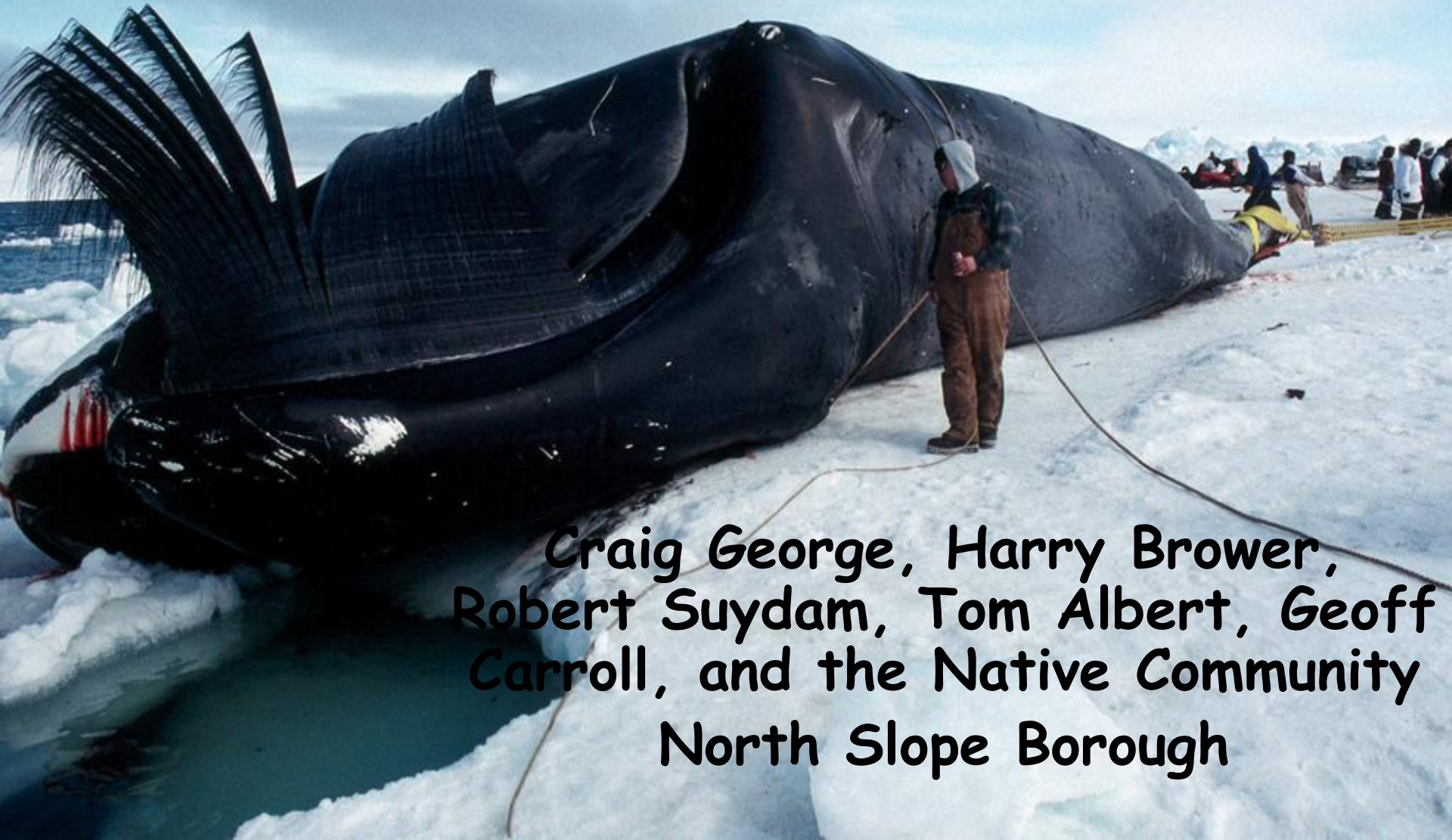


Traditional Knowledge, Science and Bowhead Whales



Craig George, Harry Brower,
Robert Suydam, Tom Albert, Geoff
Carroll, and the Native Community
North Slope Borough

Talking Points...

- Background (what is TK, what is science?)
- Bowhead Population Survey
- Bowhead reactions to industrial noise
- Bowhead Longevity & Life History
- Olfaction (smell) in bowheads

TK and Science?

