

**Framework to move forward on delisting by managing inside the DMA to stabilize the population at the 2007 estimated population level.**

| <b>Management Framework</b>                                                                                                                                                                    | <b>Background and Application Protocol</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
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| <b>1. Area within which mortality limits apply.</b>                                                                                                                                            | 19,279 square miles<br>Demographic Monitoring Area (DMA) <sup>1</sup> (Figures 1 and 2).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>2. Management objective.</b>                                                                                                                                                                | To stabilize the population at approximately the 2007 population estimate (currently 683 using the Chao 2 <sup>2</sup> methodology).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>3. Population estimator.</b>                                                                                                                                                                | The model-averaged Chao2 population estimator will be used as the population measurement tool unless another scientifically sound method becomes available.. The 2007 Chao2 population estimate was 683 (CI 609 to 757) and the 2014 chao2 population estimate was 757.                                                                                                                                                                                                                                                                                                                                                       |
| <b>4. Allocation process for managed</b>                                                                                                                                                       | Management within the mortality limits within the DMA. Coordination among the states to manage within the mortality limits within the DMA. The Wind River reservation will receive a portion of the available mortality limit based on the % of the WRR geographic area within the DMA.                                                                                                                                                                                                                                                                                                                                       |
| <b>5. Management review by the Study Team every 5 years to assure that management actions are achieving the objective of a stable population at the estimated number at time of delisting.</b> | The management review will assess if the management system is achieving the desired objective to maintain a stable population at the 2007 estimated population size. The management review is a science-based process that will be led by the Study Team (which includes all state and federal agencies and the WRR Tribes) using all recent available scientific data to assess population numbers and trend against the management objective. Vital rates such as age/sex-specific survival and reproductive rates will also be reevaluated using the most recent data to adjust sustainable mortality levels as necessary. |

<sup>1</sup> See maps on p. 5.

<sup>2</sup> The Chao2 methodology (Keating et al. 2002; Cherry et al. 2007) as established by the Study Team uses a model-averaged result of sightings of females with cubs as per Harris et al. (2007).

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|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------------|-----------------------------|---------------------------------------|
| <b>6. Mortality limit % for independent <u>FEMALES</u> based on the results of the model-averaged Chao2 methodology.</b>                                                                                                                       |                                                                                                                                                             |                            |                          |                             |                                       |
|                                                                                                                                                                                                                                                | <683                                                                                                                                                        | 683 <sup>3</sup>           | 684-757                  | >757                        |                                       |
|                                                                                                                                                                                                                                                | <7.6%                                                                                                                                                       | 7.6% <sup>4</sup>          | 9%                       | 10%                         |                                       |
| <b>7. Mortality limit % for independent <u>MALES</u>.</b>                                                                                                                                                                                      | <683                                                                                                                                                        | 683                        | 684-757                  | >757                        |                                       |
|                                                                                                                                                                                                                                                | <15%                                                                                                                                                        | 15%                        | 20%                      | 22%                         |                                       |
|                                                                                                                                                                                                                                                |                                                                                                                                                             |                            |                          |                             |                                       |
| <b>8. Mortality limit for % of dependent young.</b>                                                                                                                                                                                            | <683                                                                                                                                                        | 683                        | 684-757                  | >757                        |                                       |
|                                                                                                                                                                                                                                                | <7.6%                                                                                                                                                       | 7.6%                       | 9%                       | 10%                         |                                       |
|                                                                                                                                                                                                                                                |                                                                                                                                                             |                            |                          |                             |                                       |
| <b>9. Expected background level of annual mortalities from management and other causes - Using average yearly total mortality of independent bears (≥2 years) from all causes including unknown/unreported estimates, <u>2011 to 2014</u>.</b> | 38 expected independent bear deaths/year due to management, illegals, and other deaths (17 F, 21 M)<br>(This includes dead bears from inside the DMA only.) |                            |                          |                             |                                       |
| <b>10. <u>Total mortality limit independent FEMALES</u> (≥2 years).</b>                                                                                                                                                                        | 609<br>(as an example)<br>at <7.6% mortality                                                                                                                | 609-683<br><7.6% mortality | 683<br>at 7.6% mortality | 684-757<br>at 9% mortality  | >757<br>at 10% <sup>5</sup> mortality |
|                                                                                                                                                                                                                                                | <b>&lt;16</b>                                                                                                                                               | <b>16 to 18</b>            | <b>18</b>                | <b>21 to 24</b>             | <b>&gt;26</b>                         |
| <b>11. <u>Total mortality limit independent MALES</u> (≥2 years).</b>                                                                                                                                                                          | 609<br>at <15% mortality                                                                                                                                    | <683<br><15% mortality     | 683<br>at 15% mortality  | 684-757<br>at 20% mortality | >757<br>at 22% mortality              |
|                                                                                                                                                                                                                                                | <b>&lt;32</b>                                                                                                                                               | <b>&lt;36</b>              | <b>36</b>                | <b>48 to 53</b>             | <b>&gt;58</b>                         |

