

BEST-BSIERP

# Bering Sea PROJECT

UNDERSTANDING ECOSYSTEM PROCESSES IN THE BERING SEA 2007–2013

## Do Subsistence Harvests Reflect Ocean Ecology?

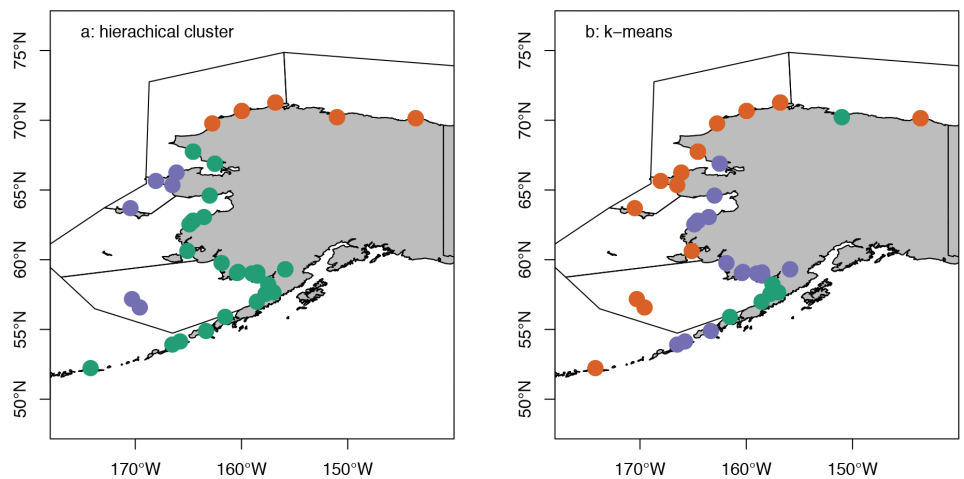
WHAT REGIONAL PATTERNS OF HUNTING AND FISHING REVEAL

When Alaska’s coastal residents hunt and fish they, in effect, sample their local environment. We wanted to know what the patterns of subsistence harvests could tell us about ecological patterns in the environment, and also whether those patterns revealed any cultural preferences for certain types of foods. We looked at 35 communities along the coasts of the Bering, Chukchi, and Beaufort Seas. We found that the patterns of local harvests appear to follow biological, oceanographic, and geographic patterns, with the precise patterns depending on the type of analysis (Figure 1). These results suggest that subsistence harvests are samples of the local environment, indicating patterns of regional ecology, physical settings, or other influences on what people harvest. Further studies of harvest levels could reveal patterns over time, reflecting environmental change.

We also divided the villages into six regions and compared the regions to see which regions were most closely related. Not surprisingly, geography dominated the result (Figure 2). Interestingly, the northern Bering Sea aligned more closely

*continued on page 2*

Fig. 1



Villages (dots) shown in the same color share similar subsistence harvest practices. The variance between (a) and (b) reflects two different cluster analysis approaches. Both analyses show east-west divisions, which appear to follow patterns of ocean currents and species migrations. The left-hand figure (a) also separates North Slope communities, likely reflecting high seal and whale harvests in the area. In the right-hand figure (b), the green dot on the North Slope is Nuiqsut, which is located on the Colville River and has similarities with communities on the Alaska Peninsula that also harvest a mix of fish and marine mammals.

### The Big Picture

Our analysis of the relationship between ecological patterns and subsistence patterns is one of many analyses that emerged from all the interactions among researchers throughout the Bering Sea Project. The cluster analysis of subsistence harvest data helps to connect the characteristics of the ecosystem to human interaction with the Bering Sea (and neighboring seas). It is exciting to see that different approaches to studying the ecosystem produce similar pictures of what is happening. This increases our confidence that we are correctly identifying patterns, and also reinforces the idea that ecosystem patterns matter to people who live on the islands and coast of the Bering Sea.

with the Chukchi and Beaufort than with the central and southern Bering Sea. This differs from an analysis of marine ecology done for the same region, but is not surprising given the migration routes of bowhead whales and walrus, which are popular subsistence resources in the northern Bering Sea as well as along the Chukchi and Beaufort coasts.

## How We Did It

We started with subsistence harvest survey results compiled by the Alaska Department of Fish and Game. These covered 35 communities in the region. Because some communities had more than one year of data, we had a total of 53 harvest surveys from 1964 to 2009. The degree of detail about the harvest varied from study to study,

with more recent studies typically identifying harvests by species (e.g., sockeye salmon, or king eider), rather than by larger group (e.g., salmon, or eiders). For the purpose of establishing a consistent body of data to work with, we had to sacrifice some level of detail and lump some species together. Then we conducted the cluster analyses at the village and regional levels to see what patterns emerged.

## Why We Did It

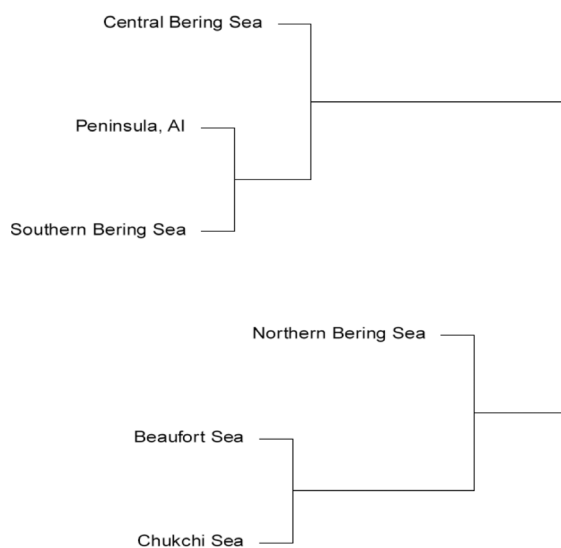
An earlier analysis of marine ecology data spurred us to wonder how subsistence harvest patterns compared with the underlying ecological patterns across the same region. While we recognized that hunters and fishers have to rely on what is available, we wondered if

other factors might also affect harvest patterns. In addition to satisfying our curiosity, we hoped that the results might shed light on whether subsistence harvest characteristics could be used as indicators of the condition of the ecosystem. Further studies looking at patterns over time would be useful, but at the moment we do not have enough studies in the same villages at different times to do that analysis.

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*The Bering Sea Project is a partnership between the North Pacific Research Board's Bering Sea Integrated Ecosystem Research Program and the National Science Foundation's Bering Ecosystem Study. [www.nprb.org/beringseaproject](http://www.nprb.org/beringseaproject)*

Fig. 2



Communities were grouped into six oceanographic regions, and the results were analyzed to see how similar the subsistence harvests were to one another. The farther left the bar connecting two regions is on the above diagram, the more closely their harvests resemble one another. The Peninsula, AI (Alaska Peninsula and Aleutian Islands) group is most similar to the Southern Bering Sea group. These two are the most similar of any pair of groups. These two are also fairly similar to the Central Bering Sea group. These three, on top, have relatively little in common with the three on the bottom. The Beaufort Sea group and the Chukchi Sea group are closely related, and have some features in common with the Northern Bering Sea group, although this link is not as close.



Subsistence harvests, such as the variety of foods seen here at a community feast in Wainwright, reflect the ecology of the local area. In this picture, maktak (bowhead whale skin and blubber) fills the bowls in the foreground, with a variety of fishes, marine mammal meats, soups, and other delicacies behind.

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