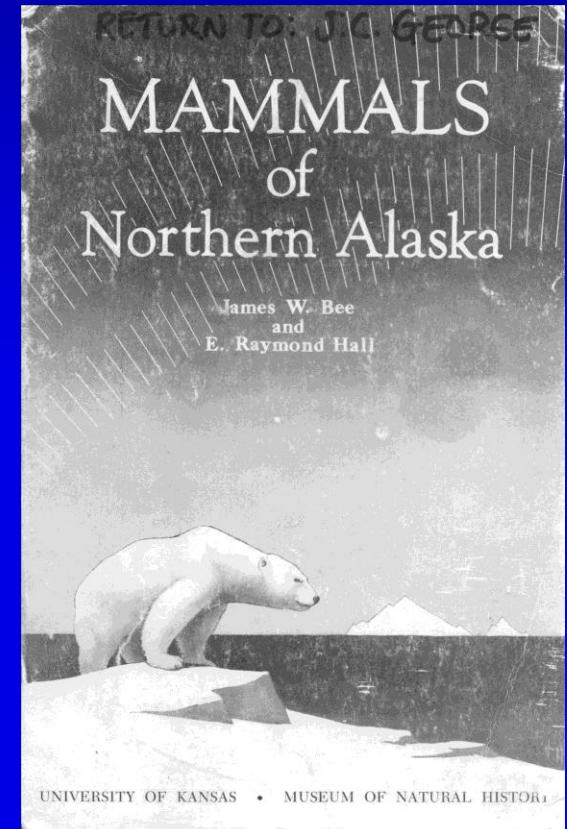
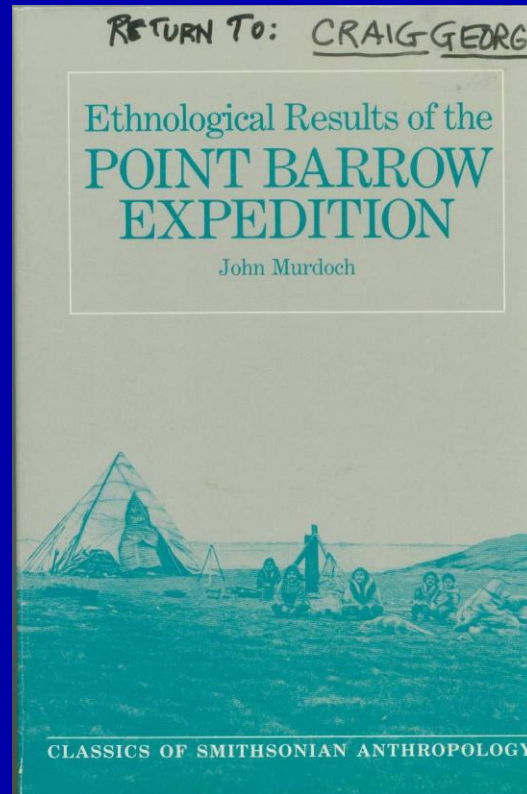
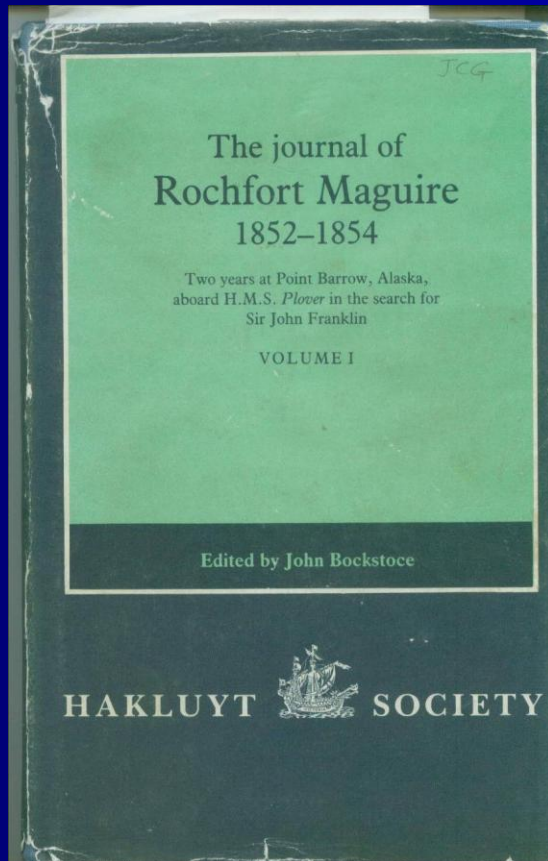
TK: Information that is passed on which is important for survival; it is gathered through observation, experience, and 'recorded' orally often as stories - continually tested by ones own experience. (T. Albert, J. Burns) (Amundsen v Scott)

Science: 1. the study and theoretical investigation of natural phenomena, 2. systematic activity requiring study and method, 3. **Knowledge, especially that gained through experience.**

- Websters New Riverside Dictionary

Integration of TK and Science

Not a new concept: e.g., Maguire (1852),
Murdoch 1881, Bee and Hall ~1950s, others...
Amundsen vs Scott. What changed?



Recording and Using TK

- Mutual Respect Prerequisite (patience)
- Identify experts for specific fields
- Use tried and true “published” methodologies (interview, maps, verification)
- Carefully record observations
- Learn the language!
- Always review information with community before releasing or publishing; offer the raw data
- Offer co-authorship for all papers



EXAMPLE 1. WHALE CENSUS

Senior Whaling Captains
(roughly):

"I know you are trying to do
a good job, but you're
missing lots of whales! They
swim under the ice and
some travel way offshore
beyond what you can see.
So, figure out how to do it
right...."





Harry Brower, Sr. and
Tom Albert, Sr.

