A comparison of winter distributions of *Aethia* auklets derived from tracking data and ship-based surveys

Fig. 1. Carley Schacter with geolocator-tagged Parakeet Auklet

Carley R. Schacter[1] & Katherine F. Robbins[2]

Department of Biology, Memorial University of Newfoundland, St. John's, Newfoundland, Canada

[1]crs634@mun.ca, [2]kfr056@mun.ca

Background:

Ship-based surveys:

- Eulerian data (snapshot of bird density/area)
- Long-term data
- High spatial accuracy
- Direct observation of behavior
- Limited spatial/temporal coverage, especially in winter

Tracking data:

- Lagrangian data, follows *known individuals* over time
- Time series of behavior data (but indirect)
- Limited by sample size of tags and number of colonies visited
- Spatial accuracy can be very low
- Missing data around equinoxes (geolocation tags)

Methods:

- Tracking data: geolocation tags on Whiskered, Crested and Parakeet Auklets (Fig. 2) from two colonies (Buldir and Gareloi) in the Aleutian Islands, Alaska
- Sea survey data extracted from North Pacific Pelagic Seabird Database (NPPSD)
- Percent volume contours using kernel density estimation of non-breeding season locations, weighted by number of birds observed (sea surveys) or colony size (tracking data)

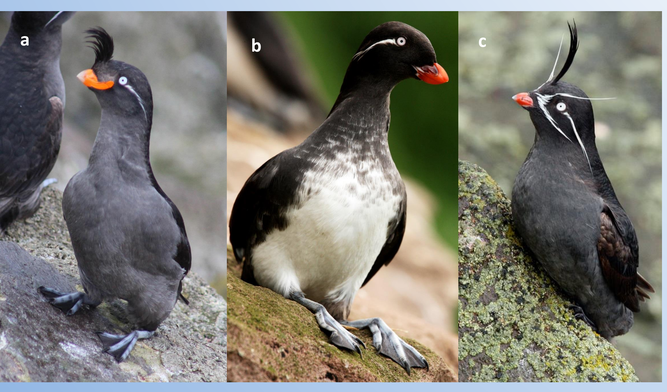

Fig. 2. (a) Crested auklet; (b) Parakeet auklet; (c) Whiskered auklet

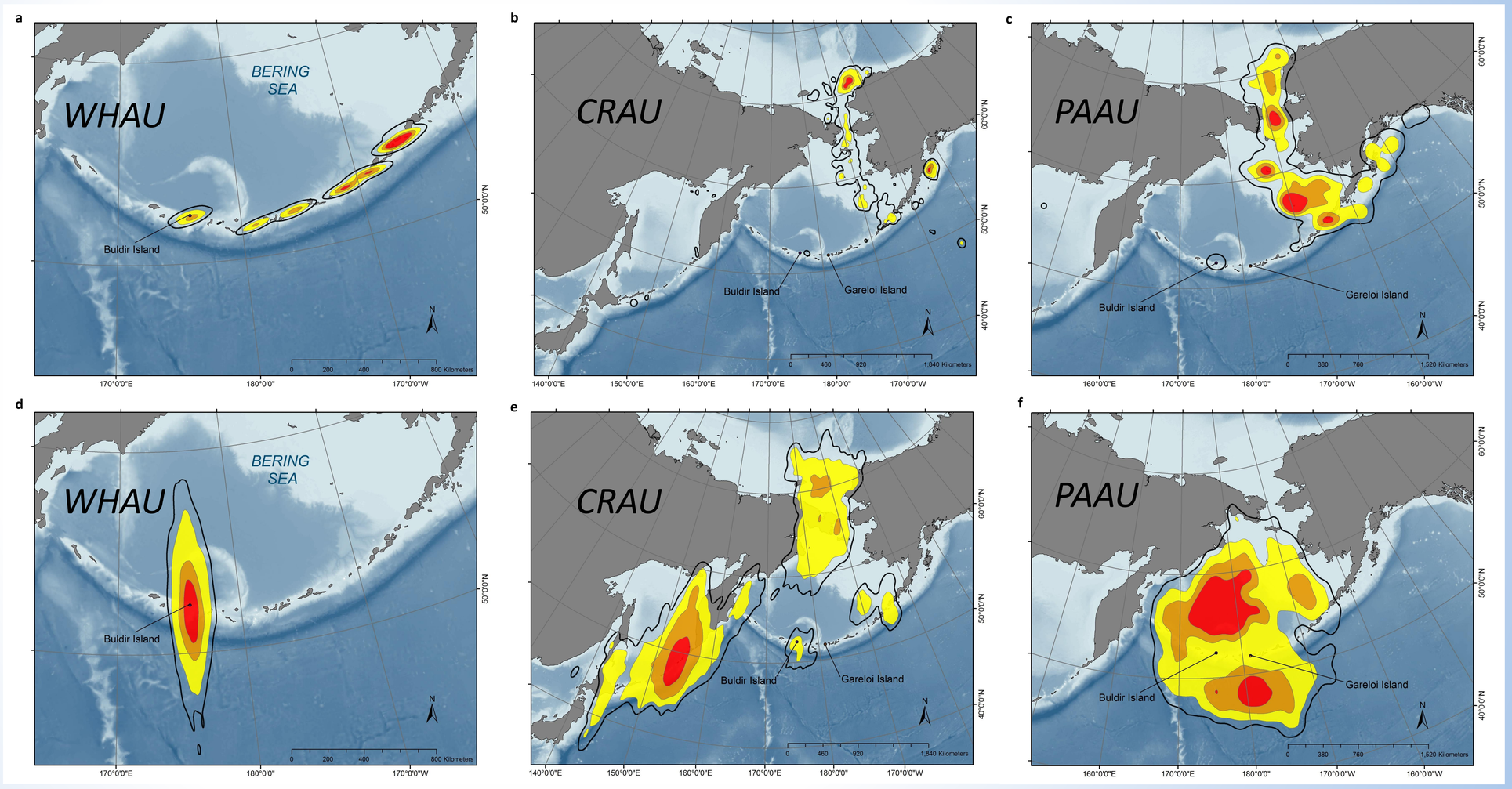

Fig. 3. Percent volume contours derived from kernel density estimation of sea survey data from NPPSD (a-c; red=25%, orange =50%, yellow=80%, black line=95%) and tracking data (d-f; red=25%, orange=50%, yellow=80%, black line=90%). Geolocation tags deployed on Whiskered (WHAU, Buldir, n=17), Crested (CRAU, Buldir, n=56; Gareloi, n=42) and Parakeet Auklets (PAAU, Buldir, n=46; Gareloi, n=18). Sea survey data points weighted by log of number of birds sighted. Tracking data points weighted based on relative size of breeding colonies on the two islands.

Whiskered Auklets (*A. pygmaea*)

- Remain near colony all year, little mixing among colonies
- Tracking data limited by number of colonies used, highlights low latitudinal accuracy of geolocation tags

Crested Auklets (*A. cristatella*)

- Second distinct wintering area not apparent in sea survey data
- Large aggregations in productive coastal waters, could skew sea survey data

Parakeet Auklets (*A. psittacula*)

- Weighting by colony size affects relative importance of shelf region in tracking data (used more by Gareloi birds)
- The most important wintering area has *no* ship survey coverage

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