

BERING SCIENCE

Fall 2020 Bering region ocean update—summer science highlights

www.beringregionoceandata.org

WELCOME

The Bering Sea is experiencing many changes. Loss of sea ice and record high ocean and air temperatures impact wildlife and all aspects of life for coastal communities. The Bering Region Ocean Update project began in spring 2020, in part, to increase regional data sharing among federal, state, community and private sector partners. This is the second of four expected reports [read the [spring 2020 update](#)]. Other project activities include ensuring that all existing Bering Sea region data are available in a central data portal; and coordinating research activities between scientists and agencies.

Keep reading to learn how this summer's ocean and air temperatures in the Bering Sea compared to the longterm average. We also share updates on several state and federal research projects, such as NOAA's pollock surveys which were conducted via saildrone rather than ship due to the coronavirus pandemic.

WHO ARE WE?

The information in this report comes from federal and state agencies, and university scientists who work in the Bering Sea. We hope to share observations from communities and local knowledge holders in the next Bering Science report that is expected for January.

The Bering Science reports are facilitated by a partnership between the Alaska Ocean Observing System (AOOS) and the University of Alaska Fairbanks International Arctic Research Center. Funding was given to AOOS by the White House Executive Order 13840 to increase sharing and use of federal and non-federal ocean data.

NAVIGATION

Ocean & atmosphere	2
Pollock surveys	3
Red king crab	4
Phytoplankton	5
Salmon	5
Marine mammals	6
Seabirds	7
Harmful algal blooms	8
Marine debris	8

CITE THIS REPORT

Prewitt, J., H. R. McFarland, R. Thoman, M. McCammon. 2020. Bering Science: Fall 2020 Bering region ocean update, Issue 2 [newsletter]. Alaska Ocean Observing System, Anchorage, Alaska.

REVIEWERS

Thank you to our reviewers who provided valuable input into this publications.

FEEDBACK

Your opinion is valuable to us and can help guide future reports. Please provide feedback by filling out an [online survey](#).



Photo by Neal Herbert NPS



@BeringRegionOceanUpdate



(907) 644-6756



beringregion@aoos.org

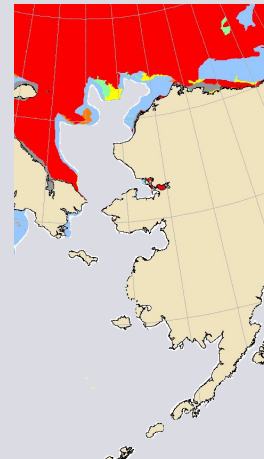
SUMMER OCEAN & AIR

SPRING ICE MELT

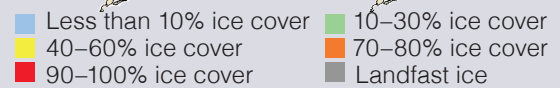
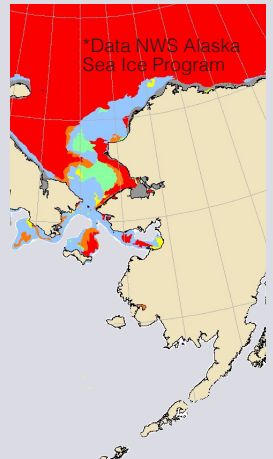
Ice retreated rapidly in the central Bering Sea in March. In April, melt became more gradual north of St. Matthew Island and along the coast before speeding up again in May. As is often the case, some areas saw ice melt and move away only to return with a change in wind direction.

- **Togiak/southeast Bering Sea**—some ice into the first week of May.
- **Norton Sound/northern St. Lawrence Island**—small areas of ice into the second week of June.
- **Western Gulf of Anadyr**—small areas of ice until July 4.
- **Kotzebue Sound**—became all open water on June 24, which is typical for the past decade but much later than 2018 (June 04) and 2019 (May 28).
- **Northern Seward Peninsula**—north winds allowed some ice to persist until the last week of June.

