



Rhode Island Department of Environmental Management

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Harmful Algae Bloom Biotoxins

Marine Harmful Algae Blooms (HAB) may produce biotoxins that can sicken humans if they consume fish or shellfish contaminated by HAB toxins. Rhode Island Department of Environmental Management (RIDEM) and RI Department of Health (RIDOH) routinely monitor RI's marine waters for harmful algae and enact shellfish closures when toxins are detected. Details are outlined in the state's [Harmful Algal Bloom and Shellfish Biotoxin Monitoring and Contingency Plan](#). While Rhode Island has taken steps to ensure the safety and high quality of shellfish harvested from RI's waters, it is important to be informed of the risks associated with marine biotoxins and simple steps to protect you and your family. Symptoms of HAB toxin poisoning can vary depending on the type of HAB toxin. Marine toxins and toxin poisoning information is listed below. This information is also available on the Centers for Disease Control and Prevention (CDC) website at: <https://www.cdc.gov/habs/illness-symptoms-marine.html>.

The three phytoplankton that have the potential of producing toxins and contaminating shellfish in Rhode Island waters' and their associated syndromes:

Phytoplankton: *Pseudo-nitzschia* spp.

Syndrome: Domoic Acid Poisoning and Amnesiac Shellfish Poisoning (ASP)

Domoic acid poisoning is caused by eating shellfish contaminated with domoic acid, a toxin produced by the diatoms *Pseudo-nitzschia*, *Nitzschia*, and *Amphora*. These diatoms have been found in the United States along the Pacific coast, northeast coast, and the western coast of Florida. Rhode Island experienced its first emergency shellfish closures caused by a *Pseudo-nitzschia* bloom in October 2016 and again in March 2017.

Domoic acid poisoning has caused a variety of symptoms ranging from memory loss to death. The first reported human domoic acid poisoning event occurred in Canada in 1987 when 143 people became ill and 3 died from eating domoic acid-contaminated mussels. Reported signs of the poisoning were stomach and intestinal symptoms, confusion, disorientation, memory loss, coma, and death. The illness was named Amnesic Shellfish Poisoning (ASP).

Most of what we know about domoic acid poisoning comes from studies of marine mammals, particularly sea lions. Animals, including marine mammals (seals, walruses, and sea lions), have been poisoned by domoic acid, which results in neurologic behaviors and can be fatal.

Shellfish, such as mussels, can accumulate these toxins, making people who eat them sick with various symptoms including the following:

- Vomiting and diarrhea within 24 hours of eating
- Dizziness
- Headache
- Disorientation
- Short-term memory loss
- Seizures, weakness, paralysis, and death can occur in severe cases

Phytoplankton: *Alexandrium* spp.

Syndrome: Paralytic Shellfish Poisoning (PSP)

Paralytic Shellfish Poisoning (PSP) is caused by eating shellfish contaminated with saxitoxins, a toxin produced by dinoflagellates of the genus *Alexandrium*. Saxitoxins, also known as PSP toxins, cause symptoms related to the nervous system. PSP toxins can be found in shellfish (such as mussels, cockles, clams, scallops, oysters, crabs, and lobsters) that usually live in the colder coastal waters near the Pacific states and New England. A species of puffer fish found off the east coast of Florida was recently discovered that also contained saxitoxins. As of November 2017, RI has not experienced a bloom of *Alexandrium*.

Symptoms usually begin within 2 hours of eating contaminated shellfish, but can start anywhere from 15 minutes–10 hours after the meal. Symptoms are generally mild and can include the following:

- Numbness or tingling of the face, arms, and legs
- Headache
- Dizziness
- Nausea
- Loss of coordination
- A floating sensation
- Muscle paralysis and respiratory failure can occur in severe cases

In cases of severe poisoning, muscle paralysis and respiratory failure can lead to death in 2–25 hours. The risk of death from PSP is reduced if healthcare professionals can rapidly provide ventilation if the ill person becomes paralyzed.

Phytoplankton: *Dinophysis* spp.

Syndrome: Diarrhetic Shellfish Poisoning (DSP)

Diarrhetic Shellfish Poisoning (DSP) is caused by eating shellfish contaminated with okadaic acid and dinophysistoxins, toxins produced by the dinoflagellates *Dinophysis* and *Procentrum*. In the United States, these dinoflagellates have recently been found along the Gulf Coast of Texas. As of November 2017, RI has not experienced a bloom of *Dinophysis*.

DSP produces stomach and intestinal symptoms that usually begin 30 minutes to a few hours after eating contaminated shellfish and include:

- Vomiting
- Severe diarrhea
- Nausea
- Abdominal cramps
- Chills

Recovery occurs within about 3 days, with or without medical treatment. DSP is generally not life-threatening.

What kind of shellfish are affected?

Mussels, clams including soft shell and razor, and oysters can accumulate these toxins. We normally only consume the abductor muscle of a scallop and therefore do not associate these toxins with the consumption of scallops. However, caution should be taken with the whole animal if there is a HAB in the harvest area. Sea snails (Whelk or Conch) feed on

clams and other shellfish and can also become contaminated but since we normally only eat the mussel meat of these animals we only need to be sure to thoroughly remove the digestive gland before cooking.

Does cooking shellfish make them safe to eat?

No, the toxins produced by these three harmful algae are not destroyed by cooking, grilling, frying, freezing or salting.

What should I do if I think I have consumed contaminated shellfish?

If symptoms are mild, call your health care provider and the RIDOH. If symptoms are severe, call 911 or have someone take you to the emergency room immediately.

What is the treatment?

There are no antidotes.

How can I protect myself from these toxins?

Prevention is the best medicine. RIDEM regularly monitors for these toxin producing algae and closes waters to shellfishing when toxins are detected. Before shellfishing, always check for closures on RIDEM's 24-hour shellfish hotline at (401) 222-2900. Sign up for the RI Division of Marine Fisheries' listserv at [Marine Fisheries Listserv](#) or follow us on [Twitter](#) for timely updates.

What about shellfish offered by restaurants, stores, farmer's markets? Are they safe to eat?

Shellfish harvested commercially and sold to the public come from licensed certified dealers or growers. These commercial harvesters must meet stringent state and federal health standards. Always buy your shellfish from a licensed dealer.