Peer Review Summary Document

(12/4/2013)

Peer Review Plan

http://www.usgs.gov/peer_review/docs/yellowstone_grizzly_bear_population.pdf. [17 KB PDF]

Title and Authorship of Information Product Disseminated

Response of Yellowstone grizzly bears to changes in food resources: a synthesis, By Frank vanManen, Cecily Costello, Mark Haroldson, Daniel Bjornlie, Michael Ebinger, Kerry Gunther, Mary Frances Mahalovich, Daniel Thompson, Megan Higgs, Kathryn Irvine, Kristin Legg, Daniel Tyers, Lisa Landenburger, Steven Cain, Kevin Frey, Bryan Aber, and Charles Schwartz.

Peer Reviewers Expertise and Credentials

Peer Reviewer #1: USGS Research Ecologist. Reviewer #1 specializes in carnivore ecology, population dynamics, and habitat modeling.

Peer Reviewer #2: USGS Research Wildlife Biologist. Reviewer #2 specializes in nutritional and physiological ecology of large mammals, anthropogenic effects on large mammals, population ecology of ursids.

Charge Submitted to Peer Reviewers

The reviewers were asked to make an objective evaluation of the research.

Summary of Peer Reviewers Comments and USGS Response to Peer Reviewers Comments

Overall comments from the reviewers were favorable. A few criteria were ranked as needing minor revisions, all others were adequate. Suggestions for minor revisions focused primarily on data collection and analyses, presenting better premise for the study components, consideration of alternative hypotheses, and improving the Discussion and Conclusion sections.

USGS responses to specific comments from the peer reviewers are in italics below.

REVIEWER # 1

- Reviewer asked for clarification on a number of issues related to the section on whitebark pine status and trend.
    - *Additional details and clarification were provided and the section was re-organized.*

- Reviewer commented that not all grizzly bears had equal access to whitebark pine and whether it would be more informative to subset the data in those that had whitebark pine in the home range versus those that did not.
    - *The sample used in the report was stratified by proportion of whitebark pine in home range for the habitat analyses. Other analyses in the report were approached from a population standpoint and thus all sampled bears were included in the analyses.*

- Reviewer indicated too much reliance on the grizzly bear literature.
    - *The authors included broader ecological literature to discuss ecological principles.*

- Reviewer commented that it may not be reasonable to assume that carrying capacity of grizzly bears in the GYE did not decline (based on Schwartz et al., 2013) when whitebark pine resources have been reduced. If whitebark pine is important to some of bears, then carrying capacity would have to have been affected in some measure. They were eating seeds for a reason. There has to be an ecological consequence (albeit small) for not doing so.
    - *Ultimately, shifts in diets due to changes in food availability, or the cost of obtaining particular foods, are an issue of energetics. The reviewer makes the assumption that shifting to other resources reduces caloric intake per unit of effort, which either is a results of more effort needed to obtain food items equal or greater in caloric value or less effort but lower caloric value compared with whitebark pine. However, animals may become more adept to explore alternative resources over time and some of those resources may provide high rewards (e.g., carcasses, colonial insects). We do not disagree with the reviewer but also recognize that alternative foods may exist that barely affect foraging energetics and the consequences may simply not be detectable in terms of lowering carrying capacity*

REVIEWER #2

- Clarify statements supporting the prognosis for whitebark pine.
    - *Changes were made accordingly to address this comment.*

- Separating density-dependent effects from direct effects of reduced food availability is difficult. Focusing on the mechanisms by which bears responded to whitebark pine decline provides the best evidence that there are pure density-dependent effects unrelated to reduced food availability that are likely driving the reduction in population growth rate. The premise for the approach and how the findings of the different study components relate to each other should be clarified.
    - *These sections of the report were strengthened as suggested.*

- Reviewer sought clarification on why body mass would be included as a predictor of percent body fat because structural size variation is incorporated in the body fat metric. Additionally, reviewer cautioned about fitting generalized additive models (GAM) models. This would particularly apply to interpretation of the most recent 3 years of data (Research Question 3).
    - *Although body mass enters into the calculations for percent body fat from bioimpedance measurements, body mass was included because it functioned to "control" for a potentially confounding factor. The purpose was to make comparisons between time periods and ask if a bear of X kg in the early period (2000-2004) has the same % body fat as a bear of X kg in the later period (2008-2013). Use of body mass in this manner is not uncommon (e.g., Pitt et al. 2006. Journal of Mammalogy 87:717-722). Additionally, the GAM analysis was eliminated.*

- Reviewer asked to support the premise that rate of body fat gain determines the final predenning percent body (Research Question 3).
    - *The premise for this analysis in the report was that if rate of body fat changed in the fall as whitebark pine declined, a change in slope of the body fat over the course of a year and a change in the overall level of body fat would also be evident. Accumulation of body fat would initially decline in the fall as whitebark pine declines and repeated years of poor whitebark pine crops would also result in lower levels of body fat in the spring and summer.*

- Reviewer asked for clarification on whether female percent body fat decreased as whitebark pine declined, and if so, did it remain at a level lower than before whitebark pine decline or did it recover to previous levels? That distinction is important to evaluating the current status of body condition (Research Question 3).
    - *The report was modified to provide a better description of the sampling issues under research question 3 and focus on analysis of body fat condition throughout the year*

rather than the GAM analysis mentioned previously. This approach provided the strongest inference we could obtain regarding body fat levels and did not indicate a decline in body condition during the peak whitebark impact period of 2008-2013, compared with the pre-impact period of 2000-2004.

- Reviewer commented that because the study only examined whitebark pine, it might be important to acknowledge that habitat quality has been documented to affect home-range size and overlap, but that the effects of population density on range size are well supported in the literature. This study determined if whitebark pine alone affected home-range size, but results are not necessarily conclusive that other important food resources do not potentially affect home range size. Other studies have documented the role of habitat quality and food availability in affecting range size. Putting these results in the context of other literature would strengthen the conclusions (Research Question 7).
    - *The authors acknowledge that the results do only apply to their comparison with whitebark pine. Clarification was made to indicate that the work of Bjornlie et al. was limited to whitebark pine. Additionally, given that home ranges of females decreased in size, the alternative explanation that the overall food supply has increased, rather than decreased, was explored; however, there is no indication this is actually the case. Literature from other species on home-range size relationships with food supplies and density, as well as clarification that the relationship found between range size and density is well established, were added.*

- The reviewer had questions about sample sizes, seasonal differences in sampling, statistical parameters, and so on, that were not provided and thus could not be fully evaluated.
    - *Sample sizes and other pertinent statistics to the summaries of all 8 studies presented in the report were added.*

- The reviewer suggested the overall conclusions need to resolve the potential effect of any observed increase in mortality from on population growth (Haroldson et al, in prep.). It may be primarily driven by density-dependent effects, but is this mortality additive, and, if so, what is the effect size for males but more particularly, females?
    - *Additional results from the Haroldson et al. analyses that address this issue were added, including examination of a sex effect.*

The Dissemination

The approved information product will be submitted to the Interagency Grizzly Bear Committee and will be publicly released at their discretion.