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April 26, 2016

Public Comments Processing
Attn. Docket No. FWS-R6-ES-2016-0042
U.S. Fish and Wildlife Service, MS:BPHC
5275 Leesburg Pike
Falls Church, VA 22041-3803

Re: Proposed rule delisting Yellowstone Grizzly Bears

The Gallatin Wildlife Association (GWA) is a non-profit volunteer wildlife conservation organization representing hunters, anglers and other wildlife advocates in Southwest Montana and elsewhere. Our mission is to protect habitat and conserve fish and wildlife. GWA supports sustainable management of fish and wildlife populations through fair chase public hunting and fishing opportunities that will ensure these traditions are passed on for future generations to enjoy. We support the Montana constitution which states: "the opportunity to harvest wild game is a heritage that shall forever be preserved" and that "the legislature shall provide adequate remedies to prevent unreasonable depletion of natural resources."

GWA notes that the sciences of population genetics and evolutionary biology have been growing and changing rapidly since the grizzly bear was listed in 1975. Standards for listing or delisting species, once dependent mostly on numbers of animals, are increasingly related to species' genetic compositions and to the evolutionary processes affecting population genetics. This is appropriate because we cannot leave animals to future generations of Americans. We can only leave population genomes.

Gallatin Wildlife Association Opposes Delisting at This Time

GWA appreciates that GYE grizzly bears have increased substantially in numbers with FWS management under the Endangered Species Act. However, for the many reasons cited below, GWA contends that delisting is premature because the incomplete or unclear proposal is based almost entirely on demographic recovery and neglects the projected long-term evolutionary future of GYE bears under the Conservation Strategy

(CS) and the 3-state MOA. With today's awareness of population genetics and evolutionary biology, simple demographic recovery of bear numbers is not adequate to assure long-term recovery of wild grizzly bears. Under this standard, existing and assumed regulatory mechanisms are not adequate for delisting.

The only certain way to enhance the long-term fitness and evolutionary potential (defined as "genetic adequacy" below) of GYE grizzly bears is to increase the population size across a larger landscape so that there will be a larger number of adult bears exposed to natural mortality and there will be common exchanges of animals and their alleles between the GYE and the northern continental divide. Given the unique value of the GYE grizzly bear population, and our limited understanding of bear population genetics, establishing bears on a larger, connected landscape is an appropriate requirement for delisting.

GYE grizzly bears should not be delisted until there are permanent populations of bears in the Gravelly-Snowcrest-Centennial Mountains, in the Selway-Bitterroot Wilderness, and along the connecting crest of the Bitterroot Range. Alternative connected landscapes, all in Montana, might include the Madison, Tobacco Root, Highland Mountains and continental divide north of Butte; or the Sapphire Range. However, these alternative habitat connections include more interruptions of public land by private, developed land. Consistent occupation of these alternative corridors may prove difficult to maintain and human/bear conflicts would be more common.

Further – upon ultimate delisting, GWA supports establishing a buffer zone for limiting discretionary mortality, including hunting, surrounding Yellowstone National Park.

The Delisting Proposal is Premature and Incomplete

GWA believes that population genetics and evolutionary biology of grizzly bears are not adequately reflected in the Conservation Strategy (CS) for the Grizzly Bear in the Greater Yellowstone Ecosystem (2016 Final Draft, on line April 19, 2016). In particular, great uncertainties regarding the significance of allele losses, changing genetic compositions, and the effects of future random and selective processes are not recognized. We define a genetically adequate wildlife population as (1) being large enough to avoid inbreeding and to maintain genetic diversity for (a) retaining wild characteristics bequeathed from past evolution and (b) retaining evolutionary potential for responding to changing environments of the future; and (2) is influenced by a preponderance of natural selection rather than by small population effects and/or by replacement and weakening of natural selection with human selection and impacts. GWA believes the Conservation Strategy fails to fully address these issues.

We note that the Conservation Strategy is still a "Final Draft".

- An executive summary, noted in the table of comments, is not included.
- The very important state plans, cited as "included" in the Strategy (p. 18), are not appended. It appears that only the Wyoming Draft plan is available at this time.

- State planning, review and finalization should precede review of the federal Strategy and delisting proposal. Otherwise, federal assertions and commitments depend upon uncertain assumptions. Without state commitments, the adequacy of existing regulatory mechanisms for protecting the Yellowstone grizzly bear genome cannot be evaluated.
- GWA would like to see the expert opinions of three appropriate and independent species specialists cited by FWS as part of a delisting process. These opinions should be available in obtaining a wider input from the public and scientific community.

