Estimating Population Size of Grizzly Bears Using Hair Capture, DNA Fingerprinting, and Mark-Recapture Analysis

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ABSTRACT

Field biologists can now remotely capture a small tissue sample from an animal and identify the species and individual using DNA microsatellite analysis. We used this approach to estimate grizzly bear (*Ursus arctos*) population size in a 9866 km^2 area in southeast British Columbia and a 5030 km^2 area of southwest Alberta. We captured bears by removing hair at bait sites surrounded by a single strand of barbed wire. DNA fingerprinting of the root portion of the hair was used to identify individuals. We used the closed mark-recapture models available in the program CAPTURE (White et al. 1982, Rexstad and Burnham 1991) for estimation of population size. Model selection was based on our knowledge of bear biology, results from statistical tests available in CAPTURE, and Monte Carlo simulation. We captured 109 different bears and had 25 recaptures in 5 10-day trapping sessions in British Columbia. In Alberta we captured 37 bears and had 9 recaptures in 4 14-day sessions. We captured >1 bear at 36 sites in British Columbia and concluded that some of these bears were sows with cubs, suggesting this hair capture method may work for the entire bear population. We used model M_h in CAPTURE to estimate the population size in the British Columbia study area as 262 with a 95% confidence interval of 224 – 313, and for the southwest Alberta area as 74 with CI 60 - 100. Grizzly bear density was estimated at 27 bears /1000 km^2 in the British Columbia study area and 15 bears/1000 km^2 in the Alberta area. In the British Columbia study area, bears appeared to be more abundant in the north where human density and development was lower. In contrast, bears were found throughout the Alberta study area including the more heavily populated aspen parkland zone to the east. We believe that remote hair capture combined with DNA fingerprinting are promising techniques for estimating distribution and abundance of bears and potentially many other species. This approach is of special interest to management biologists because it can be applied to large areas of size similar to that which conservation and management decisions are made.

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