

Bering Strait: Walrus and Saxitoxin—late summer/fall 2017

Background: A recent marine mammal study published in the journal *Harmful Algae** (2016) detected **two types of biotoxins produced by algae** (domoic acid and saxitoxin), in the stomach contents and fecal samples of walrus (and other marine mammals) in the Bering Strait region. These findings were surprising because little was known about algal biotoxin exposure risks to these important subsistence food resources. Clams and other shellfish can concentrate the biotoxins in their tissues while they eat tiny algae by filtering ocean water. Walrus ingest the concentrated biotoxins when they eat the clams containing the biotoxins. The study's detection of algal biotoxins in Alaska marine mammals has created concerns regarding potential health effects to these important marine wildlife—as well as food safety concerns among coastal communities and Alaska Native co-management partners.

Recent Bering Strait walrus stranding event: During August and September 2017, a total of 39 walrus, reported in good body condition, were documented having washed ashore along the northern Seward Peninsula raising questions about the cause(s) of death. Community members from the Native Villages of Diomed and Shishmaref collected samples of intestines and/or stomach contents from four walrus (two beached carcasses from Shishmaref; one beached carcass and a freshly harvested walrus from Diomed). As part of an ongoing monitoring effort, the samples were analyzed for the presence of domoic acid and saxitoxin at the NOAA Wildlife Algal Toxin Research and Response Network (WARRN-West). Low levels of domoic acid and moderate to high levels of saxitoxin were detected in all samples. Saxitoxin levels were above average compared to recent years (Lefebvre et al. 2016).

Why are we concerned about saxitoxin? Saxitoxin is one of the biotoxins that cause paralytic shellfish poisoning (PSP). Saxitoxins are a well-known human health hazard in Alaska and the rest of the U.S. PSP can occur in people when they eat clams, crabs, and other seafood contaminated with saxitoxin. Saxitoxin targets the nervous system and blocks nerve function. If high concentrations of saxitoxin are eaten, breathing difficulties and paralysis occurs in both humans and marine mammals. A federal US Food and Drug Administration seafood safety regulatory limit of 800 ng saxitoxin per g shellfish protects human consumers of shellfish from PSP. The amount of saxitoxin required to cause harm to a walrus is unknown.

Were the saxitoxin levels found in these walrus enough to cause illness and/or their death? We are unable to make a diagnosis as to the cause of death of the 39 Pacific walrus found dead along the northern Seward Peninsula, based on the current evidence. A marine mammal algae poisoning event is diagnosed by the observation of a combination of unusual behavioral symptoms in an affected animal, presence of harmful algal “blooms” in nearby waters, and high toxin levels in animals and prey. For this event we had samples from only four walrus to test. Saxitoxin was found in stomach and/or fecal samples at moderate levels in three walrus and one walrus had a level well above the federal seafood safety regulatory limit for human consumers. These valuable observations and data show us we need to continue monitoring walrus and other marine mammals to determine if saxitoxins affect their health.

Thoughts on subsistence uses of walrus include:

- Walrus muscle and blubber are not likely to accumulate saxitoxin in levels that pose a human health hazard, although these tissues have not yet been tested.
- Thorough cleaning of the inside of intestines and stomach contents with water is an important aspect of traditional and customary food preparation methods. We do not know if these food preparation practices safeguard against ingesting saxitoxin when

consuming marine mammal intestines or stomach contents. Consuming intestine, stomach, and/or their contents in areas with known biotoxins likely has the same risk as consuming shellfish from those areas (Deeds et al. 2008). However, **we had no reports in the Bering Strait region of anyone contracting PSP symptoms from eating their traditional foods during August-October 2017.**

- Paralytic shellfish poisoning (saxitoxin) in Alaska and the U.S. is generally associated with the consumption of contaminated shellfish (e.g., clams, crabs). Thus, **eating clams and/or other shellfish has always carried a risk of ingesting algal toxins**, whether shellfish are gathered from the beach or from the stomach of a walrus or bearded seal.
- Remember: you cannot see, smell, or taste algal toxins. Cooking or freezing these foods will not lessen the toxin's effects.

Currently, the Southeast Alaska Tribal Ocean Research (SEATOR) group, operated by the Sitka Tribe, is available to test shellfish for dangerous biotoxins to improve tribal and rural access to traditional foods. The newly formed (2017) Alaska Harmful Algal Bloom Network (AHAB) aims to provide a statewide approach to PSP biotoxin awareness, research, monitoring, and response in all of Alaska's coastal communities.

Since we do not know what our future will bring, it is very important to remain vigilant and observant, and to communicate. Continued communication and sharing of observations between hunters, communities, regional resources, and scientists is essential to better understand how much algae toxin affects walruses and other marine mammals in northern and western Alaska.

- **If you feel sick from eating clams or other shellfish, please contact your health care provider immediately.**
- For more information on harmful algae toxins—symptoms, treatment, etc.—**call the Alaska Section of Epidemiology at (907) 269-8000 Mon-Fri or (800) 478-0084 after hours**
- **Remain vigilant:** if you see walruses (or other marine wildlife) acting in an unusual manner or dead in the Bering Strait region please contact:
USFWS – Marine Mammals Management: (800) 362-5148
Alaska Sea Grant - Gay Sheffield: (907) 434-1149
Kawerak - Subsistence - Brandon Ahmasuk: (907) 443-4265

Teamwork was essential to learning more about this event and included: Native Village of Shishmaref, Native Village of Diomede, USCG Aviation Detachment (Kotzebue), Alaska Sea Grant, Kawerak Subsistence Resources Program, Eskimo Walrus Commission, North Slope Dept. of Wildlife Management, NOAA Wildlife Algal Toxin Research and Response Network, SOA Dept. of Health and Social Services, Centers for Disease Control and Prevention, USFWS Office of Law Enforcement, National Park Service, and USFWS Marine Mammals Management.

Literature cited

*Lefebvre, K., et al. 2016. Prevalence of algal toxins in Alaskan marine mammals foraging in a changing arctic and subarctic environment. *Harmful Algae* 55:13-24.

Deeds, J., et al. 2008. Non-traditional vectors for Paralytic Shellfish Poisoning. *Marine Drugs*, 6:308-348.