The 3-state Memorandum of Agreement is Inadequate

- The MOA may not yet have been approved by the three state wildlife commissions.
- The MOA is focused almost entirely on maintaining a limited number of grizzly bears within a limited area, the Demographic Monitoring Area (DMA). It fails to address the current and future genetic quality of this controlled population (see below). It provides no commitment for bears outside the DMA, especially for establishing connecting populations to provide genetic exchange between the GYE bears and bears of the northern continental divide population.
- The MOA statement that Miller and Waits (2003) “recommended a minimum population of at least 400 bears” would “adequately mitigate the potential effects of genetic drift and inbreeding depression” in GYE bears is a gross oversimplification at best, and inaccurate at worst. Miller and Waits stated that, with 400 bears, it is “unlikely that genetic factors will have a substantial effect on the viability of” GYE bears “over the next several decades.” We have underlined qualifying words ignored by the MOA statement. Note that “viability” of GYE bears is not the same as genetic quality of GYE bears.
- The MOA does not recognize that “there will inevitably be loss of genetic diversity without immigrants or transplants” (Kamath et al. 2015) or the implications of this loss for evolutionary potential of GYE bears. It does not commit to providing for immigrants or transplants.
- The MOA fails to recognize the likely impacts of discretionary removals of bears, including by hunting, upon the population generation interval. The expected shortening of generation interval will enhance the rate of genetic drift that will reduce fitness of the bear population, as described below.

Selected Genetic Indices: an Inadequate Basis for Managing GYE Grizzly Bears

- GYE grizzly bears are the most important grizzly population in the nation. Management should be cautious, minimizing risk to the future of the population. Basing decisions only on bear numbers will be inadequate. The more difficult issues of long-term genetic sufficiency must be defined and addressed.
- Grizzly bears have a long generation interval. Using current methods and sample sizes, genome changes will occur slowly and may be undetectable during even a few decades.

- Wildlife genetics is very poorly understood. We do not know the long-term fitness implications of alleles that increase, decline or disappear in populations. We just don't know how several thousand alleles interact or what they do. With so little understanding, even with the best available science, abundant caution is justified in managing GYE grizzly bears for future generations of Americans.
- The most frequently-used measures of population genetic health are based on small samples of thousands of alleles in wildlife populations. These measures are heterozygosity, allelic diversity, and genetically effective population size. They are only indices to what may be occurring across generations of microevolution in populations. There is little objective basis for precisely defining "significant" or "acceptable" limits for any of these measures of genetic health.
- Yet, management agencies often present measures of heterozygosity, allelic diversity and genetically effective population size as if there were clear science-based definitions of levels or numbers necessary to meet clearly-stated goals. This is rarely true.
- Population genetics and the methods used in this science are understood little or not at all by most Americans – and they are little understood in many wildlife management agencies. These agencies have strong political pressures influencing their decisions. Consequently, there is a widespread tendency to use and present peer-reviewed science selectively and incompletely in order to justify decisions that are at least somewhat politically acceptable. Examples:
 1. The misuse of Miller and Waits (2003) in the 3-state MOA, cited above.
 2. The Conservation Strategy (CS: pp. 5, 52) states that "500 bears" will "assure the genetic health of the population." This is a gross oversimplification of the population genetics issue. The cited (Franklin 1980) threshold of 500 animals was published 36 years ago and there has subsequently been abundant, more complicated literature on this subject (Cf. Traill et al. 2009; Willoughby et al. 2015).
 3. Based on Kamath et al. (2015), the CS (p. 52) concludes that the (genetically) effective population size of GYE bears has increased to 469 animals. It fails to note the reported very large confidence limits for this estimate (284-772), or other, smaller estimates of genetically effective population size given in Kamath et al. (An estimate of 280 is used in the abstract.)
- In summary, considering the importance and value of GYE grizzly bears and our limited understanding of their population genetics, managing bears primarily for "demographic recovery" (criteria, pp. 34-35), promoting some minimal, acceptable number and distribution of bears, is not justified, and should not be presented as "sufficient" for future generations of Americans.

Claim that GYE Grizzly Bears are at Biological Carrying Capacity is Not Justified

- Delisting documents promote the idea that the GYE is "full" and can support no more bears; at least implying that this justifies delisting.

1. The 3-state MOA states the GYE grizzly bear population reached a “biological carrying capacity” during 2002-2014. This position has been repeated with the “full sardine can” analogy used by one FWS biologist.
 2. Van Manen et al. (2015) reach a similar, but more detailed conclusion. They emphasize a non-significant decline in female fecundity and declines in cub and yearling survival, particularly in the core area of the GYE, as evidence that the bear population has reached carrying capacity. GWA notes that density-dependent declines in fecundity and survival rates are expected to occur throughout much of the cited logistic curve of population growth. Declines in these rates are symptoms of gradually approaching carrying capacity, not evidence that carrying capacity has been reached or even closely approached. Moreover, there is no separate analysis to indicate that carrying capacity is limiting the possible number of bears throughout the GYE, especially at the periphery. GWA believes van Manen et al. (2015) present arguments with far more confidence than is warranted.
- However, the bear population is increasing by 3-4% per year (CS p. 28); and harvests and other human-caused mortality will have to be adjusted to maintain total adult mortalities up to 10-22% in order to limit the population (CS Table 2, p. 36). These are not characteristics of biological carrying capacity. The arguments that bears are limited by biological carrying capacity are oversimplified and misleading.

