Peer Review Report

Reviewer 1

Species Status Assessment for the Grizzly Bear
(*Ursus arctos horribilis*)
In the Lower 48 States:
A Biological Report

U.S. Fish and Wildlife Service
Grizzly Bear Recovery Office
Missoula, Montana

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Peer Review of the Draft Species Status Assessment for the Grizzly Bear (*Ursus arctos horribilis*) in the Lower-48 States: A Biological Report.

GENERAL COMMENTS
Item 1. Species needs, biology, habitat, population trends, historic and current distribution. [1. Is the Biological Report's description and analysis of the species' needs, biology, habitat, population trends, and historic and current distribution accurate and, if not, what information is missing and how is it relevant?]

The Biological Report (hereafter Report) is very thorough regarding species needs, biology, habitat, and historic and current distribution. As mentioned in the Report, the grizzly in GYE is the most studied population in the world and that research has produced a wealth of information. Similarly, management and research on grizzlies in NCDE has been extensive and of high quality. Good research has also been conducted in SE and CYE. Results of past research has generally been well covered in the Report. The literature cited section reflects this thorough coverage.

I have some specific comments that I will present later in the review. In particular, I would like to see more explanation of why methods for estimating population size and trend differ between ecosystems. I also would like to see some treatment of population densities in the many geographic units that are described. Population density is a very good means of assessing habitat quality. I also have some questions concerning home range, denning and population target (see SPECIFIC COMMENTS, below).

I am surprised at the effort put into the analysis of the San Juan and Sierra Mountains. I don't think it is realistic to consider either of those areas as being able to support viable grizzly populations.

Items 2 and 4. Grizzly viability in the lower 48 states: demographics, habitat, stressors, genetics, and other factors. [2. Does the Biological Report provide adequate review and analysis of the factors relating to the overall viability of grizzly bears in the lower-48 States (e.g., demographics, habitat, disease and predation, and genetics) and, if not, what information is missing and how is it relevant? 4. Does the Biological Report provide adequate review and analysis of stressors and other influences on grizzly bears in the lower-48 States? If not, what information is missing and how is it relevant?]

These two questions seem interrelated and I combined them into one series of comments.

The tone of the Report is that habitat quality and grizzly mortality are the key factors affecting grizzly viability. Monitoring habitat and mortality is critical to assessing vitality. The system of geographic units to organize that monitoring is very complete but complex. I think one or two tables to summarize that information (km^2/mi^2 of various units for each ecosystem) would improve understanding and comparison among ecosystems. It would also be helpful to understand how much monitoring effort is put into each of the occupied ecosystems (number of

radio-collared bears, aerial surveys, etc.). I suspect GYE is the most heavily monitored, but it is difficult to judge.

I have a concern regarding how the Report deals with ecosystems that extend into Canada. I understand that the objective of the SSA is to access viability of the grizzly in the lower 48 States, but those portions of ecosystems that extend into Canada are extremely important to the "3 Rs'" that are used to evaluate grizzly populations in the U.S. Also, it's not clear why the Report provides information on the Canadian portion of the SE but not the other ecosystems.

I recommend the Report provide relevant information on the Canadian populations, including a revision of Figure 9 (pg. 39) to show the extent of those populations in Canada. It would also be important to know population estimates for Canada, current management and research in those areas, and collaboration of efforts with Canadian biologists and managers.

The demographics for GYE are very strong and are good for the other occupied ecosystems. If demographics for Canadian populations were added to the Report, comparison of those data with data for lower 48 populations would most likely strengthen the assessment of grizzly vitality in the lower 48. That information could be obtained from publications cited in the Report (COSEWIC, 2012; Proctor et al. 2007, 2012 and 2018, McLellen et al. 1999; McLellen and Shackleton 1988). Also, a previous USFW report (U.S. Fish and Wildlife Service. 2011. Grizzly Bear (Ursus arctos horribilis), 5-year Review: Summary and Evaluation. Missoula, MT.) provided considerable information on the shared U.S. and Canada grizzly populations.

