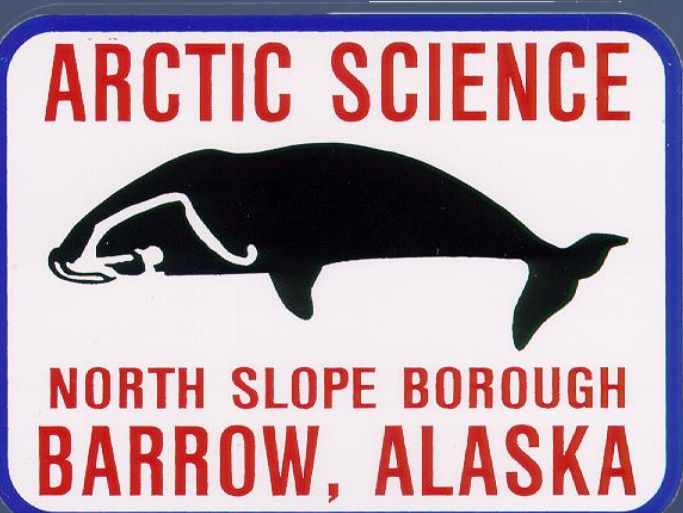




UPDATE ON BOWHEAD WHALE BYCATCH: OBSERVED IN AERIAL PHOTOS AND LANDED WHALES

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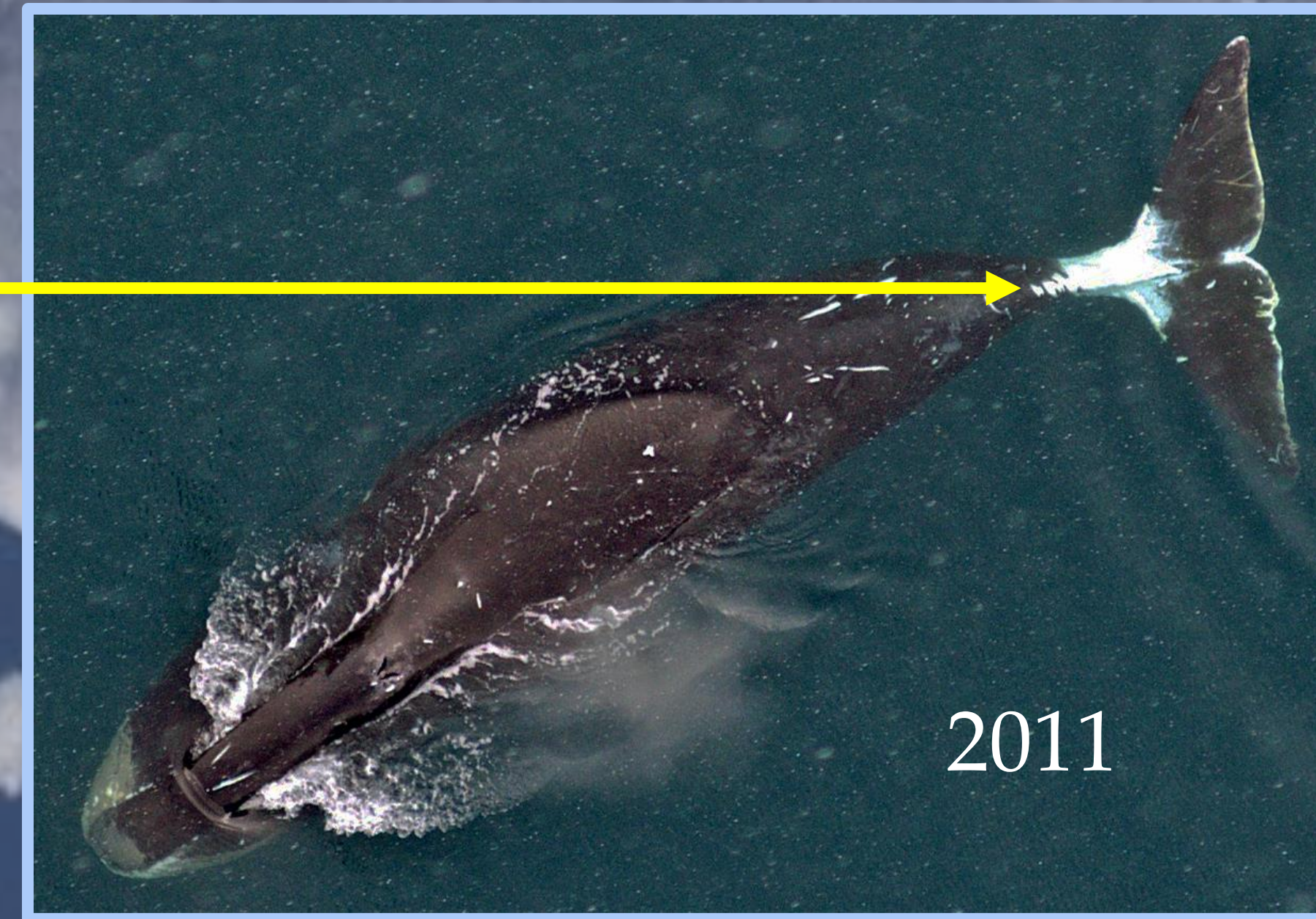
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Entanglement Scarring in Aerial Images



