Listening & Learning

Alaska Native Science Commission Newsletter

Naalaktuaqtuni Ilitchiruni-lu: Listening & Learning

Volume 4, Issue 1 **Summer 2003**

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The Nenets: Passing On Their Heritage in a Changing World

By Sven Haakanson Jr.

From 1994 to 1997, I had the honor of traveling to and working in the Yamal Peninsula in the Western part of Siberia, Russia. During this period, I spent the summer months working with Dr. William Fitzhugh, Director of the Arctic Studies Center, Smithsonian Institution, Washington DC and Dr's. Andre Golovnev and Natalia Federova, Ekaternburg University, Russia where we conducted archaeological surveys and excavations.In 1994, we ran into a group of Nenets Reindeer Herders who were living very traditionally. Immediately, I wanted to learn more about who they were and how they had maintained their traditional way of life. It wasn't until 1996 that I was able to return in the winter to live and work with Brigade 17 of the Yarsalinskie Solvkhoze to conduct ethno-archaeological research for my dissertation. This is a combination of ethnographic and archaeological observations to understand how the Nenets created sites in the winter and summer months. What I learned was they followed a very structured pattern based on their traditional ways and this influenced how sites were created. Brigade 17 moved every five to ten days in order to ensure that their reindeer did not overgraze their land and to follow the seasonal cycles. There were over 20

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Northwest Regional Meeting Conveys Environmental Concerns

The Alaska Native Science Commission (ANSC) received funding from the National Science Foundation (NSF) to conduct statewide regional workshops to provide technical, and scientific, and to communities regarding NSF research. The regional workshops assist in gathering Native community research priorities and recommendations, and developing regional community research plans.

The Northwest Regional meeting was held in Kotzebue January 22-24, 2003. The ANSC Board of Commissioners, staff, and Dr. Anna Kerttula, Program Director and Renee Crain, Science Assistant for the Arctic Sciences Section, Office of Polar Programs, Na

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The Nenets (Continued from page 1)

brigades following a set migration route and rarely did they overlap with others as they migrated north in the summer and south in the winter. I learned how to make *Nardi,* (sleds), set up *mya* (chooms or tepees) and appreciate how lucky they are and we are to live as we do today. The Nenets are proud to have maintained their culture and they are a wonderful model to use in knowing how important it is to continue living and passing on our own culture today.

What I experienced in this time was amazing. The majority of Nenets still speak their language, follow their traditional ways of life and continue to pass on their cultural heritage.

To experience living with them allowed me to see how important it is to preserve, maintain and continue sharing and passing on our cultural heritage as Natives. "

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This note only touches on the surface of all that I experienced, but it is important for you to know there are other cultures that even in hard times have been able to maintain and perpetuate their heritage.

More images can be viewed at the following web page:

www.thearctic.is/Phototour/Sven%20Haakanson.htm or if you want to learn more about who the Nenets are contact me at the Alutiiq Museum in Kodiak, Alaska at 907-486-7004.

Sven Haakanson Jr. is the director of the Alutiiq Museum in Kodiak, AK, and serves as a commis-

NW Regional Meeting (Continued from page 2)

tional Science Foundation were in attendance.

The meeting participants included Elders, hunters, gatherers, Native scientists, the City of Kotzebue, the Northwest Arctic Borough, Kotzebue IRA, Manillaq, Deering City Council, Unalakleet Tribe, Norton Sound Health Corporation, Savoonga, Native Village of Elim, NANA Regional Corporation, Native Village of Shungnak, Kiana Traditional Council, Kotzebue Elders Council, Point Hope, Aggaluk Trust, National Park Service, UAF-Chuckchi Campus, East Carolina University, University of Alaska Fairbanks, US Fish and Wildlife, and Alaska Fish and Game.

Meeting facilitator, Patricia Cochran, Executive Director of the ANSC, provided guidance, which included discussions on promoting Native co- principal investigators; fish abnormalities; cysts, death, and skin irregularity with marine mammals; the increase of bear and beaver; the increase of willow trees; the migration and sickness of caribou; the impact of climate change; and the cause and effect of various contaminants.

Patricia Cochran reviews a list of research projects going on in Northwest (NW) Alaska with regional meeting participants

Drs. Terry Chapin and Gary Kofinas of the University of Alaska Fairbanks presented research on climate change and how it is affecting the Arctic, and the migration routes of caribou herds in Alaska and Canada. The presentations were of great interest and many comments and questions were asked. A list of 38 research projects that are being carried out in the region and a list was handed out to the participants during the meeting. The research projects are being conducted by the National Science Foundation, Alaska Department of Fish and Game Division of Subsistence, University of New York, The National Park Service, and US Fish and Wildlife Service and are just a sample of the new area research.

