Phone conversation notes (supplemented by email exchange and review, March 3-5, 2020)

February 13, 2020.

Phone conversation between Sue Livingston (note taker) (FWS, Oregon fish and wildlife office), Elizabeth Willey (FWS, Klamath Falls fish and wildlife office), and Sean Matthews (Oregon State University, Institute for Natural Resources), getting clarification from Sean regarding papers that he has co-authored. David Green (lead author on all papers) was invited but unavailable.

Notes from this conversation were later submitted to Sean and David for their review (March 3, 2020). These notes reflect their edits and corrections from that review, received March 5, 2020.

The papers in question (unpublished manuscripts) were:

> Green, D.S., S.M. Matthews, R.C. Swiers, and R.A. Powell. 2016. The effects of mixed-severity wildfires on fisher (Pekania pennanti) population dynamics, baseline report of population dynamics prewildfires,in partial fulfillment of Cooperative Agreement Award F15AC00857. Institute for Natural Resources, Oregon State University, Corvallis, Oregon.
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> Green, D.S., S.M. Matthews, R.C. Swiers, and R.A. Powell. 2017. The effects of mixed-severity wildfires on fisher (Pekania pennanti) population dynamics, in partial fulfillment of Cooperative Agreement Award F15AC00857. Institute for Natural Resources, Oregon State University, Corvallis, Oregon.
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> Green, D.S., R.A. Powell, and S.M. Matthews. 2019. Forest fires have a short-term negative effect on the forest dependent carnivoran the fisher (*Pekania pennanti*). Draft unpublished manuscript.

First wanted to confirm whether it was OK to continue to use these unpublished reports. Sean said that much of the data in these unpublished manuscripts were captured in the 2018 Green et al. published paper (Dynamic occupancy modelling reveals a hierarchy of competition among fishers, grey foxes and ringtails. J. Animal Ecology 87:813-824), so we should cite the 2018 paper where applicable. Otherwise, these three unpublished documents are OK to use.

Asked about the discrepancies in the density and abundance values in Table 1 of Green et al. 2016 and Table 1 of Green et al. 2017. Assumed they should be the same over the same years. David and Sean reparametrized the model between the 2016 and 2017 analyses. Specifically, they included in the 2017 analysis an effect of week to estimate the effect of seasonality and they modeled detection function independently for each sex. The most current results are in the 2019 document.

Regarding the pre-fire population data, and particularly looking at Table 1 in the 2016 paper, confirmed with Sean that it was reasonable to conclude that the fishers, at least in this study area were probably fluctuating around carrying capacity. Shows a fairly stable population between 2006 and 2013 (at least within the study area).

Regarding the dramatic post-fire decline in estimated abundance of 40 percent (as compared with the previous year), in their 2019 draft manuscript they explicitly tested the hypothesis that the fire caused these declines and model results supported this hypothesis. Post-fire and pre-fire credible intervals overlap, but the post-fire estimates are definitely on the lower end of the historical population estimates. However, the modeling results suggest that the 40% decline in fisher numbers was due to the fire. Rather than just compare the post-fire decline with the year immediately preceding the fire, they intend to look back at the historical data from 2006 on to consider the post-fire decline in context with the historical pre-fire trend data.

Related to previous paragraph, and as mentioned in the 2018 published paper, populations are not perfectly stable so you see regular fluctuations on both time and space. Figure 3 of the 2019 paper shows hotspots of fisher occurrence that blink in and out through time. This variability can be the result of many factors, including territory shifts, dispersing juveniles, and an assortment of other ecological factors difficult to tease out. Prior to the fire (between 2006 and 2013), this population exhibited variation in the number of fishers on the landscape. Thus, to attribute any effects from the fire on fishers, they would have to be strong and overcome the naturally occurring variation. The 2019 paper indicates that the effects of fire were stronger than the naturally occurring variation.

Asked Sean's assessment of why abundance estimates of fishers would reduce outside of the burn area and whether this might reflect a widespread phenomenon such as drought or some other compounding factor. The data and before-after study design support the conclusion that the decline was attributable to the fire and the post-fire landscape. The distribution of home ranges in the study area likely partially overlapped the edges of fire footprint, thus affecting more fishers than just those residing entirely within the fire footprint. The post-fire landscape likely rendered home ranges overlapping the edges of the fire area unsuitable and were no longer occupied. It is also possible that the fire induced broader changes on the landscape that could have also had negative effects on fishers (e.g., negative interactions with sympatric carnivores, failed dispersal of fishers, declines in prey availability).

As a follow-up via email exchange with Sean and David March 3-5, 2020, Sue asked the following question, "When you state that the population was essentially "stable" through 2013, I'm assuming that is just a qualitative read of the trends in the annual abundance estimates as they fluctuate up and down around a general central abundance value; similar to what K-selected species do as they reach carrying capacity."

David's response was, "In regards to your question about stability-- Yes, you are correct. We did not do any formalized analyses of trends, but did not see any major trends in the number of fishers before the fires occurred. Then, following them and with the analyses of the effects of burn severity, we saw that 40% decline."