adults and infants. Recent research finds that DHA, one of the types of omega-3 fatty acids found in salmon, is critical to normal eye and vision development in infants. Other studies indicates improved brain development in babies whose mothers ate higher levels of DHA during pregnancy (Birch et al 1998). Finally, research indicates that consumption of fish once a week among people aged 65-94 reduced the incidence of Alzheimer's disease by 60 percent when compared to those who rarely or never ate fish (Morris et al 2003).

Not only are they believed to support brain functions, omega-3 fatty acids appear to be helpful in preventing heart attacks – leading cause of death in for Karuk people. Recent Harvard studies find that several helpings of fatty fish a week – a prime source of omega-3 fatty acids – appears to protect men and women from heart disease. Furthermore, there is evidence that, at increased consumption levels, the presence of omega-3 fatty acids in the diet may dramatically cut the mortality rate of heart attack survivors (Albert et al 1998). The presence of omega-3 fatty acids in the diet is estimated to reduce incidence of coronary heart disease by 30 percent (Albert et al 2002,

Hu et al 2002). Omega-3 fatty acids may also be helpful for people with diabetes. People with diabetes tend to have high triglyceride and low HDL levels. Omega-3 fatty acids from fish oil can help lower triglycerides and raise HDL (Friedberg et al 1998). Other benefits appear to include reduced risk of stroke in women and prevention of osteoporosis. Omega-3 fatty acid intake may help protect against strokes caused by plaque buildup and blood clots in the arteries that lead to the brain (Iso et al 2001). Other studies suggest that omega-3 fatty acids help increase levels of calcium in the body, deposit calcium in the bones, and improve bone strength. A study by Kruger and co-authors indicates that people who are deficient in certain essential fatty acids are more likely to suffer from bone loss than those with normal levels of these fatty acids. Women over 65 with osteoporosis who were given EPA (eicosapentaenoic acid) and GLA (gamma-linolenic acid both are types of omega-3 fatty acids) supplements experienced much less bone loss over a three year period than those who were given a placebo. Many of these women also experienced an increase in bone density (Kruger et al 1998).

Traditional Diet in the Prevention and Treatment of Diabetes

Historical, comparative and experimental studies indicate the significance of traditional diets for both the prevention and treatment of diabetes in native populations. Diabetes is a 'new' disease among Native Americans, having developed from a rarity before World War II to an 'epidemic' in recent years. Before the 1940's and 1950's, diabetes was rare in Indian populations. Although cases of diabetes did begin to appear more frequently after the 1940's and 1950's, many groups did not see significant increases until after the mid-1970's, a situation that reflects the continued impact of Western lifestyles on American Indians (Olson 2001, 165). In more recent times, Native people in the United States have lived more urban, industrialized and sedentary lifestyles. Since World War II, there has also been an increased reliance on machines and store bought foods (Olson 2001,165).

To account for the rapid rise in the prevalence of Type II diabetes in Native populations, geneticist James Neel (1962) postulated the existence of a "thrifty gene." According to Neel's theory, early peoples existed through feast-famine cycles, and the thrifty gene would have had selective advantage because it increased the ability of the body to store fats (energy) that could later be metabolized during periods of food shortage (Joe and Young 1993, 5). The thrifty gene hypothesis is debated in the literature. Regardless, the importance of diet, and the specific benefits of traditional native diets, on both the prevention and treatment of the disease is undisputed.

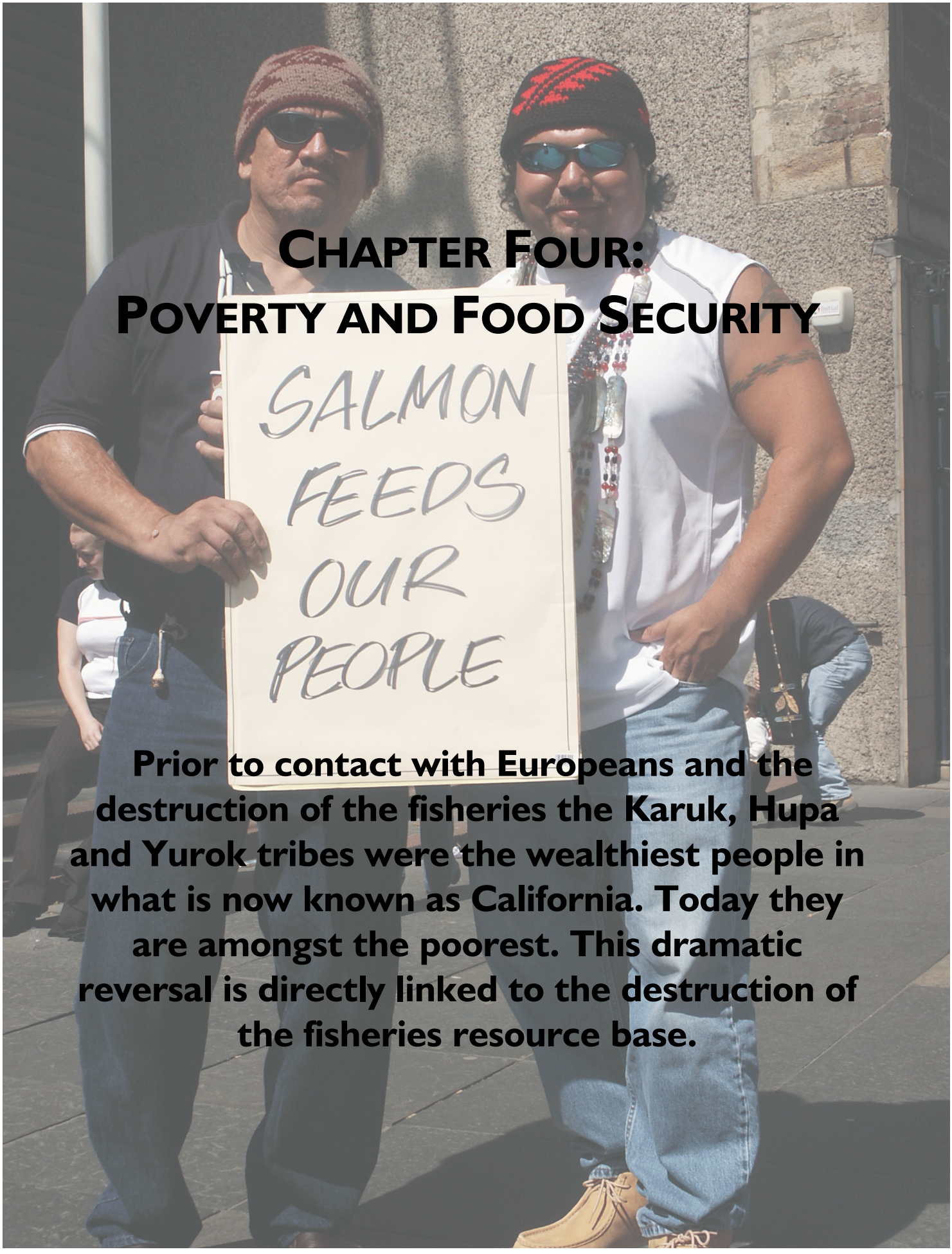
Not only was diabetes unknown in Native populations until their adoption of a "western" diet, experimental research and anecdotal evidence confirm the importance of traditional food in the prevention of diabetes. For example, a high fat, hypercarloic "affluent" diet fed to a small group of Tarahumara Indians of Northern Mexico for 5 weeks led to weight gain and an increase in total and LDL cholesterol and plasma triglyceride concentrations. The authors of this study conclude that "a western lifestyle is associated with an adverse health profile and that the adverse metabolic consequences of modernization might be reduced if a traditional lifestyle is maintained" (McMurry et al 1991).

