CHELAN COUNTY P.U.D.

Two Dam Independence Project

A year in review

December 21, 2020
Presenter: Janet Jaspers

- Project Overview
- Technical Challenges
- Operational Challenges
- Measures Used to Mitigate Operational Challenges
- How were Operations?
- Stakeholder Feedback
- Reevaluation of Operational Buffers
- Takeaways and Next Steps

Agenda

Reminder

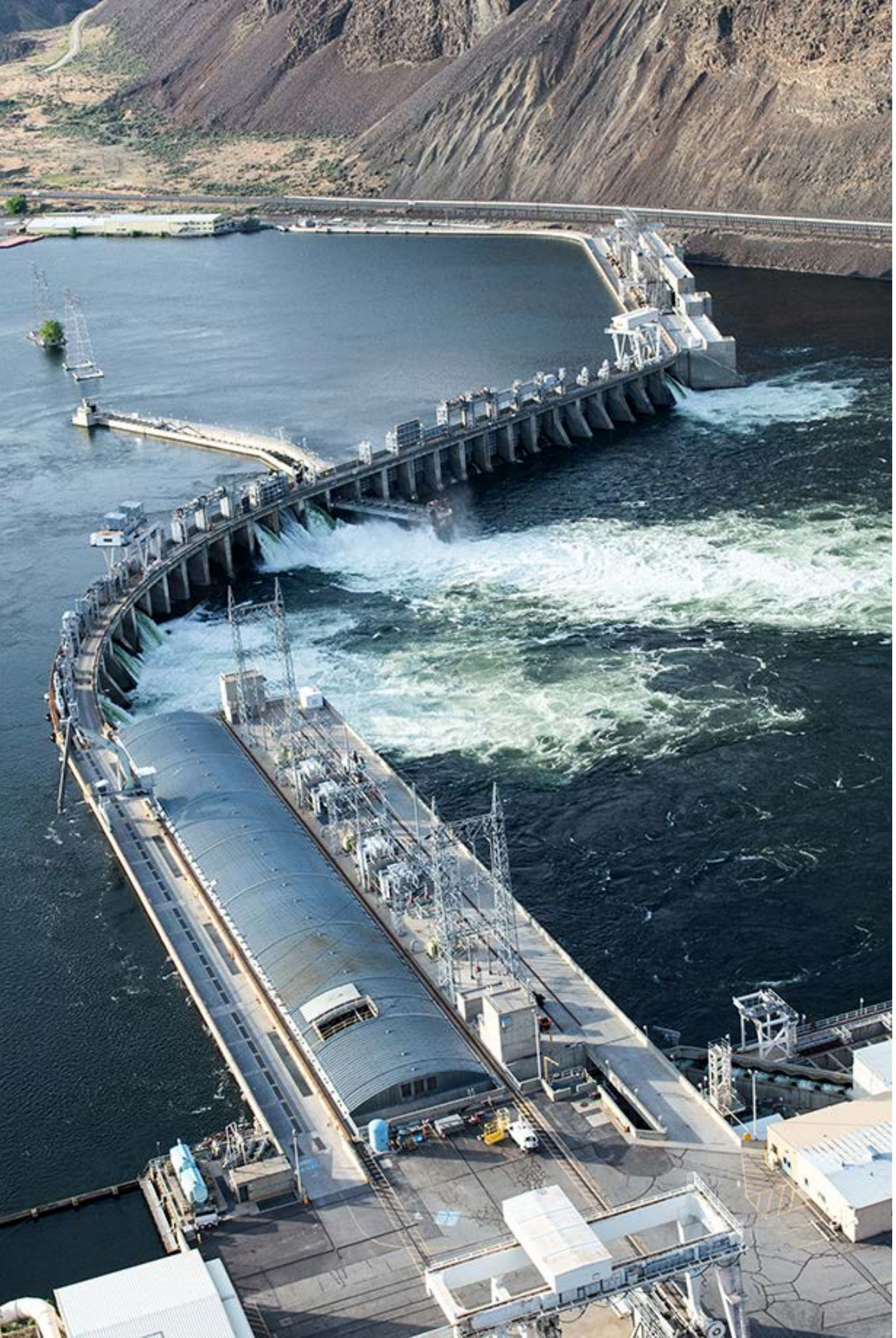
Why did the District undertake this project?