The Alaska Native communities voiced their concerns and provided suggestions about the methods and types of research that are being conducted within their communities. Their contributions will be compiled into a regional report. After reviews by the participants, the regional report will be provided to the National

(Continued on page 3)

NW Regional Meeting (continued from page 2)

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Calendar of Events

Sealaska Kusteeyi Program
University of Alaska Southeast
Juneau, Alaska
August 4-15, 2003
Roy Iutizi-Michell
907-586-9272
r *oy.iutzimitchell@sealaska.com*

Region X DHHS Tribal Consultation
Anchorage Sheraton Hotel
Anchorage, Alaska
August 8-9, 2003
Lorena Sklonberg
907-568-6006
lskonberg@anhb.org

Tanana Chiefs Conference Wellness Gathering
Chena River Convention Center
Fairbanks, Alaska
August 11-14, 2003
Susie Frantz
907-452-8251, x3141

54th Arctic Science Conference
University of Alaska Fairbanks
Fairbanks, Alaska
September 22-24, 2003
Jennifer Risse
907-474-5365
risse@giseis.alaska.edu

North Pacific Research Board
Hotel Captain Cook
Anchorage, Alaska
October 1-2, 2003
Dr. Clarence Pautzke
907-278-6772
cpautzke@nprb.org

32nd Annual

North American Association for Environmental Education Conference
Anchorage, Alaska
October 7-11, 2003
Eric Wade
907-376-0970
http://naaee.org/conferences/index

Alaska Federation of Natives Annual Convention
Egan Convention Center
Anchorage, Alaska
October 20-25, 2003
907-274-3611
http://www.nativefederation.org/

Alaska Native Health Board Annual Meeting
Anchorage, Alaska
November 4-6, 2003
907-562-6006

Meet Mr. Charlie Johnson, ANSC's New Commissioner of Circumpolar Arctic Research

Charlie Johnson was born in White Mountain, Alaska and is a member of the White Mountain Tribal Government, White Mountain Native Corporation, and Bering Straits Native Corporation. He is married with three children and currently living in Nome, Alaska. He earned his Bachelor of Science degree in Math and Business Administration from the University of Oregon in Eugene.

Presently, he is the Executive Director of the Alaska Nanuuq Commission and responsible for representing polar bear villages, the development of co-management and conservation programs with government agencies, and the negotiation of conservation treaties with Russia and the Natives of Russia.

L to R: Patricia Cochran, Charlie Johnson, and Elaine Abraham

Additionally, he serves as the Chief Commissioner of the Bering Straits Regional Commission in developing visa free travel for Natives of Alaska and Chukotka (Russia) under an agreement signed by Presidents Bush and Gorbichev. He is also a member of the Sustainable Task Force, International Arctic Science Committee, which develops criteria and recommendations for policy and funding agencies for research in Arctic Sustainable Development policy in order to provide guidance to the eight nation Arctic Council.

Past positions he held include: Commissioner, US Arctic Research Commission; Executive Director of the Eskimo Walrus Commission; Vice-President, Alaska-Inuit Circumpolar Conference; and the President of the Bering Straits Native Corporation.

Ms. Taqulik Hepa, New Commissioner of Arctic Research

Ms. Taqulik Hepa was born and raised in Barrow, Alaska. She grew up living a subsistence based lifestyle and has great respect for her traditional and cultural way of life. Participating in subsistence hunting activities with her family has taught her many valuable lessons in subsistence survival skills.

Ms. Hepa holding a bear skull

Currently, Ms. Hepa serves as the Deputy Director for the Department of Wildlife Management for the North Slope Borough. In this capacity, she is in contact with many local people and outside agencies dealing with subsistence related issues. She serves as one of two Project Coordinators who designed and implemented the NSB Subsistence Harvest Documentation Project.

She is a member to the following Boards and Commissions: the Arctic Research Consortium of the U.S., Gates of the Arctic National Park and Preserve Subsistence Resource Commission, and Barrow Arctic Science Consortium. Taqulik cares deeply for the protection of her environment and subsistence resources and wishes to expand her opportunities to participate in the advancement of research programs in the Arctic.

Meet Ms. Nirvana Ramos, ANSC's New Student Advisor

Ms. Nirvana E. Ramos is the daughter of Charmain Ramos and granddaughter to Elaine Abraham, both of Yakutat. She belongs to the Raven Moiety, Copper River Clan from the Owl House. She is the daughter of the Daak Taan, Granddaughter of the Coho Clan, and Great Granddaughter of the Teik Weidi (Brown Bear). She is member of the Mt. Saint Elias Dance Group of Yakutat, Alaska.