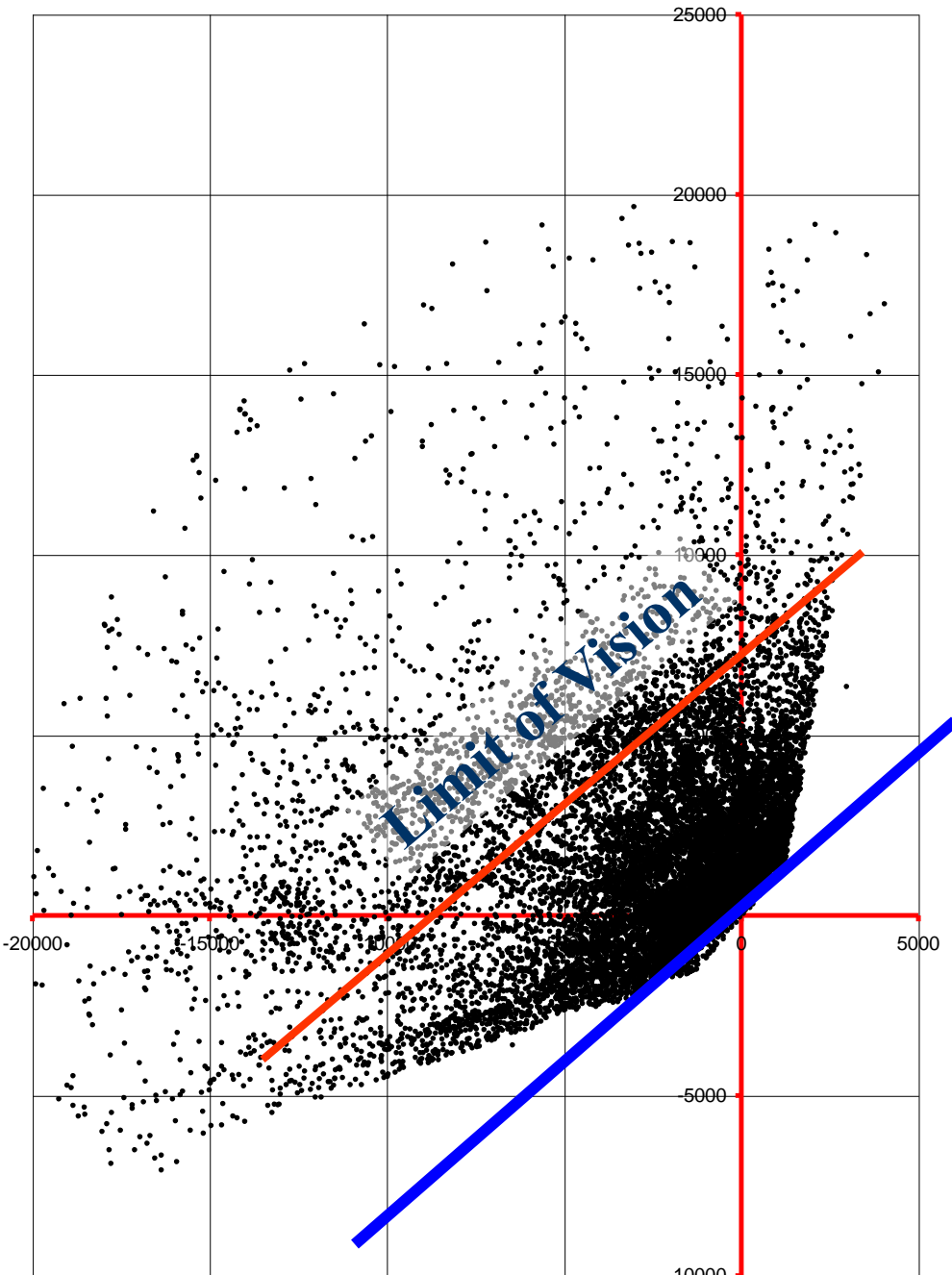




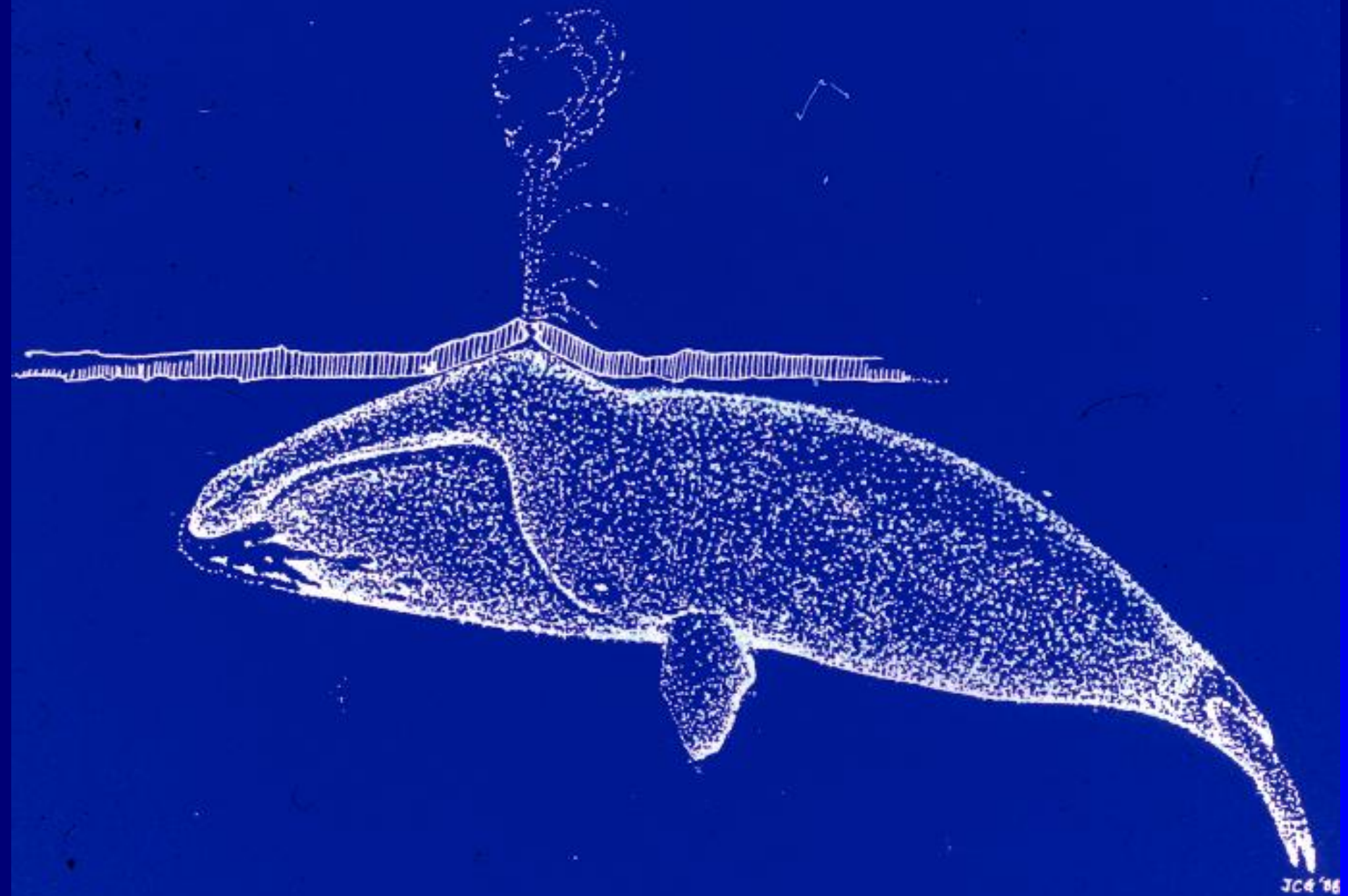
Ice-based whale census



2001 Acoustic Locations

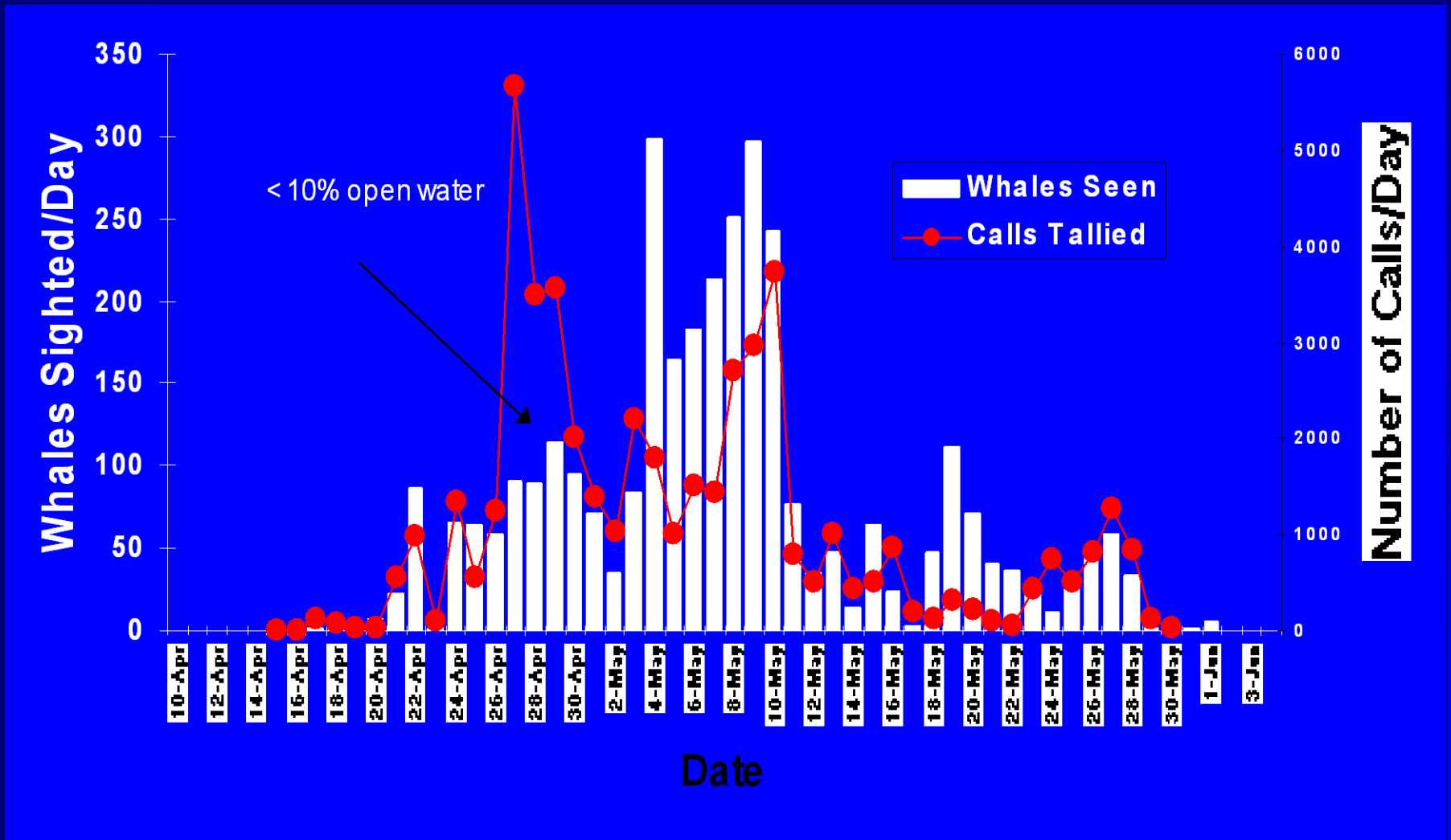