- Operate RR and RI absent Mid-Columbia Hourly Coordination
- Chelan was a strong advocate for continued coordination and will continue to look for opportunities to coordinate in the future
- Take on the functions Grant PUD (acting as Central) performed on behalf of the District
  - River planning
  - Project dispatch (calculation of project setpoint)
  - Pond accounting
- Do it in a way that ensured key obligations continued to be met (reliability, environmental/biological, contractual etc.)

Project Overview

» Significant stakeholder engagement and outreach effort (internal impact across multiple business units and significant interest from internal customers)

» Re-evaluation of business and work practices that had been in place since the early 1970s



Project Overview

- Implementation of 3 vendor-supported software systems

  CADSWES RiverWare – short-term hydrologic planning model

  RT Vista – plant/unit dispatch

  OATI webAccounting – participant pond accounting

Project Overview

- Complete rework of significant portions of Energy Management System
- Implementation of a custom data exchange framework capable of transferring millions of individual data points a day between Energy Planning & Trading and the control system

Statistics

- 2-year design/implementation timeline
  - *Nov. 2017 – Nov. 2019*
- ~21,000 labor hours
- $3.2M in non-labor costs
- ~200 hours internal staff training
- ~30 hours of training to power purchasers/participants
- 64 hours vendor training

Technical Challenges

- Make RI responsive to a dynamic generation setpoint
- Ground-up implementation of very complex, highly integrated systems (our peers thought we were a bit crazy)
- No ability to run in parallel – limited testing windows to ensure everything worked
- Support sub-hourly data exchange (in preparation for emerging energy markets)

Operational Challenges

- Impact of independent operations on:
  - Average elevation – will it be lower?
  - Minimum elevation – will reservoirs be drafted near minimum more frequently?
  - Volatility – will the reservoir move up and down (draft/fill) more frequently?
- How will stakeholders respond?
- No way to understand impacts prior to cutover – *only way to answer all the questions is to operate independently*

Proactive Measures

- Operational buffers
- Formation of Reservoir Issue Response Team
- Elevation constraints during high use periods
- Holiday elevation constraints

Operational Buffers

- As part of TDIP Cutover, operational buffers were implemented at the bottom of each reservoir to protect compliance with license minimum elevation requirement
  - *610.0' at RI*
  - *703.2' at RR*
- Capacity reductions were also added as the headwater level neared the buffer elevation
- Buffers = unusable storage for purchasers/participants (8% of composite physical storage)
- Loss of flexibility/degradation of the purchased slice product
  - *Communicated to participants that buffers were temporary and would be reevaluated*

