

# SAMPLING AND ANALYSIS OF ALASKA NATIVE SUBSISTENCE FOODS

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## ABSTRACT

Disease patterns and dietary practices of Alaska Natives differ substantially from the general US population. A wide variety of subsistence foods continue to be commonly eaten in over 200 villages in Alaska; comprehensive composition data are needed for population-specific health research and tribal, state, and federal efforts to improve nutrition through preventive programs and nutrition education. USDA researchers, with contributions from the Alaska Native Dietary and Subsistence Food Assessment Project, are developing a database on the nutrient content of 50+ traditional Alaska Native foods. The number of tribal villages and the diversity in the food supply across tribes necessitated sampling strategies for foods which are fished, hunted, harvested, or prepared by Native methods. Bearded seal meat, seal oil, Beluga whale, caribou, Canadian and snow geese, fermented sheefish eggs, Kobuk River broad white fish, preserved herring, salmon, sheefish, wild blueberries, and blackberries, among others, were collected for analysis or analyzed; analysis for about 100 nutrients are performed using official, validated methods, and under a rigorous quality control program. Data on these foods and from other published sources were or will be released on the USDA website: <http://www.nal.usda.gov/fnic/foodcomp/> and to the tribes.

## INTRODUCTION

Foods from the land and sea have nourished Alaska Natives for thousands of years and are still widely eaten, particularly in the over 200 villages of rural Alaska. These foods tend to be more nutrient dense than store-bought alternatives, and are significant sources of protein, mono- and polyunsaturated fatty acids including omega-3s, vitamins A, C, D, and E, and iron and zinc. Native foods not only provide nourishment, but collecting, processing and eating them is critical to preserving culture and providing physical activity. Existing studies, although limited, associate eating Native foods with positive health outcomes. Daily consumption of seal oil and salmon has been associated with improved glucose tolerance (1); consumption of subsistence foods rich in omega-3 fatty acids and selenium have been associated with reduced rates of prostate cancer rates in Canadian Inuit (2). In general, Alaska Natives, health professionals and researchers are interested in learning more about the health giving properties of traditional Alaskan foods. However, existing food composition databases contain incomplete information; nutrient data for some foods are nonexistent (e.g., vitamin D, vitamin K), and many of the existing analysis were performed up to 40 years ago; Nobmann found that 93% of analyzed traditional Alaska foods are missing data on folacin content (3). In addition, many foods have never been tested, particularly in the form in which they are preserved and prepared (e.g., dried caribou, fermented sheefish).

This collaboration supports development of a comprehensive and high-quality database on the nutrient content of approximately 50-100 traditional Alaska Native foods, part of a larger USDA American Indian/Alaska Native (AIAN) Foods Database being developed by the Nutrient Data Lab (NDL). Tribal and public nutrition educators, health professionals, and researchers will gain valuable information in efforts to promote continued consumption of subsistence foods and overcome chronic diseases and health problems facing members of the the Alaska Native population.

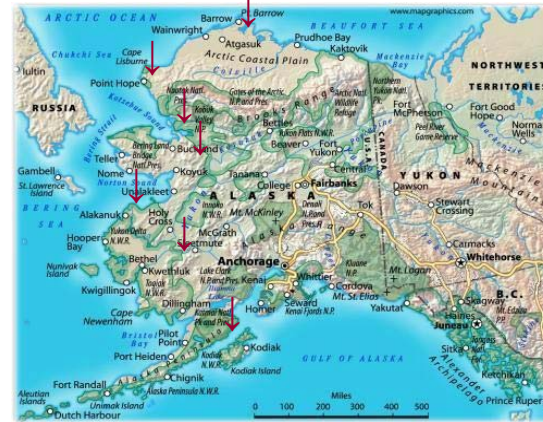


Figure 1. Alaska Native Tribal Areas: Sampling Sites. Sampling and preparation of subsistence foods took place primarily in the Inupiaq (Northwest) and Yupik and Yu'pik regions (West). This included Kotlik, Shungnak, Chevak, Kotzebue, Stebbins, Buckland, Point Hope and also the southern site of Chignik.



Top: Mary Gregory (Yupik) picking wild rhubarb. Photo contributed by the Diabetes Prevention Program, Yukon-Kuskokwim Health Corporation.  
Bottom: Ben Snowball (Yupik) cooks whale meat.



## METHODS

### Food pickup and sample preparation –

- Tribal members and researchers identified and prioritized subsistence foods for sampling.
- Commonly consumed foods donated from 6 village tribes or subsistence foods expert for the project.
- Multiple samples collected within/among villages when possible.
- Foods preserved (dried, frozen, fermented, canned, smoked) or prepared (boiled, fried or baked) as commonly eaten.
- Foods frozen (–70 ° F) and shipped on gel ice (foods).