Acoustic Studies



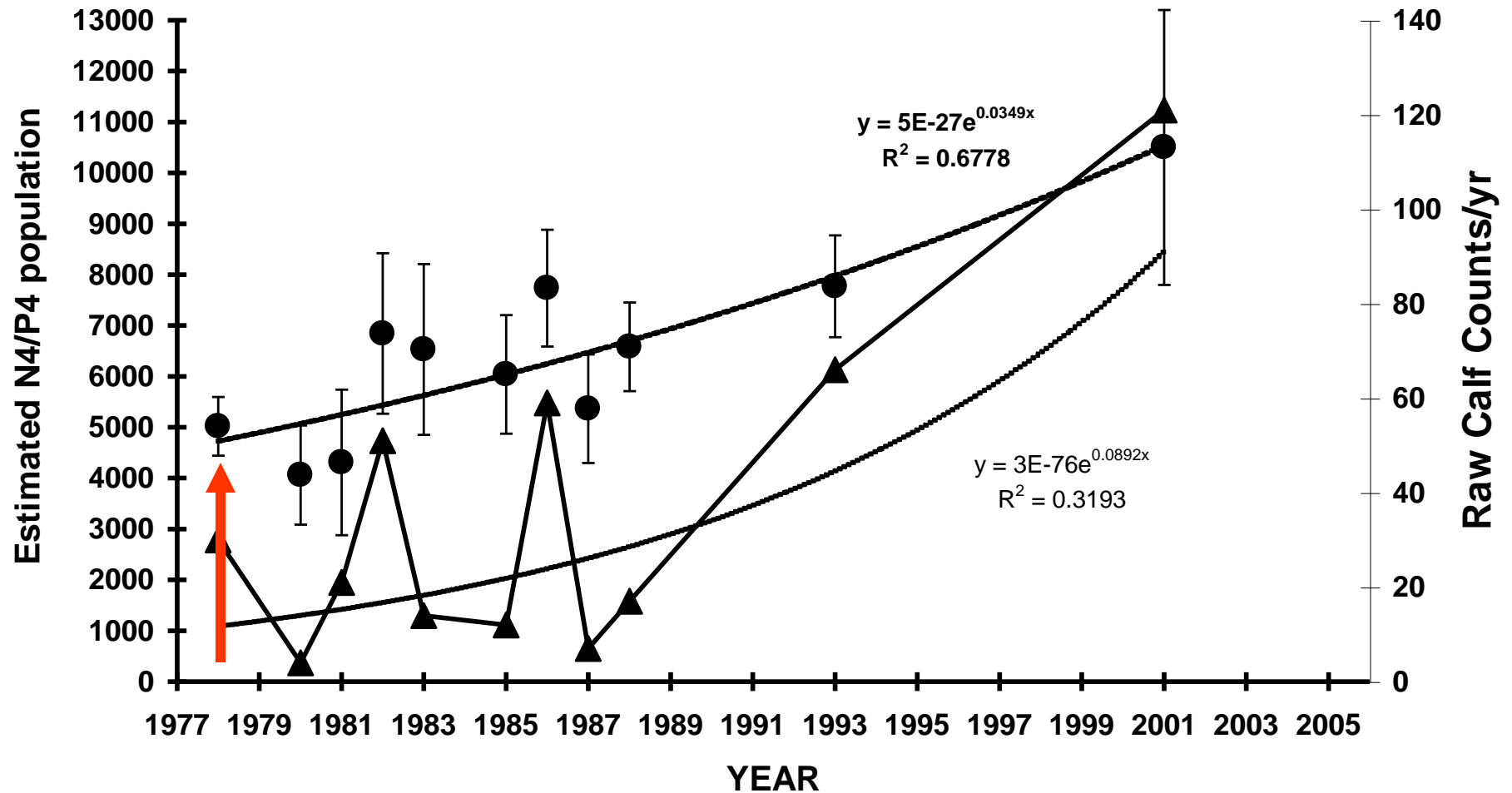


plot



Population Size and Trend

BCBS Bowhead Whale Population Trend
Estimated from Census Data



