



## Peer Review Report

# Simulation of Scoggins Dam Safety Modifications in RiverWare

### Date

September 17, 2021

### Originating Office

Bureau of Reclamation, Columbia-Pacific Northwest Region, Regional Office, 1150 N. Curtis Road, Boise, Idaho, 83706

### Reclamation Roles

Director or delegated manager: Lorri Gray, Regional Director, Columbia-Pacific Northwest Region, Bureau of Reclamation

Peer Review Lead: Devin Krasowski, Civil Engineer (Hydrologic), Columbia-Pacific Northwest Region, Bureau of Reclamation

### Peer Review Scope

The modeling assumptions related to the proposed Safety of Dams modifications to Scoggins Dam for the interim risk reduction and the model output are considered scientific information and were the subjects of this peer review process.

Peer reviewers were asked to provide responses to the following questions:

1. Are the assumptions clearly explained in the documentation of the modeling analysis?
2. Does the documentation clearly show the effects of the assumptions on the river-reservoir system?
3. Does the document adequately characterize the uncertainty associated with the analysis?

The scope of this review did not include the selection of RiverWare as the appropriate tool for this analysis, the RiverWare software, or the Scoggins RiverWare model. The Scoggins RiverWare model has been reviewed in accordance with the Quality Assurance Plan for Columbia-Pacific Northwest Region Baseline Hydrologic Models.

## Peer Reviewers

Peer reviewers were selected who have river-reservoir modeling expertise within the Pacific Northwest and had not been involved directly in the model development or analysis. The three selected reviewers were all from the Bureau of Reclamation and are listed below:

- Bob Lounsbury, Civil Engineer (Hydrologic), Long-Term Operations and Planning, Columbia-Pacific Northwest Region
- Jonathan Rocha, Civil Engineer (Hydrologic), River and Reservoir Operations, Columbia-Pacific Northwest Region
- Christopher Runyan, Civil Engineer (Hydrologic), River and Reservoir Operations, Columbia-Pacific Northwest Region

## Summary of Reviewer Comments

Reviewer comments regarding the three questions identified above for the peer review scope are summarized below. Reviewer numbers do not directly correspond to the list above, in order to retain anonymity with respect to their comments.

Reviewer 1 did not explicitly answer the questions, but provided this input :

“Overall, well written report. Appropriate level of detail, clear results narratives, and nice graphics. Interesting climate change results as well.

The scenario change was so minimal that a quick look at historical data could probably show the same conclusions since the only real impacts to the scenario would have been with respect to the facilities’ ability to regulate flood flows during the late fall through spring period. And during this period, the controlling factor for flood releases has never been capacity at the dam but rather capacity to maintain the Dilley gage below flood levels.”

Reviewer 2 noted:

“The assumptions used in the modeling were either provided within the report or a reference was provided where model assumptions or modeling logic could be found in prior documentation.”

“The numerous figures contained within the report provides a high level of transparency in the results of the modeling effort. Description of these results were also provided within the document highlighting key conclusion to what the results were showing.”

“Overall, yes, although greater emphasis should be noted that the reduction in the spillway capacity from 12,000 cfs to 6,800 cfs that was modeled will need to be coordinated with the Corps of Engineers that has FRM oversight responsibilities on Scoggins Dam which is a Section 7 FRM project.”

Reviewer 3 did not explicitly answer the questions.

Based on the reviewers' comments on the document, the following general changes were made.

- Exceedance plots of outflows from Scoggins Dam for the climate scenarios were added.
- More details regarding how the proposed spillway changes affect flood management operations and coordination were given.
- The location map was updated to include relevant stream gage locations.
- More explanation was provided regarding the historical results the climate scenarios were compared to.
- The document was updated with a more accurate description of the type of modeling done in RiverWare.

Specific reviewer comments and agency responses are listed in the following table.