Similar results are seen for tribes in the United States. In a review of the historical changes in diet for the O'odham people anthropologist Brooke Olson notes the "transition in foodstuffs from the eighteenth century, when Spanish missionaries introduced lard, beef and sugar, to World War II when the O'odham diet significantly shifted to a reliance on store-bought and commodity foods. Before this diet shift, diabetes was unknown to the O'odham people" (2001, 175). Studies of the Pima people suggest that the adoption of an Anglo diet may increase the risk of developing diabetes in Pima Indians (Williams, et al 2001). One study of the Pima people reports that "the Pima Indian diet of the last century was much higher in carbohydrate and lower in fat compared with the modern-day Pima diet. Any changes that this diabetes prone population can make toward their traditional diet may help to decrease their incidence of diabetes" (Boyce and Swinburn 1993, 369). In comparative work between two Northern tribes, Ed Nobmann and co-authors (1994) found that not only are Alaska Native's diets are more "western" than are those of Chukotka Natives, these diets were more prone to higher cholesterol. Alaska natives consumed a greater proportion of kilocalories as carbohydrates and fat than Chukotka Natives. The authors found that "Coastal Chukotka Natives had lower average serum LDL cholesterol and higher HDL cholesterol levels than tundra Chukotka Natives, despite their high fat and kilocalorie intakes" (Nobmann et al 1994, 123). In another experimental study "a group of Aborigines with Type II diabetes assumed a traditional lifestyle including diet for 7 weeks, they showed marked improvements in fasting glucose, insulin and triglyceride concentrations" (O'Dea 1984).

Other studies using traditional foods found improvements in glucose tolerance and insulin secretion with consumption of traditional foods. In their study of individuals with obesity and diabetes to assess effects of traditional foods on lipprotiena, metabolism, insulin secretion and energy expenditure, Howard and co-authors found that "In individuals having a wide range of

obesity and glucose tolerance, substitution of complex carbohydrates for saturated fat has beneficial effects of lowering LDL cholesterol and possibly improving glucose tolerance and insulin secretion, but without having any adverse effects on lipoprotein metabolism or energy expenditure" (Howard et al. 1991, 786).

In closing, an important health benefit of traditional lifestyle is conferred in the act of harvesting of traditional food species. Hunting, fishing, berry picking and plant harvesting are activities requiring physical activity. Especially when they are part of regular activity patterns, these pursuits contribute to fitness and overall health (Kuhnlein and Chan 2000, 671; Kuhnlein 1992).



Chapter Four: Poverty and Food Security

Prior to contact with Europeans and the destruction of the fisheries the Karuk, Hupa and Yurok tribes were the wealthiest people in what is now known as California. Today they are amongst the poorest. This dramatic reversal is directly linked to the destruction of the fisheries resource base.

CHAPTER FOUR:

POVERTY AND FOOD SECURITY

"Government policies have allowed natural resource extraction and development activities that have historically destroyed and currently threaten subsistence foods, traditional and modern small-scale agricultural practices and other food systems in North America, the Americas and all over the world, depriving Indigenous peoples of their basic human right to food security. Governmental policies and development activities often put Indigenous and local communities into a state of poverty, malnourishment and hunger."

Statement of the Indigenous Environmental Network on the Right to Food and Food Security, 2001

- Prior to contact with Europeans and the destruction of the fisheries the Karuk people were **amongst the wealthiest** in what is now known as California. **Today they are amongst the poorest.** This dramatic reversal is directly linked to the destruction of the fisheries resource base.
- The devastation of the fisheries is also directly linked to the disproportionate **unemployment and low socio-economic status** of Karuk people today.
- **The destruction of the fishery has led to both poverty and hunger.**
- The United Nations recognizes the right to **food security** and **food sovereignty**.
- Poverty and hunger rates for the Karuk Tribe are amongst the highest in the state and nation. **Median income for Karuk families is $13,000**.
- The **poverty rate** for Karuk tribal members in Siskiyou County is **88.4-91.9%**.
- **11.3% of tribal members are employed but living below the poverty line.**
- **13.5% of families** live in either substandard or over-crowded conditions (2004).
- Difficulty in meeting basic needs results in overwhelming **physical and psychological stress.**

Salmon was both the primary food and also the basis of the prosperous subsistence economy of the Karuk people. The destruction of the fishery has led to both poverty and hunger. Prior to contact with Europeans and the destruction of the fisheries the Karuk, Hupa and Yurok tribes were the

wealthiest people in what is now known as California.[4] Today they are amongst the poorest. This dramatic reversal is tied to the destruction of the fisheries resource base.

Lack of traditional food impacts the Karuk Tribe not only due to decreased nutritional content of specific foods, but results in an overall absence of food, leaving Karuk people with basic issues of food security. The devastation of the resource base, especially the fisheries, is also directly linked to the disproportionate unemployment and low socio-economic status of Karuk people today. Access to food and traditional food sources such as salmon are recognized as a basic human right by multiple international human rights treaties. The United Nations also recognizes the right to food security and food sovereignty.

"Salmon Feed Our People"

> "My gram and my mom and my aunt would fix fish all during the fishing time. They would pile it in baskets and keep a huge smokehouse going all the time."
>
> – Vera Vern Davis, Karuk Tribal Member, Former Karuk Council Member (quoted in Salter 2003, p. 33).