Example 2. Man-Made Noise in the Ocean

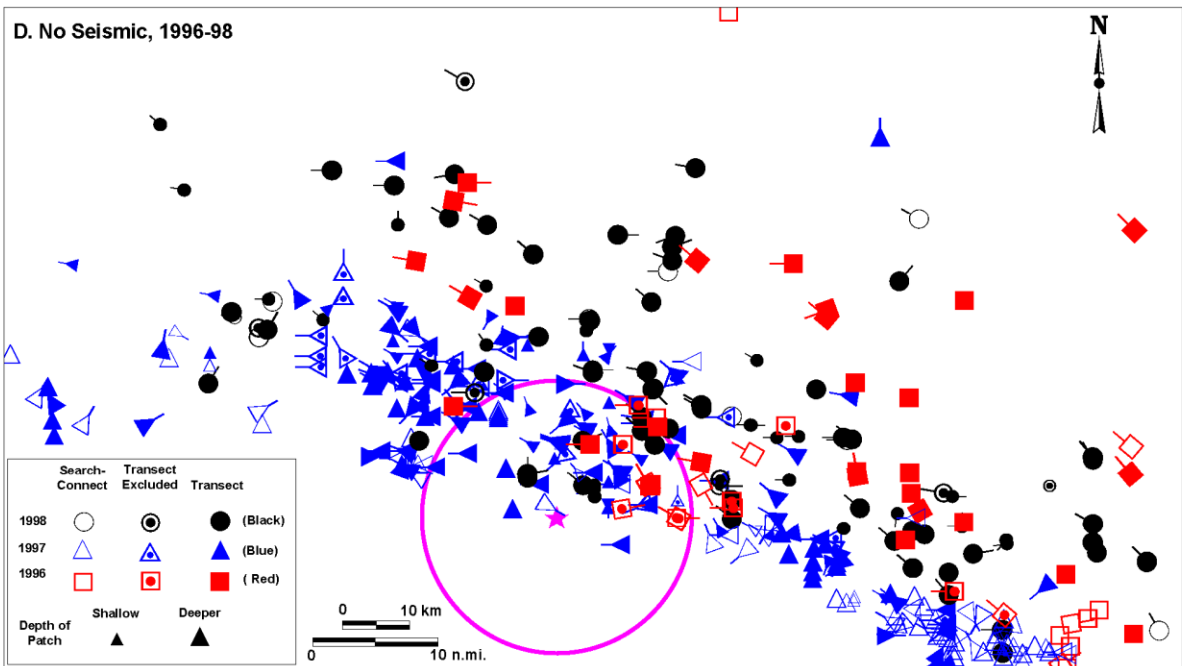
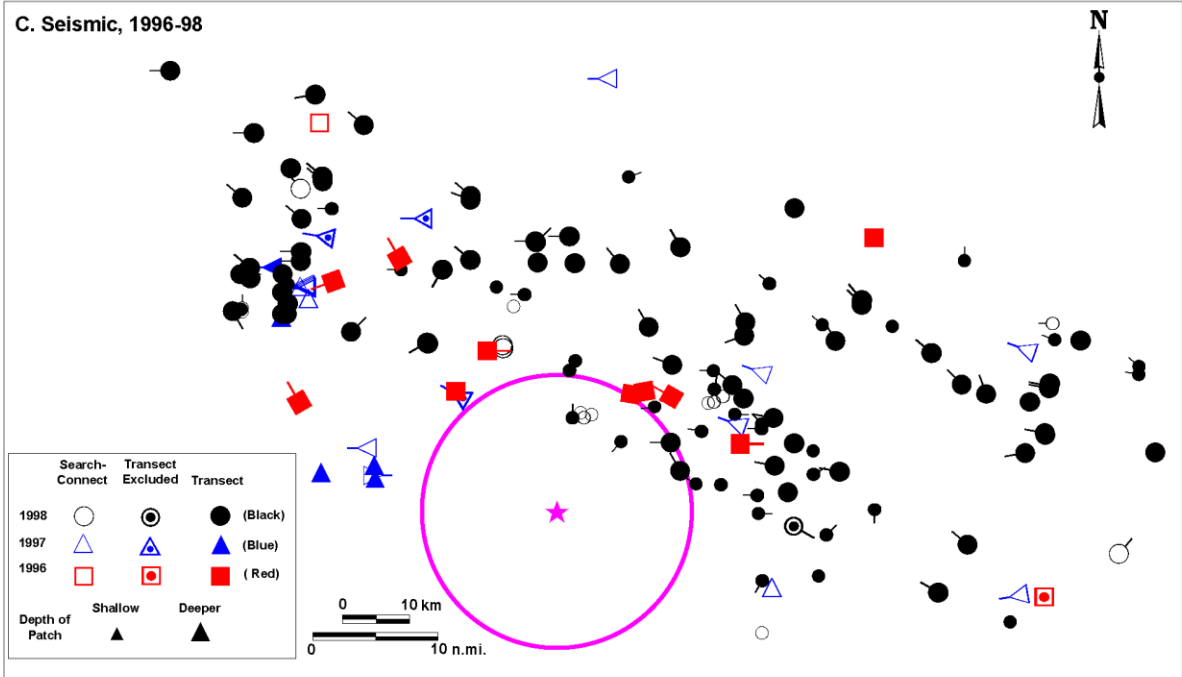
Whaling Captains in 1980s stated:

- *Noise from seismic testing and ships deflects migrating whales and makes them harder to hunt.*
- *Whales aren't in the places we typically find them.*
- *We have to go much further offshore to harvest them, which can be dangerous.*



Seismic Reaction studies, Richardson (ed.) 1999.

Migrating vs feeding whales





99B7
6 weeks?
3 cm
Baleen = 0



99B18
0 yr 4m
Baleen = 12 cm



06B10
6.1 m
Baleen = 32 cm
5 months



06B9
7.8 m
1 yr
95 cm



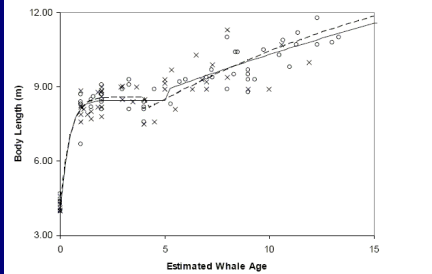
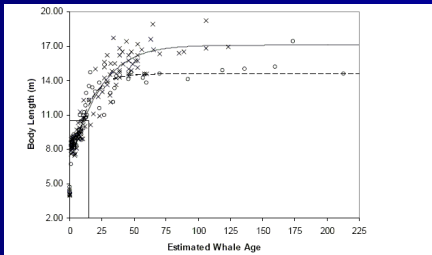
05B10
8.9 m
Baleen = 95
Age = 1.5 yr



07B19
8.6 m
Baleen = 137
Age = 4 yr



02B19
9.3 m
Baleen = 168 cm
Age = 7-8 yr



OLFACTION

Inupiat TK "*bowheads are sensitive to odors*"

No burning allowed during whaling.

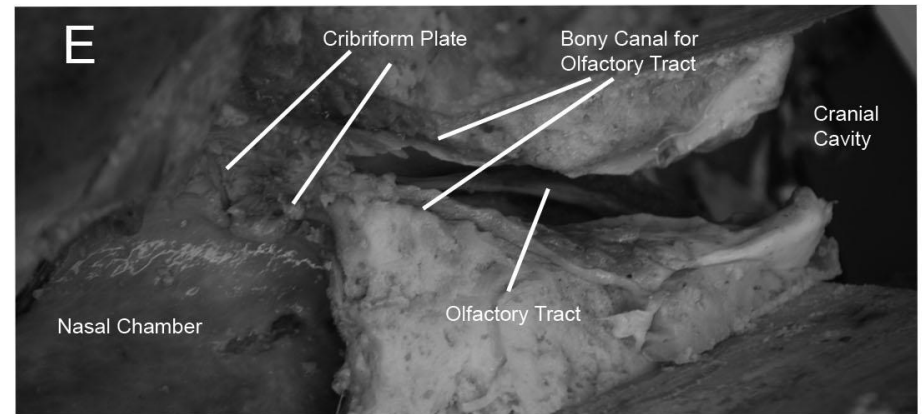
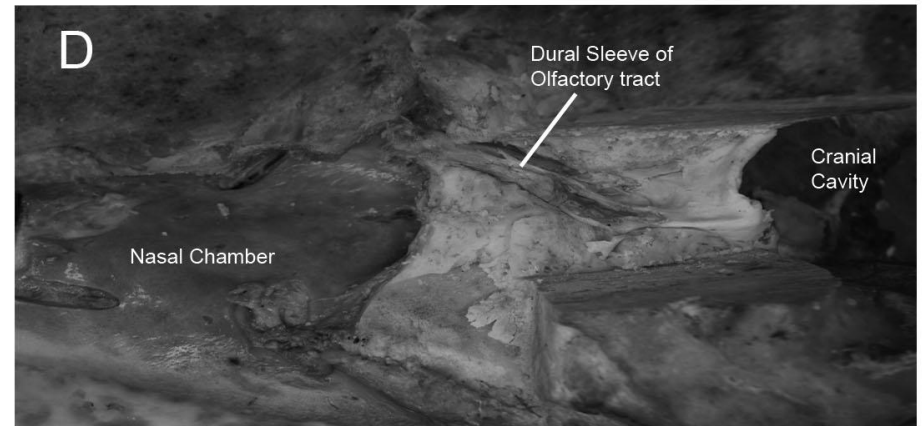
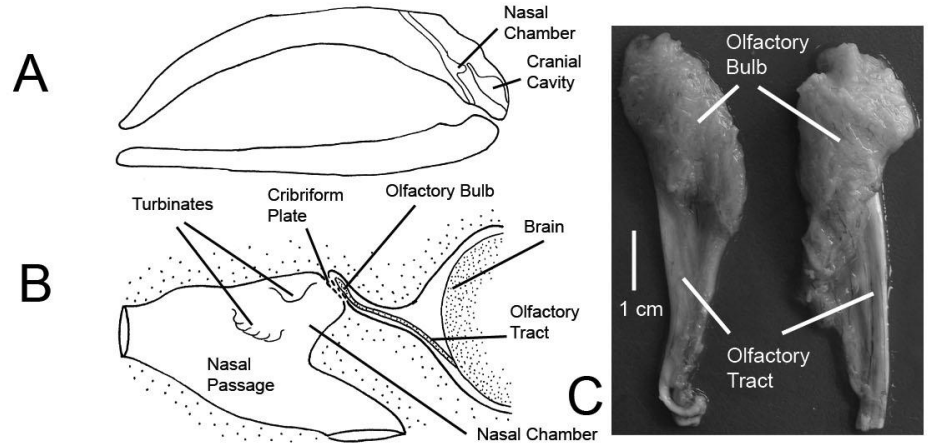
Science: "no olfaction in odontocetes, likely none in mysticetes"

