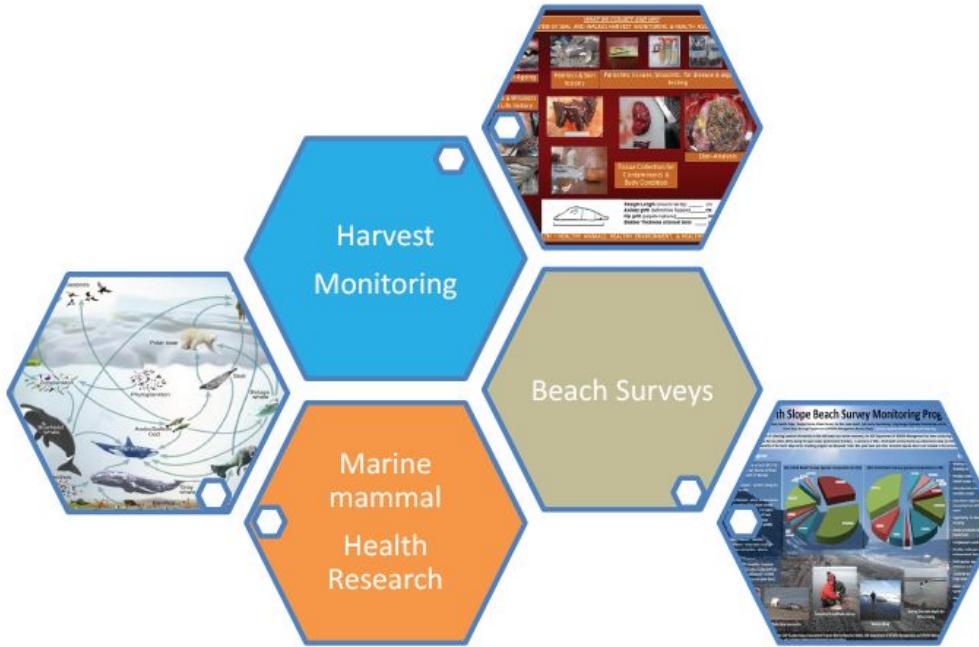




Research Update



NSB DWM

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Ice seal committee Meeting
March 23-25, 2022 Virtual



North Slope Borough

Outline

- Yellow Blubber
 - TEK
 - Causes
- Sarcocystis
 - Molecular characterization
- Marine Harmful Algae
 - Saxitoxin
 - Cyanobacteria
- Sharks, Shipstrike, Seal eater
- Coronavirus surveillance



Seal Stranding & Harvest Monitoring Team:
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Nayakik, Billy Adams

Yellow Blubber TEK and Local knowledge

- perception about yellow blubber (YB) in bearded seals as “evidence of ill health” varies among communities.
- Some have never seen it, others know about it and speculate that age (older), sex (female), parasites as well as diet (more fish) contribute to YB.
- Not all hunters/communities will avoid YB if the other organs look good and the animal smells right.
- Oil from YB has a different taste/smell (stronger; better for Umiak skins; sometimes preferred or not) and can affect seal oil rendering.



Yellow Blubber Case review

- earliest cases date back to 2000 from Wainwright and Point Hope.
- Communities that have reported YB include North slope communities (Utqiagvik, Kaktovik, Wainwright, Point Hope) and Bering Strait communities (Kotzebue, Nome, King island, Gambell; unknown).
- The majority of cases (~ 33) have been documented where there are existing ice seal monitoring programs (Point Hope, Utqiagvik, UAF-Map).
- Preliminary analysis of case material suggests that YB is more frequently seen in adult females than males.



