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## **DENSITY DEPENDENCE, WHITEBARK PINE DECLINE AND VITAL RATES OF GRIZZLY BEARS IN THE GREATER YELLOWSTONE ECOSYSTEM**

Frank T. van Manen,\* U.S. Geological Survey, Interagency Grizzly Bear Study Team, Bozeman, Montana 59717

Mark A. Haroldson, U.S. Geological Survey, Interagency Grizzly Bear Study Team, Bozeman, Montana 59717

Mike R. Ebinger, University of Montana, College of Forestry and Conservation, Missoula & Montana State University, Ecology Department, Bozeman, Montana 59717

Daniel D. Bjornlie, Wyoming Game and Fish Department, Lander, Wyoming 82520

Daniel J. Thompson, Wyoming Game and Fish Department, Lander, Wyoming 82520

Cecily M. Costello, University of Montana, College of Forestry and Conservation, Missoula, Montana 59812

Recent evidence suggests annual population growth of the grizzly bear (*Ursus arctos*) population in the Greater Yellowstone Ecosystem has slowed from 4.1–7.6 percent during 1983–2001 to 0.3–2.2 percent during 2002–2011. Substantial changes in availability of an important fall food has occurred over the past decade. Whitebark pine (*Pinus albicaulis*), a highly variable but important fall food source for grizzly bears, has experienced substantial mortality due to a mountain pine beetle (*Dendroctonus ponderosae*) outbreak that started in the early 2000s. Concurrent with changes in food resources, the grizzly bear population has reached high densities in some areas and has continued to expand, now occupying >50,000 km<sup>2</sup>. We tested research hypotheses to examine if changes in vital rates detected during the past decade were more associated with grizzly bear density versus a whitebark pine decline. We focused our assessment on known-fate data to estimate survival of cubs-of-the-year, yearlings, and independent bears ( $\geq 2$  yrs) and reproductive transition of females from having no offspring to having cubs. We observed a change in survival of independent bears between the periods of 1983–2001 and 2002–2012, which was mostly a function of increased male survival; female survival did not change. Cub survival and reproductive transition declined during the last decade and were associated with an index of grizzly bear density, which indicated increasing density over time. We found no support that the decline in these vital rates was associated with the index of whitebark decline.