Thewissen et al. *Olfaction and Brain size in the Bowhead whale (Balaena mysticetus)*

Olfactory bulbs large, complex

0.13% brain weight

50% OR genes functional



Example 3. Bowhead Longevity Story

Indirect Age Estimates

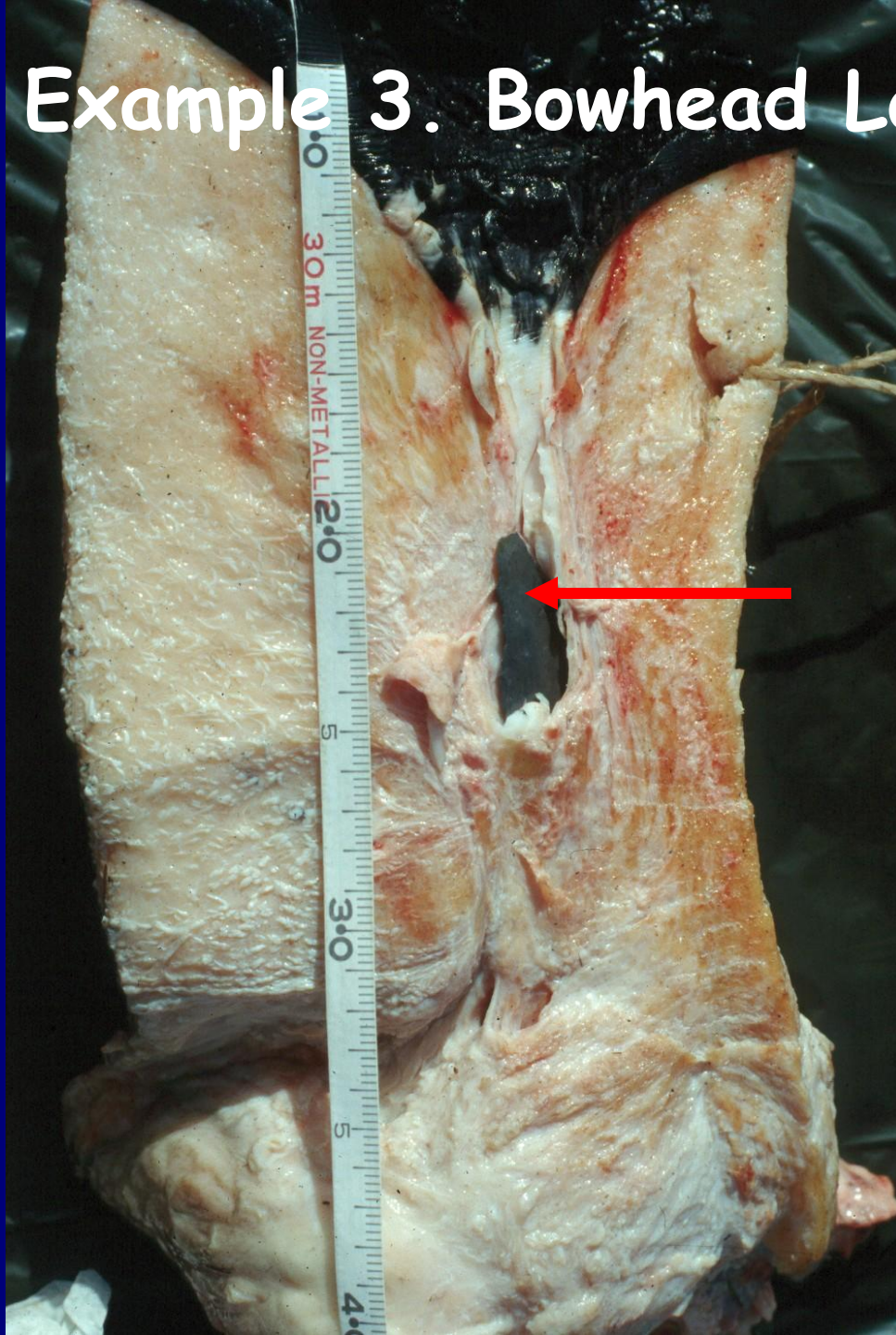




Photo:
Bill Hess

Recovery of old Yankee weapons



Complete Ebenezer Pierce 1885 patent bomb lance (New Bedford Whaling Museum accession number 1988.10).



Unassembled E.P. 1879 “bomb lance” fragment (from whale 07B8 captured, male 15 m, at Barrow, Alaska, in May, 2007)