<sup>3</sup> Population ranges based on model-averaged result of the annual application of the Chao2 counting method. The mortality limits in numbers of bears for independent females and males change as the annual Chao2 population estimate changes.

<sup>4</sup> A 7.6% independent female mortality rate will result in population stability using the updated vital rates (IGBST 2012).

<sup>5</sup> A 10% mortality level of females will result in rapid return to lower population numbers with resulting rapid reductions in available discretionary mortality. Such a high female mortality rate will result in inconsistent year to year discretionary mortality levels and challenges in season setting and management.

|                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                         |                                        |                               |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|--|
| <b>12. Examples of the number of independent female and male bears “available” for hunting and additional management removals inside the DMA. This is the number available in excess of the expected annual mortality from other causes.</b> | <b>Examples:</b><br><b>For 683 bears: (manage for population stability)</b><br><b>F limit = 18 – 17 background mortalities = 1 F available (1 state, 0 WRR)</b><br><b>M limit = 36 – 21 background mortalities = 15 M available (15 state, 0 WRR)</b><br><br><b>For 757 bears: (manage for population decline)</b><br><b>F limit = 24 – 17 F background mortalities = 7 F available (7 state, 0 WRR)</b><br><b>M limit = 53 – 21 M background mortalities = 32 M available (31 state, 1 WRR)</b><br><br>(+ any mortalities outside the DMA) |                                         |                                        |                               |  |
| <b>13. State allocation (all 3 states)</b> Allocation among states will be determined through a future methodology.                                                                                                                          | 609<br>(as an example)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 683 <sup>6</sup>                        | 684-757                                | >757                          |  |
|                                                                                                                                                                                                                                              | <b>F: 0</b><br><b>M: 10<sup>7</sup></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>F: 1</b><br><b>M: 15<sup>5</sup></b> | <b>F: 4 to 7</b><br><b>M: 25 to 31</b> | <b>F: ≥9</b><br><b>M: ≥36</b> |  |
| <b>14. Wind River Reservation allocation</b> (based on % of reservation within the DMA).                                                                                                                                                     | 609<br>(as an example)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 683                                     | 684-757                                | >757                          |  |
|                                                                                                                                                                                                                                              | <b>F: 0</b><br><b>M: 0</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>F: 0</b><br><b>M: 0</b>              | <b>F: 0</b><br><b>M: 1</b>             | <b>F: 0</b><br><b>M: 1</b>    |  |

**Important connectivity issue that needs to be addressed:**

It is important to maximize the opportunity for occasional male movement between the NCDE and Yellowstone to address concerns about negative long-term isolation impacts to Yellowstone. To achieve this objective, it will be desirable to minimize discretionary mortality in the genetic connector area in Montana between the NCDE and Yellowstone through the Madison Range, Tobacco Roots, Highland Mountains, Boulder Mountains and Nevada Mountains. This can be accomplished by not permitting sport hunting in these connector areas. Management of any human-bear conflict in these connector areas will still proceed as necessary and appropriate; only sport hunting would be curtailed in these connector areas. Since there are few if any grizzly bears currently in these areas, there is little loss of hunter opportunity by implementing this conservation objective. A commitment to connectivity management in state regulations or in Commission policy statement would make this clear and legally defensible.

<sup>6</sup> Between 609 and 683 there would be a fraction of an adult female available.

