Trends in Causes and Distribution, and Effects of Whitebark Pine Decline on Grizzly Bear Mortality in the Greater Yellowstone Ecosystem

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Documented grizzly bear (*Ursus arctos*) mortalities have been increasing in recent years in the Greater Yellowstone Ecosystem (GYE), due, in part, to increases in bear numbers and range expansion. Previous research has documented that variable seed production of whitebark pine (WBP; *Pinus albicaulis*), an important fall food, is inversely related to grizzly bear fall mortality. However, WBP has experienced widespread mortality during the last decade because of mountain pine beetle (*Dendroctonus ponderosae*) infestations. We investigated trends in causes and distribution of human-caused mortalities for independent-aged (≥ 2 yrs old) grizzly bears in the GYE during 1975–2012, and the effect of WBP cone production on numbers of fall (> 1 August) mortalities (*n* = 172) during the period of WBP decline (2000-2012) using Poisson regression. During 1975–1982, 91 percent of mortalities occurred within the Grizzly Bear Recovery Zone and primary causes were poaching/malicious killings and losses related to conflicts with livestock. During the two most recent decades most mortalities were associated with ungulate hunting, usually involving self-defense kills, or anthropogenic sites, and an increasing percentage of mortalities occurred outside the recovery zone. Using predictor variables of cone production, sex, location in or out of the Recovery Zone, and year suggests: 1) annual cone production was still predictive of human-caused fall mortalities, 2) no evidence of a difference in annual numbers of fall mortalities between males and females, and 3) an increase in annual mortalities over the study period, with most of this increase outside the Recovery Zone.