

# Diabetes Prevention in Indian Country: Developing Nutrition Models to Tell the Story of Food-System Change

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*The disruption of the traditional food systems of Native Americans is generally believed to have contributed to the epidemic levels of type 2 diabetes and obesity present on U.S. Indian reservations today. Tribes are increasingly engaged in disease prevention and health promotion efforts including restoring components of their traditional food system. This article discusses the development of nutrition models for tribes in two regions; California and the Three Affiliated Tribes of North Dakota. Each nutrition model tells the story of food system change and its health consequences through narrative and cultural imagery. Ultimately the models suggest ways to eat that reflect the traditional food pattern by using contemporary and traditional foods available today.*

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**Keywords:** nutrition; diabetes; Native American; food system; nutrition model; Mandan; Hidatsa; Arikara; Californian tribes

In the United States, type 2 diabetes has emerged as a serious public health problem in American Indian populations. Public health institutions recognize American Indian and Alaska Natives (AI/AN) as having a higher relative risk of diabetes than other groups of Americans and a greater likelihood to suffer from complications of diabetes (Shalala, Trujillo, Hartz, & Paisano, 2000). Today, an estimated 9.7% of the AI/AN population has diabetes, compared with 5.7% of non-AI/AN populations in the United States (Denny, Holtzman, & Cobb, 2003). The greater the degree of American Indian heritage an individual has seems to correlate with

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diabetes risk. The Strong Heart Study reported that among women with full American Indian heritage, there was 9 times the likelihood of getting diabetes than women of one quarter Indian ancestry (Howard et al., 1999).

Type 2 diabetes is mostly a lifestyle disorder and commonly emerges when a population adopts a "Westernization" or modernization of their lifestyle (Joe & Young, 1993). Native Americans across the nation are less involved with their traditional subsistence patterns and are more involved with the modern economy, a change that became most prominent following World War II (Jackson, 1986). These changes in subsistence patterns account for a more sedentary lifestyle and a diet that includes new foods, an increased availability of foods, and a new mix of macronutrients: protein, carbohydrate, and fat. Research suggests that the susceptibility of Native Americans to diabetes is a phenomenon in which environmental changes affect gene expression (Swinburn, Boyce, Bergman, Howard, & Bogardus, 1993).

Conventional nutrition education approaches, such as the USDA Food Guide Pyramid, do not have a historical or cultural basis for American Indians and may not capture the interest or attention of clients. To date, there have been very few published nutrition education materials that are culturally specific to tribes or tribal regions. Almost 500,000 American Indians live on 300 reservations and trust lands in the United States (U.S. Bureau of the Census, 2002). In recent years, tribes have been engaging in diabetes- and obesity-prevention efforts through some 318 new diabetes-prevention programs across Indian Country (Indian Health Service [IHS], 2004). Nutrition education is a key component used by a majority of these programs. Despite the clear impact of culture on health beliefs and lifestyle behaviors (Carter et al., 1997), nutrition education materials that are culturally based are not readily available in many American Indian communities.

## Food Sovereignty

Farmers, hunters, fishing peoples, and others throughout the world have defined food sovereignty as the rights of all peoples to define how they will hunt, grow, gather, sell or give away their food with respect to their own cultures and own systems of management of natural resources (International

Indian Treaty Council [IITC], 2002). Indigenous people have witnessed a steady erosion of their traditional food systems, food sovereignty, health security, and livelihood security since contact with non-Native settlers. Loss of traditional lands, of plants, of animal herds and fish/shellfish, and of traditional water sources have nearly destroyed traditional American Indian food systems. Increasingly, American Indians are involved in the movement for food sovereignty at local and national levels, maintaining that it is a prerequisite for food security (IITC, 2003). Numerous examples exist across Indian Country showing tribes' involvement in strengthening, protecting, or restoring traditional food practices: restoring buffalo herds back to tribal lands, planting gardens consisting of traditional foods, increasing water-quality standards, establishing game reserves, teaching traditional ways of preparing meats and vegetables, and re-assuming/claiming traditional lands to put into food production (IITC, 2003). The White Earth Land Recovery Project in northern Minnesota has been successful in restoring the tribal land base. Its program supports traditional harvesters of rice, maple syrup, and other traditional foods and arts and features these products in a catalog called *Native Harvest*.

Many Native people consider the restoration of traditional subsistence foods and practices essential to regain their health, traditional economy, and culture for generations to come. Teaching nutrition in a way that supports tribal food sovereignty and the use of traditional foods with a message that is consistent with the historic food practices is needed. One contemporary American Indian woman said, "Before we can start talking about nutrition, we have to renew the spiritual connection our people had with food as a gift from the Creator. It makes sense for us to renew our bodies with that traditional source" (L. DeCorra, RN, Winnebago Tribe, as quoted in LaDuke, 2005, p. 20).

### Native Nutrition Models

In an effort to teach nutrition while preserving cultural knowledge of traditional food systems, tribes from several regions have made efforts to develop their own food models to teach nutrition from a historical perspective. The Native nutrition models tell the story of their nation's changing food system from past to present and the corresponding change in health. These models use a combination of imagery with Native symbols and narrative. Ultimately, the models offer a message for today by promoting eating in a way that is reflective of earlier food patterns using contemporary and traditional foods. The ancient symbol of the Medicine Wheel has been used in three of these models.

Many tribes in North America use the Medicine Wheel to teach various symbolic concepts related to balance in all natural systems. Everything has a spirit or part of the Great Spirit within itself. The four sections of the Medicine Wheel each have a different color and different meaning. Some examples of this symbolism include: the four grandfathers;

the four cardinal directions; the four seasons; the circle of life; health comprised of mental, spiritual, intellectual, and physical health; and many other relationships that can be expressed in sets of four (McGaa, 1990). As applied in this project, the symbolism of the Medicine Wheel also corresponds to the four dietary components of Native American's traditional food systems: (a) water, (b) the four legged and finned Ones, (c) gathered plants, and (d) cultivated crops.