The importance of large tracts of secure habitat and high calorie foods is correctly emphasized in the Report. I thought that the analysis of stressors that affect habitat quality, such as motorized access, private land development, vegetation management, and recreation was particularly well done.

An important aspect of grizzly viability is genetic diversity and this topic was well covered in the Report. The use of genetic sampling has relevance to estimation of population size and trend and could have application for restoring and monitoring in the BE and North Cascades ecosystems. Further, genetic sampling has demonstrated connectivity between the U.S. and Canadian populations and provides justification for more consideration of the Canadian populations in this Report.

Human-caused mortality is a primary factor affecting grizzly bears and the Report adequately covers the topic. The information presented does a good job of detailing how mortality is monitored and used to determine allowable mortality limits.

Items 3 and 6. Analysis of current and projected future condition of grizzlies.
[3. Does the Biological Report provide accurate and adequate review and analysis of the current and projected future condition of the species? If not, what information is missing and how is it relevant? 6. Are the statements about current and future condition logical and supported by the evidence provided?]

These two items essentially deal with the same subject and I therefore decided to discuss them collectively.

The methodology used to assess current condition of ecosystems is logical and based on a solid foundation of demographics, habitat quality, stressors, and genetic diversity. I have a few questions that I will address in the specific comment portions of this review.

An important concern I have is the current and future condition of the BE. I don't understand the status of BE relative to its potential to support a viable grizzly population. It is a large, intact block of land that is 98% wilderness and is surrounded by extensive National Forest land with large areas of inventoried roadless areas (Fig. 21, pg. 95). There is evidence that grizzlies occasionally more into BE from other ecosystems (Fig. 22, pg. 160). In 2000, the USFWS designated the BE for an experimental population but no bears were translocated. Elsewhere in the Report it is stated that the probability for recolonization of BE from other ecosystems has increased. The BE would seem to be a logical ecosystem to establish a population and that probability could be enhanced through translocation. The Report should explain why the establishment of a population in BE has not been pursued more aggressively.

Regarding future scenarios, I did not consider Chapter 7 a strong part of the Report. I understand the need to look into the future, but much of what is presented is very subjective. This is unavoidable given the many aspects that have to be evaluated (Table 17, pg. 214). The five scenario categories provide a lot of unnecessary complexity. I think the scenarios could be reduced to three categories (decreased conservation, current, and increased conservation) and provide essentially the same evaluation. Even then, future assessment of these scenarios will be difficult because of complexity of a large number of variables in each category.

In addition, I think there should be specific priorities and recommendations associated with the scenarios. For example, on page 216 (2nd paragraph) it is stated that there is uncertainty associated with how fecundity is measured. Because that is such an important demographic, I think work on improving surveys for that metric would be a high priority. Another example of a recommendation/priority might be improving connectivity from NCDE to GYE and BE through conservation easements and reduced motorized access. I note that a prior report (U.S. Fish and Wildlife Service. 2011. Grizzly Bear (Ursus arctos horribilis), 5-Year Review: Summary and Evaluation. Missoula, MT.) listed recommendations.

Item 5. Omissions, insights, inconsistencies. [5. Are there any significant oversights, omissions, or inconsistencies in the Biological Report?]

The way the Report deals with the grizzly populations that are shared by the U.S. and Canada seems somewhat inconsistent. I think it's an important omission to not depict the extent that NCDE, CYE, and North Cascade ecosystems extend into Canada. The Report states that it is concerned with ecosystems in the lower 48, but often it refers to the Canada populations. The point is that the 3 Rs in the lower 48 are importantly influenced by Canadian populations. This aspect at the Report is covered elsewhere in this review.

Other minor inconsistencies are covered later in this review under a section titled "CORRECTIONS".

Item 7. Literature [7. Does the Biological Report include all the necessary and pertinent literature to support our assumptions/arguments/conclusions?]

Literature that is relevant to the SSA assessment has been well covered in the Report. I indicate below places in the Report where statements are made that probably should be referenced.

- Pg. 43, last two paragraphs. The Report states that adults eat more meat than subadults. Is there literature that reports this?
- Pg. 224, fifth line from the bottom and pg. 226, middle of first paragraph. Has augmentation (or translocation) in CYE or elsewhere documented that female survival of relocated bears is low because they wander? This seems to contradict statements in the Report that the CYE augmentation program has been successful.