In high school she represented Sealaska youth and was elected by her peers as chair of the Alaska Federation of Natives' Youth Council.

In 1994 and 1995, she completed two workshops held at Ellamek Elicaraq Summer Camp that focused on Aerospace and Biology. In 1996 and 1997, she received multiple year awards and was recognized in "Who's Who Among American High School Students."

She currently is an Architect & Engineering major at UAA and a Civil Engineering Intern at Alyeska Pipeline Service Company.

Meet Ms. Viola Stepetin, ANSC's New Student Advisor

Aang, (*Hello in Aleut*)

My name is Viola Joan Stepetin and I am a Student Advisor for the Alaska Native Science Commission. I am from the Pribilof Island of St Paul. That is my father's home and my mother is from Atka on the Aleutian Chain. At present, I am studying science technology and civil engineering at the University of Alaska, Anchorage.

In January, I traveled to Kotzebue for my first Board and regional meeting. I learned how the Board operates and their goals along with the mission statement and how these goals and objectives can be met. This was a rewarding and exciting learning experience for me.

While in Kotzebue, I met local Elders from the Northwest Region, representatives from the National Science Foundation and scientists performing various research projects in the region.

I learned the roles and interactions of these organizations and saw how changes would better serve the Native people of Alaska. I also learned of the challenges that are in the future for the Board and Alaska. However, after spending three days with the Board members and staff I have confidence that the challenges will be met.

My personal experience was spiritual growth. I was surrounded by strong and courageous Alaska Native leaders. I am gaining strength and confidence from them by watching, listening and learning. It is refreshing to be on the same team and speak the same language regarding Native issues and concerns.

I am proud to be part of the Alaska Native Science Commission Board and will strive to contribute as much as I can and make the most of my role as a student advisor.

Kobuk Watershed Stewardship Project

By Christina Wilson, Student Intern

The Kobuk Watershed Stewardship Project, managed by the State of Alaska Department of Natural Resource's Alaska Soil and Water Conservation District, is assisting five rural communities in protecting their water quality. Through a variety of water activities such as, data collection, community training on stewardship concepts, and increased communication with agencies and organizations, the much needed protection is being provided.

The project goals are:

- Document present day conditions of the Kobuk River water quality and start the continuous monitoring program,
- Localize delivery of technical support for watershed stewardship, andIncrease local capacity in the Kobuk Watershed for watershed stewardship.

There are four main reasons the villages decided to start a program to protect their water quality:

1) expanding communities, the population of the Kobuk has grown from 1,091 in 1980 to 1,440 people today, and accompanying this growth is increased pressure on subsistence resources and the drinking water, 2) tourism is on a rise, this puts pressure on water resources with in the watershed, 3) mining is becoming a problem in the area due to several rich mineral deposits within the Kobuk River and 4) there is no water quality data for the Kobuk Watershed because the watershed is relatively pristine, but no testing has been done to validate this.

The Alaska Soil and Water Conservation District is currently scheduled to

The Alaska Soil and Water Conservation District is currently scheduled to

visit the Kobuk to talk about funding for the program and plan a summer trip for data collection. The villages are inviting, the Department of Environmental Conservation, Maniilaq Native Association, and the National Park Service to inform them about the project and see what other resources are available for this effort.

For further information please contact Rachel Morse at 271-2424 ext. 108 or rmorse@alaskaswcds.org.

Christina was an intern at the Alaska Soil & Water Conservation District. She is currently studying for a Journalism Degree at UAA.

Meet Mr. Aaron Peters, Intern Alaska Native Science Commission

Meet Mr. Aaron Peters, a new intern with the Alaska Native Science Commission. He was born in Galena and raised in Ruby, a small Athabascan village in the heart of Interior Alaska. His mother's name is Mary Peters. He has three sisters and one brother. He graduated in 1997 with honors as the salutatorian from the Merreline A. Kangas School in Ruby. After high school, he joined the Air-force. After completing basic training in San-Antonio, Texas, he went on to the Air Force Police Technical School at Lackland Air Force Base, Texas. Upon graduation from Technical school, his first assignment was at Kirtland Air Force Base, in New Mexico. In New Mexico for three consecutive years, he was granted a top-secret clearance and able to see things that many ordinary people (civilians) are not able to see.

He credits his Air-force experience as a great way to learn responsibility, attain new world views, and discipline. While stationed in New Mexico, he attended the University of New Mexico as a part-time student. After his tour of duty, he worked for Alyeska Pipeline Service Company as a security officer in Valdez, Alaska.

