

20 June 2013

Grizzly Bear Recovery Coordinator  
U.S. Fish and Wildlife Service  
University Hall, Room 309  
University of Montana  
Missoula, MT 59812

Re: Comments on Draft Revised Supplement to the Grizzly Bear Recovery Plan; Specifically, Revisions to the Demographic Recovery Criteria for the Greater Yellowstone Ecosystem

Dear Dr. Servheen:

We are writing to provide comments on the proposed revisions to the demographic recovery criteria for grizzly bears in the Greater Yellowstone Ecosystem (GYE) as outlined in the draft Revised Supplement to the Grizzly Bear (*Ursus arctos horribilis*) Recovery Plan. 78 Fed. Reg. 17708 (Mar. 22, 2013). We would like to draw the U.S. Fish and Wildlife Service's (FWS) attention to several concerns, including concerns related to methodological flaws in assessing population status and trend, genetic isolation of the GYE grizzly bear population, suitable habitat delineation, and continued opportunities to participate in the grizzly bear decision-making process.

## **I. Population Status & Trend**

### *a. Chao2*

FWS most recently has relied on the Chao2 estimator coupled with Knight et al.'s (1995) method for estimating unduplicated females with cubs-of-the-year ( $F_{COY}$ ) to estimate minimum grizzly bear population size. Those estimates of minimum population size, in turn, have been used to infer population trends over time. FWS has acknowledged biases inherent in using unduplicated counts of  $F_{COY}$  to index population size, as well as biases in the Knight et al. rule set and in Chao2 itself. Interagency Grizzly Bear Study Team, Updating and Evaluating Approaches to Estimate Population Size and Sustainable Mortality Limits for Grizzly Bears in the Greater Yellowstone Ecosystem 7, 20 (Sept. 2012) [hereinafter IGBST 2012]. In addition to these acknowledged biases, FWS should address and account for problems flowing from increased observer effort and probable increased grizzly bear sightability.

First, there has been a substantial increase in observer effort over time and Chao2 is known to be sensitive to the amount of observer effort expended (see Steve Cherry et al., Evaluating Estimates of the Numbers of Females with Cubs-of-the-Year in the Yellowstone Grizzly Bear Population, 12 J. AGRIC., BIOLOGICAL & ENVTL. STATISTICS 195, 195 (2007)). FWS should explain why increased observer effort has not confounded the agency's grizzly bear population and trend estimates, both with respect to the standardized and non-standardized sampling methods used to produce annual estimates of  $F_{COY}$ . See Daniel F. Doak & Kerry

Cutler, Re-Evaluating Evidence for Past Population Trends and Predicted Dynamics of Yellowstone Grizzly Bears, *Conservation Letters* (accepted 2013), doi: 10.1111/conl.12048.

Second, as bears have shifted their habitat use to more open landscapes, there has been a probable increase in the overall sightability of grizzly bears in the GYE as well as an increase in the proportion of  $F_{COY}$  observed more than once. Counts of  $F_{COY}$  and the Chao2 estimator both are known to be sensitive to heterogeneity in sightability (see, Cherry et al. (2007); Kim A. Keating et al., Estimating Numbers of Females with Cubs-of-the-Year in the Yellowstone Grizzly Bear Population, 13 *URSUS* 161 (2002)). FWS should explain whether such heterogeneity in sightability and increased sightability confound the agency's estimate of grizzly bear numbers and trends, and how the agency is dealing with this issue. See Doak & Cutler (2013)

Finally, the combined effects of increased observer effort and increased sightability might be compounded, producing an overly optimistic picture of grizzly bear status and trend. FWS should discuss whether and how the singular and the combined effects of observer effort and sightability have influenced its estimates of population status and trend—particularly since FWS's grizzly bear recovery standards are grounded in status and trend estimates.

*b. Mark-Resight*

We would also like to comment on the IGBST's recent recommendation to transition to mark-resight as a means of estimating the GYE grizzly bear population size. IGBST 2012 at 7. While mark-resight may produce a less biased population estimate than Chao2, the method may also produce a population estimate larger than Chao2. If FWS still intends to transition to mark-resight, the agency should explain in more detail both the methodology itself, as well as its intended process for reconciling any new population estimates with Chao2 estimates and trajectories. In addition, FWS should identify and explain how it intends to address any challenges that might arise due to marking and resighting methods, any potential risk-inflating biases, and any "[b]iases from heterogeneity in the availability and detection probabilities of marked bears relative to unmarked bears[.]" IGBST 2012 at 7.

