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## DEMOGRAPHY AND BEHAVIOR OF POLAR BEARS FEEDING ON STRANDED MARINE MAMMAL CARCASSES

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Polar bears spend most of their time on drifting pack ice and feed primarily on ringed seals (*Phoca hispida*) and bearded seals (*Erignathus barbatus*) (Stirling and Archibald 1977; Smith 1980). In Alaska, polar bears have also been observed feeding on stranded marine mammal carcasses during fall months while traveling along the coast and barrier islands of the Beaufort, Chukchi, and Bering seas (U.S., Fish and Wildlife Service 1995, Kalxdorff 1997). Marine mammal carcasses may be an important food source for polar bears, particularly if polar bears are nutritionally stressed.

An increase in polar bear numbers occurring along coastal areas, as well as more protracted use of the coastline and barrier islands of the Beaufort Sea has been noted in recent years (Amstrup 2000). The near shore environment is an area that is subject to increasing oil and gas development and other anthropogenic activities. Recent estimates of mortality of polar bears due to potential oil spilled from off shore developments (Liberty Draft EIS) suggest that oil may occur on or near barrier islands and coastal areas where polar bears aggregate.

In 2001, the Minerals Management Service (MMS) funded a study to increase understanding of foraging and carcass utilization patterns of polar bears using the near shore environment. The objectives of this study are to: 1) determine the number, age/sex composition, behavior, and habitat use of polar bears using bowhead whale carcasses at Barter and Cross Islands during fall months; and 2) determine the magnitude of interchange of polar bears between Barter Island and Cross Island during fall months. This information will be used by MMS in pre-lease sale environmental assessments and other planning activities.

The U.S. Fish and Wildlife Service, in cooperation with the North Slope Borough, Alaska Nanuuq Commission, and the Native villages of Kaktovik and Nuiqsut, conducted field work during September 11-25, 2002 on Cross Island and September 3-29, 2002 on Barter Island. A combination of scan, continuous, and focal sampling methods were used to record data. Preliminary results indicate a presence of 9-13 polar bears at Cross Island and 43-53 polar bears at Barter Island during the respective study periods. The majority of animals observed were adults (including adult males, females without cubs, and unknowns). In addition, at Barter Island, over 25% of the animals observed were adult females accompanied by first and second year cubs. Overall, polar bears spent the majority of their time inactive during day and feeding at night at both study areas. At Barter Island, polar bears frequently swam from Bernard Spit (an off shore barrier island) to the carcass site, and also frequently entered water between feeding bouts. Polar bear interchange between the study sites was not successfully determined. A final report will be prepared following field work currently planned for fall 2003.

### Discussion

Robert Suydam: Do you have any data to indicate whether the same bears are coming back year after year to the same sites? Do they know that these are good places to eat from year to year? Have you explored the use of Platform Terminal Transmitter (PTT) tags for the polar bears? The range for detecting PTT tags is much greater now. Are there any plans to start putting PTT tags in polar bears so you can scan bears that show up?

Susi Kalxdorff: This is the first year of the study, so hopefully we'll be able to address whether bears recurrently visit whale carcass sites after next year. We are planning on working with the USGS Biological Resources Division (BRD) to movement information for the collared bears that we saw are Barter Island (they can wear collars up to three years).

When you look at other places like Canada and Churchill, there is definitely a learned behavior to come back to feeding places like the Churchill dump. In that case managers knew they were getting repeat visitors and that those bears taught their offspring to feed at the dump. The use of PTT tags is still in the development phase. The BRD is actively pursuing that, but the funding is not yet available.

Taqulik Hepa: Are you documenting human and bear interactions at the carcass sites? Because it is a concern in Barrow and we had to deal with a large number of bears over the last year.

Susi Kalxdorff: Yes, it's not necessarily a specific objective of this study, but it is something that is of interest to us and we were collecting information opportunistically on that in Kaktovik and Nuiqsut as well. We have started to develop a database to house those data. We are interested in working with the community to develop safety guidelines or a bear management plan so nobody gets hurt.

Craig George: Have you considered doing some energetic modeling to try and estimate what the contribution of whale carcasses is to the total energetic needs (annual energetic need) of bears?

Susi Kalxdorff: No, we haven't done that yet. What our Canadian colleagues have recommended is that we start recording what specifically polar bears are feeding on (meat vs. blubber; younger bears need protein for growth whereas adult bears probably eat blubber). Geoff York and Todd O'Hara have a student that will be doing some energetic work this fall, but USFWS has not done an energetics model as of yet. We're just trying to characterize bears that are present at the feeding sites.

Craig George: Are females selecting den sites near carcasses disproportionately to other habitats-what's causing the clustering of denning?

Susi Kalxdorff: Not that I'm aware of. I'm not aware of clustering of denning around Kaktovik or Cross Island, but there appears to be a trend of increased use of the coast in the fall. There's been more terrestrial denning in the last decade as compared to earlier times; that might be because these females have figured out they can get fat on the carcasses prior to denning.