Currently, he is in his third year as a biology major at the University of Alaska Anchorage. He received two competitive scholarships from the Alaska Native Tribal Health Consortium. In my free time, I enjoy cross-country running/skiing, reading, hiking, mountain biking, volunteering for different organizations, and I especially enjoy spending time with family and friends. I am looking forward to working with and meeting all of you.

Local Residents and Scientists Work as a Team to Understand Arctic Change

By Terry Chapin and Gary Kofinas, Institute of Arctic Biology, University of Alaska Fairbanks

It is not news to local residents that the Arctic is changing. What is exciting, however, is that local residents and university or agency scientists often see different parts of this picture. By combining our observations we are more likely to understand what has happened in the past and to predict how things may change in the future.

The climate of the Arctic is warming more rapidly than any place on Earth, but this warming does not occur every year or in every place. For example, the climate warms more rapidly in Alaska than in eastern Canada. The climate switches about once a generation (20 years) between relatively warm and relatively cool periods. On average, however, warming in the Arctic is occurring more rapidly at present than at any time in at least the last 400 years. The climate has also become less predictable. There are two major climate systems in Alaska: the arctic air mass, which is cold, and the temperate air mass, which extends south to the lower 48 and is much warmer. The boundary between these air masses in winter tends to lock onto either the Alaska Range (making interior and western Alaska cold) or the Brooks Range (making these regions warm). Every time the boundary between these air masses moves, the temperature changes by 10-20 degrees. Frequent changes in the location of this boundary explain why the climate has been so unpredictable and why the changes in climate of this region are so large. Alaska spends more of its time with a temperate air mass than it used to do.

This climate warming causes almost everything else to change. However, in many cases local residents know the patterns and causes of these changes better than do the scientists who study arctic change, because local residents spend more time on the land and see more places. For example, scientists have noticed that the forest is slowly moving into the tundra in the Seward Peninsula and the Noatak and that the tundra is becom ing more shrubby, but local residents may have the best information on where these changes occur and why. If these changes are common, they could cause the climate to warm more rapidly, because trees and shrubs absorb more heat than tundra and cause the local climate to become warmer.The ice and the ground are changing too. Sea ice is thinner and less predictable. On land, permafrost is beginning to thaw in places like the Seward Peninsula or interior Alaska where it is already warm. Satellite images show that lakes are drying up in many places. We need to work with local residents to understand where this has happened and what other ecological changes are tied to this.

Finally, the warmer climate has caused fire to occur more frequently. The area burned has doubled in the last 20 years. Local residents know from direct experience the impact of wildfire on habitat and wildlife. By working together as a team local residents and scientists have a better chance of understanding why these changes are happening and what will happen in the future.

Alaska Native Fish, Wildlife, Habitat, and Environment Summit Project

by Larry Merculieff

This past year, the Rural Alaska Community Action Program (RurAL CAP) hosted the first Alaska Native Fish, Wildlife, Habitat, and Environment Summit. Participants included Alaska Native Elders, hunters, gatherers, fishers, tribal and other leaders. The purpose of the Summit was to take a "snap-shot" of the condition of fish, wildlife, habitat, and environment around the state, compare information to the last fifty years, and develop recommendations for what communities need to do to deal with emergent challenges and issues.

Athabascans report lower water levels in Interior lakes and streams, with consequent effects on fish, birds, beaver, caribou, and other wildlife populations. Tlingit, Haida, and Tsimpsian Elders note adverse changes to forest ecologies from human activities. Siberian Yupiit report difficulties in forecasting weather due to major environmental changes. Inupiat and Central Yupiit report changes in sea ice thickness, migrating patterns of whales, rising water levels causing coastal erosion, large seabird die-offs, and declining populations of sea birds and walrus. Alutiiq, Aleut, and Yupiit peoples observe steady declines of sea lions, fur seals, harbor seals, sea otters, four species of eider ducks, arctic loons, cormorants, prey fishes, and certain species of salmon. Throughout Alaska, Native hunters are noting off-colored meat, changes in taste, or unusual lesions in large numbers of fish and wildlife.

The species experiencing severe and sustained declines in their populations are (and for thousands of years have been) an integral part of the way of life, cultures, community-wellness, and local economies of rural Alaska, and are essential to maintaining the integrity of marine and terrestrial ecosystems. Native cultures derive food, nutrition, ethics and values of stewardship, language, code of conduct, songs, dances, ceremonies, rites of passage, history, and a sense of place and spirituality from the lands and waters they are connected to. Wildlife declines of the magnitudes indicated by Alaska Native reports constitute a critical threat to the health and well-being of rural communities, and to the economic and cultural viability of all river, coastal, and inland communities throughout Alaska.

