Monitoring Ringed Seals – Does Poisson Regression Improve Trend Analysis?

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Ringed seals (*Phoca hispida*) inhabit shorefast and pack ice of northern Alaska. They are primary prey of polar bears, and occur in habitat where oil exploration occurs. They maintain breathing holes in sea ice which forms in autumn and persists until June/July. In spring, seals excavate lairs in snow on top of the ice for hauling out and/or to give birth and nurture pups. Ringed seals are most readily observed and counted during the molt in May-July, when lairs collapse and seals haul out on the ice surface.

We conducted strip transect type aerial surveys of ringed seals in the Alaskan Beaufort Sea during May-June 1996-1999 using a fixed wing aircraft. Survey altitude was 91 m and total strip width was 0.82 km. In total, we surveyed 13,100 linear km covering 10,776 km^2. Densities ranged from 0.36 seals/km^2 in the west to 1.54 seals/km^2 in the east, and were highest in 1999 (0.98 seals/km^2) and lowest in 1996 (0.57 seals/km^2). Densities on fast ice were about 50% lower in 1999-1996 than during 1985-1987. Poisson regression analysis was conducted to examine variability in seal counts. Density increased from shore to about 15-25 m water depth, and as ice deformation decreased. Time of day and weather also affected counts. Sea ice is an important feature of seal habitat, and is annually and geographically quite variable. Poisson regression was particularly useful for interpreting effects of ice characteristics on density. Overall, Poisson regression was less successful in improving trend analyses for ringed seals than it was for harbor seals. Harbor seal counts are affected by molt chronology, which remains largely constant from year to year. Ringed seal haulout behavior is also affected by the molt, but depends on snow and ice conditions which are annually, and to this point unpredictably, variable.

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