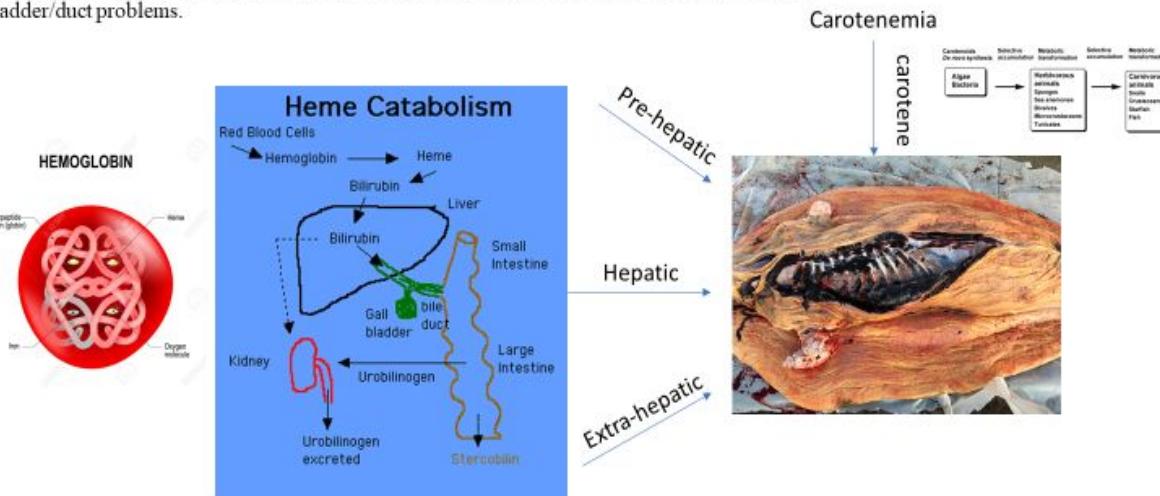
Diagnostic Work-up

- Histopathology: Only a few cases (n=11) have been sampled over the years for targeted histopathological evaluation. Based on the limited data available **YB in bearded seals was associated with liver disease (liver inflammation; liver flukes) in some seals but not all.**

Causes for yellow discoloration of fat in marine mammals and domestic species is related to **hyperbilirubinemia (jaundice)**, and **carotenemia (carotenes)**.

- Carotenemia:** caused by increased uptake of carotene (pigments in the diet) and it is harmless to the animal.
- Hyperbilirubinemia:** Deposition of bilirubin happens only when there is an excess of bilirubin, a sign of increased production or impaired excretion.
- Bilirubin is a breakdown product of hemoglobin (red blood cells) and the liver, biliary system and kidneys are important organs in removing it from the body.
- Excess of bilirubin (hyperbilirubinemia) in the body is not normal and is often caused by liver and gallbladder/duct problems.

We encourage seal hunters and communities to continue to work with their local point of contact to report YB's, take photos and submit samples (liver/blubber/blood (serum)) so that we can continue to better characterize YB in bearded seals.



Sarcocystis spp.

Collaboration: UC DAVIS, CA (Dr.Shapiro/Dr. Sinnet)

Objective: to conduct molecular characterization of the type of sarcocystis. spp. present in key marine mammal species (ice seals, polar bear, beluga) from Alaska.

- multiple Sarcocystis spp. are present in arctic marine mammals in Alaska.
- For iceseals we confirm that *S. pinnipedi* is present in arctic bearded and ringed seals but also other species.
- The next step is further phylogenetic characterization of these sarcocystis species.

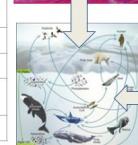
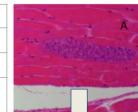


Sarcocystis (A) in muscle tissue from Alaskan ringed and bearded seals was first reported in Utqiagvik almost 40 years ago. Mostly an incidental finding, its marine life cycle remains an enigma. We present novel baseline data on tissue distribution and prevalence (%) of Sarcocysts spp. in ringed and bearded seals from the North Slope Borough and Bering Strait Region of Alaska (2008-2016) (Table 1) and propose a prey-predator-scavenger marine life cycle model for sarcocysts spp. in the Arctic.

TABLE 1*	# Examined	# Lesions	%
BEARDED SEAL			
Skeletal muscle	128	68	53
Digestive System -esophagus -tongue	110	25 1	23 <1
RINGED SEAL			
Skeletal muscle	67	44	66
Digestive System -esophagus	63	4	6
Heart	69	4	6

Note: Organs for each system were collected, but there was variability in collection and is reflected in a differing totals for each system

Acknowledgments: This study was funded by a substantial grant from the Coastal Impact Assistance program, U.S. Fish and Wildlife Service, US. Department of the Interior, and the North Slope Borough. All tissue were collected under NMFS Permit #824-1899-00 or NMFS Permit #17350-01. Stranded sea otts were collected under authority of the Alaska Marine Mammal Stranding Network. Many thanks to the North Slope Borough and the Bering Strait communities who allow us to sample their harvest. We could not do this work without their support.