We also believe the FWS should address several concerns related to  $F_{COY}$ . First, FWS should discuss how it is dealing with the challenge of fully counting sightings of unique  $F_{COY}$  on moth sites. Second, it is well-recognized that mark-resight suffers from low precision due to small numbers of  $F_{COY}$  marked and observed. IGBST 2012 at 7. As a result, this methodology leads to very large confidence intervals (CIs) and thus considerable uncertainty regarding both true population size and trend. The agency should explain how the uncertainty accompanying such large CIs fits into intelligent and conservative decision-making, and how its population targets will be assured in the face of such uncertainty. See discussion Part IV.a, infra; Chapter 6: Research and Uncertainty, in KRISTIN SHRADER-FRECHETTE, *ETHICS OF SCIENTIFIC RESEARCH* (ROWMAN & LITTLEFIELD PUBLISHERS, INC. 1994).

FWS should also explain why it has not adopted a 95% confidence standard, given that adoption of that customary standard would help ensure conservative management of the GYE

grizzly bear population. The agency could be more confident that the population was being maintained at the defined level of adequacy (i.e., 500 bears, 48 F<sub>COY</sub>) if the lower confidence limit matched these values. In sum, FWS should acknowledge and address the uncertainty inherent in its population and allowable mortality estimates provide clear criteria for how those estimates and their associated uncertainty are analyzed, and consider using the standard 95% confidence interval to ensure conservative management of the GYE grizzly bear population. See, e.g., Victoria J. Bakker & Daniel F. Doak, Population Viability Management: Ecological Standards to Guide Adaptive Management for Rare Species, 7 FRONTIERS IN ECOLOGY & ENV'T 158 (2009) (providing an example of how to address this CI issue)

## II. Genetic Isolation

The Draft Revised Supplement proposes to “maintain a minimum population size of 500 animals and at least 48 females with cubs (F<sub>COY</sub>) ... as indicated by methods established in published, peer-reviewed scientific literature and calculated by the [Interagency Grizzly Bear Study Team (IGBST)] using the most updated Protocol, as posted on their website.” Grizzly Bear Recovery Plan: Draft Revised Supplement: Revised Demographic Recovery Criteria for the Yellowstone Ecosystem (Feb. 19, 2013) [hereinafter Draft Revised Supplement]. FWS presents the 500-bear/48 F<sub>COY</sub> target as a conservative goal meant to minimize the effects of genetic drift and inbreeding depression. Draft Revised Supplement (citing C.R. Miller & L.P. Waits, The History of Effective Population Size and Genetic Diversity in the Yellowstone Grizzly (*Ursus arctos*): Implications for Conservation, 100 PROC. NAT'L ACAD. SCI. 4334 (2003)). However, a population consisting of only 500 individuals is insufficient to maintain a genetically robust population of grizzly bears without resorting to human-assisted translocation. Conservation Strategy at 37. The need for human-assisted translocation, in turn, does not support the notion of a GYE grizzly bear population has been “[r]estor[ed] ... to the point where it is again a secure, self-sustaining member of its ecosystem[.]” 78 Fed. Reg. at 17708 (emphasis added).

FWS should ensure that the GYE grizzly bear population is indeed self-sustaining before delisting occurs. The agency should consider establishing protected corridors between the GYE grizzly bear population and other regional populations to facilitate the establishment of a metapopulation. See Miller & Waits (2003) at 4338 (arguing for the “establish[ment of] intermediate populations and protecting and restoring intervening habitat” between the GYE and the Northern Continental Divide Ecosystem and “encouraging range expansion through natural dispersal”); U.S. Fish & Wildlife Service, Draft NCDE Grizzly Bear Conservation Strategy ii, iv, 4, 6, 13, 19, 37 n.2, 41, 85-87 (April 2013) (discussion of need for and establishment of “Demographic Connectivity Areas”); id. at 32 (“envision[ing] the NCDE serving as a ‘source population’ for grizzly bear populations in the ... Greater Yellowstone ecosystem ...”); id. at 36 (declaring a goal of “[m]aintain[ing] genetic linkage opportunities between the NCDE south toward Yellowstone with consistent grizzly bear presence in these intervening areas”). Connectivity would help protect the GYE grizzly bear population from the effects of genetic isolation, and obviate the need for human-assisted translocation.

## III. Suitable Habitat

FWS proposes to designate a Monitoring Area “within which all demographic criteria are assessed.” Draft Revised Supplement. This Monitoring Area would include all USFWS suitable habitat as well as certain mortality sinks. Draft Revised Supplement. FWS defines suitable habitat based on three characteristics:

- (1) being of adequate habitat quality and quantity to support grizzly bear reproduction and survival;
- (2) contiguity with the current distribution of Yellowstone grizzly bears such that natural recolonization is possible; and
- (3) having low mortality risk as indicated through reasonable and manageable levels of grizzly bear mortality.