> 'There are 3000 members in our tribe. Last year we caught 1000 fish. There's not enough to go around. We eat fish, so its kind of like we are obligated to get fish to our people, especially our elders, as many as they want. But they don't always get what they want."
>
> Harold "Littleman" Tripp, Traditional Karuk Fisherman

Before the impacts of dams, mining and over fishing, the Karuk people subsisted off salmon year round. With the destruction of the salmon population it is no longer possible for Karuk people to subsist on their traditional foods. In the absence of salmon and other foods from the land, people purchase foods in grocery stores or rely on government commodities. Now poverty and hunger rates for the Karuk Tribe are amongst the highest in the state and nation.

Communities are defined as food secure when all members have access to nutritionally good, safe and culturally acceptable food through local non-emergency sources at all times. Recent U.S. Department of Agriculture studies show that while roughly 90% of the U.S. population is food

[4] Kroeber, A. L. 1925. *Handbook of the Indians of California* cited in Arthur McEvoy *The Fisherman's Problem.* 1986.

secure, only 78% of Native Americans in the United States are food secure (US Dept Agriculture 1999). Recent data from the California Health Interview Survey conducted by U.C.L.A. show that Native people have the highest rates of both food insecurity (37.2%) and hunger (16.9%) in California (Harrison et al 2002). The study reports that rates of food insecurity and hunger in both Siskiyou and Humboldt Counties are high. For the Karuk people the issue of food security is fundamentally linked to the lack of salmon and other traditional foods. For Karuk people food security has been an ongoing problem since European contact.

Poverty and Loss of Fishery Resource Base

> "For many millennia, the Indigenous peoples have developed and refined traditional sustainable agriculture, maintained hunting, fishing, and gathering practices, developed animal husbandry, all based on Indigenous and local knowledge handed down through the generations. These practices have enabled our Indigenous communities to achieve sustainability and food security - to adequately address hunger and nutrition - providing sufficient food year after year despite fluctuations in weather patterns and natural disturbances. By adhering to these practices, our Indigenous communities have been able to retain economic independence and self-sufficiency, and ensure that the diversity of plant and animal species remains high."
>
> – From Indigenous Environmental Network Statement on the Right to Food and Food Security, 2001

Although specific causes vary by region and history, the destruction of their resource base and separation of Indian people from the land has led to drastic poverty levels for Native people across the United States. Nationally, the poverty rate for Indian people is 25.9% (U.S. Census Bureau 2000). The rate for the Karuk Tribe is much higher. In addition to the creation of problems of hunger and food security, the depletion of the Klamath fisheries has lead to poverty for the Karuk people both directly through the loss of the economic resource base, and indirectly by forcing the shift from a society organized around subsistence to a society organized around the buying and selling of goods and services at the point when few such resources remain and the community is physically remote.

The 2004 the poverty line for a household of four is $18,850. Poverty rates for the Karuk Tribe are difficult to determine precisely as high percentages of people are unwilling to offer this information (KTOC 2004). However, there is no question that poverty within the Tribe is extreme. Regional poverty statistics provide background framework (see Table 9 below). In Happy Camp,

Somes Bar and Orleans, communities that are both within the tribe's ancestral territory and home to a significant number of Karuk people today, poverty rates are well above state and county averages.

Table 9 Regional Poverty Rates and Percentage of Native Population

Community	% Native	Individual Poverty Rate
Happy Camp	24	22.9
Orleans	29	20
Somes Bar	25.9	32.6
Hoopa	81.7	36
Siskiyou County	3.9	18.6
Humboldt County	5.7	19.5
California	1.0%	14.2

Source: U.S. Bureau of the Census

The poverty rates within Siskiyou and Humboldt Counties (ancestral territory of the Karuk Tribe and residence of the majority of the present population) are 18.6 and 19.5% respectively. These figures are much higher than the California statewide average of 14.2%. Furthermore, within the regions where the Karuk population is concentrated, poverty is much higher. Happy Camp, with 320 enrolled tribal members and their decedents out of a total population of 1,277 is 25% Karuk. Here the percentage of individuals living below the poverty line jumps to 22.9%. Similar results are observed for other communities in the Karuk ancestral territory including Somes Bar and Orleans (see Table 9).

The Karuk Tribe itself gathers detailed data on income, employment and housing conditions for tribal members and decedents (KTOC 2004). These figures indicate that poverty amongst the tribe is significantly higher than for non-native people within local communities. While the median

Table 10 Percentage of Karuk Households Living in Poverty

Percentage of Total Karuk Households Below Poverty Line	80.1-85.0%.
Percentage of Karuk Households in Siskiyou County Below Poverty Line	88.4 – 91.9%.

Note the Poverty Line for a family of four is $18,8500 in 2004.

Source: Karuk Tribe of California Demographic Summary 2004

household income in Siskiyou County is $28,178, the median household income for members of the Karuk Tribe is $13,000 (KTOC 2004). The percentage of all Karuk households living below the poverty line in 2004 is between 80.1% and 85.0% (see Table 10). For Karuk people living within Siskiyou County the poverty rate is even higher: 88.4-91.9%.

In the absence of either the subsistence fisheries economy or a thriving market economy, employment and unemployment are part of the picture of overall poverty in the Tribe. Unemployment rates within the Tribe are particularly difficult to assess as they vary according to source and calculation method. Furthermore, official unemployment statistics underestimate unemployment as they do not account for those who are no longer officially counted as looking for work (as occurs more frequently when available jobs are minimal or nonexistent). Table 11 reports official unemployment figures from several sources, as well as the percentage of people in the Tribe who are working out of the population considered 'available for work" (ages 18-65 but not students or disabled) – see Table 11.[5] Furthermore, the fact that a full 11.3% of Karuk people are employed and still living below the poverty line points to the low wages and insufficient availability of work in the region.

[5] For more details on Unemployment Rate calculations see Appendix A.

Table 11 Other Socio-Economic Conditions of the Karuk Tribe

Socio-Economic Indicators	
Unemployment Rate (Karuk Tribal Census, 2004)	26.5%.
Labor Market Information on the Indian Labor Force: 2004 Percentage of Population "Available for Work" who are Employed	47.4%
Labor Market Information on the Indian Labor Force: 2004 Percentage of Population "Available for Work" who are Not Employed	52.6%
Employed and Under Poverty Line	11.3%
Families Living in Substandard or Over-crowded Conditions	13.5%

Note that hunger and food insecurity become issues significantly before individuals reach the actual poverty line. The recent California Health Interview Survey reports that 28.3% of Californians whose income was 200% of poverty level were found to be food insecure (200% of the poverty line is $37,700 for a family of four).