The "professors" of the Native world, the Elders, fault the Cartesian-based management paradigms and decision-making processes for such things as growing pollution in the rivers from outboard motor petroleum discharges, noise pollution from growing numbers of planes and boats, harassment and harming of fish by "catch-and-release" and tagging programs, wanton waste by industrial trawling fleets throwing all sorts of fish and other marine organisms overboard dead or dying, contamination of tundra and waters by airborne pollutants, and a complete lack of understanding of the sensitivity and connectivity of all things on this planet. The Alaska Native Elders are not reluctant to point out that such widespread degradation of environment and diminishing wildlife did not exist when they were children, but began with the introduction of these fish and wildlife management regimes and growing human caused disturbances.

The reports of Alaska Natives sound an alarm to the world that it must wake up and pay attention because these trends are not isolated to Alaska, and the changes they portend for this planet are huge. The Alaska Native Elders know that humans can cause things to change dramatically and quickly in the environment. They understand that the progression charts of the scientists attempting to predict changes in the environment fail to take into account the cumulative and collective impacts of change and how the synergy of the "parts" can result in very rapid shifts in the whole environment.

Who better to sound an alarm than people who have an intimate and sustained connection to the environment, like Alaska Natives. Their cultures have survived and thrived for thousands of years in the same ecosystems because they notice subtle changes to the smallest things that forewarn of consequences if certain behaviors or actions do not change.

The Elders understand that everything is connected, including humans. They understand and feel an urgency to develop real partnerships where their ways of knowing and others are brought together with respect and reciprocity. The environmental challenges are so daunting that we must find ways to eliminate the barriers between peoples and to tap into the worldviews and wisdom of all cultures. Indeed, for this reason, we may find that cultural diversity is as important as biologic or genetic diversity if the human being is to survive as a specie. Alaska Natives and people from other ways of knowing must find ways to reach out to each other, to dissolve distrust, to work WITH each other for the sake of all our coming generations. To Alaska Native Elders, it is not a question of whether or not Mother Earth will survive…it is whether or not we two-leggeds will. It is up to us.

Mercury Found in Commonly Prepared Subsistence Foods of a Rural Alaskan Village

By Roger F.N. Rothschild & Lawrence K. Duffy

In the characterization of exposure, proximity to a source is an inexact surrogate of actual contact with the toxicant from the source. The characterization of mercury exposure requires an understanding of all potential pathways through which mercury in the environment may result in exposure. This includes direct pathways such as through air and drinking water and indirectly through uptake in food sources. Over the years, there has been a desire by Alaskans to know the mercury (THg) burdens on Alaskan subsistence food users as well as any health impacts relating to THg in peoples diets. Many people in Alaska live a traditional subsistence lifestyle. For example, among Yup'ik, Alutiiq, and Inupiat, they have intakes of wild foods per individual which range between 375 to 600 pounds per year. Marine mammals, waterfowl, salmon, freshwater fish, caribou, and moose are the major sources of protein and fat in subsistence diets. The State of Alaska Section of Epidemiology has summarized data on the levels of mercury in Alaskan fish and humans several times over the last ten years. They reported that mercury levels are very low in the most frequently consumed fish from Alaska such as salmon. Eating fish provides both inexpensive and readily available nutrients.

Mercury is a natural element in the earth's crust which also is distributed to the circumpolar north by coal-fired utility plants and waste incinerators located at temperate latitudes. Within the biogeochemical cycle, the metal, Hg^0, can be oxidized to inorganic mercury (Hg II) and then methylated by bacteria. Concentrations measured in aquatic organisms are different according to their position within the food webs, particularly the piscivorous species which have the highest levels of contamination due to the biomagnification of the methylated form of the metal. In a recent study conducted in Alaska, pike (*Esox lucius*), a resident freshwater piscivorous species, had mean mercury levels greater than 500 ng/g wet weight and which often exceed the EPA critical value for human consumption. However, riverside populations of western Alaska tend to have low Hg levels in hair because salmon is their main source of proteins.

> *"Recent studies have focused on fish, but little is known about the THg levels in prepared foods."*

Recent studies have focused on fish, but little is known about the THg levels in prepared foods. It has been reported that mercury, including MeHg, remains bound to fish muscle during cooking (boiled) and drying. In one published study of Arctic char, *salvelinus alpinus*, an Inuit food, mercury concentrations increased four to six-fold during cooking and drying. In this report, we present the study conducted on native prepared food from the Napakiak community (Figure 1, ref 19). The principal goal was to identify the effect of food preparation on dietary Hg intake as well as identifying the traditional food items in the Yup'ik diet that may be associated with Hg exposure.

