

Movement and haul out behavior of ringed seals during the 2011 open water season

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BACKGROUND:

Ringed seals (*Phoca hispida*) are the most abundant of the Arctic ice seals and are an important food source for both polar bears and Inuit peoples. Understanding movement patterns of ice-associated seals is increasing in importance as sea ice habitat decreases and industrial development increases. In December 2010, the National Marine Fisheries Service proposed listing ringed seals as a threatened species across their range. Few movement studies have been conducted in the Alaskan portion of the species range. This work aims to build on previous studies and increase our understanding of movement and diving behavior over a larger scale and across seasons. The results will be important for assessing and mitigating impacts of changing ice conditions and industrial development.

METHODS:

Ringed seals (n=20) were caught during July and August, 2010, near Barrow, AK using free floating multifilament nets near broken ice and dip nets on ice and beaches. A satellite transmitter "SPLASH" tag was attached to the head using 5 minute epoxy and "SPOT" tags were attached to the web of the hind flippers. Basic morphometric measurements and biological samples were collected. SPLASH tags transmitted location and dive information at least once per day from July - Dec. Locations were derived using the Argos Kalman filtering method and sensor data were decoded using the WC-DAP Program from Wildlife Computers. Location data was further filtered using the Douglas Argos Filtering Algorithm. Sensor data were summarized and graphed using SAS statistical software.

PRELIMINARY RESULTS:

Retention of SPLASH tags was lower than expected likely due to an unidentified disease that caused hair loss beyond the normal molt period.

Movements: Several tagged seals made extensive roundtrips between the Alaska coast and the southernmost ice edge, with some seals traveling more than 400 km north of Point Barrow (Fig. 1). One individual, not shown, traveled more than 724 km east to Mackenzie Bay, Canada in the southeastern Beaufort Sea. Foraging type movements (dives >2 m, >2 min.) occurred both over the continental shelf and over the deep waters of the Arctic Basin. The majority of dives were short (< 7 min.) with increased duration during deeper diving bouts (Fig. 2). Over the Arctic Basin several seals dove between 10-14 min. Time spent at depth was greatest ≤2 m (traveling) and between 20-50 m. Increased dive duration in Nov. and Dec. may be related to diving under ice.

Haul out behavior: Seals hauled out periodically throughout the open water season but at a decreased frequency and duration compared to other seasons (Fig. 3). The mean time of day for haul out varied by season (summer: afternoon vs. winter: night).

CONCLUSIONS:

- Ringed seals travelled to the pack ice edge over the Arctic Basin and spent time hauled out and foraging during the open water season
- Adult ringed seals tagged near Barrow in summer migrated through the Bering Strait to winter
- Daily timing of haul out changed seasonally
- Ringed seals exhibited similar foraging movements regardless of whether they were over the shelf or the Arctic Basin
- Dive depth appears to be a function of bathymetry likely correlated to prey location in the water column

