Reviewer #1 Evaluations:

Science Category (Required): Science Category 2

Presentation Category (Required): Presentation Category A

Key Points (Required): Yes

Reviewer #1 (Comments to Author (shown to authors):

I don't know if my annotations in the file system here are actually working, so here are my additional notes and comments:

No annotations are found in the attached PDF file.

Overall this paper is good and should be published. I have some minor comments that need to be addressed before a final is accepted.

A couple of times (page X-2, line 16 and in the conclusions) the authors describe the primary mechanisms of impacts to be a "smaller rain to snow" ratio when I think they mean a "smaller snow to rain" ratio. Please review this wording carefully throughout the paper: if, as I think is the case, rain is increasing with temperature, then the "rain to snow" ratio is going up, not down.

We appreciate very much for the corrections. We have modified the wording throughout the paper changing “rain-to-snow” to “snow-to-rain” instead.

Page X-3, line 26: wasn't the 2016-17 year the wettest on record (not "one of the")?

Thanks for correcting this. The corresponding sentence has been changed to “…, in 2016-2017 California experienced **the most extreme wet year of the historical record since the year 1895**”

Page X-3, line 38: define what the "historical record" actually is: what years?

Here, “historical record” refers to the historical time-period since 1980s. The corresponding sentence has been updated to “… of the historical record **since the 1980s.**”

Page X-3, line 41-43: These "previous studies" span decades. Say so. Also, the sentence is confusing: you mean "warming reduces snow water equivalent and SHIFTS TIMING OF peak spring streamflows..." right? The way it is written, it implies it "reduces" peak spring streamflows and I don't think that's what you mean. Also, add citations from the earliest examples of these "previous studies" like the late 1980s work of Gleick or Lettenmaier or others.

We appreciate very much of the comments. We have updated the sentence to “Previous studies, **spanning decades**, have found that warming reduces snow water equivalent (SWE) and **shift timing of peak** spring streamflows [**Gleick, 1987; Lettenmaier and Gan, 1990;** Maurer, 2007; Mao et al., 2015; Berg and Hall, 2017].”

Page X-4, line 55-57. The paper would benefit from a sentence or two explaining that "Flooding risk" also is a function of how water is stored in the reservoirs and how those reservoirs are operated. It isn't just a function of if Pr falls as rain rather than snow.

Thanks. We have added the sentence “**Flooding risk increases dramatically if the Pr falls as rain rather than snow, though it is also a function of how water is stored in the reservoirs and how those reservoirs are operated.**” to the manuscript.

Page X-5, line 80. This is NOT the official "water year." That runs from October 1 to September 30th. Clarify.

Thanks for the correction. We have updated the sentence to “The time period of the simulation is from June 1st, 2015 to June 30th, 2017, **roughly covering two water years.**”

Pages X-6 to X-8: I cannot adequately comment on the appropriateness or application of the methods. I hope another reviewer can. For example, does it matter if the temperature anomalies applied are just the average monthly warming, or should it use changes in the daily min/max? Similarly, I'm not sufficiently familiar with the appropriateness of the downscaling approach to comment.

Thanks. For clarification, the perturbation of the T anomaly based on the longer-term monthly average is applied to every 3-hourly forcing data from WRF reference run to account for both robust temperatures changing trends and the inner-variability.

Page X-12, line 214: you say the severe flood events "resulted" in the Oroville Dam problem. It's probably more accurate to say it "contributed" to it.

Thanks for the correction. We have changed the sentence to “With relatively high Pr and warm temperatures, the northern SN region encountered severe early season flood events during this recent wet year, contributed the Oroville Dam spillway emergency occurring in February 2017.”

Reviewer #2 Evaluations:

Science Category (Required): Science Category 2

Presentation Category (Required): Presentation Category A

Key Points (Required): Yes

This is a good manuscript. The methodology and data used in the analysis are reasonable. I would recommend accepting the manuscript to publish in Geophysical Research Letters, but with few clarifications listed below.

1) Please clarify the water years definition in section 2.1

Thanks for pointing out this. We have clarified this and updated the sentence to “The time period of the simulation is from June 1st, 2015 to June 30th, 2017, **roughly covering two water years.**”

2) Noah-MP model was used to simulate hydrologic variables. While the Noah-MP model is appropriate for the study, but the model performance over the calibration and validation periods were described. It would be good to show if the calibration procedure guarantees that physical processes are well represented especially in the mid to high elevations where alterations in runoff pattern are most likely to be affected by climate change.

Thanks for the comment. The performance of the reference run over the study region has been evaluated including Pr. and SWE, against multiple station observations, showing an overall reasonable degree of accuracy with detailed measurements reported in the supplement (as shown in Figure S3). The calibration also covers a very good sample of the station observations in the middle elevations (as shown in Figure S2).

More detailed information about the performance of the WRF model settings used in this study, i.e. WRF coupled with the Noah-MP model, can be found in Walton et al. [2015, 2017] on climatology representation. Overall, Walton et al. [2015, 2017] found that WRF matches PRISM’s temperature climatology and temporal variability with high spatial correlation incorporating snow-albedo feedback. Slight cold bias exists in WRF at higher elevations, partly due to the sparse observations over mountain peaks. The cold bias might imply that the SWE could be smaller in the reference run and further reduced under prescribed future warming patterns.

Given the well-simulated physical processes in WRF, the offline runs of Noah-MP model are forced with the 3-hourly outputs from the reference simulation including the initial land surface properties, perturbed T2, 2-meter specific humidity, surface pressure, 10-meter wind, shortwave and longwave radiation, and Pr rate. Therefore, we can separate the warming effects on SWE and runoff patterns from other dynamical factors resulted from climate change.

In the manuscript, we have added the following paragraph by the end of “Model Evaluation” section: “**More detailed information about the performance of the WRF model settings used in this study, i.e. WRF coupled with the Noah-MP model, can be found in [Walton et al., 2015, 2017] on climatology representation. Overall, Walton et al. [2015, 2017] found that, WRF matches observed temperature climatology and temporal variability with high spatial correlation incorporating snow albedo feedback. Slight cold bias exists in WRF at higher elevations, partly due to the sparse observations over mountain peaks. The cold bias might imply that the impacts of warming climate on snowpack and early-season flood risk could be even more intense as the following section focuses on.**”

3) I am not completely agreed with the conclusion based on the explanation and evidence presented in the manuscript that human activities may have exacerbated the Oroville Dam spillway overflow that occurred in February 2017. More explanation is needed.

We agree that additional explanation is needed here for clarification. In the manuscript, we discussed that the average runoff could be around one-third less for the extreme rainfall event in the beginning of February 2017 covering the Feather River watershed, given historical the historical warming is hypothetically removed. We acknowledge that the water storage of the Oroville Dam is not only positively related to surrounding runoff, i.e. physical environmental conditions, but also related to how the infrastructure is constructed and managed, which is beyond the scope of this study. As first reviewer points out, the flood risk is also a function of how water is stored in the reservoirs and how those reservoirs are operated rather than just a function of how much precipitation falls as rain rather than snow.

We have updated the corresponding sentence in the abstract to “In the Feather River Watershed, historical warming increased runoff by over one-third during the period of heaviest precipitation in February 2017. This suggests that **historical anthropogenic warming** **may have exacerbated runoff conditions including timing and intensity underlying the Oroville Dam flood event** with spillway overflow that occurred in this month.”

We have also added the sentence by the end of the flood risk section: “**We acknowledge that the water storage of the Oroville Dam is not only positively related to surrounding runoff, i.e. physical environmental conditions, but also related to how the infrastructure is constructed and managed, which is beyond the scope of this study.**”