### Three Affiliated Tribes Food Model

Tribal Chairman Tex Hall of the Three Affiliated Tribes representing the Mandan, Hidatsa, and Arikara Nations symbolically declared "war on diabetes" in 2002. Developing a nutrition model based on historical patterns was one project that emerged from this initiative. A team of community leaders collaborated with a consulting nutritionist during a 12-month period to produce the model. The work group included several tribal-programs directors and respected tribal elders. A tribal graphic artist and illustrator produced the imagery for the model.

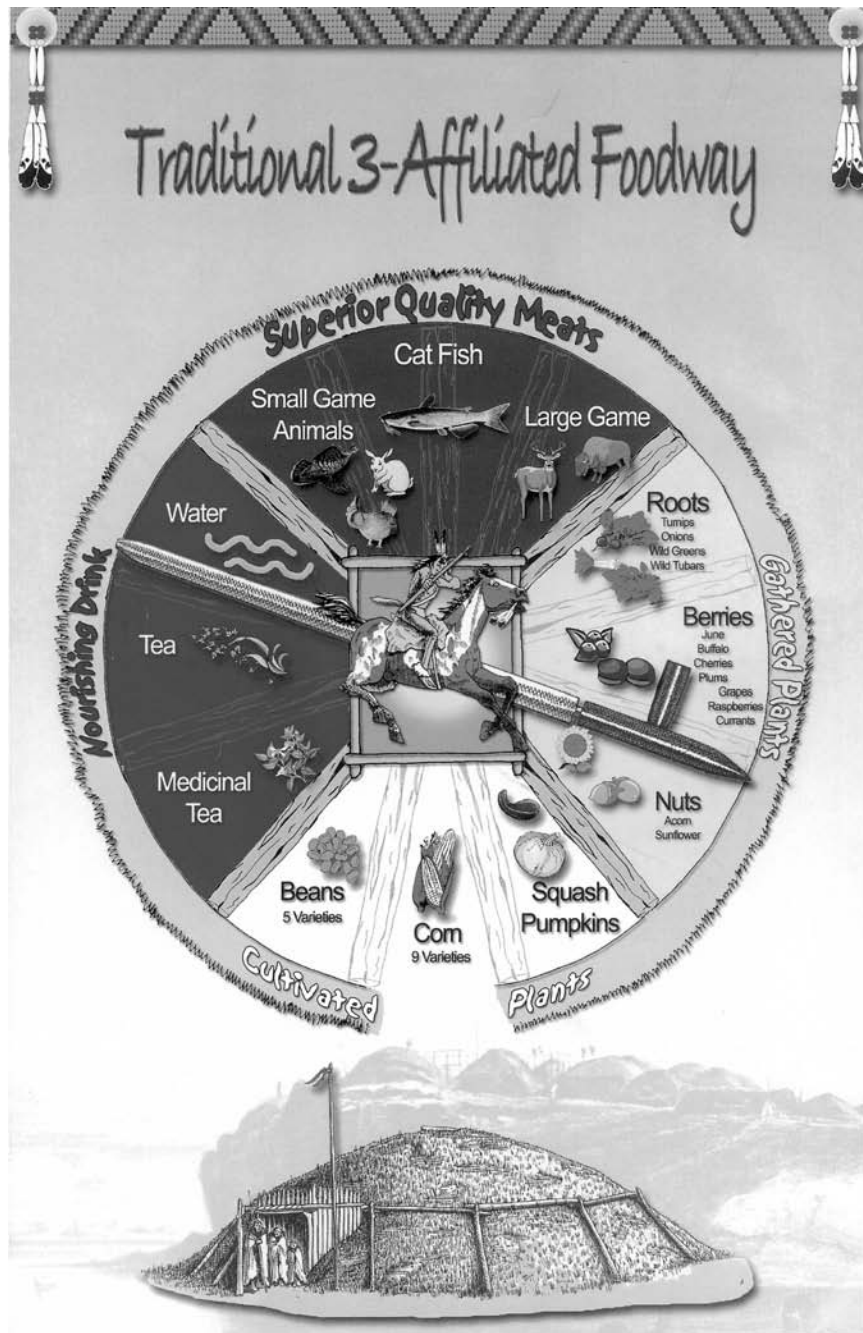
The combined symbolism of the Earth Lodge and the Medicine Wheel make up the frame for the model. The circular Earth Lodge is the traditional dwelling place of the Three Nations people. Each historic period is depicted in a layout with a visual image of the model on the left page and the narrative to the right. The model tells the story of the changes to the tribe's food pattern over time. The goal of this food model is to build community consciousness about how food and dietary changes impact community health and well-being. Furthermore, the model could help tell the youth, a generation that has witnessed only the result of the diet and lifestyle changes, the story of their diet transition.

## NUTRITION MODELS

### Traditional Food Pattern Pre-1880s

The narrative for the traditional food pattern (see Figure 1) describes the great agricultural tradition of the people of the Mandan, Hidatsa and Arikara Nations, known among tribes for their skill at raising crops of corn, beans, squash, sunflower, and tobacco for their food value and their value in trade with area tribes (Meyer, 1977).

The women in each family cultivated several acres of fertile bottom lands along the Missouri river. Enough food was produced and stored to supply their family throughout the year. Surplus crops were grown to allow for trade with other tribes and non-Native explorers and trappers (Wilson, 1987). The traditional foodway of the Mandan, Hidatsa, and Arikara people gave them superior nourishment, contributing to their great strength, endurance and health as a people and nation. Within the symbol of the Earth Lodge and the Medicine Wheel are the four essential components of the Mandan, Hidatsa, and Arikara food pattern:



**FIGURE 1. Traditional Food Pattern of the Mandan, Arikara, and Hidatsa Tribes.**  
 SOURCE: Used with permission of the Mandan/Hidatsa/Arikara Nations of North Dakota.

