Anonymous Referee #2

Author responses are below comments in italics

This paper is a useful exposition of the potential and challenges of using crowdsourcing techniques to gather a timeseries of scientific data over several years with changing teams. The information presented is valuable, but requires more context, organization, analysis, visualization, and reflection to be useful to other readers of the journal.

We agree and have addressed these concerns more specifically in our comments responding to AR#1.

CONTEXTUAL:

Dam removal is gaining traction primarily in the US and Europe in recent years. The authors note correctly that research on this is primarily on larger dams although smaller dams and barrages may be more common. Even in the larger dam cases, often little is known about the before and after timeseries of critical stream physical and ecosystem changes because of the dam removal. The case that is made here that in the smaller dams/barrages, it may be useful to have more citizen science use as they have shown in this case to do such analysis.

We agree!

The lack of any discernable changes in stream due to this small dam removal could perhaps be a function of not only the size of the dam, but also the hydrology (including intra and inter-annual variability), river and floodplain cross section, sediment load and characteristics, flora and fauna, history, and use trends in the area. The relative amount of live and dead storage in the dam that was removed is unclear and could have played a significant part in the results – since the live storage was already removed for this dam since 2012 when the gates were removed – so the changes in 2020 would just be the removal of the dead storage.

This makes sense.

The relative sizes of the 7 dams (major?) of which one was recently removed would be useful to indicate along with their locations. Even for the site of interest, some characteristics of the dam that was studied (even basics like a name/codename if any, height of sluices, live/dead storage, catchment area, inundation area on the map, rainfall, flows, original operations, etc.) and the characteristics of the u/s and d/s monitored areas (incl. some visualization of the cross sections and other information) would be useful to include. A timeline of the events on the dam would be a great graphic to include.

We intend to make substantial changes to figure 1 for the revision, including the locations of the other dams and the lake locations. We think we can also include a timeline on this figure. We do have site

photographs that can be included either in supplemental data or perhaps as an additional figure in the paper if that is recommended.

Such approaches could actually also be useful to understand changes when dams are first constructed if there is a good baseline for a few years before the dam is constructed.

The description mentioned that one concern that may have led to dam removal was the spring fish migration problems during high flow – did this change after the full dam removal?

We have a vague answer addressing this question from the Trout Unlimited study report that indicates that fish migration was not actually studied before and after the sluice gates were permanently opened. We can include this information in section 2.2 for the revision.

METHODS:

The primary thrust of the paper is to showcase how crowdsourcing methods could be standardized and used to collect useful information using simple tools and techniques. It does seem like these can not only be a great way to teach students and get them more connected to the nature around them, but also provide some data for insights even with the quality concerns.

A challenge indeed is that 3 years data on either side of a dam removal may not give enough time for the geomorphological and ecological processes to change and may just reflect the variability in the streamflows and sampling. The use of basic data quality management is also highlighted (e.g. missing data and not knowing which cross section measurement was from which site). The websites for sharing the data and code should be checked as they do not exist as included.

We are planning to include substantially more material and a readme file to the supplemental data. The supplemental data links are not complete links in the references section, thank you for bringing this to our attention. Both the code and dataset will be updated to include all additional files when they are added for the revision.

Code: https://doi.org/10.6084/m9.figshare.30758267

Dataset: https://doi.org/10.6084/m9.figshare.30752828

The use of simple tools and simplified standard operating procedures and their description is useful. Some of these techniques may also be modernized over time – e.g. writing on paper pads in such an environment and then digitizing into spreadsheets for analysis can perhaps be replaced by using smartphone tools (online spreadsheets or even simple apps that can have built-in error checking upon entry and also record locations, etc.). Simple probes/sensors that are getting increasingly cheaper could be utilized. Some of the lidar scanners built into some smartphones and tablets could also be great for cross sections that seems to have been a weak spot in this analysis due to unusable data from traditional methods.

WEN did start using an app and tablets to record field data the year after our analysis, which was designed to ensure all data was collected in the field (users cannot click off a page until all fields are completed). We can add this information in the future work section of the manuscript.

Overall, it looks like this study can provide pointers for both what to do and certainly on what not to do in the case of crowdsourcing such data. It also points to perhaps moving towards a more standardized approach ensuring better data quality that can provide crowdsourced harmonized data for every stream based on the work of nearby educational institutions that facilitate crowdsourcing. This could provide a great way to just look at stream physical and ecological changes over time whether dams are involved or not. It may be useful to also explore strengthening some national knowledge network for crowdsourced stream monitoring that can also develop simple online ways to organizing, analyzing, visualizing, and disseminating these kinds of open-source data for open science. This may be a great approach to be further adapted to encourage open science especially for the developing world where even less is often known about local streams or rivers.

Thank you! We completely agree and we very much hope that this paper can serve as a guideline for other citizen science monitoring projects.