METHODS

While in the process of collecting diet recall interviews from the village of Napakiak (Figure 1, ref 19, population 200), food samples were collected. These samples were in the form in which the foods were normally consumed. The data presented here were returned to the village leaders and to the Yukon-Kuskokwim Health Corporation. Food samples were stored at -20^0C until analyzed for mercury. Total mercury (THg) was analyzed by cold vapor atomic fluorescence spectrophotometry (CVAF) after samples were digested with acid. For THg, 1 gram of sample was transferred to a 40 ml pre-cleaned vial, to which 7 ml of 70% HNO_3/30% H_2SO_4 was added. The samples were heated on a hotplate at 90^0C for 4 hours, until all soft tissue was dissolved. After cooling, the digests were diluted to a final volume of 37 ml with 10% 0.2N BrC1. For THg, aliquots of digests were reduced with $SnC1_2$, followed by CVAF detection.

To access the accuracy of THg determination, certified dogfish tissue (DORM-2) from the National Research Council of Canada was analyzed. Our recovery was 101.2% of the published values for DORM-2 for THg. A check standard and a blank were run after every 10 samples. A duplicate and a spike of samples were performed once for each run of 20 samples. Only descriptive analysis of the data was performed across food groups because of the small samples sizes.

RESULTS

Mercury was detected in 41 out of 45 food samples measured; their concentrations are presented in Table 1. The critical value for human consumption established by USEPA is .2 mg/g (200 ng/g). The range of mercury in all food samples in which mercury was detected was 1.0 – 443.8 ng/g. Concentrations in pike and mallard were higher than the EPA critical value, but lower than the FDA action level of 1000 ng/g. Because of the small sample sizes, levels can be strongly influenced by individual samples. The

(Continued on page 9)

Mercury found (continued from page 8)

Bearded seal is an example where the mean of 140 ng/g for an *n* =4 had a standard deviation of 151 ng/g.

The salmon foods qaamalluq and qiaqanuk showed THg concentrations ranging from 10 – 225.8 ng/g. The combined means for both red salmon and king salmon qaamalluq was 80.6 ng/g for *n*=6. These levels are higher than the boiled red salmon (36.6 ng/g). These levels are also lower than the dried Bearded seal, (*Erignathus gaibatus*), whose mean concentration was 140.0 ng/g (n=4).

As expected, plants have low THg level. Also the herbivores that feed on plants, caribou, reindeer, and moose, have low levels. The moose and reindeer stews, however, were similar to the seal stew.

DISCUSSION

The objective of this study was to obtain preliminary data about THg levels in traditional Yup'ik foods. Because of limited resources, only one or a few samples of each food item were collected and analyzed in this study. Relatively high values of standard deviation (1-105%; Table 1) were observed which suggests that there is a high level of intra-food type variation in mercury concentrations. Any dietary intake estimates based on low numbers of samples should be interpreted with caution.

Methylmercury (MeHg) concentrations in fish tissues are of special concern because of the potential of MeHg to biomagnify through the food web in aquatic ecosystems. MeHg is generally accumulated more efficiently from food than Hg in an inorganic form such as Hg^{2+}. The biological half-life of MeHg in fish is longer than that of inorganic Hg and MeHg is the major form of THg in fish muscle. As THg accumulates in the edible portions of fish, primarily as the MeHg, MeHg will be biomagnified up the food chain. Because of the importance of fishing, both commercial and subsistence, to Alaska's Yup'ik economy, the Hg in fish has become a focus of research interest. The concentrations of mercury in salmon derived foods are comparable to those reported in the literature (Table 2). For example, both smoked King Salmon (Table 1) and Red Salmon Qiaganuk have higher levels that the wild fish. Similar results were reported for Arctic char, where food preparation increased the concentration of THg in the fish muscle. There is a general trend that the prepared food items have higher THg concentrations than the raw samples. Red and King salmon feed at different trophic levels and King salmon generally have higher THg levels than Red salmon.

Marine mammals are usually on a higher trophic level than the terrestrial mammals used for subsistence so we expected to see differences between seal meat and caribou or moose meat. As seen in Table 2, we observed no difference in either THg in stews but the dried meat from seal was higher than caribou (Table 2). These levels are comparable with reported values for THg in the tissue and hair of these species. Lastly, plants and treats showed very low levels and should contribute little THg to a consumer total mercury burden.

The samples in this study were contributed by the Napakiak community and they may better represent the typical levels of mercury in the Yup'ik diet than samples of fish and wildlife collected for environmental studies. The low levels reported here are consistent with the low levels found in Yup'ik hair, however, monitoring programs to assess the changes in body burden with time should be considered. Our preliminary results suggest that mercury exposure is low but the small sample size and high variation warrants larger scale studies to increase confidence.