- The West Wind brings the rain clouds to nourish all living things. In traditional times, the people drank fresh water and teas.
  - The North Wind gives the buffalo and other grass-eating animals to hunt. Large game animals and fish nourished the people with protein and essential fats.
  - The East Wind brings springtime, a time of renewed plant growth and the beginning of the gathering season. A variety of plants were gathered for food and medicine.
  - The South Wind brings the warm summer wind and the growing season for the cultivated plants corn, beans, and squash. These starchy vegetables nourished the people year round with energy and nutrients.
- Together these food components sustained the people by providing a balance of nutrients.



We cared for our corn in those days as we would care for a child; for we Indian people loved our gardens, just as a mother loves her children; and we thought that our growing corn liked to hear us sing, just as children like to hear their mother sing to them. (Buffalo Bird Woman, Hidatsa, as quoted in Wilson, 1987)

### **A Changing Foodway—Introduced Foods Blend With Traditional Foods**

In 1887 the traditional village, Like-a-Fishhook, was being dismantled and the government began to place families on allotted land. New, introduced foods became a part of the Mandan, Hidatsa, and Arikara foodway. Many of these new foods were received through a food package issued monthly called “government rations”: coffee, sugar, flour, cereal, rice, beans, salt pork, and beef were common ration items (Miewald, 1995). During this period, the people continued to eat in balance by honoring the four food components represented in the Earth Lodge. Although people included new foods in their diet, they continued to live off the land; hunting, gathering, gardening, and raising livestock as a way of life. The people were generally healthy and had not yet witnessed the epidemic of diabetes or obesity. New infectious diseases such as tuberculosis, polio, typhoid fever, influenza, and others were the major health concerns of the time (Sanstead, 2002). The fertile bottom lands along the Missouri still provided the best land for gardening, gathering, hunting, and grazing livestock. The five communities were located near the river’s edge, where good water was easy to access.

### **Loss of the Bottomlands—Loss of Food Traditions**

It was the opinion of the delegates who worked on this model, depicted in Figure 2, that the single most disruptive event to their traditional food system was the construction of the Garrison Dam and consequent flooding of 96% of the Class 1 and 2 agricultural lands along the bottomlands of the Missouri River.

In the 1940s the people of Fort Berthoud were facing the greatest threat to their integrity as a people since the smallpox epidemic of 1837. For the first time in their history, they were going to be forced to leave the valley of the upper Missouri, their home of a thousand years. (Meyer, 1977, p. 210)

The construction of the Garrison Dam drove nearly 80% of the Fort Berthoud people from their valley homes, forever disrupting their economic, social, and religious community life. In 1951, the relocation process began. In 1954, the flooding of the bottom lands began. Also lost was plain timber, wild fruits and berries abundant in the valley, game animals that grazed in the valley, and fresh springs and creeks that provided a natural water supply. With the loss of these resources, the people became more dependent on a cash economy. No longer able to live a good life from working the land, the people depended on purchased foods and food-program foods to nourish their families. The dietary change resulted in a

decline in the health of the people. Diabetes was about to emerge as a major health threat to the people.

### **Eating out of Balance—Mid-1950s to Today**

The narrative for the “Modern Times” layout describes the changes in the economy and diet patterns that followed the dislocation of the people from their homelands (see Figure 3). A new dependence on market or commercially prepared foods existed as people no longer had arable lands to work. A majority of foods are accessed through grocery and convenience stores, at restaurants, and from fast-food establishments. Some of the more common food programs are: School Meals, Senior Meals, Commodity Food Program, and the Special Supplemental Nutrition Program for Women, Infants, and Children.

With the use of market foods, new trends emerged such as consumption of sweetened drinks and greater use of drinks containing alcohol. Rather than the quality meats of years past, people depended more on highly processed meat such as luncheon meats, hot dogs, and hamburgers. Access to fresh fruits and vegetables became more limited, as there were fewer gardens and places to gather plants, and people ate fewer fruits and vegetables (Byers, 1996). Farming and cattle ranching declined as sources of income. More people went to work outside of their community for a wage income. Oil leases provided an income for some members of the tribes. With this changing economy, changes were seen in the food patterns of the people (Meyer, 1977).

For the first time in the Native people’s history, most of their food came from market or commercial sources and, to a lesser extent, from food programs. For the first time, many no longer honored the four lessons of the traditional foodway.

1. Drinks contain added sugar and/or alcohol.
2. Meats are processed with added fat and less protein.
3. Access to and consumption of fruits and vegetables is poor.
4. Grains are highly processed and often fried.