<sup>7</sup> For practical application, with 0 or 1 female available and the difficulty of the average hunter to distinguish between males and females in the field, the states may consider what hunting management for males is actually available.

**Specific management responses tied to departures from desired conditions are required to demonstrate adequate regulatory mechanisms. The table below shows some examples of conditions and responses that are legally defensible regulatory mechanisms.**

| <b>Condition</b>                                                                                                                                                 | <b>Response</b>                                                                                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| 1. Exceeding independent female mortality limit at any time during the year.                                                                                     | Cease grizzly hunting in the DMA upon exceeding the limit.                                      |
| 2. Exceeding independent female mortality limit for 3 consecutive years                                                                                          | No grizzly hunting in the DMA the following year. FWS status review.                            |
| 3. Exceeding independent male mortality limit for 3 consecutive years.                                                                                           | No grizzly hunting the following year. IGBST biology and monitoring review.                     |
| 4. Exceeding dependent young mortality limit for 3 consecutive years.                                                                                            | No grizzly hunting the following year. IGBST biology and monitoring review.                     |
| 5. Failure to meet distribution of reproductive females criterion.                                                                                               | IGBST biology and monitoring review.                                                            |
| 6. Failure to meet/adhere to habitat standards in forest plans.                                                                                                  | IGBST biology and monitoring review.                                                            |
| 7. Failure to receive adequate funding to implement monitoring and management requirements in the Conservation Strategy.                                         | IGBST biology and monitoring review. Could lead to a FWS status review.                         |
| 8. Total population less than 500 bears necessary for genetic health as measured with Chao2 method.                                                              | No grizzly hunting inside the DMA the following year. FWS status review and possible relisting. |
| 9. Changes in Federal, State, or Tribal laws, rules, regulations, or management plans that depart significantly from the specifics in the Conservation Strategy. | FWS status review and possible relisting.                                                       |

## **Literature Cited**

- Cherry, S., G. C. White, K. A. Keating, M. A. Haroldson, and C. C. Schwartz. 2007. Evaluating estimators of the number of females with cubs-of-the-year in the Yellowstone grizzly bear population. *Journal of Agricultural, Biological, and Environmental Statistics* 12:195–215.
- Harris, R. B., G. C. White, C. C. Schwartz, and M. A. Haroldson. 2007. Population growth of Yellowstone grizzly bears: uncertainty and future monitoring. *Ursus* 18: 167–177.
- Interagency Grizzly Bear Study Team. 2012. Updating and evaluating approaches to estimate population size and sustainable mortality limits for grizzly bears in the Greater Yellowstone Ecosystem. Interagency Grizzly Bear Study Team, U.S. Geological Survey, Northern Rocky Mountain Science Center, Bozeman, Montana. [http://www.nrmssc.usgs.gov/files/norock/IGBST/GYEGBMonMortWksRpt2012\(2\).pdf](http://www.nrmssc.usgs.gov/files/norock/IGBST/GYEGBMonMortWksRpt2012(2).pdf)

Keating, K. A., C. C. Schwartz, M. A. Haroldson, and D. Moody. 2002. Estimating numbers of females with cubs-of-the-year in the Yellowstone grizzly bear population. *Ursus* 13:161–174.



Figure 1. Map showing PCA vs. DMA. Red line is the PCA (23,828 sq. km). Green area is the DMA (49,931 sq. km).

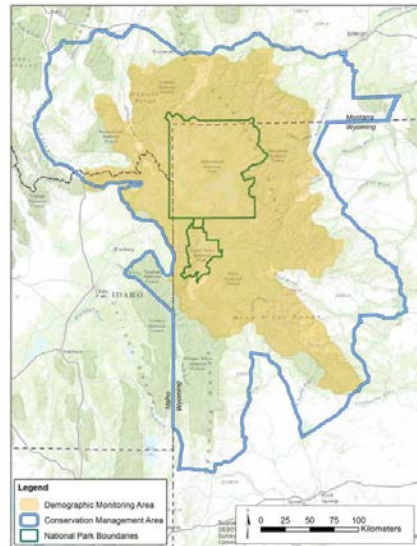


Figure 2. Blue line = old area where mortalities counted (95,225 sq. km); tan area = new mortality count area or the DMA (49,931 sq. km).