Impact of Buffer Implementation
Participant Feedback

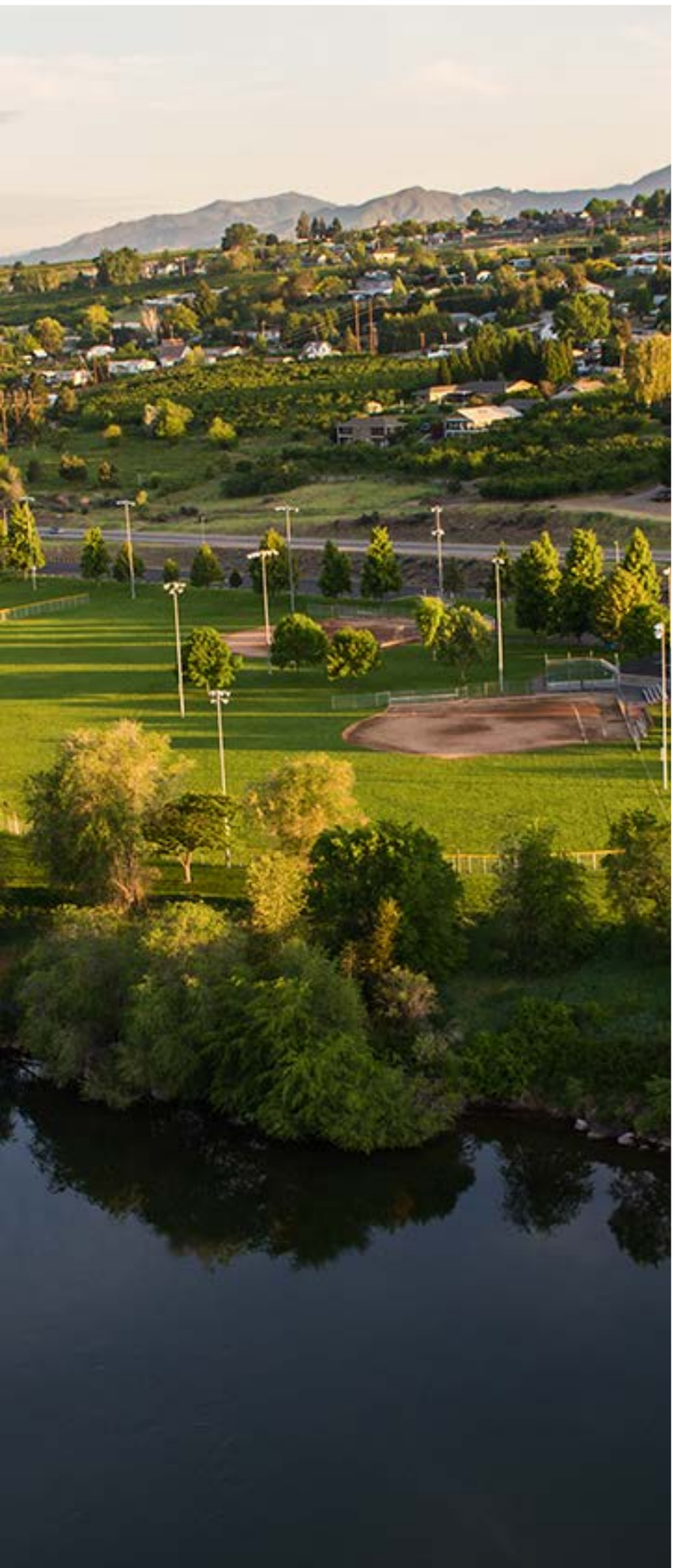
» General understanding of the need for operational and particularly recreational constraints

» Loss of flexibility – reduced ability to use storage to hit morning/afternoon peaks

» Implementing constraints in real-time is difficult to manage

» Additional constraints devalue the product

» Actual constraints differ from those represented in contract



Impact of Buffer Implementation
Participant Feedback

» Appreciates issues arising from operating hydro projects on recreational waterways

– *Precedent for future reductions?*

» Detracts from value of contracted product

– *Estimated lost value is difficult to quantify*

– *Concern regarding real-time implementation potential*

» Noted lack of discussion re: alternative measures or compensation to purchasers

Analysis of Reduced Storage

Constraint cases – (1) least to (4) most restrictive

Case 2 ≈ current operational buffers

Current operational buffers do not appear in the table but Case 2 is closest approximation

	Rocky Reach		Rock Island		Usable Storage
	Range (ft)	Min. Elevation (ft)	Range (ft)	Min. Elevation (ft)	MWh
Case 1	4	703.0	4	609.0	3906
Case 2	4	703.0	1	612.0	3439
Case 3	2	705.0	1	612.0	1797
Case 4	1.5	705.5	0.5	612.5	1309

Reservoir Issue Response Team

» Collaborates to respond to issues arising on Columbia River reservoirs, recommending mitigation, communication, or operational changes to address issues

- › Michelle Smith (License Compliance)
- › Ryan Baker (Parks)
- › Neil Neroutsos (Communications)
- › Scott Buehn (River Planner)
- › Kirby Reinhart (Rocky Reach Superintendent)
- › Alan Eastridge (Rock Island Superintendent)

Depending on the issues arising, this group will identify additional subject matter experts or departments and ask for their engagement

Recreational Constraint Approach in 2020

- Constraints may be placed on both plants for weekends between July 15-Sept. 15*
  - *RR: 704.0*
  - *RI: 611.0*
- Decision on constraints made prior day-ahead trading for Saturday and Sunday
- Decision to implement constraints based on flows, grid conditions, market conditions, hydraulic capability of project, storage likely to be used
- Was not used in 2020