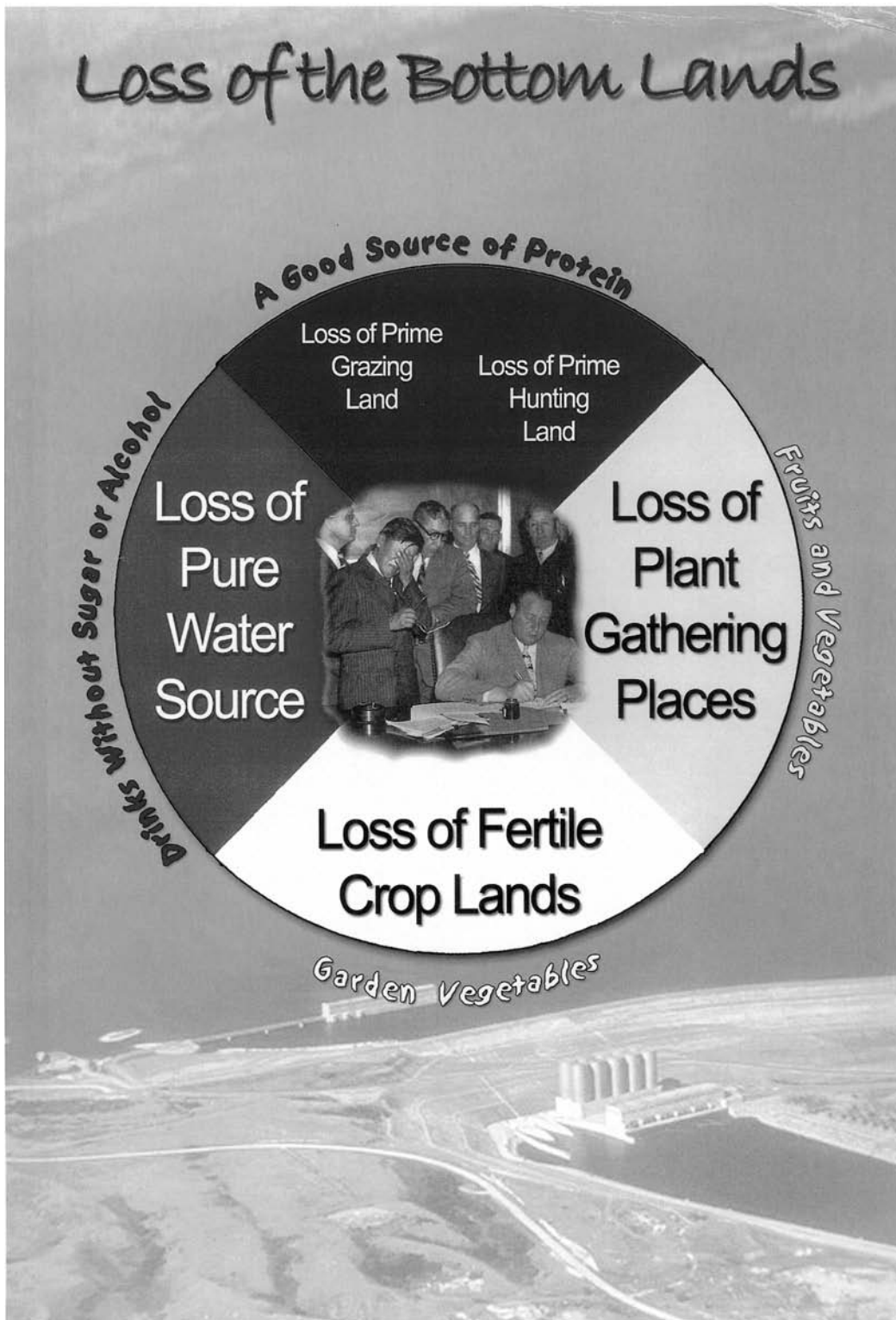
At the same time, the health of the Three Nations people suffered.

### **Restoring Balance With Healthier Choices**

The path toward healing must start in the past if it is to lead to wellness for Native people in the future. (L. DeCora, RN, as quoted in SEVA Foundation, 2002, p. 20)

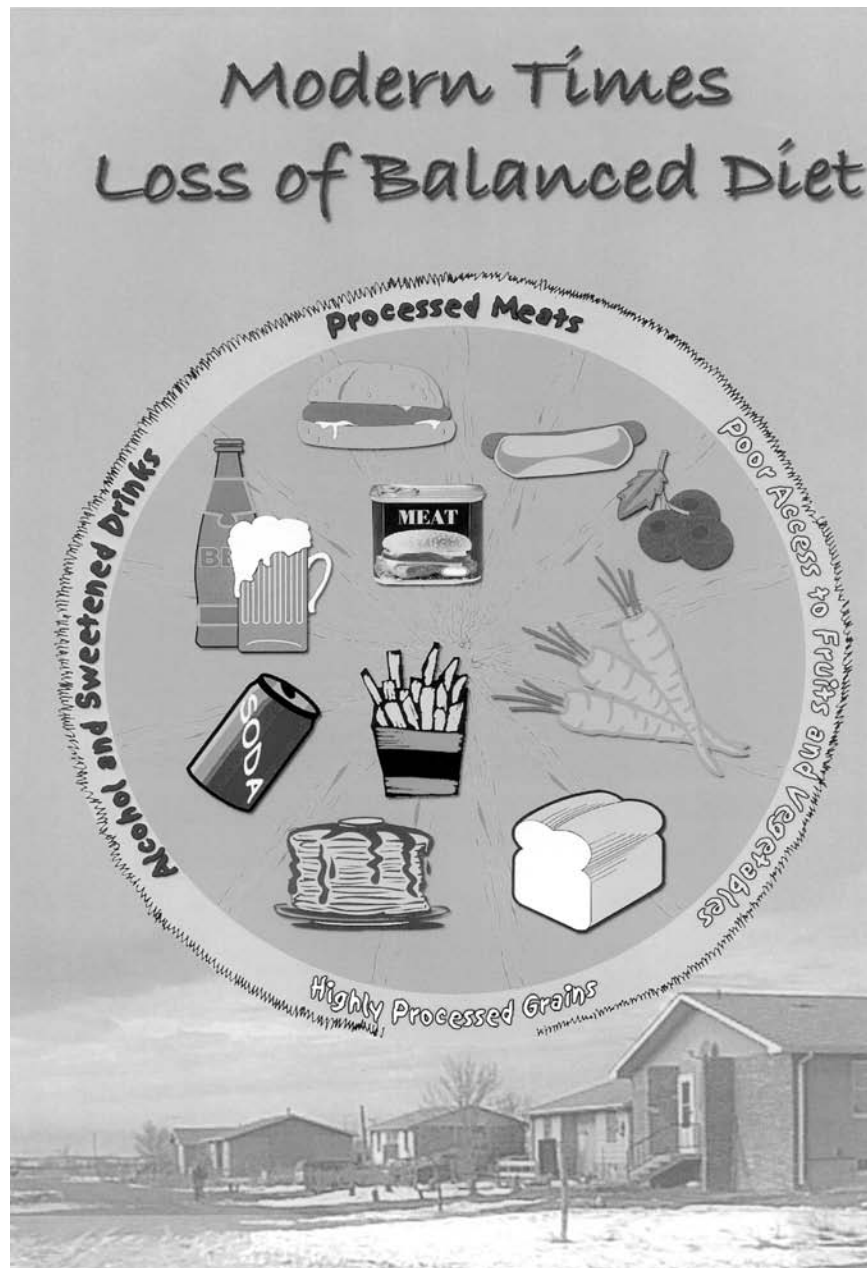
Our ancestors left us their example of good nutrition and superior health. They taught us that food is a gift from the Creator and a spiritual medicine to be eaten respectfully and in balance. (Rick Two Dogs, Lakota spiritual leader, personal communication, January 20, 2002)

