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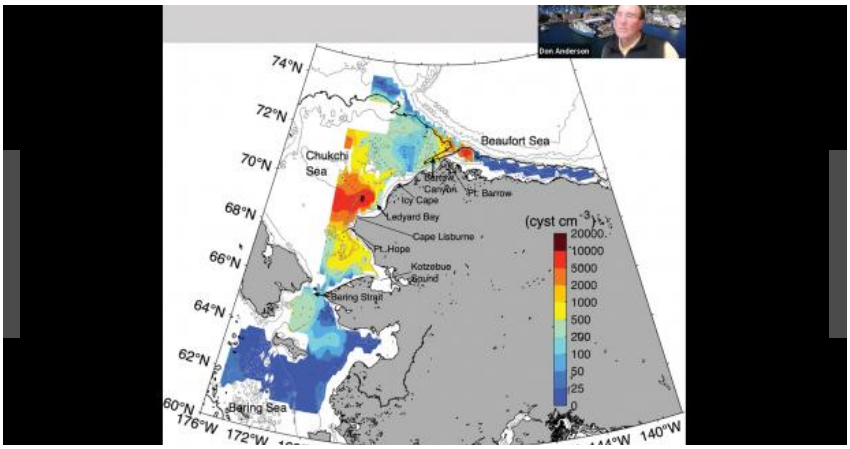

ALGAL HOTBEDS— The map shows algal cyst hotbeds off the northwest Alaska coast.

Harmful Algal Blooms More Frequent In Northwest Alaska

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By Julia Lerner

Warming sea waters are contributing to a massive growth of harmful and toxic algal blooms in the waters of the Bering Sea, putting both marine animals and human lives at risk, according to Don Anderson, a senior scientist at the Woods Hole Oceanographic Institution.

"The recent warming that we're seeing in the bottom waters supports the earlier and faster germination [of blooms]," he explained during a UAF Northwest Campus Strait Science presentation last week. "It also supports longer periods favorable to blooms. So, what you've got is a dramatic increase in the potential for local initiation of blooms."

Anderson presented his research during a Strait Science lecture on Thursday, October 14 via Zoom and discussed increasing levels of these harmful algal blooms, what's causing them, and how it might impact regional residents.

Algal blooms, which occur naturally in the summertime, are becoming more frequent in the Bering Strait region due to climate change and warming seas. These algal blooms can detrimentally impact an aquatic system in several ways: Blooms can produce toxins that poison fish, mammals and birds; Non-toxic blooms can proliferate to the point of consuming all available oxygen in the water, clogging fish gills and smothering food sources.

Anderson's presentation, which drew a large crowd of participants from across the region, focused on several types of toxins produced by these algal blooms, including domoic acid

and saxitoxin, which can cause Paralytic Shellfish Poisoning, or PSP, Neurotoxic Shellfish Poisoning, NSP for short, Amnesic Shellfish Poisoning, or ASP, Diarrhetic Shellfish Poisoning, or DSP, and Azaspiracid Shellfish Poisoning, or AZP.

The algae are “carried from the south in these relatively warm surface waters, and then can form cysts up there in the Chukchi region that fall to bottom sediments,” Anderson said.

These bottom sediment cysts accumulate, and can survive on the sea floor for decades, even centuries, forming massive “seed beds” ready to bloom, Anderson said.

“We call that a sleeping giant,” he told the audience. “It’s waiting to wake up, and when it does, it’s [in such large quantities] that it could really be a significant event for the region.”

Currently, in the Chukchi Sea, there are several massive seed beds forming and preparing to bloom. One documented seedbed extends at least 125 miles offshore, and up to 373 miles alongshore. These blooms, ingested by marine life, can cause PSP and ASP in fish and worms, then spread to more predatory animals higher on the food chain.

In 2016, a group of scientists analyzed more than 900 marine animals across 13 species in Alaska, including various whale species, seals, walruses and sea otters. Domoic acid was detected in all 13 species, and saxitoxin was detected in 10 of the 13 species. The presence of toxic algal blooms causing domoic acid and saxitoxin has only increased since then, impacting marine life and Alaska Natives who subsist on them.

These toxic algal blooms that produce enough toxins to infect marine life thrive in warmer waters. As waters up north warm, conditions become more habitable for these “sleeping giants,” Anderson said.

“We’ve calculated how many more cysts are actually going to germinate in that summertime bloom period because it’s warmer,” he said. “What you see is roughly a factor of two, so we’re getting twice as many cysts over the last 10 or 20 years germinating than was the case before.”

Anderson has focused a significant amount of his research in the Gulf of Maine, where he has studied significant levels of toxic algal blooms over time. When cysts doubled in similar aquatic environments, scientists saw “as much as a six and a half increase in the cumulative amount of toxicity we might measure along that coast,” Anderson said.

Anderson’s research has indicated the largest algal blooms in the region are centered in the Chukchi Sea, though there are smaller bloom concentrations in the Bering Strait and the Beaufort Sea.

While research has shown these seedbeds of algal blooms are increasing, research has not indicated if the accumulation of toxins in the Bering Strait or Norton Sound region is a problem – yet.

Recent data examining saxitoxin levels in forage fish around Southeast Alaska shows that, while most fish have some amount of saxitoxin, it’s not enough to be considered harmful.

“About 60 percent of the forage fish that [were] analyzed contain these detectable levels of toxins, but they were at low levels in most cases,” Anderson said. “It does indicate that forage fish are likely a substantial source of toxins that will be transferred to marine mammals, seabirds and other animals. The bottom line is that we don’t know yet if toxin levels in Arctic food webs are reaching high enough concentrations to cause health impacts in marine mammals in that region. We know that these toxins can do that in other regions, but we don’t yet know if the levels are high enough to cause impacts up here.”

Right now, the low levels of toxins present in fish are not a huge concern, but Anderson says subsistence hunters need to be careful.

“The low toxin levels in the muscle tissue indicates a very low risk to human health from salmon and halibut consumption, and there is also little risk to the commercial fishing industry,” he said. But given the relatively high toxin levels in salmon excretory organs, there may be more risk to human health if livers and kidneys are consumed.

Currently, scientists at the U.S. Geological Survey and the National Park Service have partnered to study HABs in national park waterways, including in Alaska. The Sitka National Historic Park, near Juneau, is one of the participating parks.

“We’re finding HABs in new areas,” said Jamie Kilgo, project co-lead and marine ecologist at the NPS in a press release. “We need to monitor areas where they are a known issue and anticipate where we might find them in the future so we can protect visitors, pets, park staff, volunteers and wildlife.”

Anderson says research in Alaska’s northern waters is ongoing.

The Strait Science lecture series, co-produced by UAF Alaska Sea Grant and UAF Northwest Campus, connects scientists and researchers with residents in the region.