• Food Analysis Lab Control Center, Virginia Polytechnic Institute and State University Samples: sample homogenization, QC materials, shipped samples to analytical labs on dry ice.

### Sample analysis –

• Analysis for ~100 nutrients, i.e., proximates, vitamins, minerals, amino and fatty acids, carbohydrates, carotenoids and phytonutrients. Most assays AOAC International methods:

- Selenium: AOAC 986.15 (9.1.01)
- Folate: AOAC modified 992.15 (50.1.21), microbiological
- Vitamin K (phyloquinone): HPLC, Booth & Sadowski, *Methods Enzymol.*, 282 (1997) pp. 446
- Fatty acids: GLC, CE 1-62 (1997)
- Vitamin D: AOAC 982.29 (modified)

• Quality Control: blanks, duplicates (where sufficient sample is available), spikes, blind control composites, and in-house control samples, e.g., Standard Reference Materials (SRM).

• Internal and external data reviews.

*Sampling of endangered species is approved under the National Marine Mammal Laboratory 782-1694 permit, National Oceanic and Atmospheric Agency.*

TABLE 1. Subsistence Foods in Alaska: Preliminary Data for Select Nutrients<sup>1</sup>

Food, Plant	Protein g/100g	Fat g/100g	Folate	Vitamin K <sup>2</sup> mcg/100g	Total Sugars g/100g
Blackberries	0.5	0.5	3.2	6.1	2.3
Blueberries	1.2	0.6	10.0	17.8	5.6
Salmonberries	1.0	0.3	17.0	14.8	3.6

<sup>1</sup> A dash indicates food is not expected to contain measurable amounts. <sup>2</sup> Phylloquinone. <sup>3</sup> Estimate as sum of fatty acids.

Food, Animal	Protein g/100g	Fat g/100g	Omega-3 g/100g	Se mcg/100g	Vitamin D mcg/100g
Caribou, raw meat	22.6	3.4	0.2	12.5	--
Caribou, dried meat	54.5	4.8	0.2	36.8	--
Salmon, Chum (Dog), dried	60.9	10.6	1.6	97.5	--
Salmon, King (Chinook), kippered	24.8	12.5	1.6	30.5	1.2
Salmon, red (Sockeye), canned	27.3	5.6	1.3	40.3	--
Salmon, red (Sockeye), kippered	24.5	4.8	0.9	33.5	2.0
Sheefish, dried	22.2	2.8	0.6	42.3	--
Whitefish, dried	62.4	13.4	1.5	113.0	--
Whitefish eggs	21.3	5.8 <sup>3</sup>	1.7	92.8	--
Seal (bearded) meat, dried	62.4	2.3	---	---	--
Seal (bearded) meat, dried, in oil	35.3	25.1	0.8	90.8	--
Seal (spotted and bearded) oil	0.1	99.7	18.36	6.5	<2.0
Whale, Beluga meat, dried	66.6	8.4	.3	103.0	--
Whale (Beluga) oil	0.1	97.5	8.8	3.0	5.7

Efforts continue to expand collaborations with other tribes and researchers. The focus of analysis continues to be for highly consumed subsistence foods, particularly where limited or no data are available. Ongoing methodology research to resolve analytical challenges (e.g., post-harvest vitamin C deterioration, particularly in berries) parallels this work. In addition to sampling new foods, sampling and analysis of previously analyzed hunted and harvested foods will continue over time and in different regions of Alaska in order to expand the mean and variability estimates of these foods. Sampling of seasonal greens (e.g., wild rhubarb) and additional berries is planned for the summer and fall of 2005; sampling of wild fish (e.g. halibut, salmon) and marine mammals from other regions of Native Alaska are in progress. These new analytical data for tribe-supplied foods are provided to the tribe to support nutrition education, health programs and interventions, and the research community.

## REFERENCES

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## RESULTS

To date, about 20 subsistence foods (plants, fish, game and marine mammals) have been sampled from 6 village tribes in Alaska and have been analyzed for several emerging nutrients of health concern, such as folate, omega-3 fatty acids, selenium, sugars, and vitamin D (Table 1). Other sampled foods not yet analyzed include snow goose, walrus, ringed and spotted seal, and salmon eggs. In addition to this research, the AIAN Foods Database also includes previously published quality data and supportive information (4). Nutrient data for nearly 100 Alaska Native foods are included in the USDA AIAN database, found on the NDL website: [www.nal.usda.gov/fnic/foodcomp..](http://www.nal.usda.gov/fnic/foodcomp..)