To honor their example of good nutrition, Native peoples can choose to eat from the four components of their traditional food pattern, using both contemporary and traditional foods, as shown in Figure 4. A balanced plate of food for today includes the four components of the traditional foodway:



**FIGURE 2. Loss of the Bottomlands—Loss of Food Traditions.**  
 SOURCE: Used with permission of the Mandan/Hidatsa/Arikara Nations of North Dakota.

- water and nourishing drinks,
- a good source of protein,
- fruit or vegetable,
- whole grains and/or starchy vegetables.



**FIGURE 3. Loss of a Balanced Diet: Mid-1950s–Present.**  
 SOURCE: Used with permission of the Mandan/Hidatsa/Arikara Nations of North Dakota.

In a balanced meal, no one food group dominates the plate. Foods that are minimally processed are more similar to traditional foods. Less-processed foods include whole grain breads and cereals, fresh cuts of lean meats, fruits and vegetables without added sugars, and unsweetened drinks. Fats that are more similar to traditional fats are sunflower oil and fat from grass-fed animals.

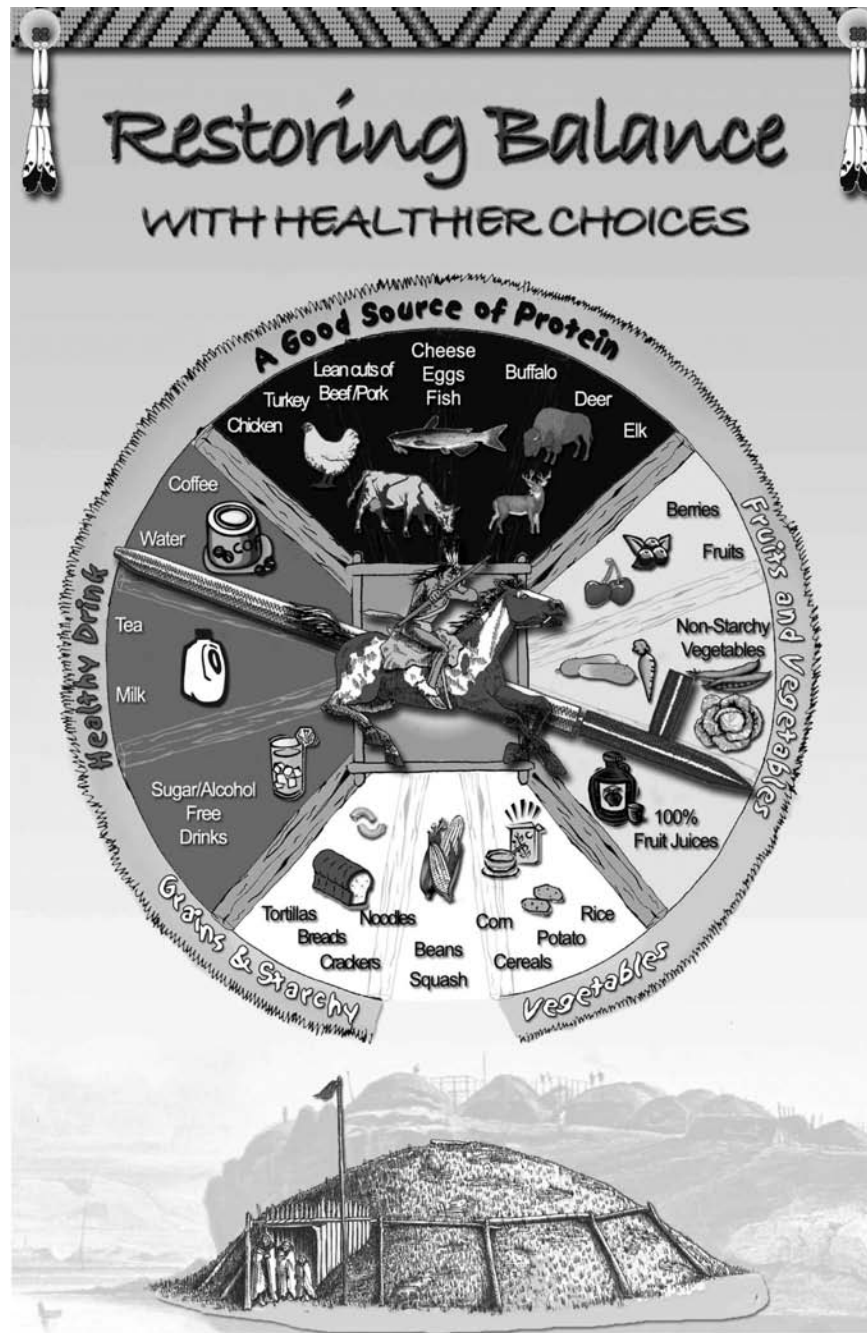
Keeping our connection to our land by hunting, fishing, gathering, planting, drying, and preparing our traditional

foods will strengthen our people and sustain our traditional food system into the next generation. (Hugh Baker, Hidatsa, food model project initiator, personal communication, December 5, 2003)