#### Background on USFWS Suitable Habitat (Mar. 2013).

Fulfillment of the first characteristic, habitat adequacy, is based in part on the sufficiency of food resources and seasonal foraging opportunities in the area. Id. FWS’s 2007 delineation of suitable habitat presumably reflected the best available science regarding food resource distribution at that time. However, food resource availability and distribution are shifting (e.g., whitebark pine and cutthroat trout declines),<sup>1</sup> and the suitability of grizzly bear habitat is changing accordingly. The FWS has recognized that certain areas may no longer be suitable habitat as food resource availability changes. See id. FWS should update its delineation of suitable habitat (and thus its Monitoring Area boundary) so as to reflect any new information emerging from the IGBST’s and other researchers’ ongoing food resource research. The agency should ensure that habitat defined as suitable remains sufficient to sustain a recovered grizzly bear population now, and is likely to do so into the foreseeable future.

In addition to reassessing the adequacy of delineated suitable habitat, we believe that FWS has improperly excluded certain areas of biophysically suitable habitat—including portions of the Wyoming Range, Wind River Range, Gravelly Range, and Centennial Mountains—from the Monitoring Area. All of these areas potentially could serve as grizzly bear source areas, and the Centennial Mountains and Gravelly Range constitute critical portions of potential linkage zones between the GYE and central Idaho. See Charles C. Schwartz et al., Hazards Affecting Grizzly Bear Survival in the Greater Yellowstone Ecosystem, 74 J. WILDLIFE MGMT. 654 (2010); Troy Merrill & David Mattson, The Extent and Location of Habitat Biophysically Suitable for Grizzly Bears in the Yellowstone Region, 14 URSUS 171 (2003). Such connections are critical to achieve a “secure, self-sustaining” population. 78 Fed. Reg. at 17708.

Finally, we encourage the FWS to encourage and promote conflict reduction efforts in sink areas and other peripheral habitats that currently are or are likely to become occupied by grizzly bears. Bears that wander outside the core of the GYE are more likely to encounter humans and thus have a higher mortality risk; however, if those mortalities occur outside the

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<sup>1</sup> For a recent discussion of some of these changes, see Arthur D. Middleton et al., *Grizzly Bear Predation Links the Loss of Native Trout to the Demography of Migratory Elk in Yellowstone*, 180 Proc. Royal Soc’y B (2013), available at <http://rspb.royalsocietypublishing.org/content/280/1762/20130870>.

Monitoring Area, they will not be counted toward mortality thresholds. This could lead to a mismatch between the subpopulation where bears count toward abundance estimates and the subpopulation where bears mortalities are tallied. That is, bears emigrating from the Monitoring Area or whose home ranges overlap the Monitoring Area border might be spotted within the Monitoring Area during a survey, and thus count toward population size. However, these same bears might wander outside the Monitoring Area and be killed, but their deaths would not count against the population size. Depending on the frequency with which such events occur, this mismatch could skew population estimates, threaten the overall GYE grizzly bear population, and preclude the establishment of a connected metapopulation.

#### **IV. Continued Participation**

FWS's proposed revision to Criterion 1 in the Draft Revised Supplement would "eliminate the criterion's dependence on a specific method (e.g., Chao2) so that [the FWS] can rapidly implement improved scientific methods as they become available in the peer reviewed literature." Draft Revised Supplement. It appears this proposed rapid-response approach would effectively exclude the scientific community from participating in the process of reviewing status and trend methodology outside of the formal peer review process. We urge FWS to reconsider this approach; independent scientists can provide valuable insights on and recommended improvements to grizzly bear monitoring techniques. Further, given how tightly FWS controls the raw data on GYE grizzly bears, independent scientists have limited opportunities to contribute to grizzly bear conservation in the GYE outside the comment process.

This concern also pertains to the FWS's proposed revision to Criterion 3's determination of sustainable mortality rates. Draft Revised Supplement. Instead of specifying sustainable mortality rates for the different cohorts of bears, "these rates would be calculated by the Study Team and modified as new data indicates warranted." Draft Revised Supplement. Again, we urge FWS to reconsider this approach and to allow independent scientists to review and provide input on the establishment of sustainable mortality rates. Independent scientists have made important contributions to the mortality discussion, such as highlighting the importance of reproductive and survival senescence in determining sustainable mortality rates. See Doak & Cutler (2013). The continued involvement of independent scientists may prove especially useful in the mortality level-setting context, as there may be a substantial lag time before the effects of increased mortality and/or declining fecundity are observable. Engaging independent scientists may allow for such problems to be detected before unsustainably high mortality rates severely impact the GYE grizzly bear population. See generally HAL CASWELL, MATRIX POPULATION MODELS (2001). Such concerns are particularly warranted given the recent high levels of mortality among yearling and possibly cub age classes, as well as last year's dramatic exceedance of allowable mortality for adult male bears.

#### **V. Conclusion**

We appreciate the opportunity to comment on the draft Revised Supplement to the Grizzly Bear Recovery Plan, as well as FWS's consideration of the issues raised in this letter.

Please feel free to contact us with questions about any of the issues raised, or if you require additional information or explanation.

Most sincerely,

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