Bowhead Whale Diet: Bering Sea to Beaufort Sea (2007-2012)

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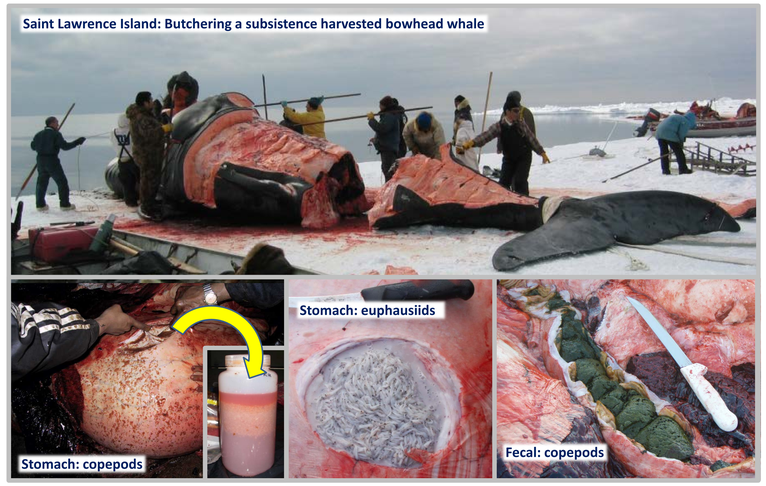
INTRODUCTION

Bowhead whales seasonally occupy the Bering, Chukchi, and Beaufort seas. This study examined the diet of bowhead whales (*Balaena mysticetus*) harvested by Alaska Natives from the Bering and Beaufort seas during 2007-2012 (Figure 1). We describe prey identified from bowhead stomach and/or fecal samples from bowhead whales harvested by the communities on Saint Lawrence Island (Gambell, Savoonga), Barrow, and Kaktovik.

Figure 1. Coastal communities from which postmortem examinations were conducted and diet data were collected from subsistence harvested bowhead whales during 2007-2012.

OBJECTIVES

- Identify the proportion of 149 harvested whales that had been feeding, seasonally.
- Describe the diet from prey identified from the stomach and/or fecal samples using frequency of occurrence and % prey by volume.



RESULTS – Proportion of Feeding

Beaufort Sea

- A higher proportion of whales had been feeding near Barrow (92%) than at Kaktovik (54%; Table 1).
- More whales had been feeding near Barrow during the fall (92%) than the spring (10%).
- During spring, a larger proportion of whales were feeding near Saint Lawrence Island (73%) than at Barrow (10%).

Bering Sea

- There was no seasonal difference in the proportion of whales feeding (spring 73% vs. fall 75%) near Saint Lawrence Island.

RESULTS – Diet

Beaufort Sea

- Near Barrow, amphipods and mysids occurred more frequently in whales during the fall than during the spring (Table 2).
- During the fall, mysids, fish, and euphausiids occurred more frequently in bowhead whales harvested near Barrow than whales harvested near Kaktovik. Near Kaktovik, copepods and amphipods occurred in every sample (Table 2).
- During the fall at Barrow, percent by volume during 2007-2009 were dominated by euphausiids (82%, Figure 1). During 2010, the dominant prey by volume switched to copepods (88%). A diversity of prey types dominated the fall 2011-2012 samples from Barrow and included isopods, mysids, copepods, amphipods, and fish (Figure 1). During the spring, euphausiid was the dominant prey taxa in two of three samples (Figure 2). During the fall at Kaktovik, copepod was the dominant prey taxa in 6 of 7 samples (Figure 3)

Bering Sea

- Euphausiids were the only identified prey that indicated a seasonal difference in percent feeding - occurring more in fall (67%) than spring (0%) harvested whales (Table 2).
- Copepods occurred most frequently in whales near Saint Lawrence Island, spring and fall (Table 2). No percent volume data were available during this study.

Location / Season	% Feeding
Kaktovik - Fall (n=13)	54%
Barrow - Fall (n=60)	92%
Barrow - Spring (n=50)	10%
St. Lawrence I. - Spring (n=22)	73%
St. Lawrence I. - Fall (n=4)	75%

Table 1. Percent feeding, by location and season for 149 harvested bowhead whales examined during 2007-2012.

	BEAUFORT Barrow (fall)	BEAUFORT Barrow (spring)	BEAUFORT Kaktovik (fall)	BERING SLI (fall)	BERING SLI (spring)
	n=55	n=5	n=7	n=3	n=16
Copepod	60%	60%	100%	100%	81%
Amphipod	91%	60%	100%	33%	6%
Mysid	60%	-	43%	-	19%
Euphausiid	58%	60%	14%	67%	-
Fish	56%	-	14%	-	13%
Cumacea	27%	-	14%	-	-
Shrimp	24%	-	14%	67%	19%
Isopod	15%	-	14%	-	-
Crab	15%	-	-	-	-
Annelid worm	4%	-	14%	-	-
Echinoderm	4%	-	-	-	-
Barnacle	2%	-	-	-	-
Ostrocod	2%	-	-	-	-
Unid. Decapod	2%	-	-	-	6%
Snail	2%	-	8%	-	6%
Clam	2%	-	8%	-	19%
Jellyfish	2%	-	-	-	-

Table 2. Frequency of occurrence for prey items identified from diet samples collected from bowhead whales subsistence-harvested near Barrow, Kaktovik, and Saint Lawrence Island (SLI) during 2007-2012.

