Short-tailed Albatross Distribution in the Bering Sea

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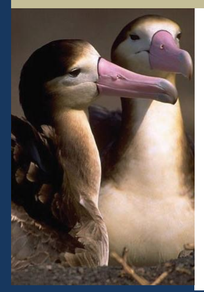
Introduction



In the Bering Sea endangered short-tailed albatross (STAL), *Phoebastria albatrus*, extensively overlap with commercial fisheries (Suryan *et al*. 2007). They spend much of their non-breeding period foraging in the Bering Sea. Their overlap with Alaskan commercial fisheries has resulted in incidental mortalities. Understanding STAL density and distributions within the Bering Sea may help reduce conflict with commercial fisheries.

Objectives and Hypotheses

1. Are Short-tailed Albatross distributions clustered in the Bering Sea?
   H1: Clusters will be present at multiple distances.
2. Where are high use areas in the Bering Sea?
   H1: Foraging will be concentrated around biologically productive areas such as the Bering Sea shelf break and canyons.

Methodology

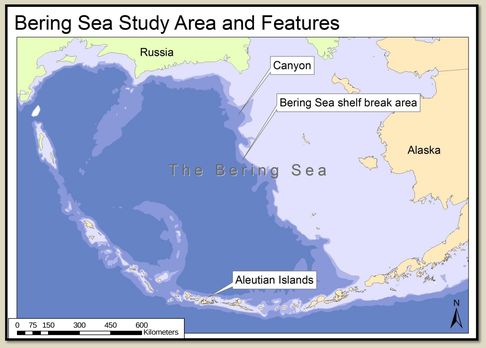
1. Conduct a Ripley's K spatial cluster analysis on STAL locations.
2. Conduct a kernel density analysis on STAL locations.
3. Create Buffers extending outward from the 500 meter depth isobaths.
4. Determine STAL density within buffers and for the total Bering Sea study area.

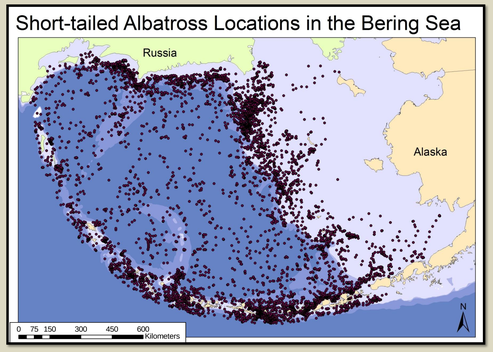
Data and Uncertainties

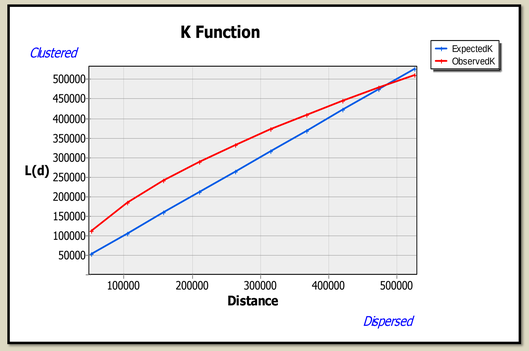
The data represent eight Short-tailed Albatross tracked in The Bering Sea. STAL were tagged in 2010 in Japan with Microwave Telemetry solar powered GPS/Argos PTT-100 satellite transmitters. The GPS tracking devices record six fixes per day in 2-4 hour intervals. This data was filtered to remove the few (< 3%) erroneous locations.

