

Using Radio Collar Activity Data to Detect Date of Parturition in Grizzly Bears

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Documenting natality among radio-marked adult female grizzly bears (*Ursus arctos*) is an important component of many population monitoring programs. Because female grizzly bears give birth in their den during hibernation, direct observation of neonate litters is not possible until after den emergence. Litter detection can also be compromised by poor visibility in some habitats, potentially leading to biased natality estimates. Using radio-collar activity data from females within three Rocky Mountain and one Alaska population, we developed a method to detect parturition events by the presence of a mid-winter spike in movement likely associated with the prolonged post-parturition licking by mothers. We developed criteria from 22 known mothers and tested them against data from another 291 females. Based on results from 40 females later observed with cubs, the overall true positive rate was 93%. The true negative rate was 87%, based on 55 females later observed with older offspring. A birth event was predicted for 45% of females that were never observed (n=38), 22% of females later observed without any offspring (n= 108), and 8% of females considered too young to reproduce (n=12). All predicted births in the southernmost Greater Yellowstone occurred in January, whereas all births in the northernmost Gates of the Arctic population occurred in February. Births in the intermediate populations, Selkirk Cabinet-Yaak Ecosystem and Northern Continental Divide Ecosystem, occurred within both months. Our anomaly detection method was highly successful in identifying parturition events and may provide an additional tool for population monitoring.