

Rapid detection and analysis of harmful algal blooms by the Makah Tribe, a partner in a new scientific collaboration in the Pacific Northwest

The Makah Tribe is a key collaborator in a new project to provide an early warning for harmful algal blooms (HABs), such as the massive, coastwide *Pseudo-nitzschia* bloom in 2015 that caused millions of dollars of losses to Dungeness crab, rock crab, and razor clam harvesters and contributed to the death of many species of marine mammals. Starting in July 2017, the Makah Tribe will collect and analyze seawater samples by boat from the Juan de Fuca eddy, the offshore area known by the Makah as “The Prairie”, a known hotspot site for HABs.



Nick Adams, Ryan McCabe, Bich-Thuy Eberhart, Courtney Winck, Aaron Parker and Anthony Odell (L to R) deploying the CTD, an instrument that will be used to measure conductivity (salinity), temperature and depth on the boat sampling trips to the Juan de Fuca eddy, a hotspot site for harmful algal blooms.



Bich-Thuy Eberhart instructing Courtney Winck, Maria Roberts and Adrienne Akmajian (L to R) on how to analyze toxins in seawater in the water quality lab.

Seawater samples from the eddy will be processed in the Makah Water Quality Lab to allow harmful algae cells and their toxins to be analyzed by newly trained staff within just 1-2 days. This information will be incorporated into a Pacific Northwest HAB Bulletin, intended to help resource managers from Neah Bay to Newport to fine-tune their decisions regarding closures of beaches to shellfish harvest, thus protecting human health and reducing the severe economic disruption that closures can have. The loss of a single razor clam opener (2-5 days) on Washington beaches results in almost \$6 million in lost expenditures and over 65 jobs (2008 dollars).

Vera Trainer, Bich-Thuy Eberhart, Nick Adams (NOAA Northwest Fisheries Science Center, Seattle), Anthony Odell, Rich Osborne (UW ONRC) and Ryan McCabe (University of Washington) visited Neah Bay on 10 April 2017, to train the Water Quality Program personnel, Aaron Parker,



Ryan McCabe and Aaron Parker (L to R) rinsing the conductivity sensor on the CTD after it was deployed.

Dana Sarff, Ray Colby, Courtney Winck, Maria Roberts and Adrienne Akmajian, on the use of equipment needed to assess the abundance harmful algae, the quantity of their toxins in seawater, and



Ryan McCabe, Anthony Odell, Bich-Thuy Eberhart, Courtney Winck, Aaron Parker (L to R) watching Nick Adams (front) prepare the CTD for deployment off the dock.

the associated environmental parameters, such as temperature and salinity with depth throughout the water column. This project, led by NOAA's Northwest Fisheries Science Center and the University of Washington, is bringing together state and federal agencies, tribal partners, and researchers at US and UK universities and is jointly funded by the Makah Tribe, the Olympic Region Harmful Algal Bloom (ORHAB) partnership through a surcharge to Washington State shellfish licenses to University of Washington Olympic Natural Resources Center, and NOAA's Monitoring and Event Response to Harmful Algal Blooms (MERHAB) program.

Aaron Parker and Nick Adams (L to R) deploying a Niskin bottle, used to sample seawater at discrete depths. It is a spring-loaded bottle that closes when a weight, called a messenger, trips a pin at the desired sampling depth.

