
EVALUATION OF BEAR RUB SURVEYS TO MONITOR GRIZZLY BEAR POPULATION TRENDS

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Wildlife managers need reliable estimates of population size, trend, and distribution to make informed decisions about how to recover at-risk populations, yet obtaining these estimates is costly and often imprecise. The grizzly bear (*Ursus arctos*) population in northwestern Montana has been managed for recovery since being listed under the U.S. Endangered Species Act in 1975, yet no rigorous data were available to evaluate the program's success. We used encounter data from 379 grizzly bears identified through bear rub surveys to parameterize a series of Pradel model simulations in program MARK to assess the ability of noninvasive genetic sampling to estimate population growth rates. We evaluated model performance in terms of: 1) power to detect gender-specific and population-wide declines in population abundance, 2) precision and relative bias of growth rate estimates, and 3) sampling effort required to achieve 80-percent power to detect a decline within 10 yrs. Simulations indicated that ecosystem-wide, annual bear rub surveys would exceed 80-percent power to detect a 3-percent annual decline within 6 yrs. Robust design models with two simulated surveys per year provided precise and unbiased annual estimates of trend, abundance, and apparent survival. Designs incorporating one survey/year require less sampling effort but only yield trend and apparent survival estimates. Our results suggested that systematic, annual bear rub surveys may provide a viable complement or alternative to telemetry-based methods for monitoring trends in grizzly bear populations.