

Further clarification on 500 as a genetic minimum and not a demographic population goal

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At our recent meeting in Idaho Falls, there were several discussions about the 500 number and whether this number was the recovered population goal in the ecosystem. The basis for this discussion is the difference between a **genetic goal**: the minimum number of animals in the population to assure a minimal loss of genetic diversity over time versus a **demographic goal**: the total number of animals in the population that demonstrates long-term acceptable probability of existence and full occupancy of the available habitat (in our case the demographic monitoring area or DMA). We set the genetic minimum goal of 500 based on the work of Miller and Waits (2003) published in the Proceedings of the National Academy of Science noted below but we did not set a demographic goal because there was previously no scientific way to do that.

As noted at the meeting however, we now see that the population has stabilized within the existing habitat in the DMA and this population stabilization is evidence of the demographic goal for a population size that occupies the available habitat and begins to exhibit density dependent self-regulation. Thus, the current population size that has stabilized since the early 2000s is a defensible demographic population goal for a recovered grizzly population in that it occupies all the available habitat in the DMA and it has essentially stabilized on its own.

We attempted to provide some background for the 500 genetic minimum during the meeting but wanted to provide a more detailed basis for this number in order to further clarify this issue.

The connection between the minimum of 500 bears and genetic management was clearly established in the **Revised Demographic Recovery Criteria Supplement to the 1993 GB Recovery Plan**, approved March 6, 2007. The following citations are relevant:

- Demographic Criteria Supplement, p. 3:
 - Because 48 adult females with cubs of the year is equivalent to a population of approximately 500 total individuals (IGBST 2005, p. 43), we are establishing a target number of 48 adult females with cubs of the year for the GYA. This target shall not go below 48 for any two consecutive years. **For genetic reasons (Miller and Waits 2003, p. 4338) it is desirable that the total population of grizzly bears in the GYA be maintained at or above 400 bears. To assure this goal is met and in order to adopt a conservative approach, the total population will be**

maintained at or above 500 grizzly bears in the GYA (emphasis added).

- 2003 draft AND 2007 Final Conservation Strategy:
 - (Executive Summary, p.7), under items to monitor) – Maintaining a total population for the entire GYA above 500 **bears to assure the genetic needs of the population** (emphasis added).
 - (Chapter 2, p. 27) – The total population (Appendix C) throughout the ecosystem must be more than **500 bears to ensure a minimum loss of genetic diversity** (Miller and Waits 2003). (Appendix D provides information about genetic management and monitoring).
- 2007 Conservation Strategy. APPENDIX C, p. 127:
 - **For genetic reasons** (Miller and Waits 2003, p. 4338) it is desirable that the total population of grizzly bears in the GYA be maintained at or above 400 bears. To assure that this goal is met and in order to adopt a conservative approach, the total population will be maintained at or above 500 grizzly bears in the GYA.

Literature Cited

Miller, C. R. and L. P. Waits. 2003. The history of effective population size and genetic diversity in the Yellowstone grizzly (*Ursus arctos*): Implications for conservation. *Proceedings of the National Academy of Sciences* 100:4334-4339.