Jim Lima: You mentioned traditional knowledge as an objective to incorporate in next year's study. Is there any way to determine changes in the pattern of hunting and taking as causing the aggregations at these bones piles. Something that's changed through anthropogenic interactions that might be causing this phenomenon or are bears coming in from the ice for some other reason?

Susi Kalxdorff: That is something we want to look at through Traditional Ecological Knowledge (TEK). Some of the questions to ask residents are, "have you seen changes in the number of bears," "have you seen bears feeding in other locations besides this," "how long have you been hunting," "where did you hunt before," "are there other areas bears use," etc. Hopefully we'll see if there is some change over time from this more historical perspective they can provide.

Todd O'Hara: There will be a feeding ecology project in cooperation with USGS, which is going to be an assessment of trophic level and location of where animals are sampled and will look at their contaminant profiles. We think chemically we can determine the significance of carcass scavenging versus preying on higher trophic animals, and a component is to look at fatty acids and some energetics. Of interest to the US Fish and Wildlife and USGS is an assessment of the nutrient value of bowhead carcasses. They may be of less nutritive value if it deteriorates over time and has a potential to introduce pathogens to the bear. Maybe sampling carcass piles over time to see how nutritive value might deteriorate would be useful. If it were a landfill we'd be concerned about the health of the bears more, but it does have some similarities if they become too dependent on it.

Susi Kalxdorff: That's a good point.

Geoff York: Are we seeing repeat bears? We did do an analysis looking at collared animals; we have about 60 animals with collars on right now. Over the past four years we drew activity circles of maybe five miles from known whale

carcass sites and came up with a list of about 20 animals over four years that had been in the vicinity of the bone piles. Only four of the 20 had been repeats and only one had repeated every year and that bear is about 33 years old this year. It's unclear, but it doesn't look like there's a learned behavior yet--no evidence of learned behavior of returning to bone piles, but hopefully we can get that information with collared animals. And to address the denning question, again, there is no evidence from collared animals that there's any change in denning location based on the location of the bone pile sites. There were actually no collared animals in the area of Barter Island this year at all. Lastly, what might have changed over the years? One thing that USGS thinks is happening is the general increase in polar bear population since sport hunting stopped. That might be allowing animals to return to shore that were historically there, but were hunted out.

Taqulik Hepa: Another factor why bears are there is because they're stranded. I know for the past two years that has been the case in Barrow.

Susi Kalxdorff: We know from village residents and other workers on the Slope that the farther off shore ice is during the fall months, the more bears tend to be on shore.

Charles Monnett: From a Minerals Management Service perspective, it is interesting that the bears are spending a lot of time in and out of the water. From a perspective of someone trying to analyze the effect of an oil spill, spending time on land is not as risky as if the bears are spending a lot of time in the water. There are also carcasses we see occasionally when flying polar bear surveys so one question is, what will you be able to tell about the general problem away from the two deposition sites where hunting is going on and also, what about the management implications? It sounded like the bears were swimming across to the bone pile. Is a recommendation for a relocation of the Kaktovik bone pile a sort of thing that might come out of this?

Susi Kalxdorff: They're complex issues and the situation varies among sites, i.e., Barrow, Cross Island, and Kaktovik. At Kaktovik, people are very invested in polar bears, e.g., one of the major activities is to watch bears at bone piles. I think there would be considerable opposition to moving the bone pile away from Kaktovik, even to Bernard Spit. Kaktovik is not as likely to be affected by an oil spill from existing facilities. A place like Cross Island is more likely to be affected by an offshore oil spill. We talked about moving the carcasses, but some problems exist. You have to wait until the ice is set up enough to get the carcass out far enough from land, but the current may bring them back to a less desirable place than they were originally deposited. We don't have an answer to that yet.

Craig George: Just an observation--all ursids have this behavior of congregating around super abundant food sources, but I've been keeping notes on these aggregations of dead marine mammals (bowheads, etc.) and it seems to be from your presentation that there's a limit of 30 to 50 animals in an aggregation within a 300 to 400 m perimeter. There are definitely bears scattered outside that, but that's a very common aggregation number (30-50), 50 being quite high around stranded bowheads and gray whales. There might be some sort of interesting behavioral things going on there.

Steve Treacy: Do you have anything to say about investigator safety?

Susi Kalxdorff: When you're working around the clock among large numbers of bears, safety is a big issue. The USFWS has made every effort to employ experienced people and ensure that they have the appropriate training, especially at Cross Island, which is a very remote location. The field crew at Cross Island also benefited from the presence of Nuiqsut whalers and the use of a whaler's cabin, which was "bear proofed" using an electric fence/alarm, as well as bear boards (nails protruding from the cabin to prevent bear entry).