Ice extent June 2019



Ice extent June 2020



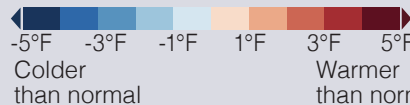
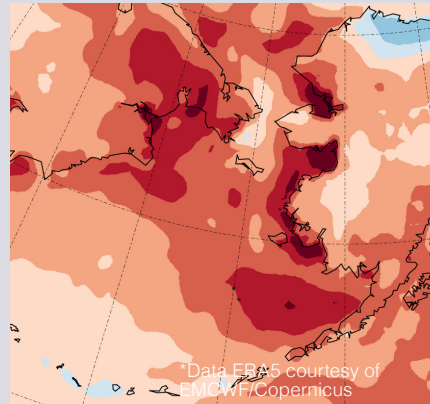
STUDY OF INTEREST—A [new study](#) estimated that the extent of Bering Sea ice in spring 2018 was lower than it's been for 5,500 years. Scientists analyzed the chemical composition of a peat core, which included plant remains from 5,500 years ago to the present, from St. Lawrence Island to estimate how sea ice in the region is changing.

SUMMER AIR

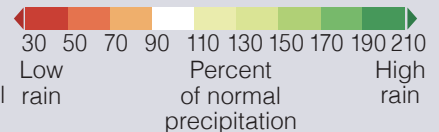
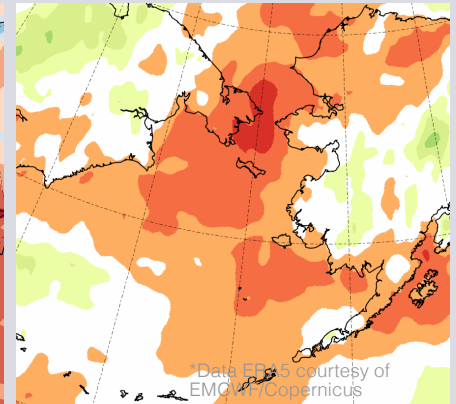
All of western Alaska was significantly warmer than normal in summer 2020, though not as warm as summer 2019. The mildest areas relative to the long term average were Kotzebue Sound, the Norton Sound coast, coastal areas north of Kuskokwim Bay and the Pribilofs. At St. Paul, the National Weather Service reported the highest temperature of record, 66°F on August 14.

Nearly all the Bering Sea region saw below normal rainfall. This was especially true for the Pribilofs northward across St. Lawrence Island and the southern Chukchi Sea. Kotzebue reported the driest summer since 1977. Water levels were low on many Bering Sea coast rivers.

Air temperature June–August 2020



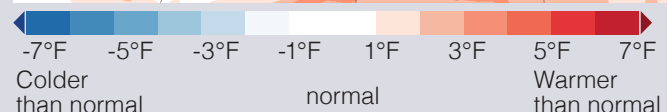
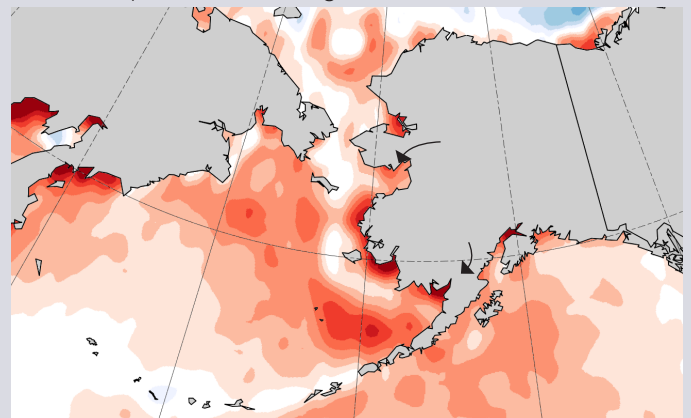
Precipitation June–August 2020



SUMMER OCEAN

In early summer, ocean surface temperatures were a patchwork, with warm and cool areas (relative to the long term average) mostly in response to the timing of sea ice melt. As typically happens, during the course of the summer the warm and cool pockets evened out. By late summer most of the Bering and southern Chukchi Seas were warmer than average, but significantly cooler than 2019. The warmest (compared to normal) areas included Kotzebue Sound, Kuskokwim Bay and upper Bristol Bay. In contrast, sea surface temperatures were close to normal west of Nunivak Island and from St. Lawrence Island north to the west side of the Bering Strait.