ACKNOWLEDGEMENTS

We are grateful to the village of Napakiak for their help and cooperation. This research was funded in part by UAF undergraduate research program (Provost Office) and Alaska EPSCoR program in Arctic Contaminants. We are also grateful for funding from the National Institutes of Health (NIEHS, NINDS, NIMH, and NCRR).

Tables stats — Tables 1 & 2 are on pages 10 and 11.

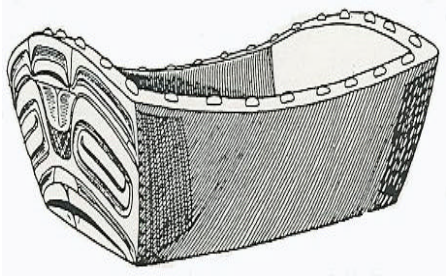


TABLE 1: MERCURY (THG) CONCENTRATIONS IN YUP'IK FOOD (NG/G)

FOOD SOURCE	THG	MEAN (S.D.)
Red Salmon (*O. nerka*)		
Qaamalluq		
Half dried, fermented	36.9	
	109.8	
	145.0	
	66.2	
	10.0	73.6 (54.4)
Qiaganuk		
Half dried	97.9	
	95.0	
	64.2	
	225.8	120.7 (71.7)
Red Roe	3.3	
Stinkhead (fermented)	337.7	
Head	40.8	
Boiled	36.3	
King Salmon (*O. tshawytsha*)		
Qaamalluq		
Half dried, fermented	115.6	
Qiaganuk		
Half dried	72.8	
	57.1	64.9 (11.1)

FOOD SOURCE	THG	MEAN (S.D.)
King Roe	6.6	
King Roe	7.7	7.2 (0.8)
Smoked King	113.2	
King Salmon with Seal Oil	117.4	
Pike (*Esox lucius*)		
Dried with Skin	443.8	
Blackfish (*Dallia pectoralis*)		
Dried	155.2	
Whitefish (*Coregonus nelsoni*)		
Dried	55.5	
½ Dried with Potatoes	33.6	
Meat		
Reindeer Stew (*Rangifer tarandus*)	11.5	
Moose Stew (*Alces alces*)	12.3	
Dried Caribou (*Rangifer tarandus*)	55.8	
Marine Mammal		
Dried Seal (*Erignathus gaibatus*)	347.1	
	149.9	
	62.9	
	0	140.0 (151.1)

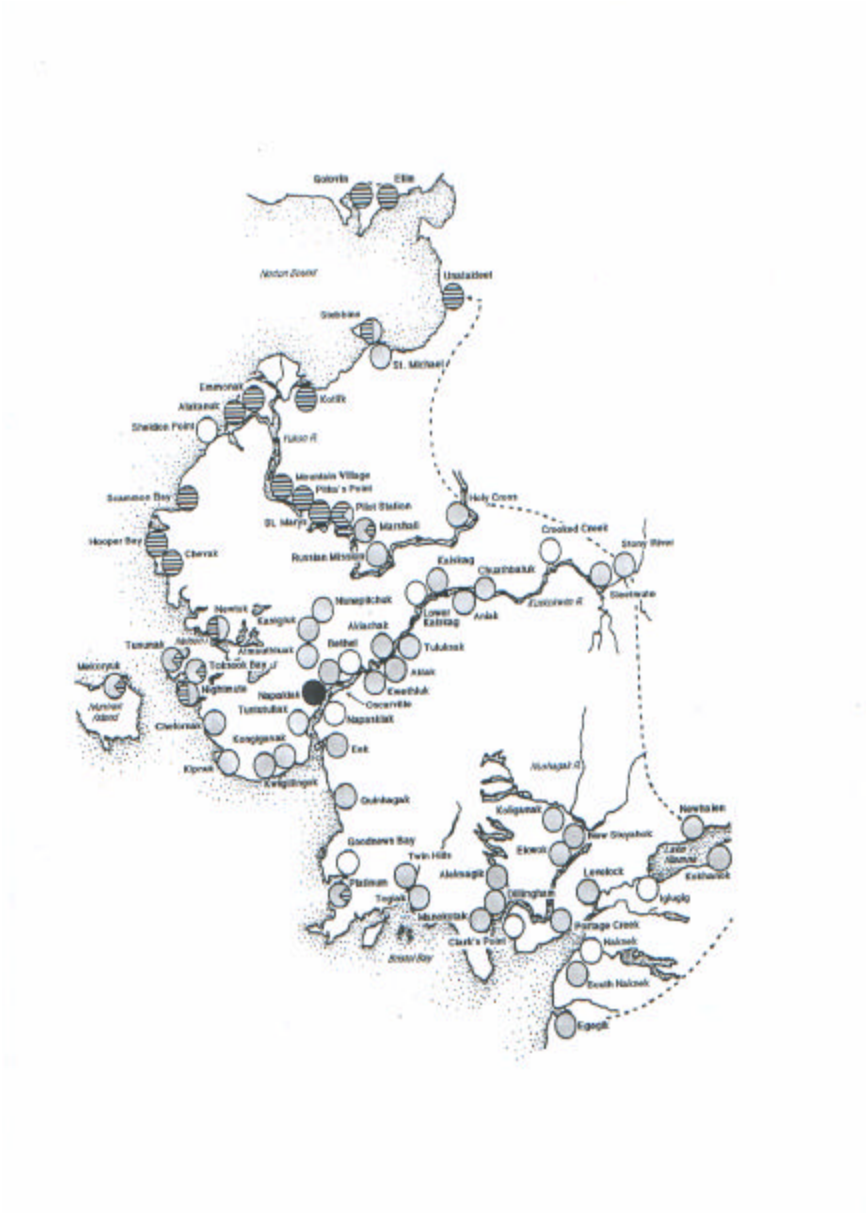
FOOD SOURCE	THG	MEAN (S.D.)
Seal Stew	6.0	
Birds		
Lesser Canadian Goose	6.2	
Dried Ptarmigan (*Lagopus lagopus*)	11.5	
Mallard Stew	357.2	
Plants		
Buttercup Greens	8.5	
Sourdough, Seal Oil and Sugar	3.9	
Tundra Tea	0	
Greens and Fish Stew	0	
Greens, Raw	3.1	
Wild Celery	0	
Boiled Fiddlehead	4.3	
Treats		
Aqutug	1.0	
	0	
	4.2	1.7 (2.2)