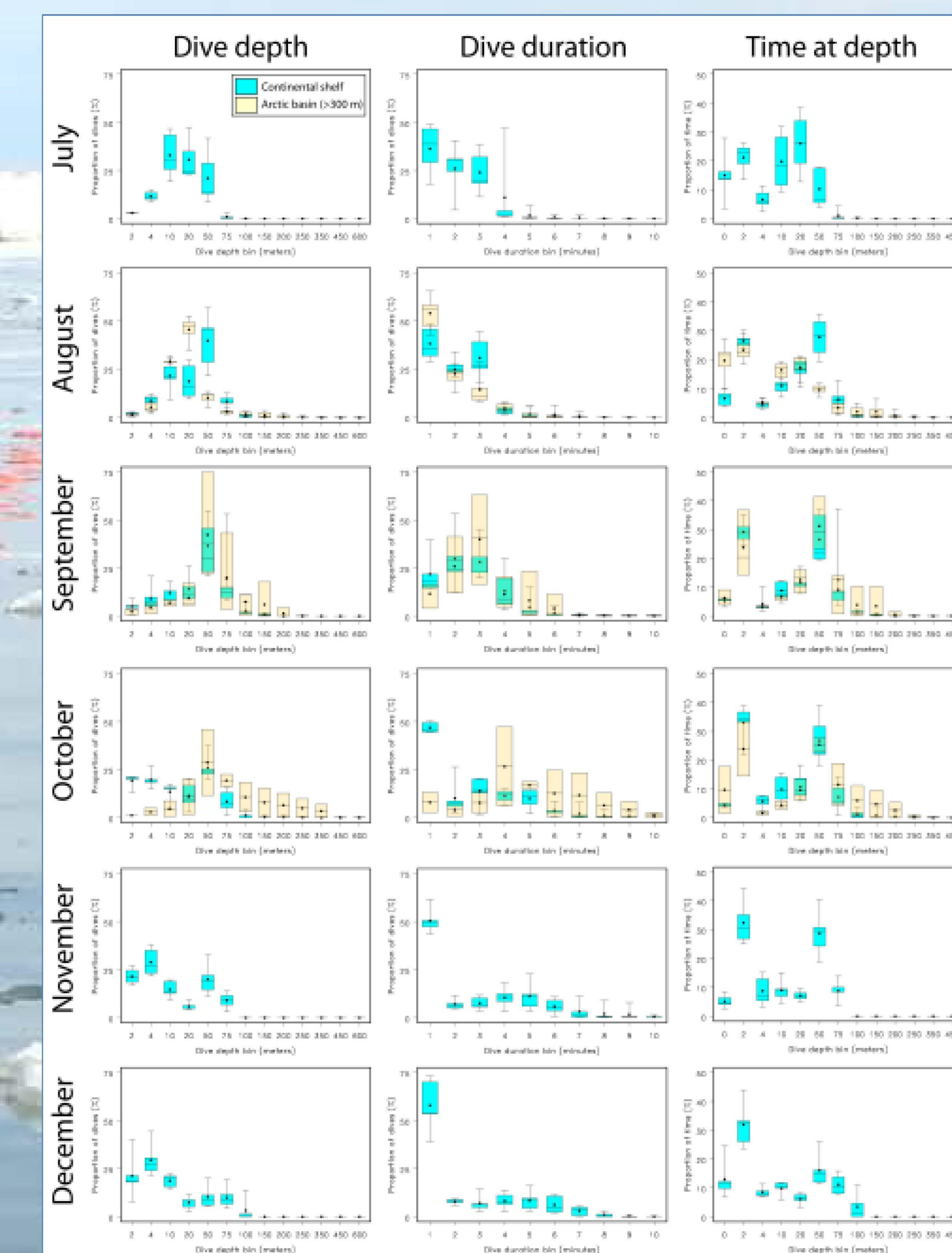


Fig. 2: Proportion of dives by depth (left), duration (middle), and time spent at depth (right), for 5 ringed seals shown in Fig. 1. Results are partitioned spatially: 1) when seals occupied areas over the continental shelf (tan) versus 2) occupancy over the Arctic Basin (cyan). Results are reported for bins (intervals), denoted with the maximum bin value.