Ocean temperature June–August 2020



WALLEYE POLLOCK

SURVEYING POLLOCK WITH SAILDRONES

Several NOAA fisheries vessel surveys were canceled this year due to the coronavirus pandemic. In an effort to partially fill the gap in fisheries surveys, three **Saildrones** (sailboat-like unmanned wind and solar-powered surface vessels), were sent to make acoustic measurements of pollock abundance in the Bering Sea. Each saildrone covered a third of the 600-nautical-mile-wide survey area usually covered by ships. Due to travel restrictions, the saildrones sailed to and from the survey area in the Bering Sea from California, which takes 45 days one-way.

The saildrones were equipped with specially designed

acoustic (sonar) sensors that are able to provide a measure of pollock abundance based on the amount of sound reflected by fish in the water. They also incorporated a variety of sensors to measure oceanographic and atmospheric conditions in this area of the Bering Sea. While not a replacement for standard ship-based surveys, where scientists are also able to collect critical biological data to better understand fish species, size, age, maturity, growth and diet, the drones provide useful fisheries independent data in years when it isn't possible to collect data by other means.

The results of this study will help fisheries stock assessment scientists monitor changes in pollock populations. Preliminary findings will be shared at the North Pacific Fishery Management Council meeting.

Left: Three saildrone survey routes. Bordered by the Aleutian Islands to the south and the edge of the eastern Bering Sea shelf to the west.

Right: Example of acoustic data of pollock schools from a saildrone survey.

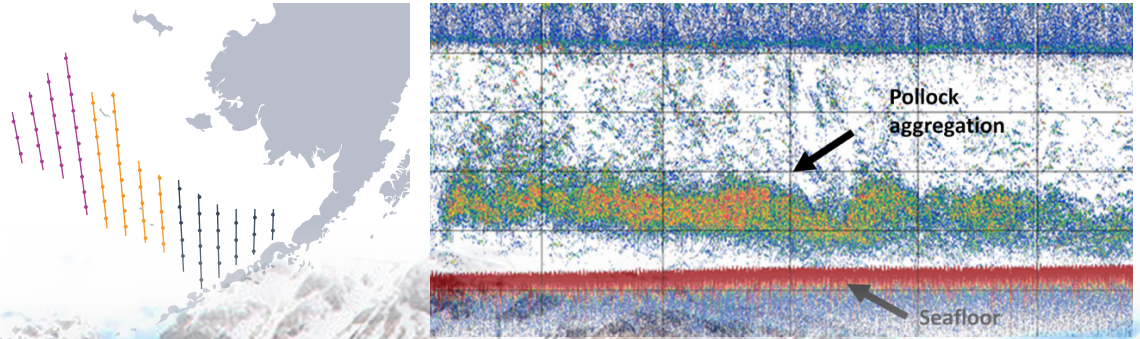


Photo by Saildrone, Inc.

Summer ocean & air (page 2): Rick Thoman • Rick Thoman, UAF International Arctic Research Center, Alaska Center for Climate Assessment & Policy • rthoman@alaska.edu

Pollock saildrone surveys: Alex De Robertis, NOAA Alaska Fisheries Science Center • alex.derobertis@noaa.gov



RED KING CRAB

LOST CRAB POTS

A new study is tracking ice floes in Norton Sound to narrow the search for lost crab pots. Red king crab fishing in the Sound usually occurs within miles of shore, through holes cut in the shore fast ice. Pot loss has increased with warming ocean temperatures that cause unpredictable and unstable ice. Lost pots can continue to trap crabs, harming the population. Other crab fisheries use sonar to locate pots, but in Norton Sound, ice breaking off the shore often drags crab pots miles from where they were set, cutting the surface buoys from the pots, making finding the lost pots challenging.