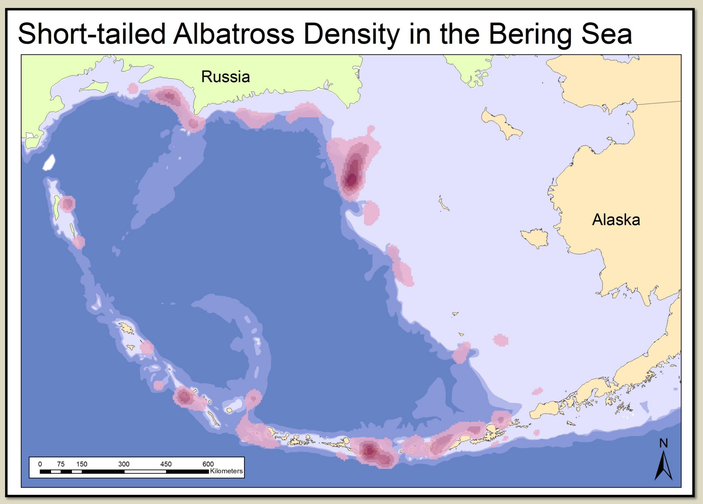
Uncertainties in this study originate with the intervals of tracking fixes. Because they varied certain points may represent more time than others. A future study may benefit from first standardizing the data into hour intervals using interpolation.

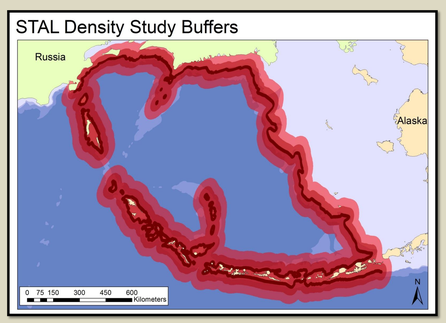
Results:

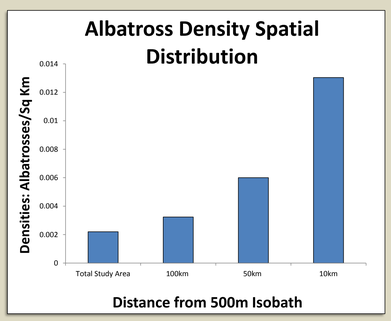


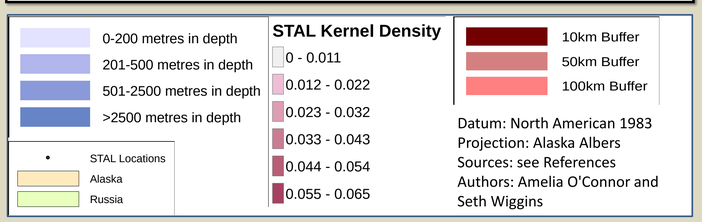












Figures from left to right:
1) A general map of the Bering Sea study area with a few key features labeled.
2) STAL location data inside the Bering Sea study area.
3) Ripley's K graph showing data clustering. Clustering is shown at distances where the Observed red line is above the Expected blue line.
4) Kernel density of STAL locations within the Bering Sea study area. Density increases from light to dark purple.
5) Map of buffers extending around the Bering Sea 500 meter isobath.
6) Histogram of average bird density within buffers and for the total study area.

Discussion

Short-tailed Albatross (STAL) distributions appear to clustered within the Bering Sea study area (Figure 3). The kernel density raster shows that birds are spending more time along the Aleutian Islands and the outer Bering Sea shelf area, density also appears greatest around canyons (Figure 4). The greatest densities of STAL foraging time is within 10 meters of the 500 meter depth isobaths, which is representative of the shelf break area (Figures 5 & 6). High seabird density has been found to correlate with shelf break areas in other studies (Nur *et al.* 2011).

References

Suryan, R. M., Dietrich, K. S., Melvin, E. F., Balogh, G. R., Sato, F., and Ozaki, K. (2007). Migratory routes of short-tailed albatrosses: Use of exclusive economic zones of North Pacific Rim countries and spatial overlap with commercial fisheries in Alaska. *Biological Conservation* **137**:450-460.

Nur, Nadav et al. (2011) Where the wild things are: predicting hotspots of seabird aggregations in the California Current System. Ecological Applications **21**(6): 2241–2257

Photo: U.S. Fish and Wildlife Service (2008) Short-tailed Albatross Recovery Plan. Anchorage, AK, 105 pp.

Map Data Sources: Oregon State University, Yashima Institute for Ornithology, US Fish and Wildlife Service, Japan Ministry of Environment, nationalatlas.gov, and Alaska Department of Natural Resources.