Table 2: Comparison of THg in traditionally prepared foods with raw foods (ng/g).

FOOD SOURCE	THG	MEAN (S.D.)
Qaamal-		Wild (ref.)
Red	73.6	51 (15)
King	115.6	80(15)
Qiaganuk		
Red	120.7	51(15)
King	57.1	80(15)
Stews		
Seal	6.0	17,200(18)
Reindeer	11.5	4.1(24)
Moose	12.3	135(25)
Dried		
Seal	140.0	17,200(18) 90-530(26)
Caribou	55.8	47.1(24)
Other Dried Fish		
Pike	443.8	823(11)
Whitefish	55.5	163(1)

Figure 1: Map of Yup'ik Alaska (19).

This figure shows the village of Napakiak. The figure represents the distribution of the Yup'ik words "to cook". The distribution here follows the common north vs. south pattern. Ega-is the original verb base for 'to cook'. In some Yup'ik areas, kenir- is used instead. Ega- is found in derivatives such as egan 'pot' (literally 'cooking device'), egamaarrluk 'partially dried and then boiled fish', and probably also egaleq 'window' (originally 'smoke hole'). Taken from ref. 19.



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New National Science Foundation Report

The National Science Foundation (NSF) released a "10-year outlook" for its Environmental Research and Education portfolio on January 8, 2003. The report, "Complex Environmental Systems: Synthesis for Earth, Life, and Society in the 21st Century", was written by the NSF Advisory Committee for Environmental Research and Education (AC-ERE). The report has three central themes:- Interdisciplinary Science, Engineering, and Education Built by Partnerships - Synthesis of Environmental Knowledge - Building Capacity to Address Environmental Research Challenges. The AC-ERE was formed in re The National Science Foundation (NSF) released a "10-year outlook" for its Environmental Research and Education portfolio on January 8, 2003. The report, "Complex Environmental Systems: Synthesis for Earth, Life, and Society in the 21st Century", was written by the NSF Advisory Committee for Environmental Research and Education (AC-ERE). The report has three central themes:- Interdisciplinary Science, Engineering, and Education Built by Partnerships - Synthesis of Environmental Knowledge - Building Capacity to Address Environmental Research Challenges. The AC-ERE was formed in response to a National Science Board (NSB) report entitled "Environmental Science and Engineering for the 21st Century: The Role of the National Science Foundation." The report recommended an increase of $1 billion per year in NSF support for environmental research, education and assessment and an emphasis on interdisciplinary approaches. To obtain a copy of "Complex Environmental Systems: Synthesis for Earth, Life, and Society in the 21st Century," send an e-mail to ere-info@nsf.gov with your name and address.

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