Alaska Department of Fish and Game and Norton Sound Economic Development Corporation placed an ice tracker on the shorefast ice in April 2020. The tracker showed the ice floes movements along the northern coast of Norton Sound into the Bering Straits region. In winter, 2021 they hope to deploy up to six ice trackers to better understand ice and pot movement.

SATELLITE TAGGING

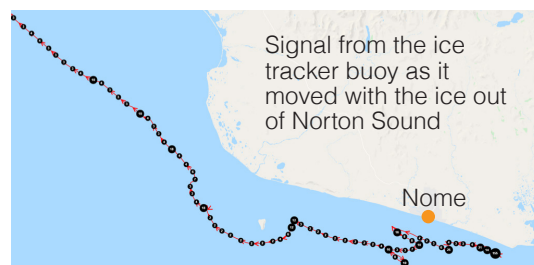
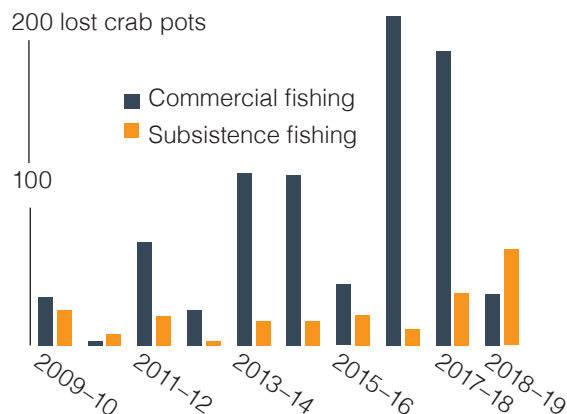
In July 2020, ADF&G tagged 16 legal male red king crab with satellite tags. The tags are set to “pop-up” at the beginning of October 2020. When the tag pops up it transmits its location along with temperature and depth data (recorded hourly while on the crab). Biologists will compare where the tagged crabs were released to their pop-up locations, along with the temperature and depth information, to identify movement patterns.

Pop-up satellite tags provide information about crab presence in areas and at times outside the fishing season. Satellite tags are different from spaghetti tags used for decades in Norton Sound. Spaghetti tags, although still useful, require the tagged crab to be recaptured to gather information. As a result, all existing information is based on when and where fishing occurs.

BOTTOM TRAWL SURVEYS

The Norton Sound red king crab bottom trawl survey is completed annually (prior to 2017 it was completed every three years). The surveys help biologists estimate red king crab abundance, which is used to establish guidelines on annual harvest for winter and summer commercial fisheries.

The survey covers most of Norton Sound and consist of a one nautical mile trawl at each of 60 stations. Annual surveys allow ADF&G to detect and track red king crab recruitment (the age at which a crab can be caught and kept in pots) helping to assess the viability and sustainability of the population.



ADF&G Biologist Luke Henslee with a pop-up satellite tagged red king crab.



PHYTOPLANKTON

PHYTOPLANKTON BLOOMS FROM SATELLITE IMAGES

Phytoplankton are photosynthetic organisms living just beneath the ocean's surface. These tiny algae make up the base of the Bering Sea food web, and the timing and magnitude of the phytoplankton bloom have large and long-lasting effects on the ecosystem.

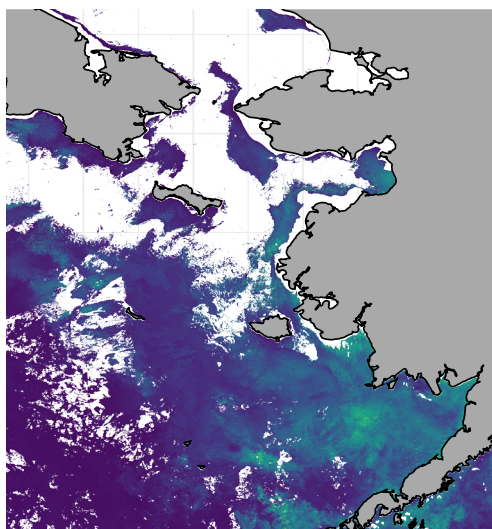
Phytoplankton contain chlorophyll, a green pigment that helps them absorb sunlight. Satellite images of the ocean show chlorophyll and can provide an estimate of the amount of phytoplankton at the sea surface.