Poverty, Hunger and Health

Food insecurity is not only a major problem in and of itself, but is in turn a risk to well-being and long-term health Harrison et al 2002, Margetts and Jackson 1993, Najman 1993). Young writes that "education and low income affect food choices and nutritional status and contribute to the development of chronic diseases, while unemployment engenders family breakdown and increases the likelihood of violence and injuries" (1997, 164). The U.C.L.A. Center for Health Policy Research reports that people who are food insecure have lower quality diets which in turn makes them vulnerable to a wide variety of diseases. Mental health risks emerge with food insecurity as well, e.g., anxiety (Harrison et al 2002).

The health challenges associated with food insecurity exist across the life span. Children in households with food insecurity have been found to do less well in school, have more absences, more frequent tardiness, more school suspensions and inferior cognitive functioning (Kleinmn et al 1998). Adolescents in homes with food insecurity exhibit more mental problems including depression and suicide (Alaimo et al 2002). A recent study found that food insecure elderly persons had significantly lower intakes of energy, protein, carbohydrates saturated fat, niacin, riboflavin,

vitamins B-6 and B-12, magnesium, iron and zinc. In addition, food -insecure elderly persons were 2.33 times more likely to report fair/poor health status and had higher nutritional risk. These results indicate that food insecure elderly persons have poorer dietary intake, nutritional status and health status than do food insecure elderly persons (Sun Lee and Frongillo 2001).

While commodity and emergency food supplies are available to supplement other sources, emergency food bags have been found to vary greatly in the amount of nutrients they provide (Jacobs, Gray-Donald and Kuhnlein 1999) and the food bank system has been criticized for providing limited nutritional support in a community (Riches 1989). And while nutritional adequacy is a general problem, these foods are particularly inadequate for native people.

Loss of Traditional Food and Other Social Disruptions

> "American Indians and Alaska Natives are plagued by high rates of suicide, homicide, accidental deaths, domestic violence, child abuse and alcoholism as well as other social problems . . . We suggest that these social ills are primarily the product of a legacy of chronic trauma and unresolved grief across generations."
> – Brave Heart and DeBruyn 1998, 60.

Not only is the devastation of the economic resource base directly linked to the disproportionate unemployment and low socio-economic status of Karuk people today, difficulty in meeting basic needs results in overwhelming physical and psychological stress (Harrison et al 2002). Food plays an important role in cultural continuity and identity – the loss of which in turn impacts alcohol abuse, suicide, violence and other so-called "anti-social" behaviors. The severe socio-economic stress experienced by many Karuk families, together with emotional trauma, is documented to cause serious social problems, including higher rates of substance abuse, school dropouts, psychological problems and violence (Beauvais 2000, 110).

It is essential to understand the social and historical context for these conditions. Social workers Brave Heart and DeBruyn describe the history of Native people in the U.S. as an "Indian Holocaust," comparable to the experience of Jews in the Jewish Holocaust (1988). Such experiences of profound social disruption lead to despair which may manifest as depression, suicide, violence and other behaviors. Furthermore, in the case of Indian people, the experience of genocide has been denied, ignored and minimized within the dominant culture. This means that grief is "disenfranchised" i.e. grief that people experience when a loss cannot be openly acknowledged or publicly mourned (Doka 1989). Brave Heart and DeBruyn describe how "Disenfranchised grief

results in an intensification of normative emotional reactions such as anger, guilt, sadness and helplessness . . . Further European American culture legitimizes grief only for immediate nuclear family in the current generation. This may also serve to disenfranchise the grief of Native people over the loss of ancestors and extended kin as well as animal relatives and traditional language, songs and dances" (1988, 67).

Food and Human Rights

> "Everyone has the right to a standard of living adequate for ... the health and well-being of himself and his family, including food, clothing, housing, medical care and necessary social services, and the right to security...."
> – Universal Declaration of Human Rights, Article 25

The right to be free from hunger and malnutrition is a fundamental human right of every woman, man, youth and child. The right to food is recognized as a basic human right under multiple treaties including the Universal Declaration of Human Rights, the International Covenant on Economic, Social and Cultural Rights, the Universal Declaration on the Eradication of Hunger and Malnutrition, International Covenant on Civil and Political Rights, Rome Declaration on World Food Security and the Declaration of the World Food Summit (see Table 12 below). The right to food is a human right recognized in Article 1 in common of the International Covenant on Economic, Social and Cultural Rights (ICESCR) and the International Covenant on Civil and Political Rights (ICCPR) which states that all peoples, by virtue of their right to Self-Determination, may establish and implement their own economic, social and cultural development. It also states that, "in no case may a people be deprived of its own means of subsistence." The Plan of Action and the Declaration of the World Food Summit in 1996 states that Food Security is "the access of all people to sufficient, safe and nutritious food to meet their dietary needs and food preferences for

Table 12 Food Security and Food Sovereignty as Human Rights

Human Rights Conventions on Food Sovereignty and Security
Universal Declaration of Human Rights, Article 25
International Covenant on Economic, Social and Cultural Rights
International Covenant on Civil and Political Rights
Universal Declaration on the Eradication of Hunger and Malnutrition
Rome Declaration on World Food Security
Declaration of the World Food Summit

an active and healthy life."The Indigenous People's Right to Food is also a collective right, linked to ceremonial practices based on spiritual relationships with earth. Universal and sustainable food security is part of reaching the social, economic and human development objectives governments agreed upon at world conferences in Rio, Vienna, Cairo, Copenhagen, Beijing, Istanbul and elsewhere. The right to adequate food is also enshrined in legal terms in the most basic international human rights treaties, including the Convention on the Elimination of All Forms of Discrimination Against Women, the International Convention on the Elimination of All Forms of Racial Discrimination, and the Convention on the Rights of the Child.

In their pronouncement of the case of the Swas Tingni of Nicaragua, the Inter-American Court of Human Rights of the Organization of American States concluded "By virtue of their very existence, indigenous communities have the right to live freely in their own territories; the close relationship of these communities with the land must be recognized and understood as the basis for their cultures, spiritual life, cultural integrity and economic survival. For indigenous communities, relationship with the land is not simply one of possession and production, it is also a material and spiritual element that they should be able to enjoy freely, as well as a means of preserving their cultural heritage and transmitting it to future generations" (9/17/01).

Chapter Five

Cultural and Spiritual Meaning of Denied Access to Traditional Foods

Traditional food has great physical, cultural, religious and social values for Karuk people. Ceremonies and daily activities surrounding food provide meaning and identity that are fundamental to emotional well being and cultural continuity.

CHAPTER FIVE:

CULTURAL AND SPIRITUAL MEANING OF DENIED ACCESS TO TRADITIONAL FOODS

"For indigenous Peoples, the collective right to food and food sovereignty are indispensable for the continuation of their cultures and Indigenous identity. The freedom for self determination of Indigenous Peoples involves not only access to but also control and management of their territories and natural resources."