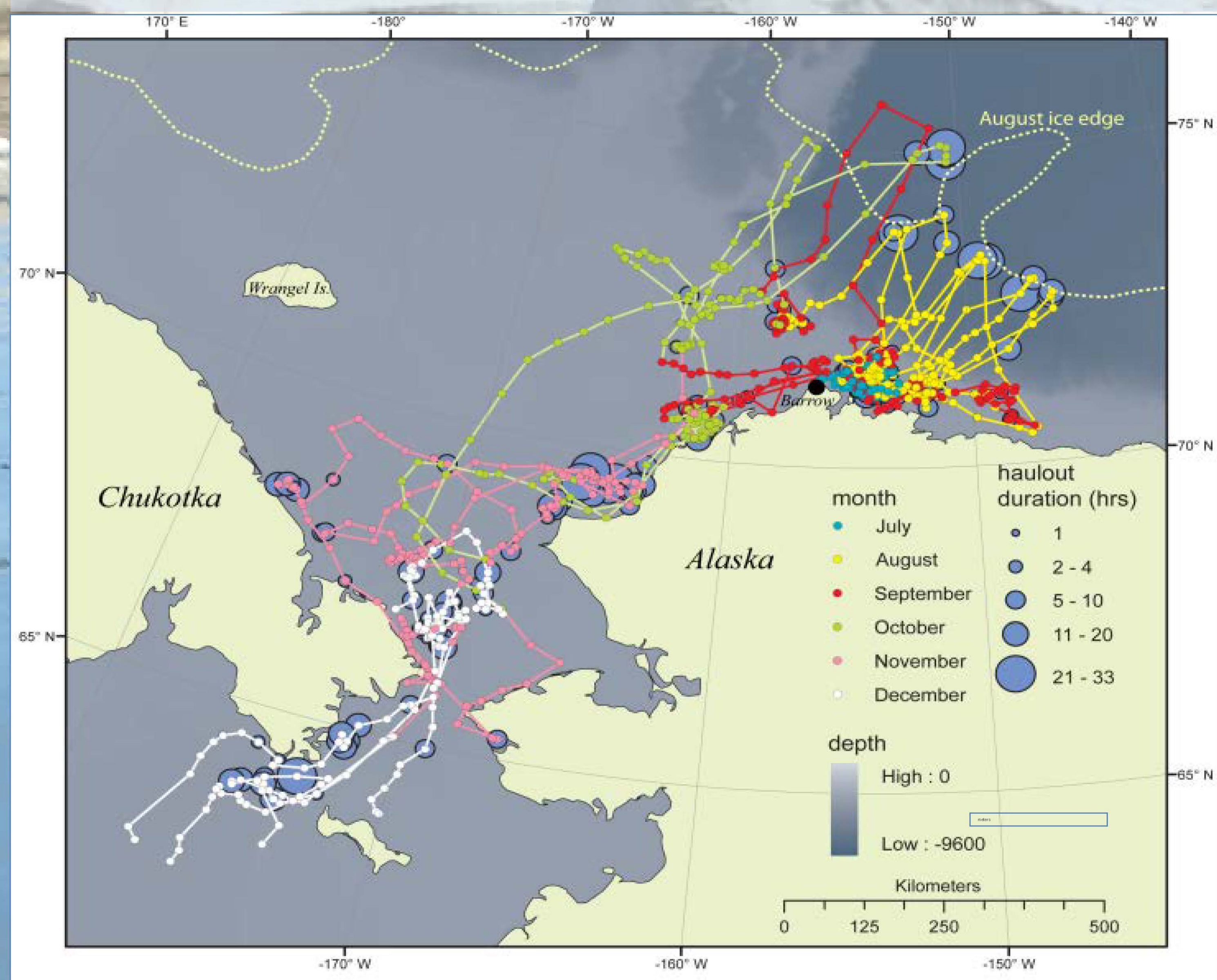


Fig. 1: Movement and Haul out behavior of 5 adult ringed seals as determined from "SPLASH" tags.

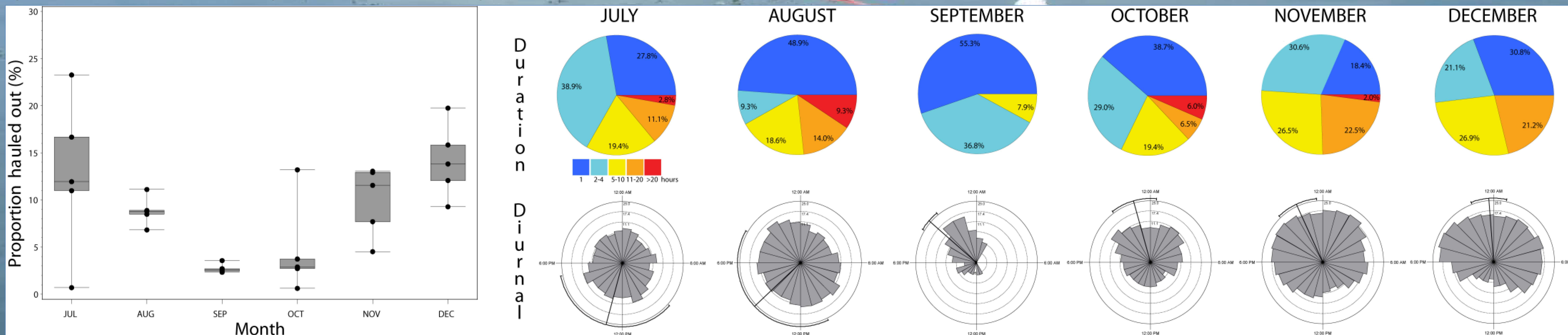


Fig.3: Monthly proportion of total activity budget spent hauled out (left), duration of haulout bouts (top), and time of day that haulouts occurred (bottom), for 5 ringed seals shown in Fig. 1.

Future Work:

- Increase sample size with a focus on tagging adults
- Capture animals during December and January to track the difference in movement between seals present during the summer and winter

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