Implications of Genetic Drift and Artificial Selection are Largely Ignored

- The GYE grizzly bear genome will be altered gradually by: 1) natural selection, 2) artificial selection due to human removals, and possibly movement of animals, and 3) genetic drift due to random factors. Natural selection has produced wild grizzly bears and is necessary to maintain their fitness to wild environments. Fitness includes all the interacting anatomical, physiological and behavioral traits of bears that determine such characteristics as energy metabolism and efficiency, disease resistance, competitiveness and reproductive potential. Artificial selection will replace or weaken natural selection. Likely, it will be random with respect to favoring or reducing certain alleles, allowing their frequencies to drift upward or downward. Genetic drift replaces selection with more randomness and includes the process of meiosis as half the chromosomes are not used in producing each 1N ovum or sperm.
- In the CS, and in much conservation biology, genetic drift is presented as a gradual loss of alleles over generations. Implications of declining, but not lost alleles, and of randomly increasing, possibly deleterious, alleles on fitness of wild populations are often ignored, as is the case in the CS.
- For other species, there has been computer-based modeling to estimate the rate of losing alleles due to genetic drift with given population sizes. There appear to be no such estimates for GYE grizzly bears. Such estimates would be useful.
- GWA argues that, given the already limited genetic diversity of GYE grizzly bears, and our limited understanding of the bear genome and its complex

functions, the importance and urgency of reestablishing gene flow from the northern continental divide bear population should not be minimized, nor neglected.

- The CS does not consider the current or expected effectiveness of natural selection, weakened and replaced by artificial selection and by genetic drift, for maintaining the wild character and fitness of GYE bears. It appears that very few adult grizzlies die in the wild, mostly in strife with other bears. GWA contends that inter-bear competition and strife are important, strong arbiters of natural selection for fitness.

Proposed Solutions to Maintain Allelic Diversity are Uncertain and Inadequate

- The recovery criteria (CS pp. 34-35) require no current movements of bears and alleles into the GYE from the northern continental divide. Further, there is no requirement for a state or federal commitment to this purpose.
- The CS states that, after delisting and resumption of state management, grizzly bears will be "allowed" to expand their range into socially acceptable areas. It states (p. 53-54) that a Montana plan (under revision) allows only for "non-conflict" grizzly bears in areas between the GYE and the northern continental divide. We have found no commitment from Idaho to allow bears in the huge Selway-Bitterroot Wilderness, a key connecting area.
- Miller and Waits (2003) arguments that 1-2 immigrants or transplants of bears into the GYE population every generation (about 10 years) will provide an "appropriate level" of gene flow, and that gene flow is not now urgent, deserves more evaluation and review. Their justifications for these statements are not given. "Appropriate" is not defined.
- The 3-state MOA makes no commitment to transplanting bears, with alleles, into the GYE population; nor does it commit to limiting discretionary mortality or to conducting any proactive management that would establish interconnecting populations of grizzly bears to facilitate gene flow between the GYE and the northern continental divide bear population.

The Conservation Strategy Livestock Allotment Standard is Inadequate

- The Livestock Allotment Standard (CS pp. 67-68) applies only within the Primary Conservation Area (PCA) which is smaller than the Demographic Monitoring Area (DMA). Thus, the CS does not address standards for federal livestock allotments on the entire DMA where a recovered bear population is to be maintained as stated in the MOA. Moreover, the CS does not address standards for livestock allotments that would interfere with establishing occupied habitat connections between GYE grizzly bears and northern bears. As noted, GWA believes these occupied connections are necessary for delisting.
- In the Livestock Allotment Standard, federal allotments may be phased out only with support from willing permittees. In effect, this provides permittees with veto power over federal decisions for uses of federal lands. Delegating this public

responsibility to private interests may violate Section 7 of the ESA and other laws.

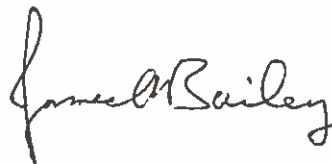
A Buffer Zone for Yellowstone Park Bears is Needed

- A most basic Park Service mandate is to leave Park resources unimpaired for future generations. Park Service policy recognizes evolution as a natural process minimally influenced by human actions.
- As envisioned in the 3-state MOA, Yellowstone Park would be the only GYE area where natural selection would predominate with adult bears to maintain a wild bear genome. Without a buffer zone, enforced by the 3 states, bears near the Park boundary would be subject to increased artificial selection and enhanced genetic drift. Also, some more-naturally-selected Park bears would breed with less-naturally-selected bears from outside the Park, diluting the wilder, unimpaired genome being maintained only in the Park.
- Yellowstone National Park has requested a buffer zone with minimal discretionary, human-caused mortality to surround the Park upon delisting. The CS fails to note and publicly respond to this request.

Sincerely,



Glenn Hockett, Voluntary President
Gallatin Wildlife Association



Jim Bailey, PhD, GWA Board Member
Wildlife Biologist, retired

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