Statement of the Indigenous Peoples at the Third Regional Consultation for Latin American and the Caribbean FAO and NDO/CSO Guatemala April 2004

- Cultural benefits of the use of traditional food in contrast to market foods include beliefs about food healthfulness and spiritual provisioning, use of food for its educational value, strengthening cultural morale, economic benefits, and place in the social fabric of community life.
- Diet change may lead to a loss of culture and identity.
- The present ongoing destruction of the resource base leads to further cultural disruption for Karuk people today. Just as ceremonies surrounding fish and the more everyday activities of fishing, eeling and gathering mushrooms and huckleberries create and maintain community ties and provide identity, so too does their absence and decline lead to further cultural disruption.
- The present decreasing access to traditional foods must be understood in the broader context of cultural genocide.

Beyond its importance as direct subsistence and its specific health benefits, traditional food has great physical, cultural, religious and social values for Karuk people. Food has long been an integral part of daily activities and celebrations. Hospitality and caring for elders are for example, important social obligations that involve food. The cultural and spiritual dimensions of salmon for the Karuk has probably received more recent attention than any other recent tribal issue (e.g. Salter 2003, King 2004). Existing documents provide in depth and critical testimony concerning the cultural and spiritual importance of salmon, eels, other fish species and the Klamath river itself. The emphasis in this final chapter will not be to repeat what has already been done, but rather to highlight the

connections between cultural and spiritual aspects of traditional foods and human health. This chapter will address the social importance of salmon and other traditional foods as food. That is, the acquisition, preparation and consumption of food plays an important cultural and spiritual role for Karuk people. Furthermore, the absence of traditional food has impacts social structure, cultural morale and mental well being.

Denied Access to Traditional Food: Social Disruptions

Traditional food has an important place in the fabric of community life (Kuhnlein and Chan 2000, Kuhnlein and Receveur 1996, Usher et al. 1995). For the Karuk people the act of feeding a visitor in one's home is a serious social responsibility. Leaf Hillman, Karuk ceremonial leader and tribal Vice-Chairman describes the importance of traditional food and the cultural disruption that arises in its absence:

> "Cultural practices such as feeding any visitor to one's home and the associated insult (that requires payment to fix) that results from the visitor's refusal to partake of food are still prevalent today among many Karuk families. These practices remain strong with many Karuk individuals and families, and also permeate traditional and contemporary Karuk gatherings of all types. It is a high order obligation and responsibility of every Karuk ceremonial leader/dance owner to provide food for everyone in attendance, at every meal or whenever they arrive in camp, throughout the duration of the ceremony. These cultural norms are also illustrated by the contemporary practice of the Karuk tribal Council to feed anyone who is in attendance at every Council meeting. These practices reflect the continuing important role that food plays in Karuk culture and identity. Unfortunately, denied and/or limited access to nearly all traditional Karuk foods means that other non-traditional foods are substituted. Therefore, these cultural practices, in fact, contribute to many of the health problems experienced within our population and are detrimental to the overall well being of Karuk people."
>
> – Leaf Hillman, 2004

Ceremonies surrounding fish and the more everyday activities of fishing, eeling and gathering mushrooms and huckleberries also create and maintain community ties and provide identity. Ron Reed describes how the activity of fishing is a forum for passing on both physical qualities, such as balance, and cultural tradition to his sons: "Fishing down at Ishi Pishi Falls you learn how to gain your balance. You learn the traditional values down there, the taboos and things like that, because it

is a sacred fishery and there are certain rules that you abide by." The activity of fishing provides an opportunity for young boys to spend time with and learn from fathers and older members of the community. Learning to dip net fish also serves as an informal rite of passage as boys begin early with easier tasks and move through a sequence of skills on their way to dipping fish. Harold Tripp describes how "you start out by packing the dipper's poles, and then you work your way up to clubbing salmon for the fisherman and packing fish, and then you start dipping, if you can get in there." The lack of traditional foods makes it impossible to engage in social activities surrounding the gathering, preparation or consumption of those foods. The present ongoing destruction of the resource base leads to further cultural disruption for Karuk people today. As Ron Reed notes "Its not just about fish. Its about the traditions, the culture, the quality of life that we are lacking."

Other consequences from the lack of traditional foods to the social structure are equally significant. One outcome of diabetes is early death due to associated conditions (i.e. heart disease, kidney failure). When elders die young they are not available to pass information and love on to the younger generations. Ron Reed describes the disruption to the social order that comes from losing elders in a family:

> We are a people who are not allowed to have fish anymore because there's not enough fish to have. It has been three generations for my people not to be living mainly on fish. And to have the different type of environment now for the children, for the elderly people. It has a profound affect on the quality of life. By tradition our elders teach our babies the ways of life while the parents are out making a living. Now we don't have that opportunity because of the mismanagement of the resources. Our people aren't living to a ripe old age and when they do they aren't living the high quality of life. So we need fish in our diet. That is very evident.

Similarly, Trafzer and Weiner (2001) note that the strength of Native peoples in some regions may be in jeopardy because the loss of numerous community healers and shamans due to early death throughout the past century has decreased the ability to protect people.

Denied Access to Traditional Food: Impacts on Identity, Mental and Emotional Well-Being

Both ceremonies and daily activities surrounding food provide meaning and identity that are fundamental to emotional well being and cultural continuity (Kuhnlein and Chan 2000). Marlene Echohawk researcher with Indian Health Services describes the way in which activities surrounding traditional foods provide "strength in unity of purpose, philosophy and belief systems in the tribal structure increases the sense of identity from a psychological, emotional and social viewpoint" (1997,

60). In her study of access barriers to food items and food preparation for Plains Indians Betty Cantrell describes how even the preparation of traditional foods is healthy for people both physically and mentally: "A great deal of human energy must be expended to dry foods: the fruits, vegetables and berries must be gathered in the wild; the game must be hunted or trapped; the foods must be prepared for drying. All of these activities provide healthy exercise. In addition, it was believed that the emotional state and attitude of the person preparing the food was passed along to those who ate the food. Therefore, the cook tired to maintain a positive attitude before and during food preparation and songs of celebration were sung during food preparation" (Cantrell 2001, 71).

Secondly, the ability to gather food from the surrounding ecosystem reaffirms a sense of place and belonging, and a sense of being cared for. This sense of connectedness is visible in the belief Karuk people hold that the salmon return home to offer themselves as food to the people. The people, in turn, have a responsibility to fish for them in order to sustain the species. Harold Tripp recalls how "my grandmother told me that we were responsible to get fish to our people – in order for the fish to survive, we're supposed to." The act of eating salmon from the Klamath river affirms sense of place, identity, connection and community. This orientation draws individuals into relationships of responsibility to care for the fish. Such a world view and set of relationships are in stark contrast to the separate, individualistic modality of the dominant culture in which plants and animals are "resources" and people are expected to watch out for their individual interests. Relationships between Karuk people and their plant and animal relations fulfill profound mental, emotional and spiritual functions. In the absence of these food species, activities such as dip net fishing, eeling or berry picking cannot take place, or take place with lesser frequency.