The following two references may have relevance in the Report.
- Hildebrand, G.V., D.D. Gustine, K. Joly, B. Mangipane, W. Leacock, M.D. Cameron, M.S. Sorum, L.S. Mangipane, and J.A. Erlenbach. 2019. Influence of maternal body size, condition, and age of recruitment of four brown bear populations. Ursus 29(2): 111-118. Has relevance to discussion on pg. 46, last paragraph and pg. 51, third paragraph.
- Gunther, K.A., and M.A. Haroldsen. 2020. Potential for recreational restrictions to reduce grizzly bear-caused human injuries. Ursus 31: article e6. Relevance to Recreation (pg. 117, first paragraph).

Item 8. Errors of fact or interpretation. [8. Are there demonstrable errors of fact or interpretation? Please provide the specifics regarding those particular concerns.]

There are a few errors that I encountered and they are listed in a review item titled "CORRECTIONS".

I had a few questions of interpretation regarding scenarios. For example, in scenario 3 (current), I thought that North Cascades, and maybe BE, should be classed as high for large blocks of intact land. They clearly are larger than CYE and SE. Other questions I had were minor and not important to the overall evaluation.

Item 9. Additional general comments.

None

SPECIFIC COMMENTS

1. <u>Population size and trend (pgs. 56-57, Appendix A).</u>

It was not clear to me why so many methods are used to estimate population size and trend. I would expect from the extensive work that has been done in the grizzly ecosystems that the most accurate and efficient methods would have been determined. However, methods differ between ecosystems. The Report indicates this is due to available resources, history of work and size of ecosystems, but doesn't provide detail on why different analyses are necessary. For example, counts of females with cubs are important in GYE, SE, and CYE but not in NDCE. More

consistency in methodology between ecosystems might allow comparisons that would improve status assessment. That could be a recommendation of this Report.

To measure population trend, the GYE uses four methods and NCDE uses two. How do they compare? I assume in Table 15 (pg. 200) that the data for GYE represents the range of estimates but only one estimate is shown for NCDE. This is relevant because population trend is considered the key parameter in assessing population status (pg. 189).

Regarding CYE and SE (pg. 272, last paragraph), the Report states that 33% of adult females will have cubs each year, but Table 6 (pg. 48) indicates an inter-birth interval of 3.4. This means that less than a third of females have cubs each year. Also, in the same paragraph, I don't know what "reporting efficiency of females with cubs" means. Is this a sightability index or some other measure and how is it determined?

2.	Home Range (pgs. 45-46).

I suggest the Report indicate what method or methods were used to determine home ranges (for example, fixed kernel). Also, were the same methods used in all ecosystems?

The Report states that home range size differs between ecosystems because of population densities, but I couldn't find any information in the Report about bear density within or between ecosystems. There are a couple of statements that suggest that bear densities were determined in NCDE (pg. 129, last paragraph) and GYE (pgs. 170, last line; pg. 171, last two lines), but no specific information was presented. It appears that population density is greater in the NCDE recovery zone than in GYE, which suggests NCDE provides higher quality habitat. If this is true, I wonder why home range sizes are much greater in NCDE (Table 5, pg. 46). Are there other factors to explain the substantial difference in home range size between NCDE and GYE?

The Report indicates that survival rates are determined for subadult bears, which I assume means that a sample of subadults is radio-collared. If so, it would be appropriate to show subadult home ranges in Table 5 (pg. 46).

3.	Denning

Figures 2 (pg. 6) and 19 (pg. 87) depict dens as important for shelter and breeding. In text, (pg. 88), it is stated that dens provide shelter for all age classes and specifically for females during breeding. I am not aware of evidence that females use dens as shelter during breeding. If this has been documented, it should be referenced.

On Kodiak Island, we infrequently had males kill cubs at den sites and on a few occasions the adult female was also killed. If a female loses cubs, she will come into estrus and breed, but I don't think that is what the Report is referring to. It should be clarified what the link is between dens and breeding.