### APPLICATION

Participants use practice sheets in the form of a blank food wheel/Earth Lodge to plan a meal to include the four food components. In practice sessions when teaching and





**FIGURE 4. Restoring Balance With Healthier Food Choices.**  
 SOURCE: Used with permission of the Mandan/Hidatsa/Arikara Nations of North Dakota.

applying the model, participants have reported much ease in learning and using the lessons of the nutrition model. Several participants commented that the wheel is easier to understand and use than the USDA Food Guide Pyramid. Plans for an educator’s tool kit to accompany the model are in progress through a partnership with the United Tribes Technical College in Bismarck, North Dakota.

**California Native Food Nutrition Model**

In 2003, the California Rural Indian Health Board Committee for Traditional Indian Health commissioned a nutrition model for American Indians living in California. The project convened at the 23rd Annual Traditional Indian Health Education Program, where a team of knowledgeable

elders from a wide range of California tribes was assembled to share expertise on each tribe's food system change with a nutrition consultant. A Native food history survey was distributed to elders from a common tribal region. These surveys explored the following questions:

1. How were traditional foods hunted, gathered, preserved, and prepared?
2. What foods did the Spanish and miners/settlers introduce?
3. Provide a timeline of when your tribe's Native diet began to change.
4. What Native foods are a part of your tribe's daily diet today?
5. How would you describe the health of your community?
6. Describe your "modern times" diet.

Recognizing the great geographic diversity of California and the impact this has on traditional food varieties, the survey was sent out to participants representing tribes from each of these four regions: Northern California, Southern California, Central Valley, and Eastern Sierra. Responses were used to help develop a common food model.

Historic references were used to identify key historic events that shaped the changes in the food system and diet of California Natives. The coil basket with protruding quail feathers along the edge of the basket and the Medicine Wheel comprise the frame of the model image. The acorn was chosen to be placed at the center of the basket, representing its important place in the diet of nearly all tribes of present-day California. The availability of good, pure water and recognition that all living things depend on water is represented by the blue ribbon of water that circles the basket. Inside the basket are images facing the four cardinal directions: the thunderbolt (a symbol for water), a four-legged animal and a fish trap, gathering hands to the East, and corn and the spiral representing life force or energy.

#### California Foodway—Traditional Times

From birth to the final ceremonies of death, baskets were the most common material items in the lives of Native Californians. The symbol of the coiled basket for this model, depicted in Figure 5, recognizes its multiple uses in cooking, storing, and carrying Native foods. The orientation of the four seasons and the four directions was brought into the basket, representing the seasonal variation of food availability and use in the following ways:

**Acorn** is at the center of the basket as it is highly valued as a nutritious staple food, providing a balance of protein, carbohydrate, fat, and other nutrients. The acorn harvest and rituals are a common activity among the diverse California tribes. For some tribes, acorns composed more than half the diet, eaten every day as mush, bread, or soup.

**West:** The Western sky brings the thunder clouds and the life-giving rains that nourish all living things. The Western quadrant includes healthy drinks used in traditional times.

**North:** The North represents the important contribution of fish and the "four-legged" to the diets of Native Californians. Important sources of protein and essential fats included salmon, trout, shellfish, deer, elk and bear, small game, insects, and nuts.

**East:** The Eastern direction represents springtime, a time of renewed plant life and the beginning of the gathering season for foods and medicine. In the East, we recognize the important contribution of the gathered plants in nourishing the people with vitamins, minerals, and other plant nutrients.

**South:** The warm Southern wind brings the summer growing season. Although few Californian tribes actively cultivated, some cultivated crops such as corn and beans were traded. Native grains and starchy roots/bulbs such as brodiaea, tule potatoes, and camas (rich in carbohydrate) are represented by the South quadrant.

**Water** surrounds the border of the basket, representing the clean spring waters that once nourished the people.

Together these four food components sustained the people by providing a balance of nutrients.