During spring 2020, the southeastern Bering Sea had noticeable phytoplankton blooms 8–9 days earlier than

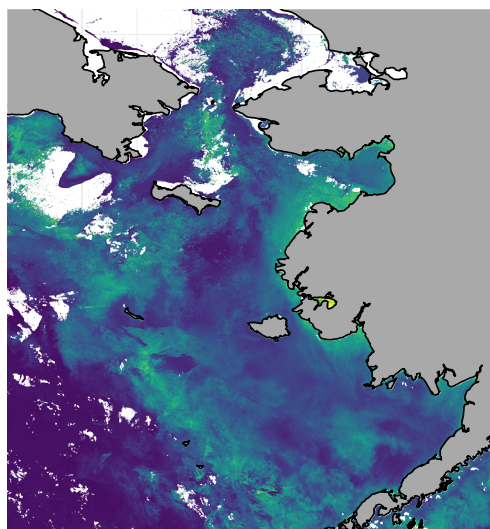
the long-term average (around the same time as the spring bloom in 2019). Scientists are still analyzing the satellite images from the summer months this year.

Satellite images provide useful information about large scale chlorophyll patterns, particularly during the summer months, but they can miss data when there is ice or cloud cover. Preliminary analysis of the satellite images from 2019 indicated that the peak of the spring bloom in the Bering Sea first occurred near shore, moving westward and into deeper shelf waters. Scientists are investigating how consistent this pattern is, how much it varies among years, and the connection to distribution, growth and survival of higher trophic level species.

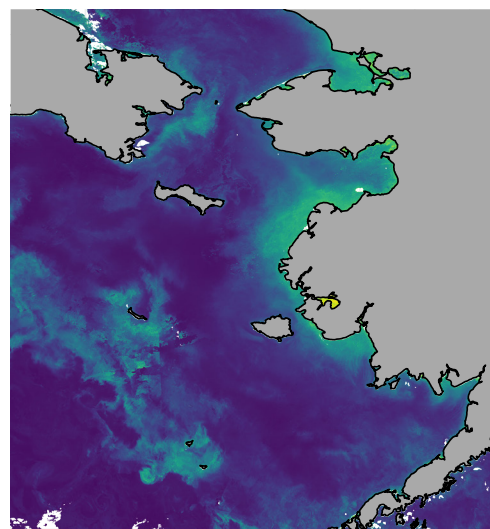
April 2020 chlorophyll levels



May 2020 chlorophyll levels



June 2020 chlorophyll levels



High
chlorophyll

Low
chlorophyll

SALMON

Salmon runs to western Alaska were unusual in summer 2020, with some stocks exhibiting markedly late and compressed run timing. Chinook and chum salmon runs were particularly poor. Overall, the Bristol Bay sockeye run was stronger than anticipated, but specific district runs were not necessarily strong. Biologists noted unusually small-sized sockeye salmon for Bristol Bay, and a lack of age-four chum salmon in the Yukon and Kuskokwim rivers. Coho salmon runs are ongoing.



Photo by C. Neilson, US FWS

Red King Crab (page 4): Jenefer Bell • Alaska Department of Fish and Game • jenefer.bell@alaska.gov

Phytoplankton: Lisa Eisner & Jens Nielsen • NOAA Alaska Fisheries Science Center • lisa.eisner@noaa.gov

& jens.nielsen@noaa.gov

Salmon: Kathrine Howard • Alaska Department of Fish and Game • kathrine.howard@alaska.gov



UNUSUAL MORTALITY

GRAY WHALE

Since 2019, gray whales have washed up dead at a higher rate than usual along their migration route from Mexico to Alaska. NOAA declared these elevated deaths as an Unusual Mortality Event (UME). An investigation is underway to better understand the cause of the UME.