For many native people, health is also felt to be influenced by the interactions between people and natural elements, since humans originated from and with the assistance of beings of the natural world (Trafzer and Weiner 2001, viii). Whereas the Western medical model emphasizes disease, Native American cultures traditionally define sickness as imbalance in the physical, spiritual, emotional and social realms. Within this framework, stress, grief or anxiety could weaken well being and make one vulnerable to disease. For example, in Cantrell's study of the Plains people many participants cited examples of themselves or others being diagnosed with diabetes during or after a stressful life event. This framework fits with the observations of Western science. There are impacts of loss and severe reduction in access to traditional food sources on other indicators of life stress including for example rates of physical conditions such as tuberculosis, ulcers, and evidence for

emotional stress including suicide, depression and high school dropout rates. Poor health can be linked to disproportionate unemployment, poverty and low socioeconomic status (Kauffman and Joseph-Fox 1996).

Broader cultural impacts to the lack of traditional diet (or adequate diet of any type) lead to other social and cultural problems in communities. Numerous studies document how diet changes for Indian people may lead to a loss of culture and identity as the entire socioeconomic system is disrupted (Usher et al., 1995; Chan and Receveur 2000). For example, suicide in Native Americans is identifiable not only by the high rate but by the pattern of youth suicide (rates are highest for those under 35) rather than amongst older age groups as with non-Indians in the US. Although there are differences from tribe to tribe, the overall suicide rate for Native Americans is 1.5 times the national average. In contrast, researchers note that "renewing interest in traditional Indian identity, values and customs should help Native American adolescents achieve a positive balance betwen the strength of their people and opportunities available in the larger society (Beauvais 2000, 110). Kuhnlein and Chan describe "multiple socio-cultural values that contribute to mental health and cultural morale" (2000, 615). For example, difficulty in meeting basic needs results in overwhelming physical and psychological stress. Brooke Olson recounts how "some Native peoples living a Western lifestyle (e.g. the Dogrib) may experience more stress and more difficulty in adjusting to different life ways, thus making the body less capable of regulating blood sugar levels, a condition that if prolonged can lead to diabetes" (2001, 166).

Another fundamental, but often invisible, factor influencing the health and well-being of Karuk people is the decreasing relevance of tribal customs and laws relating to resource management and harvest practices. Leaf Hillman notes that "when non-native people and government agencies ignore and disregard Karuk customs (laws and practices) these customs become irrelevant within our own culture." Hillman provides multiple examples:

> Karuk customs (laws and practices) concerning the management and harvesting of Tan Oak Mushrooms e.g. family/village responsibility for management and harvesting rights in certain defined geographic areas, remained largely intact until very recently. This can be explained by the lack of interest on the part of non-natives and government agencies alike. Because no one else cared and these customs did not interfere with anyone else, they remained relevant within Karuk culture. However, all of this disappeared virtually overnight when it was learned that tan Oak Mushrooms were in fact, Matsutakes and that a lucrative market existed for this species in japan and other Asian markets. Large numbers of outsiders and locals flooded the forests

> within Karuk territory, and big money was to be had at the local buying stations that sprung up overnight in our communities. In our local river communities where unemployment rates are extremely high and employment opportunities are almost non-existent, local people including Karuk quickly realized that they could make more money in a few days picking and selling mushrooms, than they ordinarily would expect to earn in an entire year or even two. In this environment, following Karuk customs simply meant that they could not compete with the hoards of outsiders flooding the area, and even if they did not violate Karuk customs (laws and practices), there would be hundred of others that certainly would. Therefore, the customs themselves along with their underlying purpose and intention, no longer had relevance in Karuk culture.

In another example, Hillman describes the profound and multi-layered cultural impacts from denied access to the traditional management practices of managing oak stand for acorn production (done through the use of fire).

> A Karuk ceremonial leader/dance owner with explicit obligations to feed the people during ceremonies may (on a good year) be able to harvest and process enough acorns to meet this responsibility, but this means that he and his family cannot eat any acorns for the entire year or risk falling short during ceremonies. Therefore, in order to fulfill the mandate of the creator to feed the people at ceremonies, one must also violate them by denying the needs of your own family. Although many Karuk retain the specialized traditional knowledge necessary to manage oak stands for acorn production, this is strictly prohibited by the USDA Forest Service (even on a small scale).

Finally, loss of relationships with the natural world, as when entire salmon runs disappear, leads to profound grief. In their article on unresolved grief from the Indian Holocaust Brave Heart and DeBruyn describe how the invisibility of this grief within the dominant culture is an additional source of stress. Karuk cultural practices include acts of tending places, plants and animals. The inability to perform these practices and maintain these relationships of burning tan oaks for food or tending mussel beds is the inability to carry out culture. It is for these reasons that the present decreasing access to traditional foods must be understood in the broader context of cultural genocide. The stress of this and other aspects of forced assimilation can in turn create or exacerbate physical (as well as emotional) health challenges.

SUMMARY AND CONCLUSIONS

"A healthy riverine system has a profound effect on the people on the river. Back in the 80's, you could pretty much fill a freezer and have nice good fish all the way through the year. But now, the economy down here is pretty much devastated. Instead of having healthy food to eat – fish– we are relegated to eating commodity foods. That's our subsidy: high starch foods, things that aren't so healthy that the Karuk people are pretty much forced to eat."

Ron Reed

SUMMARY AND CONCLUSIONS

The Karuk people are intimately dependent upon salmon both physically and culturally. Salmon has been both the primary food and also the basis of the prosperous subsistence economy of the Karuk people since time immemorial. The destruction of the fishery has led to both poverty and hunger. Prior to contact with Europeans and the destruction of the fisheries, the Karuk, Hupa and Yurok tribes were the wealthiest people in what is now known as California. Today they are amongst the poorest. This dramatic reversal is directly linked to the destruction of the fisheries resource base.

Genocide and forced assimilation over the past century have led to a loss of traditional knowledge of relationships with the land (including preparation and acquisition of traditional foods) and a change in the tastes and desires of people. Yet despite these dramatic earlier events, the testimony of elders about foods they ate until recently indicate that considerable changes have also occurred within the last generation. These most recent changes are largely due to denied access to traditional foods.