#### Loss of Traditional Food System

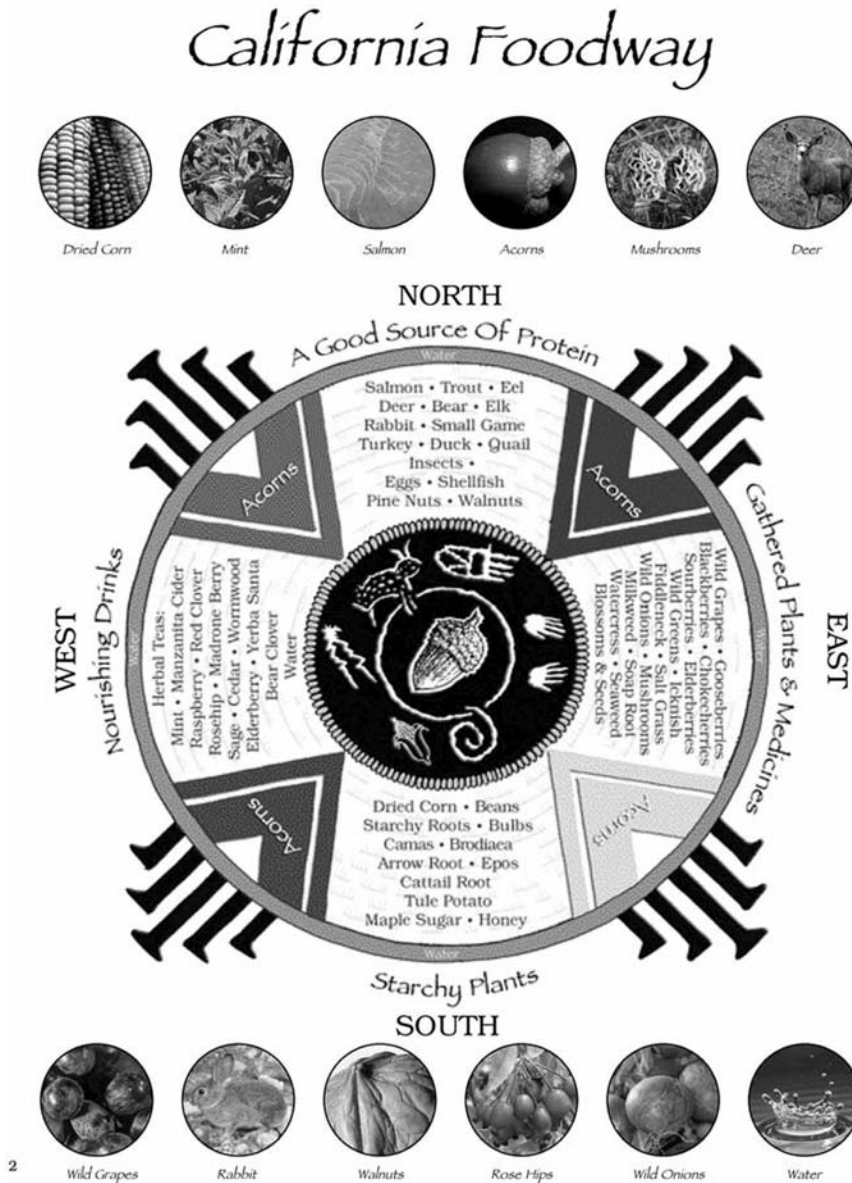
On a spring day in 1769, a small Spanish vessel sailed into the Bay of San Diego and dropped anchor. During the next 64 years, Spanish missionaries would establish 21 missions and several forts that would ultimately transform the lives of Californian Indians and lead to their near extinction. Under the supervision of the Franciscans, tribesmen were forced to renounce many of their old beliefs and activities. Rather than harvesting acorns, hunting deer, or gathering shellfish, they were expected to cultivate grains and vegetables, work in vineyards, and tend horses, cattle, sheep, pigs, and goats. The missions devastated the Native population through outbreaks of new infectious diseases, forced labor with inadequate food, and brutal conditions—all to weaken the spirit of the people. Deaths far outnumbered births because few children born at the missions survived infancy.

The missions often held the richest, most fertile lands, controlling eventually 20% of all land in California. The rapid loss of tribal lands, loss of language and cultural practices, and newly introduced foods transformed the food patterns of the people. Introduced foods eventually became more available than traditional foods. The food pattern from this "Contact Era" blends both traditional and introduced foods (see Figure 6).

By the 1820s, Mexico was independent of Spain, and California became a Mexican province. In 1834, Mexico officially secularized all mission lands. Soon after this, many of the mission Indians were landless, forced to take any kind of work.

The year 1848 saw the transfer of California from a Mexican province to a Territory of the United States under the Treaty of Guadalupe Hidalgo. Also in 1848, the "discovery" of gold at Sutter's sawmill set off a rush to California that would end the old world of Californian Indians and





**FIGURE 5. California Foodway: Traditional Times.**  
SOURCE: Used with permission of the California Rural Indian Health Board.

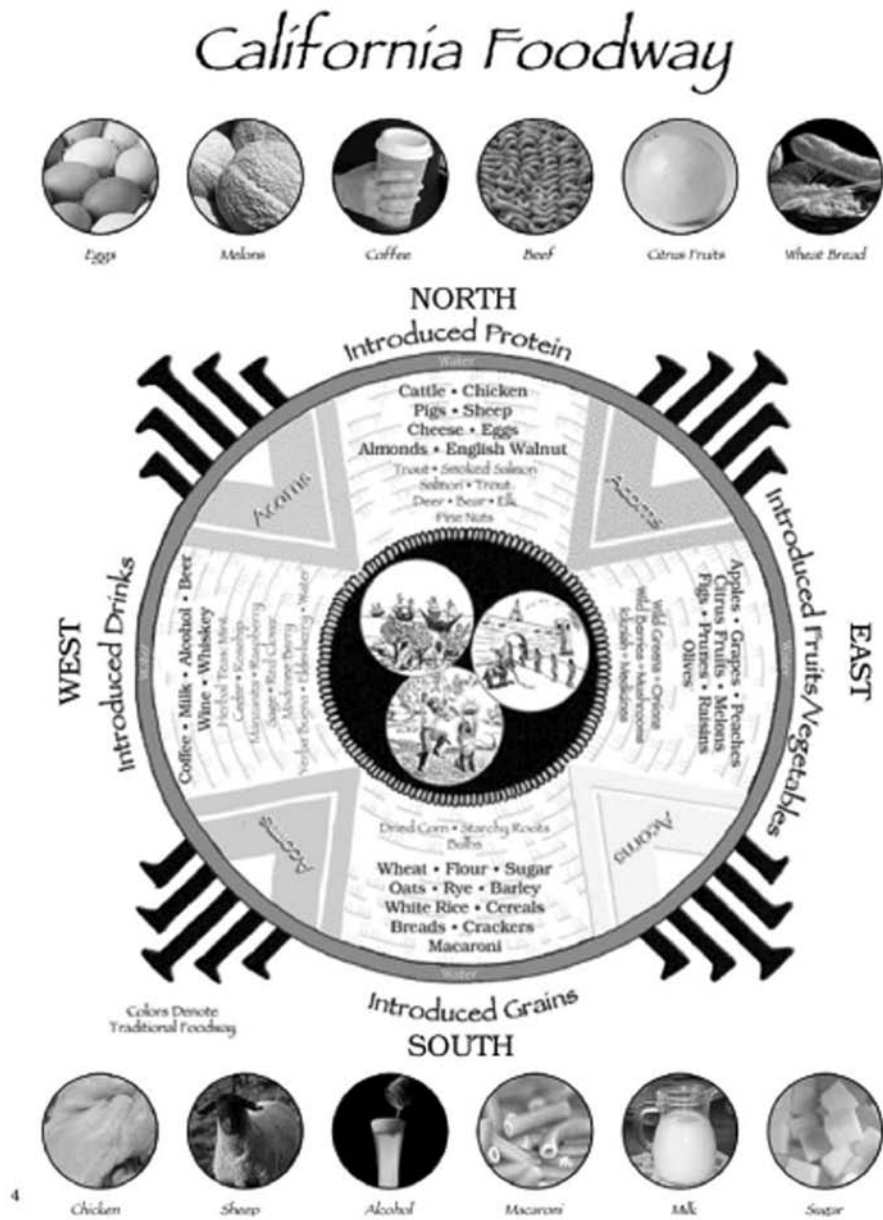
change their lives forever. These 49ers' hunger for land and natural resources devastated what little remained of tribal lands and populations.

