EFFORT, FOCUS, AND PREFERRED DEPTH OF DIVING FOR HARBOR SEALS IN PRINCE WILLIAM SOUND, ALASKA, 1993

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Satellite depth recorders (SDRs) have been deployed on a variety of pinnipeds, providing insights into movements and diving behavior. Unfortunately, individual variability and summing of data into bins have made analyses using standard statistical techniques difficult. We have developed a statistically robust analytical method that accounts for individual variability, temporal autocorrelation, and the binned nature of data. We used this method to analyze the diving behavior of 37 harbor seals, Phoca vitulina richardsi, tagged with SDRs in Prince William Sound, Alaska, during 1993-1996. Repeated measures mixed models for effort, focus, and preferred depth bin were created using the MIXED procedure in SAS. Models indicated that diving effort remained steady throughout winter, then declined from February to July. Preferred depth was deepest during winter and shallowest during May-July. Diving was shallow and focused in Copper River Delta and Cook Inlet and deeper and less focused near Yakutat and Southwestern Montague, reflecting regional bathymetry. Collinearity between month and region in the preferred depth model suggests that seals migrate to regions of deeper preferred depth in winter, perhaps indicating a seasonal cycle in type or depth of prey. The steady decrease in diving effort during spring and summer indicates that seals gradually increase the proportion of time they spend hauled out as the molt period approaches. However, diving effort increased abruptly in September, making it clear that surveys to estimate population size must be carefully timed. Diurnal and demographic changes in diving behavior were minor but significant. Diving effort was greatest at night (2100-0300 hrs), and most focused during the day (0900-1500 hrs). Diving was more focused for females than males, and for adults than subadults. These insights into foraging and hauling out behavior have practical management applications for improving surveys and evaluating habitat use by season, region and depth.

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ABSTRACTS

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