Promoting Environmental Health in Native American Communities:

A Webinar Series Addressing the Environmental Health and Exposure Concerns of North American Native Subsistence Populations

United States Environmental Protection Agency

Sponsored by the
EPA's STAR Research Grants Program and the National EPA-Tribal Science Council with additional support from EPA Office of Children's Health Protection and Environmental Education and the Human Health Research Program

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Executive Summary

The Environmental Protection Agency's (EPA) STAR Research Grants Program, in partnership with the National EPA-Tribal Science Council, conducted a webinar series designed to translate and disseminate recent findings of previous and current STAR-funded research addressing the environmental health and exposure concerns of North American Native subsistence populations. Additional support for the project was provided by the EPA Office of Children's Health Protection and Environmental Education and the Human Health Research Program.

The series highlighted research goals and preliminary findings of newly awarded projects focused on cumulative risk and climate change. These projects may particularly appeal to those interested in novel risk assessment methods or the potential direct and indirect impacts of global warming on the health outcomes to Alaska Natives. The results discussed in these webinars may be of particular interest to Agency risk assessors, Tribal environmental managers, and Tribal health care practitioners.

The series consisted of four webinars conducted from June 30, 2009 to December 10, 2009:

"Eco-social Cultural Mapping: Tribal Lifestyles and Environmental Risks," June 30, 2009.

"Alaska Tribal Berry Resources and Human Health Under the Cloud of Climate Change," October 14, 2009.

"Community-Based Risk Assessment of Exposure to Contaminants via Water Sources on the Crow Reservation in Montana," November 18, 2009.

"Climate Change and Contaminants in Subsistence Foods: A Tribal Program to Monitor the Health of Alaska Yupik Women and Children," December 10, 2009.

Overview of the Research

Many traditional North American Native Tribal Populations maintain intricate and ecologically interdependent relationships with the natural environment. Though many of these relationships developed over centuries, with knowledge and skills accumulated and passed across scores of generations, the rapid emergence of industrial chemical pollution; the availability of refined, processed foods; and social and political isolation have severely threatened the health, wellness, and way of life of individuals and entire Tribal communities in the United States.

Recently, there has been increased emphasis on encouraging traditional diets, religious practices, and customs to restore and protect the health and knowledge base of Tribal communities, while concomitantly addressing issues of environmental pollution, social justice, and sovereignty. This seminar series featured Tribal communities and their research partners conducting dietary exposure, cumulative risk, climate change health effects, and risk reduction research that aimed to quantify and reduce environmental risks and to encourage or restore traditional, healthy ways of life for American Native communities.

Specific objectives of the Webinar Series included:

1. Understanding and reviewing research findings.
2. Exploring new strategies, methods, and tools for assessing environmental health exposure among Tribal populations.
3. Identifying research opportunities for advancing health protection and maintaining traditional Tribal ways of life.

The following pages provide one-page summaries of each webinar. To read a complete summary or to view the webinars, visit http://www.epa.gov/osp/tribes/events.htm.

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Webinar Series

Promoting Environmental Health in Native American Communities

Eco-social Cultural Mapping: Tribal Lifestyles and Environmental Risks — Regional Tribal Exposure Scenarios Based on Ecological Zones and Traditional Lifeways

Barbara Harper,[1, 2] Anna Harding,[1] Therese Waterhous,[1] Anthony Wilcox,[1] and Stuart Harris[2]

June 30, 2009

This project systematically described how Tribal people interact with the environment and how they might be exposed to environmental contaminants. The initial driver was the lack of exposure scenarios and exposure factors for use in Superfund risk assessments where Tribes and Tribal resources are affected.

Tribal communities engage in active, outdoor lifestyles in all climates, with greater environmental contact rates in comparison to members of the suburban community. Diets of each Tribe are based on the natural resources present and the unique cultural uses. Consequently, most Tribal exposure factors are higher than EPA default rates.

Exposures occur through food and medicine intake as well as through cultural, ceremonial, and occupational practices of Tribal members. Data were taken in consideration of the whole-life scenario—that is, data from full-time residents, not those with recreational status—and analyses were conducted assuming nutritionally complete diets for accurate statistical plotting.

Researchers operated under the basic concepts of ecology, cultural quality of life, a broader definition of health, contemporary suppression of resource use, and reconstruction of traditional lifeways. Researchers considered the biodiversity, landscapes, critical habitat, and human use of the local environment to determine food chain concentrations and socio-cultural exposures for evaluating eco-risk to the population.

