Anonymous Referee # 1, 29 Mar 2023

* Author note: Author responses to referee comments will be included as bulleted, Arial-font text beneath the relevant comments.

Thank you for the opportunity to review this paper, it was an engaging exercise. Overall this paper presents an interesting and technically sound approach to develop, calculate, and predict seasonal flow metrics using available hydro-climatic data to facilitate adaptive water management for an upcoming spring and summer season. The results suggest this could be a very useful approach for local water managers and stakeholders in the study watershed.

A few major issues to be addressed: I am not sure that this study really took a functional flows approach as the authors suggested. In the conclusions these hydrologic metrics are framed as decision-support metrics, which seems a more appropriate couching for what has been done. It is reasonable to state that the metrics are linked with ecological functions, but that is not the same as applying a functional flows approach or the functional flow metrics developed for CA. Next, this study focused on a single watershed, but I would encourage the authors to try to broaden the paper discussion and limitations sections to how this can or can’t be applied in other settings. For instance, the analysis relied on long climate records and a detailed hydrologic model. Are these data always needed for such an analysis? Are the findings transferable to other systems? Additionally, there are a lot of great ideas that are raised in passing that could use additional thoughtful discussion and citations to really bring to light.  My remaining concern is the quality of writing in the manuscript, including terminology, grammar, sentence and paragraph structure issues. I must note that the repeated references to other chapters of your dissertation feels unprofessional. As a reviewer I would like to know that you have put in your best effort to make this a clean, standalone manuscript and not simply submitted your dissertation chapter to a journal directly. I look forward to reviewing a revised version with these changes addressed so the reader can really focus on the interesting research and implications.

* **We identify x main critiques in the general comments provided by Referee # 1.**
* **Framing as a functional flows exercise**
* **Broaden the discussion for applying to other settings**
* **Acknowledge great ideas raised in passing are beyond scope of study**
* **Remove references to other chapters**

**Specific comments:**

1. Abstract: In general, I would suggest to provide more general, compelling information and not include variables, multiple units, HUC#, etc in an abstract. See additional in-line comments.

* We propose to revise the abstract as follows:
* Abstract. In undammed watersheds in Mediterranean climates, the timing and abruptness of the transition from the dry season to the wet season have major implications for aquatic ecosystems. Of particular concern for resource managers in many coastal areas is whether this transition can provide sufficient flows at the right time to allow passage for spawning anadromous fish, which is determined by dry season baseflow rates and the timing of the onset of the rainy season. In (semi-) ephemeral watershed systems, the dry season baseflow and rainy season onset timing also dictate the timing of full reconnection of the stream system. In this study, we propose methods to predict, approximately five months in advance, two key hydrometeorologic metrics in the undammed rural Scott River watershed in northern California. Both metrics are intended to quantify the transition from the dry to the wet season, to characterize the severity of a dry year and support seasonal adaptive management. The first metric is the minimum 30-day dry season baseflow volume, which occurs at the end of the dry season (September-October). The second metric is the cumulative precipitation, starting Sept. 1st, necessary to bring the watershed to a “full” or “spilling” condition (i.e. initiate the onset of wet season storm- or baseflows) after the end of the dry season. As potential predictors of these two values, we assess maximum snowpack, cumulative precipitation, the timing of the snowpack and precipitation, spring groundwater levels, spring river flows, reference ET, and a subset of these metrics from the previous water year. We find that, though many of these predictors are correlated with the two metrics of interest, of the predictors considered here, the best prediction for both metrics is a linear combination of the maximum snowpack water content and total October-April precipitation. These two linear models could reproduce historic values of Vmin, 30 days and Pspill with an average model error (RMSE) of 1.4 Mm3 / 30 days (19.4 cfs) and 20.7 mm (0.8 inches), respectively – **revise after new analysis**. Although these predictive indices could be used by governance entities to support local water management, careful consideration of baseline conditions used as a basis for prediction is necessary.

2. 1-2 sentences should not be standalone paragraphs, as is currently done several times (L51, L72, L124, L369, etc). Please revise your paragraph and section structures accordingly.

Please use “functional flows” throughout to be consistent with the published literature

* The paragraphs on L51, L72, L75, L124, and L369 will be edited or combined with other text as suggested.
* Terminology will be standardized to use “functional flows” throughout as suggested.

3. Tense issues throughout manuscript, particularly in the Results - past, present, and "have been...". Choose one (I suggest past tense to be consistent with most journal articles) and use consistently throughout.

* To do: review Results tense

4. Some steps in the methods remain unclear. For instance, 2.3.1. is the first mention of a “model” and there is no indication of what type of model you are trying to develop or why (e.g. linear regression modeling to predict X as a function of Y…).

* The sentence “In this study we used linear regression modeling to predict watershed behavior at the end of the dry season (the response) using data available the previous spring (the predictors)” will be added to the beginning of the Methods section for clarification.

5. There are some grammatical and spelling issues to be addressed (see inline comments)

Some terms could be more clearly defined or concepts more clearly described (e.g. echo effect, partial one-year holdover, GSP).

* These grammatical and spelling issues will be revised as described in responses to inline comments below.

6. Please provide a more clear explanation for the selection of the Q spill threshold. Looking at Panel A in Figure 4, since individual hydrographs cannot be clearly distinguished I find myself struggling to fully understand how you visually determined this threshold.

* To do: provide a clearer explanation for QSpill after reanalysis.

7. Figure 8 and other map figures – add scale bar, north arrow, and in Fig 8 additional points of reference in the Scott watershed (e.g. gage locations, etc). Also, there are a lot of figures. Could any be combined or moved to SI to simplify the message?

See other inline edits in PDF.