Key Points

- Geographic gradient in prevalence with Alaskan ringed seals (66 %) > then Arctic Canada (9%).
- Ringed and bearded are likely intermediate hosts for this parasite.
- Hypothesis:** The known herbivore (intermediate) is primary pre-predator (definitive host) 2- last cycle as seen elsewhere is expanded in the Arctic by including many long-lived marine and terrestrial predator species with large home ranges as alternate intermediate hosts (B)

Cyanobacteria toxins

- Collaboration: SUNY, UAF -MAP
- Objective: to monitor for cyanobacteria in ice seal liver
- No cyanobacteria toxins were detected
- New Baseline

Surveillance for cyanobacteria algal toxins in liver tissue of ice-associated seals, Alaska

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Cyanobacteria, also known as blue green algae, produce a number of different toxins that have been implicated in morbidity and mortality of sea otters and domestic animals. The continued warming of the Pacific Arctic increases freshwater runoff, thus potentially exposing ice-associated seals during the open water season when they use lagoons and inlets.

Materials & Methods Liver samples collected (2015-2020) from 30 seals (ringed, spotted, bearded) harvested for subsistence or found dead within the Bering Strait and North Slope region were analyzed for cyanobacterial toxins (microcystin; anatoxins, and cylindrospermopsins) using LC-MS and LC-MS/MS.

Results Tissue levels were negative (below detection limit) for tested cyanotoxins and their metabolites in liver tissue. These analytical results are corroborated by our gross and histopathological findings with no evidence of jaundice and/or hepatic lesions consistent with microcystin intoxication (acute hepatotoxicosis) in examined seals.



Conclusion No widespread cyanobacterial blooms occurred during our sampling years (2015-2020), and findings from this pilot study can serve as baseline data for future marine mammal monitoring studies in Alaska.

Funding for this study was provided by:

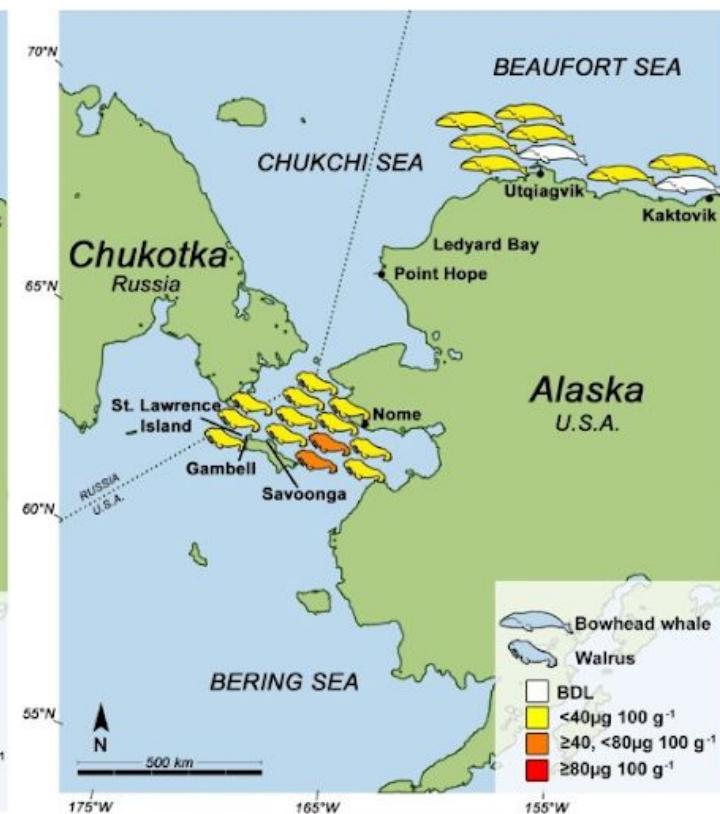
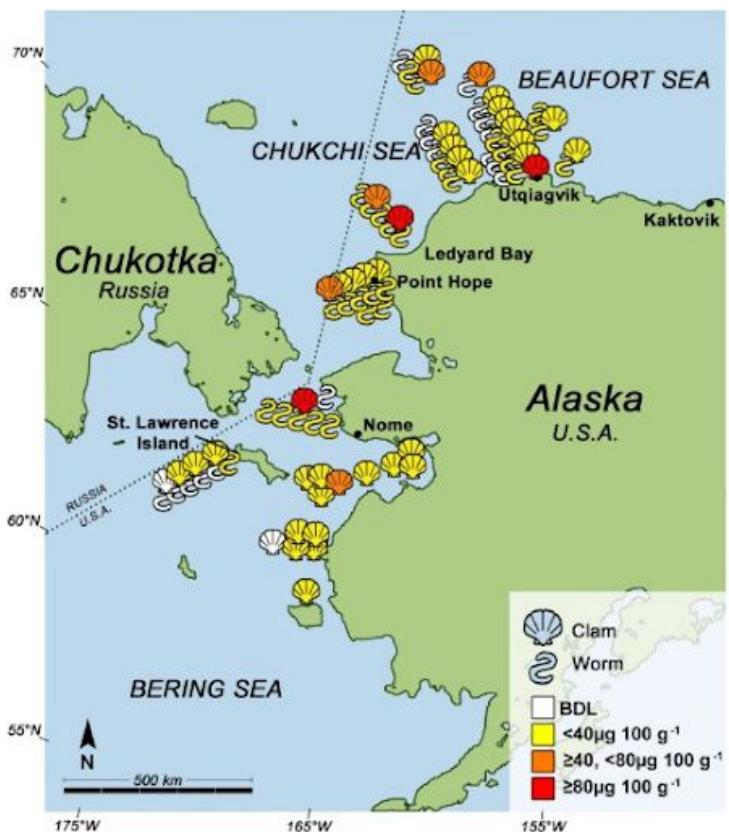