There are at least 25 species of plants, animals and fungi that form part of the traditional Karuk diet to which Karuk people are currently denied or have only limited access. Furthermore, the foods that were most central in the Karuk diet, providing the bulk of energy and protein: salmon and tan oak acorns are amongst the missing elements. The result is that Karuk people are currently denied access to foods that represented upwards of 50% of their traditional diet. Traditional fish consumption is estimated at 450 pounds per person per year (Hewes, 1973). In contrast, the present day Karuk people consume less than 5 pounds of salmon per person per year. Now so few fish exist that even ceremonial salmon consumption is limited.

The loss of traditional food sources is now recognized as being directly responsible for a host of diet related illnesses among Native Americans including diabetes, obesity, heart disease, tuberculosis, hypertension, kidney troubles and strokes. Around the world when Native people move to a "Western" diet rates of these diseases skyrocket. Identified health consequences of altered diet for the Karuk people include high rates of Type II diabetes, heart disease and hypertension. These health consequences stem from changes in the specific nutrient content of traditional foods such as salmon and acorns, as well as decrease in the physical benefits of exercise associated with their gathering. Mental, emotional, cultural and spiritual health benefits of eating and harvesting traditional Karuk foods exist as well. In the Karuk Tribe rates of diabetes and heart disease are from

2 to 3 times the average in the U.S. population as a whole. These conditions are directly attributable to denied access to traditional food resources. These are serious health conditions that lead to decreased life expectancy and decreased quality of life in later years.

Lack of traditional food impacts the Karuk Tribe not only due to decreased nutritional content of specific foods, but results in an overall absence of food, leaving Karuk people with basic issues of food security. The devastation of the resource base, especially the fisheries, is also directly linked to the disproportionate unemployment and low socio-economic status of Karuk people today. Before the impacts of dams, mining and over fishing the Karuk people subsisted off salmon year round for tens of thousands of years. Now poverty and hunger rates for the Karuk Tribe are amongst the highest in the State and Nation. The poverty rate of the Karuk Tribe is between 80 and 85%. The poverty rate is even higher for tribal members living in Siskiyou County.

Cultural benefits of the use of traditional food in contrast to market foods include beliefs about food healthfulness and spiritual provisioning, strengthening cultural morale, use of food for its educational value, economic benefits, and place in the social fabric of community life. Diet change may lead to a loss of culture and identity. The present ongoing destruction of the resource base leads to further cultural disruption for Karuk people today. Just as ceremonies surrounding fish and the more everyday activities of fishing, eeling and gathering mushrooms and huckleberries create and maintain community ties and provide identity, so too does their absence and decline lead to further cultural disruption. The present decreasing access to traditional foods must therefore be understood in the broader context of cultural genocide.

Access to traditional food sources of salmon are also a basic human right. Access to salmon is also a matter of religious freedom. Numerous international treaties recognizes the right to food security and food sovereignty

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APPENDIX A
DATA SOURCES AND CALCULATIONS

Disease Rate Calculations

Condition categories for Indian users were extracted from the RPMS data base according standardized codes. The baseline for these calculations is the Total Indian User Population from Karuk Tribal clinics (1,879 individuals). Note that this figure reflects ALL Indian people using the Karuk Clinics in Happy Camp, Yreka and Orleans, not differentiated by Karuk or other Tribe. This figure was considered most accurate because significant percentages of Karuk Tribal members use clinics from other tribes (e.g. Hupa, Yurok, IHS).

Poverty Statistics

Poverty rates for entire tribe and for tribal members living in Siskiyou County were calculated from the information from the Karuk Demographic Survey, 2004 (TDR Demographics). Note that in 2004 the poverty line for a household of four is $18,850. Median income for Karuk families is $13,000

With these figures the percentage of total Karuk tribal members living below the poverty line of $18,000 is from 80.1-85.0%. With these figures the percentage of Karuk tribal members in Siskiyou County living below the poverty line of $18,000 is from 88.4 – 91.9%.

Employment and Unemployment Statistics

According to Bureau of Indian Affairs labor market information 11.3% of tribal members are employed but living below the poverty line.

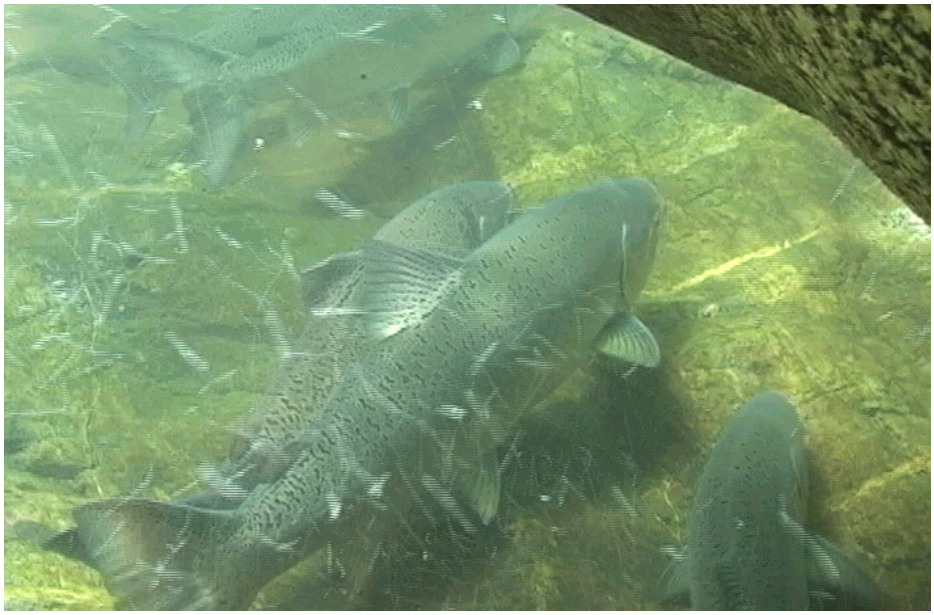
According to data from the Karuk Tribe Housing Authority, 13.5% of families live in either substandard or over-crowded conditions (2004).

Using the U.S. Department of Interior Labor Market Information on the Indian Labor Force, 2004 of 1035 tribal members in the target area, 650 are available for work. Of these 650, 308 or 47.4% are listed as employed in either private or public sector positions. By this account the remaining 52.6% are not employed. Furthermore, the report lists that 345 people are employed but still below the poverty line – a figure greater than the total number employed (308).

A second document from the Karuk census in 1997, the Labor Force Report, gives a slightly more positive assessment. This document lists the potential labor force as 347 people (out of a total of 726). This table reports 231 of the 347 or 66.6% to be employed, leaving another 116 or 33.4% as not employed. This document reports that of these 174 or 75.3% are earning over $9,048 (the poverty line for an individual) while another 57 or 24.7% are earning under the poverty line.