* To do: add scale, north arrow, and points of ref to figures
* To do: say which figures get moved to SI after reviewer 2 comments

**In-line edits:**

Page 1:

If you are talking about natural/unimpaired flow patterns, then I don't think concern is the right word for trying to understand the natural processes that will vary from year to year

* The phrase “for resource managers” will be added to clarify the concerned party (see revised abstract in response to Specific Comment 1).

which? FFs have not been defined yet

* The two key flows have been identified by name rather than being grouped under the term “these functional flows” (see revised abstract in response to Specific Comment 1).

flow metrics?

* Text will be clarified to say “hydrometeorologic metrics” rather than “hydrologic metrics”, to reflect the distinction that only one of the two metrics is directly related to flow; the other concerns cumulative rainfall. (see revised abstract in response to Specific Comment 1).

Remove text “(HUC8 18010208)”

* The suggested text will be removed (see revised abstract in response to Specific Comment 1).

Remove text “in this Mediterranean climate”

* The suggested text will be removed (see revised abstract in response to Specific Comment 1).

Page 2:

Suggest replacing “ones” with “those”

* The text will be revised as suggested.

To…

* The text “by water agencies to inform adaptive management decisions” will be added to clarify the sentence.

Suggest replacing “functional ecosystem flows are a” with “the functional flows approach is a...”

* The text will be revised as suggested.

Remove text “(see Chapter 1 of this dissertation)”

* The text will be removed as suggested and replaced with the text “(Moyle 2002)”.

Replace “modern” with “current” or “ambient”

* The text will be revised as suggested.

Replace “baseline” with “unimpaired” or “natural”

* The text will be revised as suggested.

Remove text “HUC8”

* The text will be revised as suggested.

What type of decisions?

* The text “such as agricultural cropping choices or regulatory water use restrictions” will be added for clarification.

Replace text “For example,” with “Specifically”

* The text will be revised as suggested.

Do you have a citation for this strong statement? Is that analysis done in the CDFW 2015 study, or is that citation in reference to the second noted linkage, to spawning habitat?

* To do: find additional citation for claim that PSpill is related to a long dry season

Page 3:

Suggest inserting text “runoff”

* The text will be revised as suggested.

Page 4:

Replace “functional flow types” with “functional flows” or “functional flow components”

* The text will be revised as suggested.

Add “r” to correct typo

* The text will be revised as suggested.

Which concept? FFs? threshold-based runoff response? Be specific

* The text “basin-scale, threshold runoff storm response concept from the temporal scale of a season” has been added for clarification.

This paragraph needs citation

* Two citations and additional clarifying text will be added per suggestion.

Page 6:

Suggest changing word choice of “hydraulic response”

* response

Standardize “functional ecosystem flow” as “functional flow(s)” throughout

* The text will be revised as suggested. In this specific instance the word “ecosystem” will be removed.

Citations needed to support paragraph including manuscript line 190

* response

That is the fall pulse as we defined it... or I'm not clear what you are describing and how it is different than the fall pulse

* response

Tense: replace “can use” with “used”

* response

Page 7:

Tense: make “test” past tense

* The text will be revised as suggested.

Consider alternate word choice for “durable”

* response

Page 8:

Remove text “and Chapter 1 of this dissertation”

* The text will be revised as suggested.

Replace text “uncertain” with “unpredictable”

* The text will be revised as suggested.

Insert text “station records”

* The text will be revised as suggested.

This appears to be the first mention of a "model", at least in the last few pages as far as I am seeing. The type of modeling being done needs to be clearly stated upfront.

* The sentence “In this study we used linear regression modeling to predict watershed behavior at the end of the dry season (the response) using data available the previous spring (the predictors)” will be added to the beginning of the Methods section for clarification.

Page 10:

Figure 3 should have a scale bar and north arrow

* response

Page 11:

has this (“partial one-year holdover term”) been defined already? Otherwise a definition would be helpful

* response

Change “indicate” to “indicates”

* The text will be revised as suggested.

This (determination of the QSpill threshold) is a critical part of your methods and could benefit from more detail on how this was determined.

* response

Page 12:

Figure 4 Panel A has a key but the line is not visible.

* response

Page 13:

Tense issues throughout results - past, present, and "have ...". Choose one (I suggest past tense to be consistent with most journal articles) and use consistently throughout

* response

Well identifiers: use a shorter identifier or move to SI if critical information.

* response

Page 17:

“Conversely” not an appropriate first word in paragraph

* response

“cumulative ET0 Oct-Apr”: confusing order, be consistent

* response

Is this something you are certain of, or your interpretation? Either way, why is this?

* response

“echo” effect: I am not familiar with this term. If you use this because you have seen it in other papers, cite it, and it should not be in quotes. Otherwise do not come up with new terms and just describe clearly what is happening

* response

very long sentence, consider splitting into 2

* response

Replace “worse” with “larger”

* The text will be revised as suggested.

Page 22:

It would be more clear to label panels with letters for consistency - for this and following multi-panel figures.

* Response Figures 9, 10, 11, 12, 13

Page 23:

Replace “upward” with “increasing”

* The text will be revised as suggested.

Page 26:

Remove text “state of being”

* The text will be revised as suggested.

Page 28:

Figure 15: Is the third panel necessary?

* Response

Page 29:

Remove text “(see water budget information in Chapter 2 of this dissertation)”

* The text will be removed and replaced by the citation “(DWR 2004)”.

Page 30:

Could this not be done already with existing data?

* response

Remove text “referred to as Vmin, 30 days”

* The text will be revised as suggested.

In the introduction these are framed as functional flow metrics. These are very different concepts that should be reconciled

* response