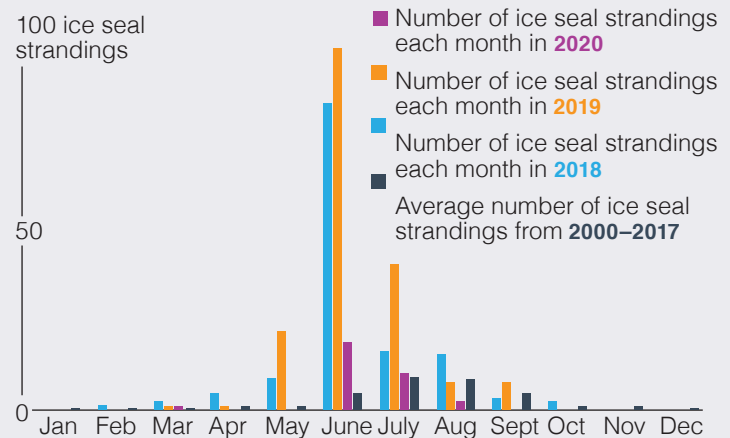
Of Alaska's 42 strandings in 2020, 14 occurred in the Bering Sea (as of September 14, 2020). There is no new information from 2020 on the cause(s) of the UME. Most of the stranded whales this year have been in remote areas (not accessible for necropsy due to the coronavirus pandemic) and/or they were in advanced states of decomposition. Results from the 10 gray whales fully or partially necropsied in 2019 are still pending, but several showed evidence of emaciation.



ICE SEALS

Since June 1, 2018, elevated numbers of bearded, ringed and spotted seals have washed up dead along the Bering and Chukchi coasts. NOAA classified the elevated strandings as an Unusual Mortality Event, initiating an investigation as to the cause. Only 29 stranded ice seal were reported in 2020 (as of August 31), compared to 112 and 165 in 2018 and 2019 respectively.

We currently do not know why the ice seals are stranding. All age classes of seals have been reported. A subset of stranded seals has been sampled for genetics, harmful algal bloom exposure and other tests. Many stranded seals were skinny and possibly emaciated. Results are pending.



REPORT STRANDED MARINE MAMMALS

Immediately report dead, injured or stranded marine mammals. To make a report, take a photo and call one of the numbers to the right. Scientists are also interested in where you are seeing live gray whales and if they exhibit strange behaviors.

- NOAA's Alaska marine mammal stranding hotline—(877) 925 7773
- UAF Alaska Sea Grant—(855) 443 2397
- Eskimo Walrus Commission—(907) 443 4380
- Kawerak, Inc.—(907) 443 4265



SEABIRDS

*Graphic by Coastal Observation and Seabird Survey Team

CONTINUED SEABIRD DIE-OFFS

From May to September 14, 2020, 320 seabird carcasses were reported in Alaska, most from the Bering Strait Region. The 2020 die-off was smaller than die-offs in summers 2017–2019, but still a concern for rural communities. Reports by local residents from the Bering Strait, Bristol Bay, and Aleutian and Pribilof Islands to US Fish and Wildlife Service play a critical role in documenting and understanding Alaska's seabird die-offs.

Birds examined from St. Lawrence Island were emaciated, however, for birds found in June the cause of death was also associated with a non petroleum oil (vegetable, fish, or cooking oil) found in the bird's esophagus and lungs and on their feathers. The U.S. Geological Survey National Wildlife Health Center examined 12 carcasses, all were emaciated and tested negative for Avian Influenza. Tissues will be analyzed for harmful algal bloom toxins. Results of those analyses are pending.

REPORT SICK OR DEAD BIRDS

To report sick or dead birds, take a photo and/or video, note the location, time, date, number of birds, and call one of these numbers:

- **Bering Strait region**—Brandon Ahmasuk (907) 443 4265 or Gay Sheffield (907) 434 1149
- **Yukon Kuskokwim Delta**—Jennifer Hooper (907) 543 7470
- **Bristol Bay**—Gayla Hoseth (907) 842 6252
- **Pribilof Islands**—Lauren Divine (907) 891 3031
- **Aleutians**—Karen Pletnikoff (907) 222 4286

Or report to the US FWS—(866) 527 3358 or ak_mbm@fws.gov.

