Review of Manuscript NEFO-D-16-00267 “Resilience of European larch forests to wildfire in the western Alps” by Jose Moris and others.

Recommendation: Accept after major revisions

Synopsis: This manuscript reports on the impact of nine fires that burned in European larch forests in the western Alps of Italy and France. The authors and their support staff obviously did a tremendous amount of work in this project and have written an interesting paper that is rich with data and analyses. The methods are sound and the interpretations of the data are logical. It is clearly a research project that merits publications and New Forests is an appropriate outlet although the International Journal of Wildland Fire may actually be a better match. Regardless of the eventual outlet, the manuscript needs some serious reorganizing and rewriting before it will be ready for publication.

The basic problem with the manuscript is that it is too long. Counting the appendix, it is 54 pages long. Part of the length problem is the inclusion of figures and tables with the text. They need to be separate. I found it annoying to have the flow of the text interrupted by a figure or table that often had nothing to do with what I was reading at the time. When text, figures, and tables are on separate pages, I can readily match the appropriate figure or table with the text I’m reading. It makes the review process go much more smoothly.

Another reason for the length problem is trying to reporting on every aspect of the research project into just one manuscript. I understand the desire to want to report on all aspects of your research project – it is a very interesting study – but that does not mean that everything has to go into one manuscript. You used four different analyses to test your hypothesis when just one or two would have sufficed. Identify the strongest data and analysis that will most clearly and concisely confirm or deny your hypothesis and focus just on them. Leave the weaker data and analyses for subsequent papers.

Related to excessive analysis is excessive explanation of material that is tangential to main theme of your manuscript. Explain why you did something as clearly and concisely as possible and provide one or two references for readers that want to delve more into that aspect. Do not include text detailing why you did not do something.

A final reason for the length problem is the lack of organization throughout the paper. Time and time again, I found paragraphs or portions of paragraphs that should have been elsewhere. Lack of organization leads to redundancy and that makes for lengthy manuscripts.

Addressing these major structural problems in your manuscript should go a long way in reducing its length to the 25 to 30 pages. Specific recommendations are provided on the following page.

INTRODUCTION

L54 – Delete the first 7 words of this line as well as “also” from later in the same line.

L69 – Delete “on” from near the end of this line.

L73 – Insert “has” between forests and consisted. Replace “probably in” with “primarily of”.

L75 – Replace “cultural larch wood pastures” with “grazed larch forests”.

L77 – Delete “light-demanding”.

L78 – Insert “However” before “Genries”.

L82 – Rewrite this line to “The strict fire suppression policy of the 20th century (Valese et al. 2014) has decreased the occurrence and size of forest fires, thereby limiting the possibility to study fire ecology of European larch”.

L86 – Move all of this paragraph except the last sentence forward so that it is the 2nd paragraph in this section. Move the last sentence to L 116.

L98-101 – Delete the first 3 words of L98 then move the remainder of these lines to the beginning of the Discussion. Delete the rest of the paragraph.

L116 (Paragraph 6) – Use the sentence from L 94 to replace the first one but rewrite it so it is in the active, not passive, voice. Delete the 2nd, 4th, and 5th sentences. Add a closing sentence that further understanding of the fire ecology of European larch forests will aid land managers in an era of land use and climatic change.

METHODS

L132 – Is the given annual temperature range correct? A change of only 3.2 C between summer and winter seems small for an area with an average elevation of approximately 1800 m.

L151-155 – Delete these lines. While they are informative, they are not important enough to merit inclusion.

L170-176 – Delete these lines. Same rationale as above. Alternatively, the substance of this paragraph could go at the end of the Discussion in a paragraph outlining the limitations of the study.

L177 – This is the beginning of your Data Collection subsection. Move that title to here. In this subsection, tell the reader exactly what you measured on the plots and how you did it. Start with the most important measurement and proceed in an orderly fashion to the least important measurement.

L181-183 – As I see it, a 12-m plot had to meet four criteria for inclusion in the study: (1) clear evidence of having been burned, (2) at least 20 m from fire’s edge, (3) at least 2 pre-fire trees, and (4) absence of post-fire management. Presence of pre-fire trees is redundant with #3 and accessibility is understood.

L184-186 – Move to later in this section.

L 189-192 – Delete all text after the reference to Table 1.

L 196 – Delete the first sentence, field measurements is understood in L 179. Move the rest of this paragraph to the end of this subsection.