Reviewer Name	Page(s) or Other Reference Location	Line Number(s) if applicable	Comment	Agency Response
Reviewer 1	13, last paragraph	2-3	Who is Scott? Maybe move his intro higher in this paragraph or refer to his org instead. 'citation' spelling. Sentence could use some rewording.	Addressed. Somehow, an editing comment made it into the report text. It has been removed.
Reviewer 1	13-14	Sec 3.1.2	Paragraphs are hard to follow. Is the regulatory target the flow or the water temp? Both? Sounds like the flow is used as a surrogate for meeting the actual regulatory water temp target? Maybe call out the actual constraint/target set by the permit and then explain its nexus between the water temp and flow.	The regulatory requirement is based on water quality (i.e., the NPDES permit). Language added for clarification.
Reviewer 1	14	Sec 3.2.2	Check the line spacing on this paragraph. Visually looks 'off' compared with the previous and preceding paragraphs.	Addressed.
Reviewer 1	16	Fig.5	X-axis label calls out 'Calendar years...' so I was expecting to see calendar year labels. That would be more meaningful than just showing the rank-values for the columns. Ditto for Figs. 8 & 17. Not sure how you can do this labeling scheme for #17 though since they share a common x-axis... Another thought for #17, maybe convert these column charts into box-whisker plots for easier comparison? This will involve just showing the total shortage value though...	X-axis label and caption for figure 5 and similar updated for clarity. Actual calendar years are not included in the label to keep the focus on the magnitude of shortages rather than on individual years.

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Reviewer 1	22	Fig. 10 & 11	<p>%-days-exceeding for the 28-year run is kind of a weird metric to show. Is this a SOD-specific metric? Might be more easily contextualized if you showed this in terms of an annual average? Like how often would the threshold be exceeded if we took the daily average over the 28 years? How about if we took the daily max over 28 years?</p> <p>If you have to take %-days-exceeding, then maybe only consider the days around the period where the problem condition occurs (late fall through the spring monsoon period if you're looking at Dilley flood stage for instance). Taking all the other days where the problem doesn't (never?) exist dilutes the reported value.</p>	Those are good suggestions for how the information in these plots could be presented. However, we believe between Figure 9 and Figure 10 (new figure numbers) it's communicated that minimum flows are met in both scenarios. This is also stated in the text. Similarly, Figure 12 (new figure number) adds a visual to help communicate what is in the text; DLLO flood state was exceeded about 0.5% of the time for both scenarios.
Reviewer 1	29	Fig. 14	Might be good to see the outflow data also in terms of an exceedance plot similar to Fig. 11 but with exceedance percentiles instead of %-days-exceeding	Plots added.
Reviewer 1	35	Fig. 20	Ditto my comments on Fig. 10 & 11	See response to comment above.
Reviewer 2	general		Due to Scoggins being a Section 7 FRM project that operates to limit flows at the Tualatin River at Dilley, suggest providing summary result plots for this location as well.	Summary hydrograph for Dilley added to section 3.3.4.

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Reviewer 2	6	Fig. 1	Can we add a small red dot on top of DLLO green dot indicating this is the formal FRM regulating target for Scoggins flood control operations?	Indication added.
Reviewer 2	7	Fig. 2	Suggest adding Lee Falls and Dilley gauge locations for context	Relevant stream gages added to Figure 2.
Reviewer 2	8		Added a caveat to the study purpose to mention that coordination with the Corps will be required on FRM. Maybe this has already happened? "Although this study did examine effects of Scoggins Reservoir with regards to meeting FRM space requirements and flood control targets at the Tualatin River near Dilley gauge location, additional analysis in coordination with the Corps will be required to ensure any proposed modification still meet FRM requirements." If this has already be completed, provide a reference to this documentation.	Footnote added.
Reviewer 2	8	Background	Suggest adding short paragraph explain[ing] the current static flood curve, i.e., winter space starting in November transition[ing] into refill starting in Jan 15th....	In section 3, the reader is directed to the calibration memo for details about FRM operations.
Reviewer 2	13		"Scott" reference seems out of place	Addressed.
Reviewer 2	11, 3.2.2 Section		Will the reduced spillway capacity from 12 kcfs to 6.8 kcfs still meet the requirements for passing the Standard Project Flood (SPF)? Suggest providing some narrative on how this reduction would change the assumed reservoir levels during the routing of the SPF. Also,	Footnote added with reference to spillway modeling document. The SOD Modifications scenario results show that flood releases were not limited and storage (or elevation) levels were nearly identical compared to the No Action scenario.