Finally, the Employment Summary from the entire tribe from the Karuk Tribal Census 2004 lists an unemployment rate of 26.5%.

APPENDIX B
FUTURE RESEARCH RECOMMENDATIONS



The following are suggestions for research the Karuk Tribe could gather. They were not pursued here due to limitations of time and resources.

1. In depth ethnographic material on historic and present food consumption and the social and cultural significance of traditional foods.

Ethnographic Analyses

This study used minimal first hand ethnographic material. Additional in-depth interviews on diet and health conditions over time are strongly recommended to provide additional data, comparative information and identify missing dimensions for the project.

It is recommended that more interviews be conducted with elders concerning foods that are no longer in the Karuk diet, foods which are in limited supply due to denied access, activities that were conducted in the past, harvesting techniques, and the social and cultural significance of foods and food gathering activities.

2. Detailed diet study including dietary analysis of commodity foods

Detailed Diet Survey

A detailed diet survey could be conducted to evaluate food consumption patterns and dietary challenges for Tribal members. If such a survey were repeated over time it could be used

alongside historical data on health conditions to see the relationship between changes in traditional food consumption and health issues over time. Note that David Eisenberg, Public Health Nurse for the Tribe has indicated interest in this project and has made suggestions about how it could be conducted.

Dietary Analysis of Commodity Goods

Detailed dietary analysis of commodity foods consumed by Tribal members could be conducted to evaluate their relationship to the present health crisis.

3. Improved Summaries of Health Statistics

Compilation of the following health statistics would be useful. This was attempted but not presently possible.

Life Expectancy

The calculation of both life expectancy and cause of death would be useful figures for the tribe. An attempt was made to pursue these, but results were not possible within the time constraints of this initial project. The life expectancy rate for American Indians is on average 6 years less than the US average. Life expectancy information could be calculated for the Karuk Tribe by using age specific death rates (e.g. percent of people age 20-24 who died in a year). Or it can be estimated life expectancy by comparing data to model life tables, using measures of infant or child mortality (percent of births surviving to age 1 or to age 5) and one or two other age-related measures of death. This task would require more extensive time for Tribal employees in Happy Camp Health Administration office.

Cause of Death

Causes of Death are an important indicator of quality of life, reflecting many current outcomes of oppression and racism. An attempt was made to evaluate causes of death within the Tribe. Because Tribal health clinics do not serve as hospitals, and because such information is not formally compiled at this time, this task would require more extensive time for employees in the Happy Camp Health Administration Office. Currently enrolled members (and descendents?) are removed from the list upon death but causes of death are not recorded. Calculation of overall causes of death could be done using existing hospital data and supplementing this information with local knowledge of people with records from the clinic. Because this calculation involves sensitive information, the use of multiple data bases and relies on local knowledge of causes of death it would be somewhat time consuming on both the part of researchers and Tribal Enrollment Staff.

Historical Figures and Annual Tabulation

It was not possible to use the RPMS system to determine past rates of conditions (e.g. heart disease, diabetes). Such information would have been highly useful in making the case that declining fish consumption is linked to increases in these diseases. It may be that this data can be extracted via other avenues (i.e. Indian Health Services files or inferred from IHS regional statistics). Furthermore, the Tribe should begin to gather such data now so that future comparisons can be made.

Summary Statistics on Conditions Associated with Diabetes

There are a number of summary statistics on conditions associated with diabetes that are currently either unavailable or appear inaccurate. In some cases data exist but appear to be incomplete or inaccurate. For example, initial calculations for rates of hypertension, kidney disease and obesity appear too low (at or below U.S. average). Other conditions which are associated with diabetes and thus suspected to occur with increased frequency in the Karuk Tribe but for which data were unavailable include: limb amputations, vision troubles, strokes, infant mortality, cancers, premature births and high birth weights. Statistics on dental health were not pursued for this report but should be included in future studies. Furthermore, it should be noted that clinical measures of diabetes will under represent cases. This points to the benefits of conducting a larger in-depth study. For example, in one study of the Navajo about one third of women with diabetes history used no medical therapy to control their diabetes (Will et al. 1997, 2106S).

Key Findings

The Effects of Altered Diet on the Health of the Karuk People
Excerpts from the Preliminary Report, August 2004

General Overview

- The diet of the Karuk people has shifted dramatically since European contact with forces of assimilation and in the past generation due to denied access to traditional foods.
- There is overwhelming evidence that the elimination of traditional foods has had adverse health, social, economic, and spiritual effects on Native American people.
- Prior to contact with Europeans and the destruction of the fisheries the Karuk people were amongst the wealthiest in what is now known as California. Today they are amongst the poorest: poverty and hunger rates are amongst the highest in the State and Nation. Median income for Karuk families is $13,000 and 88.4-91.9% of tribal members in Siskiyou County live below the poverty line. This dramatic reversal is directly linked to the destruction of the fisheries resource base.
- Environmental Justice laws require that federal agencies identify and address adverse affects to human health or the environment of their actions on minorities and low-income populations.

Denied Access to Traditional Foods

- Denied access to traditional foods is a primary reason for the altered Karuk diet today.
- There are at least 25 traditional foods to which Karuk people currently have denied or limited access. These foods represent upwards of 50% of the traditional Karuk diet.
- The dramatic decline in eel and salmonid populations that once supplied over half the Karuk diet has occurred within the lifetime of most adults alive today.
- Whereas historic fish consumption for the Karuk Tribe is estimated at 450 pounds of salmon per person per year or 1.2 pounds per day, fish consumption for the Tribe in 2004 is estimated at less than 5 pounds per person per year.

Health Effects of Denied Access to Traditional Foods

- A significant percentage of tribal members rely on commodity foods in lieu of salmon and other traditional foods. These foods are of much less nutritional value.
- Traditional diet has been found to be an important factor in both the prevention and treatment of diabetes. Traditional foods are higher in protein, iron, zinc, Omega 3 fatty acids and other minerals and lower in saturated fats and sugar.
- The estimated diabetes rate for the Karuk Tribe is 12%, nearly twice the U.S. average.
- The estimated rate of heart disease for the Karuk Tribe is 39.6%, three times the U.S. average.
- Diabetes is associated with severe and costly complications such as blindness, kidney failure, lower-extremity amputations and cardiovascular disease, disability, decreased quality of life and premature death that continue to affect American Indians disproportionately.
- The United Nations recognizes the right to food security and food sovereignty. Access to traditional food sources of salmon are a basic human right.Cultural benefits of the use of traditional food include beliefs about food healthfulness and spiritual provisioning, economic benefits, and place in the social fabric of community life.