The researchers recognized that contemporary suppression of resource use would have to be considered when collecting data. Local fish advisories, contaminated sites, and rights of access issues could restrict use and consumption and associated exposures, so real-time subsistence lifestyles and diets were measured for risk assessment. The outcomes would help target restoration efforts of the natural resources.

To reconstruct traditional lifeways and natural resources, researchers conducted culturally competent interviews and reviewed anthropological literature that included traditional ecological knowledge, physiology, culture, ecology, ethno-botany, language and oral tradition, and exposure science. Major food groups were used to categorize caloric intake, and consumption and exposure rates were estimated based on cultural activities. This holistic overview approach to data collection was used, versus simple food consumption surveys to attain precise and accurate study results, and these multiple lines of evidence were peer-reviewed for a more robust and confident conclusion.

This research was conducted solely for the benefit of the Tribe, so it was critical to ensure their willing participation. An advisory board consisting of Tribal and technical members

ensured that the communities were involved, informed (informed consent) and in control of the data (intellectual property). True informed consent was obtained after members were apprised of how the data would be used and potential misuse of the data was explained fully.

[1] Oregon State University
[2] Confederated Tribes of the Umatilla Indian Reservation

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Webinar Series

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Alaska Tribal Berry Resources and Human Health Under the Cloud of Climate Change

Mary Ann Lila, Ph.D.,[1] Courtney G. Flint, Ph.D.,[2] Gary Ferguson, N.D.[3]

October 14, 2009

This project investigated the potential health and medical benefits of wild berries to Alaska Natives in three coastal communities. Wild Alaska Berries (salmonberries, bog blueberries, blue huckleberries, and blackberries/crowberries/mossberries) are a rich part of many Alaska Native people's Tribal resources, and they produce beneficial biological compounds in response to the stresses they undergo during growth in the harsh climate. The research team worked with students and community members to look at the role berries play in the lives, lifestyle, and culture of Native Americans in each community.

The participating communities—Seldova, Akutan, and Point Hope—are located along three distinctive coastal areas of Alaska. Each one has a complement of berries keyed to the health and economic benefits of the community. Berries are important for food, physical activity, sharing with family and friends, and keeping traditions alive. They are eaten in a variety of ways and stored for winter. Berries generally are considered healthy, but specific benefits are not very well known in the communities. Berries produced under stress offer enhanced health benefits to humans.

The project was conducted within a Community Based Participatory Research (CBPR) framework. CBPR involves collaboration that equitably includes community members, organizational representatives, and researchers in the project. The research team combined biological and social sciences, community participation, and integrated inquiry.

Field screening of the berries was conducted under the Screens-to-Nature (STN) program to measure health benefits and help students and elders learn first-hand how the chemistry of wild berries makes them healthy for humans. The STN technology tested for amylases and amylase inhibitors; proteases and protease inhibitors; and antioxidants. Scientific analyses of the berries indicated that the amylase-inhibiting activity of berries slows down the process of turning starch into sugar (i.e., it has an important impact on diabetes); berries contain varying levels of antioxidants; and protease inhibitors in berries may help fight HIV/AIDS, parasitic diseases, and metabolic disorders.

Alaska Natives were engaged to assess their overall opinions and perspectives on their communities, including the risks and challenges they face from climate change, environmental contamination, threats to subsistence resources, as well as their concerns about their health and the vitality of their local economies. Each community has concerns about diabetes, cancer, and unhealthy diets.

In all three communities, Tribal health issues were linked to the loss of a traditional way of life and a decreased emphasis on subsistence resources and foods. Many factors prevent the subsistence lifestyle. The influence of Western culture on Alaska Native youth and the high cost of fuel are also altering the cultural landscape.

[1] North Carolina State University
[2] University of Illinois
[3] Alaska Native Tribal Health Consortium

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Webinar Series

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Community Based Risk Assessment of Exposure to Contaminants via Water Sources on the Crow Reservation in Montana

Crescentia Cummins,[1,2] Timothy Ford, Ph.D.,[3] John Doyle,[2,4,5] Larry Kindness,[1,2,4] Urban Bear Don't Walk,[2,4,6] Mari Eggers[1,7]

November 18, 2009

This research project developed a risk assessment program focusing on the contamination of water sources on the Crow Reservation in Montana. Water, wastewater, and aquatic subsistence foods were collected and analyzed, and contamination from toxic substances in drinking water and surface water sources were evaluated. These data are being combined with an investigation into contemporary and traditional uses of water in the Crow community.