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			adding something about coordination with the Corps on FRM aspect of this proposal will need to be completed in the future.	
Reviewer 2	15, Sec. 3.3.1		What is the historical period used for the analysis? Also results seem weird that all years in the historical period filled the reservoir completely? In the early 1990's the reservoir failed to refill. Suggest adding narrative explaining why modeled results are different. Showing model results compared to historical Scoggins elevations would be helpful to see how these compare.	Historical period added to first paragraph of section 3.2. Model calibration to historical period is documented in the Reclamation 2021 reference.
Reviewer 2	15	Fig 4/all Figs	Can you add min and maximum lines to the plot to show the full range?	The gage data we use as inputs has noise due to wind, local flow variations, etc. that can cause spikes up or down in the calculated gains on a given day, so daily min and max are not very representative of the range of flow across the years.
Reviewer 2	20	Fig 9	Suggest adding line showing were 20 and 10 cfs is on the plot	Those curves might be helpful but given the y-axis scale of Figure 9 we think the explanation in the text and caption are sufficient for explaining that min flow requirements were met.
Reviewer 2	25	Table 3	Please provide description of where Golf Course Road is located, maybe you already did? Maybe put this location on Figure 1 as well?	Model location of TGCO is on Figure 1 and geographic location has been added to Figure 2.
Reviewer 2	26	Figure 12	Suggest showing data from these two plots in a ranking format to illustrate differences in the volumetric distribution of years, hard to tell if climate scenarios are more or less volume	A comparison of volume differences between the different climates is given in Table 3. Percent exceedance plots were added below

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				in section 3.4.3 which also help corroborate the information provided in Table 3.
Reviewer 2	37	Conclusion	Please add verbiage saying the reduction in spillway capacity utilized in this study will need further coordination with the Corps.	Note added to Background section.
Reviewer 3	6	19	I don't think we ever refer to RiverWare models as "hydrologic" models. Generally, that term refers to rainfall/runoff models - VIC, PRMS, etc. I think it would be water resources model or water management model.	Good catch. Addressed throughout the memo.
Reviewer 3	6	21	Same as previous comment. RiverWare models don't typically simulate "historical hydrology" they simulate historical regulated streamflow and reservoir storage. The historical hydrology I think of as inputs, unregulated local flows input into the model. Notice on line 27 it is stated that two scenarios used "historical hydrologic inflows". This is correct, historical hydrology are inputs.	Addressed.
Reviewer 3	6	30	Same comment again, "system hydrology". Those are inputs. We could say, regulated streamflow.	Addressed.
Reviewer 3	6	35	Two periods at the end of the sentence.	Addressed.
Reviewer 3	9	60	Hydrologic inflows again. In this case those are the same as the reach gains and losses on line 61. I think I would just delete hydrologic inflows.	Addressed.
Reviewer 3	23	316	I wonder how we reference bmorph here. The UW bmorph code has been drastically changed to an entirely different technique than used for RMJOC-II.	Removed note about BMorph being used in RMJOC-II to avoid confusion. The github reference provided is to the version of BMorph used for this study.

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Reviewer 3	27	412	I need further explanation about future hydrologic inflows at Gaston not including reservoir releases and an estimate needing to be done to add releases to future flow at Gaston. I'm not understanding why this was needed.	Edits made to explain that the disaggregated RMJOC-II scenarios are the natural unregulated flows, so they would not include reservoir releases or the inter-basin transfer from Barney.
Reviewer 3	29	454	What are we looking at to conclude that Climate1 has less storage carried over? The Climate1 lines look pretty identical to me from No Action to SOD Modifications. Actually line 467 states that carry-over was similar in all climate scenarios compared to No Action.	Language added for clarification. Climate1 tended to drawdown the reservoir more quickly and have less carry over storage compared to the other climate scenarios. Not compared to 'No Action'.
Reviewer 3	N/A	N/A	There is some jumping around. Some plots like Figure 15 say Scoggins Dam and others like Figure 16 say Henry Hagg Lake. It would be good to pick one or the other and be consistent.	Changes made for consistency. When discussing storage or inflows, Henry Hagg Lake was used.
Reviewer 3	32	488	In Figure 17 and likely other Figures, what is No Action: Historical. Is that the historical historical No Action scenario or is that the No Action future historical with Livneh data? I think we generally do these comparisons against the future historical No Action scenario. Same for Figure 18 and 19 and 20, and we should state in the caption what 'Historical' means.	The climate scenario results are compared to the historical scenario (1991-2018) results, which use inputs, demand patterns, and flood space requirements as described in section 3.2. Clarification added at the top of section 3.4.3.
Reviewer 3	36	512	How to say this? "involved varying increases", is bad terminology. We didn't arbitrarily increase annual flow or reduce summer flow, the climate scenarios show whatever the data shows. Maybe, "The climate scenarios generally displayed increased total annual flow and reduced summer flow."	Addressed.

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Reviewer 3	37	558	Comment to the comment --- Would probably be good to state this in the text. And why is there additional shortage with increased outlet capacity and drawdown? Is the reservoir at minimums and it can't release the request?	Explanation added to the text.