

Supplementary Material

Effects of capturing and collaring on polar bears: Findings from long-term research on the southern Beaufort Sea population

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Methods associated with collar, non-collar, and activity sensor deployments

All satellite radio collars and non-collar radios (hereafter referred to as Platform Transmitter Terminals, or PTTs) transmitted data to polar-orbiting satellites through the Argos Data Collection and Location System (ADCLS; Fancy *et al.* 1988). PTTs were constructed as either collars (attached only to adult female polar bears), or as non-collar radios attached to the ear or by gluing the radio to fur on the bear's upper back (hereafter referred to as non-collar PTTs). Adult male polar bears were not collared because their necks are larger than their heads and they do not retain collars.

GPS PTTs were programmed to fix 3-24 locations (accuracy of ≤ 31 m; D'Eon *et al.* 2002) spaced evenly throughout each day every day. We deployed glue-on PTTs (MK-10 and SPOT5, Wildlife Computers, Inc., Redmond, WA, USA) in the spring of 2010 and 2011 and ear-tag PTTs (SPOT5, Wildlife Computers, Inc.) in the spring of 2010 (i.e., non-collar PTTs). Locations from non-collar PTTs were generated via ADCLS (Fancy *et al.* 1988), the accuracy of which was indicated by eight Argos location classes. We only used locations that were in the highest four classes (i.e., from most to least accurate, location classes 3, 2, 1, and 0). Location accuracy of Argos locations were lower than those derived by GPS, as 68% of locations were estimated to be ± 4.6 km (location class 0) to ± 0.4 km (location class 3) of the true position of the PTT (Douglas *et al.* 2012). Argos locations were filtered by a SAS-routine in the Douglas Argos-Filter (Douglas *et al.* 2012). Both non-collar and GPS PTTs

transmitted to Argos satellites during 1000-1400 hours local time every 1-2 days (duty cycle). For each duty cycle, we used the location with the highest accuracy. Since collars were not deployed in 2010 and, to ensure similar annual sample sizes with non-collar deployments, we used data from collar deployments in 2011 and a randomly selected subset of collar deployments in 2009 (model TGW-4689, Telonics, Inc.). PTT weights were 1600 g for collars (0.86% of mean body mass), 30-165 g for glue-ons (0.02-0.09% of mean body mass), and 70 g for ear tags (0.04% of mean body mass). For both GPS-based and Argos-based locations, we calculated the minimum distance travelled between two successive locations as the great-circle distance (i.e., distance accounting for the earth's curvature).

We also examined activity sensor data from GPS PTTs (model TGW-4689) deployed in the spring of 2009, 2011, and 2012. These deployments, in contrast to those prior to 2009, collected activity data at intervals sufficiently frequent to monitor bear movements immediately following capture. Accelerometers generally can be used to detect resting versus non-resting behaviors in ursids (Schwartz et al. 2009; US Geological Survey, unpubl. data) and are related to the proportion of time an animal spends resting (US Geological Survey, unpubl. data). Therefore, the data from these sensors represent the total amount of activity exhibited by the animal and should represent both the recovery of anesthesia within the first 24 hours as well as return of normal seasonal activity levels. In 2009, activity was summed and reported every 30 minutes starting 4 hours after deployment. In 2011, activity was measured over 1 hour intervals for the first 4 hours after deployment and then subsequently switched to 3 hour intervals every 3 hours. In 2012, activity was measured over 2 hour intervals every 2 hours after deployment.

References

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