LifeLine Tribal risk assessment modeling software will be used to assess the overall risks to the community from contaminated water sources. Potential outcomes from this research include a better understanding of the environmental risks of water sources associated with a subsistence-based lifestyle of Tribal populations. Also, through community-based participation, this research may help improve Tribal capacity to manage and protect environment and health through health education and other risk communication measures.

The Crow Indian Reservation, located in south-central Montana, encompasses 2.8 million acres and has a population of about 8,000 people. Although much of the Reservation is rangeland, it does include a significant amount of agricultural land.

Water has always been a treasured resource in the Crow community, and traditions and history surrounding water are still honored and practiced today. Rivers and springs continue to be used in many ceremonial practices and recreational purposes, including in the Native American Church, the Sun Dance, and Sweat Lodge ceremonies. However, water quality on the Reservation has deteriorated over the past 50 years, and, today, degradation of water quality is the community's top environmental health concern.

This research project employed a Community-Based Participatory Research (CBPR) model, which is defined as "[a] collaborative approach to research that equitably involves, for example, community members, organizational representatives, and researchers in all aspects of the research process."

The data from this project has helped the Apsaalooke Water and Wastewater Authority move into the next phase of its work, replacing wastewater lagoons and repairing water lines. The Authority is in the process of raising funds for Phase 3, which will include funds for drilling new drinking water wells and expansion of Little Big Horn College's health education facility.

[1] Little Big Horn College
[2] Crow Tribal member
[3] University of New England
[4] Apsaalooke Water and Wastewater Authority; Crow Environmental Health Steering Committee
[5] Big Horn County Commissioner; Big Horn County Health Board
[6] Legal counsel for the Crow Indian Nation
[7] Montana State University

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Webinar Series

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Climate Change and Contaminants in Subsistence Foods: A Tribal Program to Monitor the Health of Alaska Yupik Women and Children

James E. Berner, M.D.[1]

December 10, 2009

Dr. James E. Berner directs the Alaska Native Traditional Food Safety Monitoring Program, which assesses contaminant and micronutrient levels in pregnant Alaska Native women and evaluates health effects in mothers and newborn infants. In this webinar, Dr. Berner describes the climate changes taking place in Alaska and the contaminants these changes are bringing to Alaska. He discusses the impacts climate change and contaminants are having on the health of pregnant Alaska Yupik women and on subsistence food safety.

Health impact mechanisms on the Native Alaska people because of climate change and contaminants in the Arctic include:

- The effect of contaminant transport on subsistence foods.
- The spread of zoonotic disease (diseases animals can give to people).
- Damage to permafrost-dependent infrastructure.
- Unintentional injury.
- Extreme weather events.

Subsistence food safety is essential to the Alaska Native population in the following ways:

- Rural Alaska Natives are the most subsistence dependent population in the United States.
- Accumulation of organic contaminants in the food web biomagnifies and bioaccumulates, and the developing fetus and pregnant women are most sensitive to the toxicologic effects of contaminants and heavy metals.
- Traditional food has public health and culture benefits.
- Transport of contaminants by ocean, river, and atmospheric mechanisms may be increased by a warming climate.

Food safety issues surrounding contaminants include persistent organic pollutants and heavy metals that are present and threaten food safety, including mercury, lead, arsenic, and cadmium.

This research attempted to discover the human toxicological effects of climate change and contaminants in the Arctic on subsistence food safety, including negative effects on Native people in terms of growth, neurologic development; endocrine disruption; immunologic effects; and adult chronic disease, which might turn out to be the most common effect of all.

In a comparison of women in the Yukon-Kuskokwim Delta to other populations along the Arctic coast, the blood levels of persistent organic compounds in circumpolar pregnant women were less than or about average for the group. However, the

Yupik population had substantially higher omega-3 fatty acid levels than any other pregnant Inupiat women on Alaska's Arctic Ocean coast, and future studies will consider the risk and balance of these levels of fatty acids in the diet of pregnant women.

[1] Division of Community Health Services, Alaska Native Tribal Health Consortium, Anchorage, AK

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