HELP MONITOR YOUR LOCAL BEACH

The Coastal Observation and Seabird Survey Team (COASST) [provides training](#) for people interested in monitoring their beaches for sick or dead seabirds.

Larger bubbles mean more carcasses. Colors distinguish months.

- **May, 2019 (2 carcasses)**
- **June, 2019 (86 carcasses)**
63% Horned puffins
9% Murres
7% Short-tailed shearwaters
- **July, 2019 (~140 carcasses)**
51% Horned/tufted puffins
31% Murres
- **August, 2019 (76 carcasses)**
41% Murres
29% Northern fulmars
16% Short-tailed shearwaters
- **September, 2019 (15 carcasses)**
100% Crested auklets



CORONAVIRUS RESEARCH IMPACTS

The ability to collect data and information on the Bering Sea ecosystem was severely limited in 2020, due to the impact of the coronavirus pandemic on travel, field operations and group activities. The US Fish and Wildlife Service restricted most operations in order to reduce the potential of exposing remote communities to coronavirus, and to safeguard employees. The Alaska Maritime National Wildlife Refuge did not conduct seabird colony monitoring activities, and other vessel-based research programs (which included seabird and marine mammal surveys) were canceled or operated with reduced crews and fewer days at sea than originally planned.



Seabird die-off: Robert Kaler • US Fish and Wildlife Service Alaska Region • robert_kaler@fws.gov

Coronavirus impacts: Kathy Kuletz • US Fish and Wildlife Service Alaska Region • kathy_kuletz@fws.gov

HABS & MARINE DEBRIS

HARMFUL ALGAL BLOOMS

Harmful Algal Blooms (HABs) occur in many locations worldwide when certain kinds of algae grow very quickly. Some of these algae produce powerful bio-toxins that can cause **Paralytic Shellfish Poisoning** (PSP) if consumed.

Unprecedented levels of paralytic shellfish toxins have been found in shellfish collected at locations along the Aleutian Islands chain and Alaska Peninsula in 2020. Tragically, consumption of blue mussels and snails resulted in a **fatality in Unalaska, AK in early July 2020**. Analysis at the Alaska Dept of Environmental Conservation laboratory in Anchorage found the total toxin load of a sample of the blue mussels that were collected from the beach on the same day the

shellfish were consumed had extremely high toxin levels, more than 100 times higher than the safe regulatory limit. The snail samples also had elevated toxin levels, but not as high as the blue mussels.

People should be aware of the dangers of paralytic shellfish poisoning from all shellfish species harvested on beaches across Alaska. PSP toxins cannot be seen or smelled. Cleaning, cooking, freezing and aging contaminated shellfish does NOT reduce the health risk.

Tribes, communities, and the **Alaska Harmful Algal Bloom Network** continue to work with scientists to coordinate statewide research, monitoring and response. The goal of these efforts is to reduce human health risks associated with HABs.

MARINE DEBRIS

In July and August, 2020 local community observers began reporting unusual amounts and types of marine debris washing up on shorelines, starting on St Lawrence Island and expanding across the Bering Strait region in the days and weeks that followed.

Debris included plastic bottles, personal hygiene products, aerosol cans, cleaners and plastic bags—with what appeared to be fishing industry related debris, such as deck boots, intermixed. Most of the debris appeared to be foreign in origin, with Russian and Korean labels identified.

According to the initial assessment by the NOAA Marine Debris Program and Emergency Response Division, the debris patterns were consistent with a point source debris release, such as loss or dumping from a vessel.

A task force of federal and state agencies, community partners from the region, and stakeholders are actively responding to the event—sharing information, identifying needs and pursuing actions. Community members can report marine debris sightings to incident.debris@noaa.gov as well as through regional networks such as Alaska Sea Grant and Kawerak.

Debris locations and dates



Photo by Austin Ahmasuk Kawerak

Harmful algal blooms: Chandra Poe, Qawalangin Tribe of Unalaska • chandra@qawalangin.com
Marine debris: Peter Murphy • NOAA Marine Debris Program • peter.murphy@noaa.gov