SUBMISSION TO THE
NUNAVUT WILDLIFE MANAGEMENT BOARD
June 2022

For

Information: **X** Decision:

Issue: Bowhead Carcass Update, Kitikmeot Region

Potential Issue(s) or impact(s):

- Between 1 October 2020 and 14 April 2021, 11 bowhead whales (*Balaena mysticetus*) were discovered dead onshore in the Gulf of Boothia, near the community of Kugaaruk, Nunavut.
- The cluster of mortalities in a relatively short time span and small geographic area was disconcerting to local hunters and prompted an investigation by Fisheries and Oceans Canada.
- Carcasses were attended by local Inuit and tissue samples from eight whales were collected to investigate potential causes and extent of mortalities.
- Possible causes for these mortalities include starvation (poor body condition), unusual weather events, harmful algal blooms, infectious disease, anthropogenic activities such as contaminants, and killer whale (*Orcinus orca*) predation.

Provincial / Territorial / International communications necessary / completed

- DFO has updated co-management organizations and Regional Communications as information becomes available.
- Alaska has recorded bowhead Unusual Mortality Events in the past and provided recommendations on response measures.
- A report summarizing results of analyses was provided to the International Whaling Commission in April 2022.

Science Response:

- **Satellite imagery:** To investigate the extent of the stranding event, satellite images were used to search for carcasses that may not have been found by local hunters.
- **Age analysis:** Skin samples were sent to UCLA Health Sciences as part of a collaboration to determine an epigenetic clock age for bowhead whales. Results indicate that six out of eight sampled whales were subadults, under the age of 20 years.
- **Contaminants:** Blubber samples from bowhead whales harvested before the mortality event (n=6, 2008-2020) or found stranded during the event (n=6, 2020), as

well as narwhals harvested in the same region were analyzed for 209 PCB congeners.
Concentrations of PCBs in the bowheads ranged from 14.1 to 129.7 ng/g wet weight and were not considered a health risk to either the whales or human consumption. The total PCB concentrations detected in individuals found stranded during the mortality event were in the same range as those harvested before the event.

- **Condition:** Blubber anatomy and composition from stranded bowheads were compared to harvested whales to test if mortalities were related to emaciation. Harvested whales had larger adipocytes and a higher proportion of lipid than whales found dead, suggesting stranded whales may have been in suboptimal nutritional condition.
- **Histopathology and disease screening:** Blubber and skin samples from seven of the stranded whales were sent to the Animal Health Center (Abbotsford, BC) where they were processed by conventional histology techniques. Muscle samples were also screened for the protozoal parasite, *Toxoplasma gondii*, while blubber and skin samples were screened for Brucella spp. and morbillivirus.
  Tissue from one stranded whale suggested emaciation or suboptimal nutritional condition. No evidence of *Brucella* spp, Morbillivirus or *T. gondii* were detected.
- **Climatic events:** Wind and sea ice data for 2020 was compared with typical conditions and no evidence of unusual weather events prior to the mortality event was found. However, lower wind speeds than average and later ice formation was noted. In comparison to historic conditions, the reduction in sea ice in autumn 2020 was extensive and would have afforded killer whales greater access to the region.
- We conclude that although no definitive cause of the bowhead whale mortalities was identified, killer whale predation appears to be the most likely proximate cause. A contributing factor in the strandings may have been an interaction between poor body (nutritional) condition and predisposition to predation.

Media Attention:

- Some media attention in November 2021 when the first whales were observed, but none since.

Next Step(s):

- Future research will include analysis of drone-collected images from the larger population to assess body condition, reproductive history from baleen plates, population modeling to determine carrying capacity, and modeling of physical factors to associate future whale health within a larger environmental context.

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