Today Californian tribes occupy only 1% of their original land holdings. With the loss of the natural resources on land and in the rivers and ocean, the people are more dependent than ever on the cash economy. No longer able to live a good life fishing and gathering from the land, the people depend on market and food-program foods to nourish their families. Traditional foods are higher in protein, iron, omega-3 fatty acids, zinc, and other minerals and lower in saturated fats than

market foods (Norgaard, 2004). Furthermore, traditional food has great cultural, religious, and social values for tribal peoples.

The loss of traditional food sources is now being recognized as being directly responsible for a host of diet-related illnesses among Native Americans including diabetes, obesity, heart disease, tuberculosis, hypertension, kidney disease, and strokes. (Joe & Young, 1993, p. 2)

The years during relocation and establishment of the reservation system were very difficult ones for many reasons. Tribes had great difficulty adapting to the new life thrust



**FIGURE 6. California Foodway: Loss of the Traditional Food System.**  
SOURCE: Used with permission of the California Rural Indian Health Board.

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. (Jackson, 1993, p. 388)

**Broken Basket: Modern Food Pattern: 1950s–Present**

Market foods and or commodity foods have replaced nearly all the traditional diet. These market foods do not contain high-nutrient density but provide carbohydrates, energy, and nutrients through fortification (Kuhnlein & Chan, 2000).

Today, foods require no effort to gather or prepare them. Food finds us at every turn, rather than us actively seeking our supply of food and its preparation. Food choices often reflect a new taste preference for foods rich in fat and sugar. (L. Navarro, Shasta Tribe, personal communication, May 21, 2005)

Today, the growers do not always respect the plants and animals used for food, such as in the case of plants and organisms that are genetically altered in ways that could not happen naturally to produce a trait that is desirable for the

## Broken Basket



*“Our basket has come apart from misuse and neglect”.*

*Quote from California Native*

**FIGURE 7. Broken Basket: Modern Food Pattern: 1950s–Present.**

SOURCE: Used with permission of the California Rural Indian Health Board.

marketplace. The modern food pattern, shown in Figure 7, is in sharp contrast with the four components of a traditional meal pattern.

- Drinks are often sweetened or contained alcohol.
- Meats are processed with more fat and less protein.

- People consume few servings of fruits and vegetables.
- Processed grains and fried starchy foods predominate.

California Native people have experienced serious and costly health consequences resulting from the typical American diet replacing their traditional diet.



# Restoring Nutritional Balance



**FIGURE 8. Restoring Nutritional Balance With Healthier Food Choices.**  
 SOURCE: Used with permission of the California Rural Indian Health Board.

## Restoring Balance With Healthier Food Choices

Weave healthy foods into your life—prevent diabetes. (Karuk Tribe Public Health Message, as quoted in Norgaard, 2004)

Our ancestors left us their example of good nutrition and superior health. In a modern time, we can choose to honor their example by eating from the four components of our traditional food pattern using both traditional and contemporary foods. (Kibbe Conti, author of Four Winds Food Model)

A balanced plate of food includes the four components of a traditional food pattern (see Figure 8).

- water and nourishing drinks,
- a good source of protein,
- a fruit or non-starchy vegetable,
- a minimally processed grain or starchy vegetable.

In a balanced meal, no one food group dominates the plate. Foods that are minimally processed are more similar to traditional foods. Less processed foods include whole grain breads and cereals, fresh and smoked fish, fresh cuts of lean meats, fruits and vegetables without added sugars, and unsweetened drinks. Keeping a connection to the land by hunting, fishing, gathering, planting, drying, and preparing

traditional foods will strengthen the people and sustain food traditions into the next generation.

## DISCUSSION

The California Rural Indian Health Board plans to complete and distribute the California Foodway Model in 2006. It is designed so that individual California tribes can include their specific traditional or regional foods in the basket design. In so doing, they can more accurately tell the story of each tribe's food system change. On a national level, the Boys and Girls Clubs of America have used the food wheel common to these two models in their TRAIL (Together Raising Awareness for Indian Life) to Diabetes Prevention Curriculum. This curriculum, designed for after-school programs, has gone out to 70 Boys and Girls Clubs in Native American communities. The Four Winds Nutrition Model was a precursor to the California and Three Affiliated Tribes food models and is a copyright of Northern Plains Nutrition Consulting.

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