Phone conversation notes

February 13, 2020.

Phone conversation between Sue Livingston (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.

The papers in question (unpublished manuscripts) were: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 Draft unpublished manuscript.

First wanted to confirm whether it was OK to continue to use these unpublished reports. Sean said that much of the data in these unpublished manuscripts were captured in the 2018 Green et al.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 Otherwise, these three unpublished documents are OK to use.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. ~~Sean believed that there was some tweaks to the population model parameters that was done between 2016 and 2017, with the most reliable estimates being in the 2019 paper.~~ 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), Sean acknowledged this decline, though likely influenced by the fire, may also reflect within population variability. In their 2019 draft manuscript, however, they explicitly tested the hypothesis that the fire caused these declines and model results supported this hypothesis. Post-fire and pre-fire ~~confidence intervals~~credible intervals overlap, though the post-fire estimates are definitely on the lower end of the historical estimates and 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 ~~too~~ 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. ~~any post-fire analysis effects would need to be of a particularly large magnitude to overcome the background variation that exists.~~

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. ~~Sean believe the~~The data and before-after study design support the conclusion that the decline was attributable to the fire and the post-fire landscape ~~and is likely explained by the scale of the analysis~~. ~~When comparing the fire footprint with the average male (10.6 km^2) and female (4.43 km^2) home ranges, the fire footprint (132 km^2) would support~~ the equivalent of ~~1 or 2 fishers~~. ~~But because they don't have precise home range estimates (non-invasive sampling), the actual~~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)~~For fisher home ranges that even partially overlapped the fire area, the entire home range was considered non-functional~~.

Commented [SM1]: I did not say or imply this conclusion. Our pre/post fire data are convincing evidence the decline in fisher density was a function of the fire and the post-fire landscape.

Commented [SM2]: I don't know what this means.

Commented [SM3]: DSG, Need some help here with what Sue is trying to say here. Mean sigma values give us these average male and female home range sizes but we sure didn't detect 12 males and 30 females in the fire footprint.

Commented [SM4]: I'm not sure where these numbers came from.

Commented [SM5]: This is not correct, fisher home ranges would overlap the boundary of the fire footprint irrespective of the precision and accuracy of our home range estimates.