Snow morphology

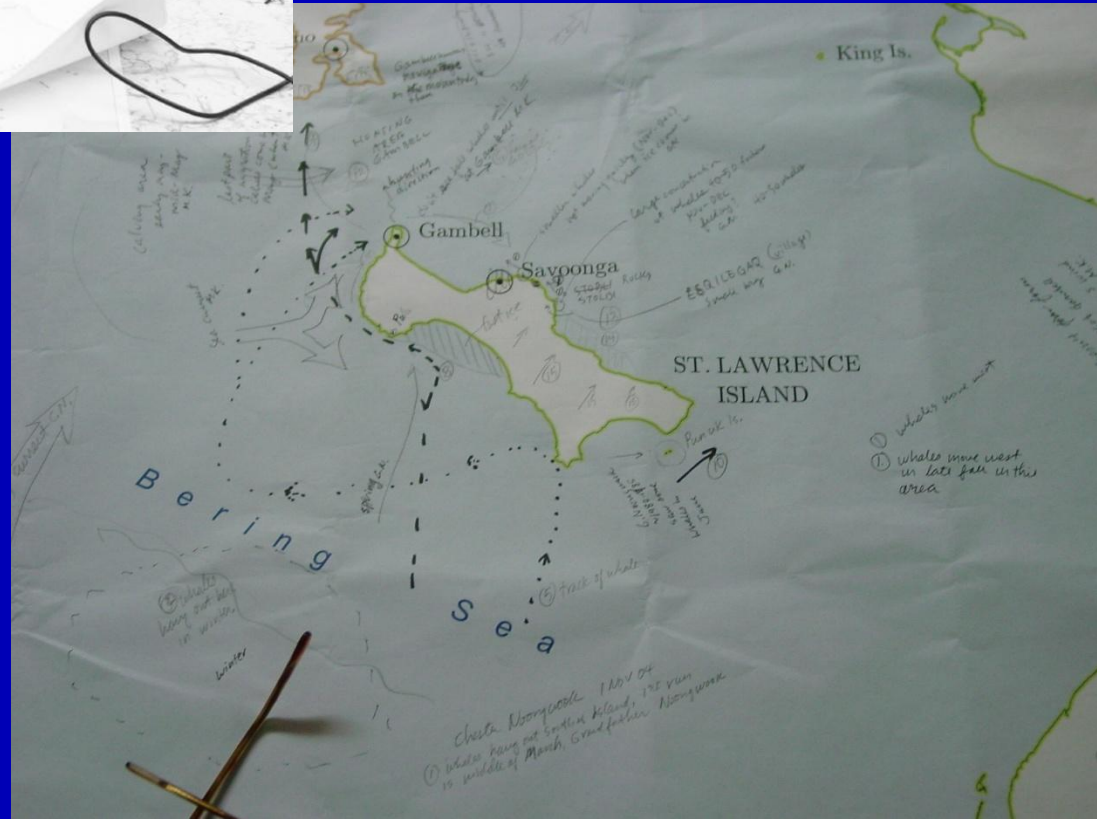


INGUTUK....



Different species? No.
Different morphology? Yes.

St. Lawrence TK Project



St. Lawrence Island TK

ARCTIC

VOL. 60, NO. 1 (MARCH 2007) P. 47–54

Traditional Knowledge of the Bowhead Whale (*Balaena mysticetus*) around St. Lawrence Island, Alaska

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(Received 23 May 2006; accepted in revised form 6 September 2006)

ABSTRACT. Despite considerable research on the bowhead whale (*Balaena mysticetus*) in Alaskan waters, relatively little has been conducted in the northern Bering Sea. To help fill this gap, we documented traditional knowledge of bowhead whales held by Yupik whalers of St. Lawrence Island, Alaska. Results include descriptions of the seasonal movements, distribution, and abundance of bowheads near St. Lawrence Island. The bowhead population appears to be increasing, as is the number of young whales seen. Changing environmental conditions are influencing distribution, leading to a somewhat earlier spring migration and a greater presence of whales near the island in winter. Hunters describe two bowhead migration paths near the island. It is unknown whether these two paths are used by two genetically different groups of whales, or whether the animals are simply responding differently to oceanographic conditions or geography. Our findings are consistent with studies of this bowhead population conducted elsewhere and suggest that additional research is needed to determine possible migratory (or genetic) differences between the two migrations of whales seen at St. Lawrence Island.

Key words: bowhead whale, *Balaena mysticetus*, St. Lawrence Island, Bering Sea, traditional knowledge, Yupik, Alaska

OBSERVATIONS OF KILLER WHALE (*ORCINUS ORCA*)
PREDATION IN THE NORTHEASTERN CHUKCHI AND
WESTERN BEAUFORT SEAS

Killer whales (*Orcinus orca*) are infrequently reported from the northeastern Chukchi and western Beaufort Seas (Braham and Dahlheim 1982), and reports of their feeding in this region are correspondingly rare (Marquette 1978, Frost *et al.* 1983, Lowry *et al.* 1987). We report on observations of predation by killer whales in this region. The following is a brief account of each sighting, most of which were reported to us by Inupiat Eskimo hunters.

During August 1982 in Peard Bay, Alaska, natives watched three or more killer whales chase a gray whale (*Eschrichtius robustus*) into shallow water. The killer whales tore off pieces of the gray whale's flukes, then attacked the whale's sides and back. The hunters reported that the killer whales "stood" the gray whale vertically, exposing its flippers and that it subsequently sank tail-first and disappeared. We interpret this as the gray whale raising its head out of the water as an evasive maneuver. This incident lasted several hours (C. Patkotak, Barrow, Alaska, personal communication).

During August 1986 northwest of Barrow, Alaska, native hunters watched a pod of 10 killer whales attack and kill a gray whale. Initially two killer whales attacked, then eight others joined the attack. The gray whale sank from sight after the attack (B. Rexford, Barrow, Alaska, personal communication).

In August of 1988 near Pt. Hope, Alaska, native hunters watched several killer whales attack a gray whale. One killer whale attacked the flanks and the flukes of the gray whale while two others pulled on the lower jaw and another tore at the tongue. The killer whales subsequently abandoned the carcass (H. Brower, Sr., Barrow, Alaska, personal communication).

Ten dead, stranded gray whales examined from 1987 through 1995 along the Chukchi Sea coast between Pt. Franklin and Barrow had injuries charac-

Summary

- TK observations useful in research, designing studies, hypotheses, etc
- Mutual respect prerequisite
- Use established methodologies to collect TK
- Seek specific TK experts (sea ice, fish, birds, caribou, etc)
- Hunters will likely notice things first (sample size)
- Community involvement
- Allow community to review reports prior to release
- Offer co-authorship on significant studies (int. prop).
- Give something back



Thank You



Bill Hess