1985



2011

Entanglement Scarring — Aerial Photos: Entanglement scars can be observed in aerial photos, but the peduncle must be clearly visible (as above).

METHODS: Inter-year aerial photographic-matches (1985 and 2011) were used to estimate probabilities of bowheads acquiring entanglement injuries.
RESULTS: Entanglement scars accumulate 2.2% (1.1% and 3.3%). About 40% of adult whales will be scarred after ~25 years; fairly consistent with high percentage of harvested whales age 50+ years with scars. Analysis of fully independent dataset of aerial photographs (from 2011, n = 693) of the caudal peduncle indicates that **12.6%** (n = 87) show evidence of entanglement scars, while scars on harvested bowheads was **12.2%**. This close agreement suggests **~12-13% of BCBS bowheads carry entanglement injuries.**

CONCLUSIONS:

- Entanglement scars are observed on Bering-Chukchi-Beaufort Sea (BCBS) bowhead whales despite their high-latitude distribution north of most commercial fishing operations; however, spatial overlap occurs and some temporal overlap occurs in some winters, so bowheads get entangled in active or ghost gear. The only tagged gear recovered to date is US gear but little is know about Russian fishing.
- BCBS bowhead population is healthy with 3.7% annual increase; nonetheless the fish/crab gear entanglement rate of 12-13% is a problem requiring attention.
- Future entanglement trends are uncertain. Locations from satellite tagged bowheads indicate wintering is limited to area with sea ice cover (J. Citta, pers. comm., 2018). In 2017-2018, bowheads wintered further north than usual in Bering Strait region while US crabbers fished typical areas far south which suggests that entanglement rates may not increase appreciably unless fish/crab gear is lost in the ice, or pot and longline fishing move into bowhead summering areas. On the other hand, longliners have already advanced north, and some bowheads utilize open water in summer on the Russian coast; hence entanglements may increase as the fisheries (crab/cod) expand northward.
- The Alaska Eskimo Whaling Commission, Alaska Sea Grant, and North Slope Borough have engaged with the Alaska Bering Sea Crabbers to discuss specifics about gear types, range overlap, and the goal of stabilizing and/or reducing entanglement.

Entanglement Scarring on Landed Whales



Entanglement Scarring—Harvested Whales: Rope injuries appear as permanent white scars against the bowhead's black skin. Most scars occur on the peduncle and leading edge of the flukes with few observed on the mouth and pectoral fins. Landed whales are routinely examined for scars.



Severe entanglement injuries to the peduncle of an immature bowhead* harvested during May 2017 at Utqiagvik (Barrow). Commercial crab line embedded ~10 cm into skin. Peduncle had ~6 line-wraps. Whale was in poor body condition.

Bering Sea US commercial crab gear recovered by hunters from dead-entangled mature bowhead near St. Lawrence Island in 2015.



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Permits: Aerial surveys: NMFS Permits 782-1719 and 14245 issued to NMML. Examinations of harvested whales: NMFS Permits 814-1899-01, 814-1899-02, 17350-00, and 17350-01 issued to North Slope Borough.