Acknowledgement: Many thanks to the North Slope and Bering Strait hunters and communities that supported this study by submitting samples from their harvest. Samples were collected under NMFS permit (21386;17350-00) and under special authority of the Alaska Marine Mammal Stranding network.

HABS : 2019 Saxitoxin Foodweb Analysis (ECOHAB project)

<https://coastalscience.noaa.gov/news/new-publication-reports-the-prevalence-of-shellfish-toxins-in-arctic-marine-food-web/>

Toxin concentrations in benthic clams worms, walruses and bowhead whales collected in the Bering Sea, Chukchi Sea, and western Alaskan Beaufort Sea. Toxin levels are categorized in relation to the commercial seafood safety regulatory limit (80 µg saxitoxin equivalents per 100 grams). White = BDL (below detection limit/not detected), yellow = low toxin levels, orange = moderate toxin levels, and red = high toxin levels.



Sharks, Shipstrike, Seal eater



Guy Good morning, 52° cloudy rain east at 10mph. Here's some pictures from yesterday I took screen shots from a fb friend and I also shared the video on my Facebook page if you want to check it out. **Looks over 5 feet or so. They untangle it and set it free. There fishing for salmon and trout, trout are already coming back from up north, which is early. Another sighting of a shark at nuvuk which scared away all the seals that were there**



Pan-corona virus Surveillance in North American Wildlife

- In 2020 the NSB DWM in collaboration with NOAA/NMFS, UAF-MAP, UME investigative team and UC Davis, CA conducted a pilot study to test harvested ice seals (ringed and bearded for SARS COv2 (the virus that causes Covid19 in people) and other important pinniped diseases of concern (avian influenza, toxoplasma gondii, and morbillivirus). All seals tested were negative for these infectious agents.
- more spillovers (when the agent crosses to other hosts (animals)) have been documented in wildlife under human care (pets, zoo animals) and commercial fur farms. However recent studies have also shown that free-ranging white tailed deer in the US and Canada have been exposed to the SARS-COV2 virus.
- USDA in collaboration with other federal agencies (NOAA; USGS etc.) and state partners is initiating a broad surveillance effort for coronaviruses in north-american wildlife.
- The NSB DWM (and others in the state) will partner with NOAA/NMFS on monitoring marine mammals for coronaviruses. Sampling designs are currently being developed and as soon as we know more details we will inform the respective Alaska Co-management organizations. **As always these surveillance efforts will strongly depend on the support and collaboration of hunters and communities that depend on these important resources.**

FYI: For terrestrial wildlife ADF&G will be collaborating with USDA on screening terrestrial wildlife considered susceptible (wolves, fox, wolverine, caribou, moose, bison).