Reference is made (pgs. 49, 51, third paragraphs) about the need for bears to accumulate fat reserves to survive the denning period. Because of the extensive radio-collaring that has been conducted in GYE and other ecosystems, I would expect data have been collected on survival during denning. This should be presented in the Report. I am aware that fat reserves affect the

ability of females to produce cubs in dens, but I am not aware of work that demonstrates significant mortality during the denning period.

4.   Population Target

I have some uncertainty regarding the value and use of the term "Population Target". Table 1 (pg. 10) indicates population target is determined from recovery criteria and/or conservation strategies, and that both number of bears and population target (also number of bears) are determined by methods that differ by ecosystem. I know how number of bears is estimated but there is no explanation in the Report on how population target is determined. On pg. 195 (Abundance) the Report states that number of bears is most important to resiliency but also mentions population target.

I know that in assessments, abundance is weighted by a factor of 3. However, in Figure 23 (pg. 197) it seems that population target is the same thing as number of bears and is weighted by three. But, in Table 14 (pg. 198) population target and number of bears are in two columns and number of bears is weighted by three. I am uncertain as to how population target and number of bears are used to calculate scores for resiliency. Table 15 (pg. 200) shows that population target and number of bears are two different demographics. I suggest that number of bears is the most important metric to use.

I also note that there is uncertainty in the population target for SE because of data from bears in Canada. Table 15 (pg. 209) indicates a target of 90 for SE that includes Canada. However, the estimated number of bears (including Canada) is a minimum of 53. This is inconsistent with estimates found on pages 66 and 67 that indicate 53 in the U.S. portion of SE and 58 in the Canadian portion of SE.

It seems to me that population target should relate to carrying capacity. When lambda indicates that a population is near carrying capacity, such as in NCDE and GYE, that should be the target. I recommend the Report provide information on how population target is determined and used.

CORRECTIONS

In this review I was not concerned with editing. However, as I went through the document, I noted a few minor errors that I thought would be helpful to point out.

1.   Pg. 4, 3rd paragraph: this should be northeast Washington, not northeast Montana.
2.   Pg. 71, 3rd paragraph, lines 1-2: DPS (Distinct Population Segment) is not included in the List of Acronyms (pg. 31).
3.   Pg. 139, 3rd paragraph, last two lines: this is an incomplete sentence.
4.   Pg. 158, last paragraph, lines 1-2: I assume the 2000 bear estimate is from Barnes and Smith (1998). If so, it should be 2600.
5.   Pg. 197, Figure 23: Is this an error: Genetic Diversity)/11?

SUMMARY

The authors of the Biological Report have done a good job of condensing a large volume of information into a meaningful Report. I worked on black bears in Yellowstone NP in the 1960s when the Craigheads were conducting research on the grizzlies of Yellowstone. It is amazing how much has been accomplished in grizzly recovery since then. The Report covers biology, demographics, important factors and conservation efforts very well. Coverage of the other aspects, such as influences, regulation, history, habitat, mortality and current conditions is very thorough. The use of the 3R evaluation approach was effective.

Development of the future scenarios was necessary, although it was very general and evaluation of the various elements of those scenarios will be difficult. In addition to what is presented in the scenarios, I believe the Report should provide more specific guidance on how future recovery should proceed. I think that continued conservation work in the SE and CYE will provide some improvement in recovery and primarily in relation to connectivity with NCDE (redundancy and representation). It is obvious that continued monitoring of NCDE and GYE is a high priority.

Information in the Report indicated to me there should be a focus on establishing a population in BE through translocation and developing increased connectivity between NCDE, GYE and BE. An increase in human presence (development, recreation) is occurring in the western U.S. and is certain to continue. Thus, I think it is risky to rely on recolonization alone to establish grizzlies in BE.

I recognize there is potential for a grizzly population in the North Cascades, but that area is so remote from other ecosystems that I don't think a relatively small population in the North Cascades would contribute importantly to grizzly recovery in the Lower 48. I believe a focus on BE and connectivity with NCDE and GYE should be a higher priority.

I appreciate the opportunity to review and learn from this good Biological Report.