L208-218 – This becomes the 2nd paragraph in this subsection. State that this paragraph refers to the 12-m plot. I find the first sentence confusing. Did you identify to species all living trees, snags (standing dead trees) and stumps? Did you measure all of these for dbh? If so, how did you measure the dbh of stumps that were not 1.3 m tall? Was there a minimum dbh, i.e., 5 cm, below which you considered the stem to be part of the regeneration pool? How does a nearby living tree help identify a fallen tree in a mixed-species forest? Where I live and work, that approach would be quite unreliable. Based on L 211 to 213, you divided the snags into two groups; those that died before the fire and those that died after the fire. Is that correct? If so, that needs to be stated more clearly. The sentence on L213-214 is not necessary. Are the measures n L214 and 215 the minimum criteria for measuring logs? If so, that needs to be stated more clearly. Also, I have never heard of a downed log having a base diameter and top diameter, but I have heard of them having a large-end diameter and small-end diameter. Is that what you mean?

L218-224 – Make a new paragraph with these lines explaining what you inventoried on the 6-m plot. These lines are quite confusing and need clarification.

L218 – I do not see rocks, litter or coarse woody debris listed in Table 2. Is CWD the same as logs?

L220 – Do you mean seedling instead of sapling? A sapling has a measurable dbh and a stem only 30 cm tall obviously has no dbh yet you counted everything taller than 10 cm.

L221 – I'm not sure what you mean by "any dbh cutoff"? In the field, how did you determine if a small tree predated the fire or was post-fire regeneration? How many questionable trees were cored? How were those cores prepared for ring counting? Presuming that all "young" trees were post-fire regeneration is problematic because you have no control stands to use as a standard.

Conclude the Data Collection subsection with an explanation of where you obtained the climate, fire, and topographic information for each plot or site.

The Data Analysis Subsection needs to consist of two parts: an explanation of how you converted the field measurements into the data used in the statistical analyses and the statistical analyses themselves. For example, how did you go from hemispheric photos to percent canopy cover? How exactly did you arrive at a grazing impact or fire severity rating for each plot? While you generally provide these details, they are scattered throughout the Methods section and they need to be al presented here in an orderly, logical manner. I would start with describing how you developed your fire severity rating as this is central to your paper.

L226-236 – Delete the third sentence of this paragraph.

L238-240 – Incorporate these lines into the paragraph describing measurement of the 6-m plot.

L241-257 – Did you actually rate each plot when you were there as to its grazing intensity or was this done afterwards based on the data? Either approach is fine, but I am unsure on this point so it needs to be made clearer. If it was the latter, then these lines need to go in the Analysis subsection.

L297-307 – This is the second part of your Data Analysis section. I think you have too many analyses and that is what is making this manuscript so long. I would pick two analyses for this paper and then do a second paper using the other two analyses. The logical pairings are effect size/resilient space and GLMM/random forest. The grouping of plots into fire severity classes needs to go in the first part of this subsection.

Figure 3 – Not sure if this graph is necessary. The little information it contains could easily be covered in a couple of sentences.

Figure 4 (left graph) – Shading of data points needs to be more pronounced. It is too difficult to distinguish between the low and high severity plots. On the right graph, the legend's shading does not match that of the graph.

L373-375 – Put the most important results first and leave the non-significant ones until the end of the paragraph.

Figure 5 – I like graphs A and C, they are clear and easy to understand. However, graphs B and D are not. They may not even be necessary as they convey the same information as graphs A and C. If they are necessary, then flip the order of variables on the vertical axes so the trend line decreases from left to right. Then it will more intuitive to the reader that fire and snags are more influential than time and soil.

Figures 6 and 7 – These two sets of 16 graphs are too small to easily understand. Given the scant amount of text given them (Lines 410-418) are these two figures even necessary? Alternatively, they could be material for the Appendix.

Discussion – Depending on what analyses you decide to emphasize, this section will have to undergo substantial revision.

I find the chronic referencing of your tables and figures annoying. That should be done sparingly to bring added emphasis to an important point. It is also indicative that data that should be in the results section have been incorporated into the discussion. Lines 444 to 446 is a perfect example of results that should be in the previous section.

L447 – No control plots can be a serious problem (a fatal flaw to some reviewers) so you must be careful with your assumptions. For instance, you assumed all larch mortality since the fire was caused by the fire. That may not be correct because you have no idea of the degree of larch mortality in the unburned areas.

References – 114 in total. That is about double what normally appears in a manuscript reporting research results.

Appendix – I like Table S1 and Figure S3. Maybe they should be in the results and discussed in the text. Figure S1 is unnecessary. Figure S4 is good too. I never been to Europe so I appreciate a few photos showing what this forest type looks like.