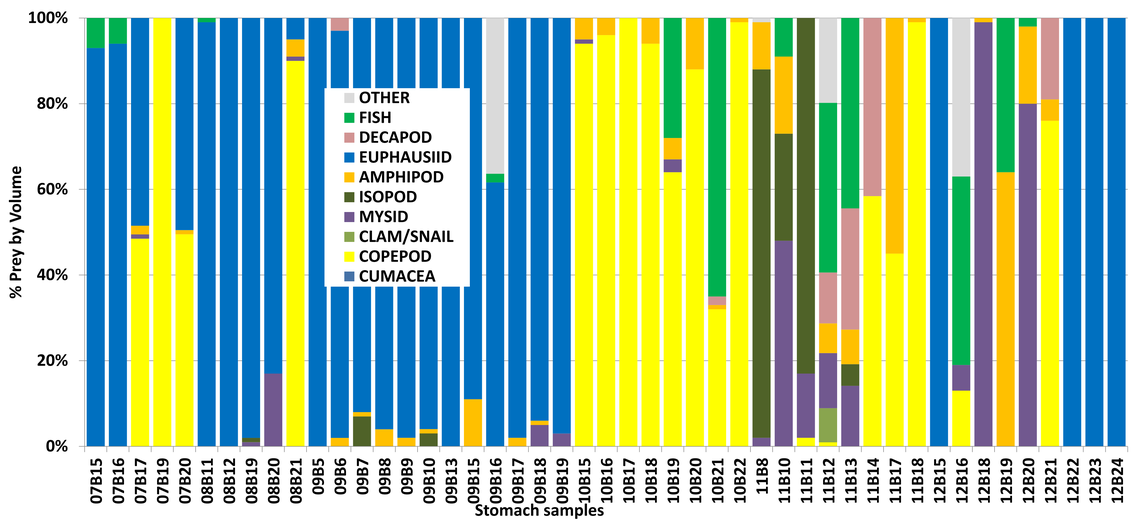


Figure 1. Percent prey by volume for 47 individual bowhead whales harvested in the western Alaskan Beaufort Sea near Barrow during the fall (2007-2012).

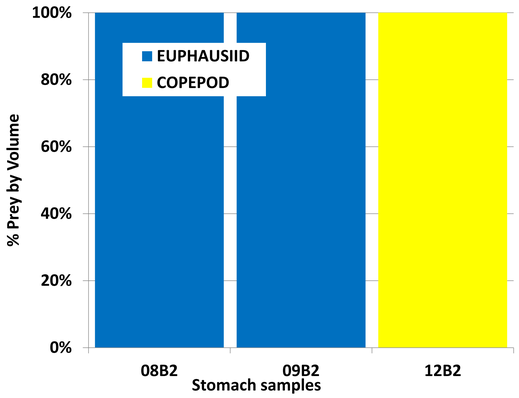


Figure 2. Percent prey by volume for three individual bowhead whales harvested in the western Alaskan Beaufort Sea near Barrow during the spring (2008-2012).

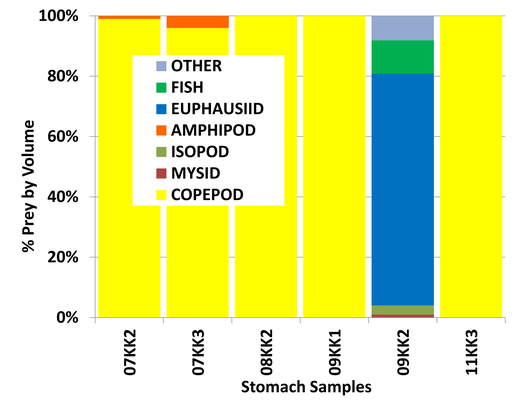


Figure 3. Percent prey by volume for seven bowhead whales harvested in the eastern Alaskan Beaufort Sea near Kaktovik during the fall (2007-2011).

DISCUSSION

Beaufort Sea:

- A higher proportion of bowhead whales fed regularly in the Alaskan Beaufort Sea during the fall migration than the spring. Near Barrow, the largest amounts consumed (i.e. full stomachs) were observed more often in fall.
- During spring, most whales harvested near Barrow were not feeding. Note that the bowheads that pass Barrow in spring are on migration from the Bering Sea to E. Beaufort Sea.
- There appears to be annual variation in the types and volume of prey consumed.
- Ecological shifts in secondary prey types may be occurring and deserve further study. For example, small fish occurred in over half of whales near Barrow during fall.

Bering Sea:

- The waters near Saint Lawrence Island appear to be important areas of bowhead whale feeding during spring and fall.

Beaufort Sea vs. Bering Sea

- There are strong indications of seasonal differences in the prey types and feeding behavior of harvested whales during their seasonal occupation of the Bering and Beaufort seas.
- We recommend caution when interpreting these results due to small sample sizes and an unaccounted state of digestion in samples.

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