

Project #: 644

Title: Response and Intervention System for Climate Change Induced Paralytic Shellfish Poisoning in Aleut Communities

Principal Investigator(s) and Recipient Organization(s):

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Project Summary: This project will educate local residents about paralytic shellfish poisoning (PSP) and train them to use test kits to monitor for PSP toxin. The project activities will include workshops, development of a manual on how to set up a community-based surveillance system, and public outreach materials. The proposed communities extend the length of the Aleutian Islands where little baseline data is available on PSP toxin. Since 1973, over 150 outbreaks have been reported in Alaska, with three fatalities since 1994. In an effort to reduce the risk of PSP encounters, the Alaska Science and Technology Foundation funded research to develop a rapid test kit proposed by Jellett Biotech in Nova Scotia, Canada, which was developed in 1994 and, in 2004, was approved by Food and Drug Administration, Interstate Shellfish Sanitation Program for screening shellfish, opening opportunities for communities to use a reliable, inexpensive method. The project PIs will investigate the increased risk of PSP as a result of climate change and the reliability of traditional knowledge used when harvesting clams and mussels. Methods developed to monitor occurrence and distribution of PSP toxins in connection with climate change observations will increase communities' capacities in responding to the threat of poisoning while developing the process of interlinking modern technology and traditional knowledge.

Progress Summary: The project has expanded both geographically and in the depth of research. An additional time was requested and six months were granted by the Program Director. The samples from 12 communities have been tested. The rapid expansion has not allowed for additional training of local coordinators to perform the Jellett tests. The coordinators from the communities of Sand Point, Alaska, and Nikolskoye, Russia, have been successfully collecting and testing specimens. All other communities collect samples and ship them to Anchorage.

The traditional knowledge portion of the project was re-evaluated and re-designed to reflect changes in the biological research. All efforts were made to enhance the community-based nature of the project. PI, V. Gofman, consulted with Dr. Allesta, Associate Professor and Group Leader, and Paula Williams, Research Assistant, the Resilience and Adaptive Management Group, University of Alaska Anchorage, on the best ways to develop the survey instrument. With their assistance, a draft questionnaire utilizing a structured format with the use of cognitive techniques was developed.

In April 2007, coordinators from four villages participated in a three-day workshop organized in Anchorage. Dana Osterback (Sand Point), Charly Bendixen (King Cove), Naomi Kashevarof (St. George) and Anton Shelikof (Akutan) collaborated on finessing the questionnaire to ensure full comprehension of the questions by village residents. They also learned how to conduct an interview and how to use a digital recording device. At the conclusion of the workshop, an elder from False Pass, Lorraine Jonsson, graciously agreed to participate in a

training interview. The interview was recorded and debriefed. The coordinators discussed public outreach and made recommendations how to improve it in the communities. Workshop outputs include the Manual for Traditional Knowledge Survey for this project that could be utilized for other projects as well and the questionnaire consisting of 51 questions. Due to logistic and financial constraints, the Nikolskoye coordinator from Russia could not participate in the workshop. The workshop materials were translated into Russian. The Nikolskoye coordinator, Ivan Vozhikov, and Gofman attended Arctic Council meeting in Norway at the end of April. This opportunity was used to train Ivan and to work on the Russian version of the questionnaire. English and Russian drafts of the questionnaire were calibrated and are identical. All materials have been delivered to the villages. Monthly teleconferences with coordinators to monitor the progress and to timely address emerging problems have been organized since May.

While training coordinators, the researchers observed a striking difference in the levels of indigenous (Unangan) knowledge demonstrated by the coordinators in their twenties and the older people. It also became apparent that hypothesis that environmental changes could make Unangan knowledge on shellfish unreliable may not stand the test. The elder interviewed at the workshop demonstrated that a number of parameters, such as water and air temperature, clarity of water, changes in condition of clams, are used to determine when it is safe or not safe to gather shellfish for consumption. The core of the problem may not be in the perceived static qualities of indigenous knowledge but rather in the lack of knowledge transfer from elders to younger generation, thus, creating a void in younger generation's knowledge of shellfish. When this couples with a lack of means to test shellfish that may have elevated PSP levels the community may be at risk of the increase of poisoning. These are preliminary observations. Conclusions can only be drawn after the surveys are completed and analyzed.

Co-PI, Bruce Write, reports the following progress on testing:

Mouse bioassay test results from the Alaska Department of Environmental Conservation (DEC) lab indicate 38 μg PSP for Unga mussels, a new test site. Another new test site, Nelson Lagoon, using mouse bioassay tests indicate $\leq 32\mu\text{g}$ PSP. Jellett test results indicate Nikolskoye (Russia) mussels remain below 40 micrograms (80 micrograms is the FDA limit for consumption). Samples collected in Unalaska in May and June show an increase of PSP above 40 μg using the Jellett test kits. False Pass samples collected in late May indicate $\leq 32\mu\text{g}$ PSP using the mouse bioassay test, but the Jellett test strip indicated levels above 40 μg PSP. Akutan and Atka samples using the mouse bioassay tests indicate $\leq 31\mu\text{g}$ PSP. Sand Point Airport Spit butter clams using mouse bioassay tested at 33 μg PSP and Sand Point's Ivanof Bay mouse bioassay tested at 35 μg PSP for cockles while the Jellett test kits indicated PSP levels of $\geq 40\mu\text{g}$ PSP. Spring, summer and fall are traditionally the seasons when PSP levels increase. In April, butter clams in King Cove were measured (using mouse bioassay methods) to be at 65 micrograms, but the levels in butter clams may be higher based on the higher PSP levels in King Cove mussels. Butter clams can remain toxic for two years after infection with PSP, so this is a species to be avoided and harvesters should remain cautious when consuming any bivalves in Alaska.

Last spring mussel samples received from Nikolski, AK, were dislodged from the holes in submerged lava flows and, based on their annual growth rings, were around 100 years old! Those sample tested negative for PSP.

Samples are sent in by several colleagues. These samples are shucked, homogenated and separated into sample tubes. A 50ml sample is sent to a NOAA lab in Seattle, 100ml sent to the DEC lab for mouse bioassay tests and, the remaining samples will be used for the Jellett tests. The NOAA lab will be performing several tests using the 50ml sample including a high-tech test called high-pressure liquid chromatography (HPLC) which analyzes all 24 toxins and has the potential to reveal detailed information about PSP in Alaska. The HPLC test results may be available in the fall of 2007. This additional data will greatly enhance the scientific value of the project and possibly result in publications.



Village coordinators: Naomi Kashevarof, Charly Benfixen, Dana Osterback and Anton Shelikof



At the workshop, Anchorage, April 3-5, 2007:
Paula Williams, Research Assistant, discussing the survey process with Charly Bendixen and Anton Shelikof.