**we will re-evaluate based on recreation and flow levels*

Constraints will be placed on both plants for Fourth of July and Labor Day

This practice has been used in previous years

Participants expect these constraints

Holiday Constraints

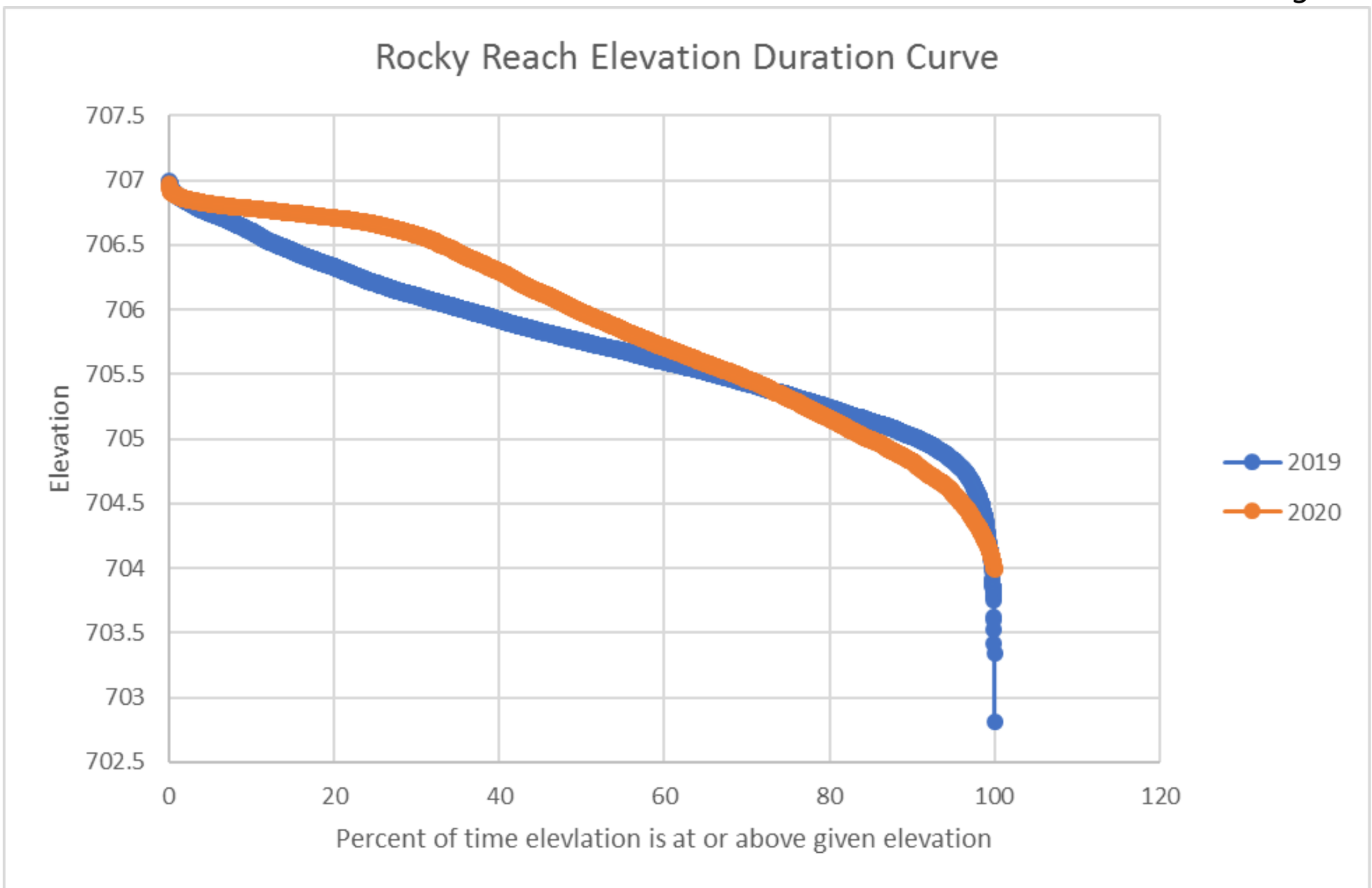
Uncertain

“To-Be” Reservoir Operations at

Rocky Reach

Jan. 2019 – Nov. 2019 -> 110% of average water year

Jan. 2020 – Nov. 2020 -> 108% of average water year



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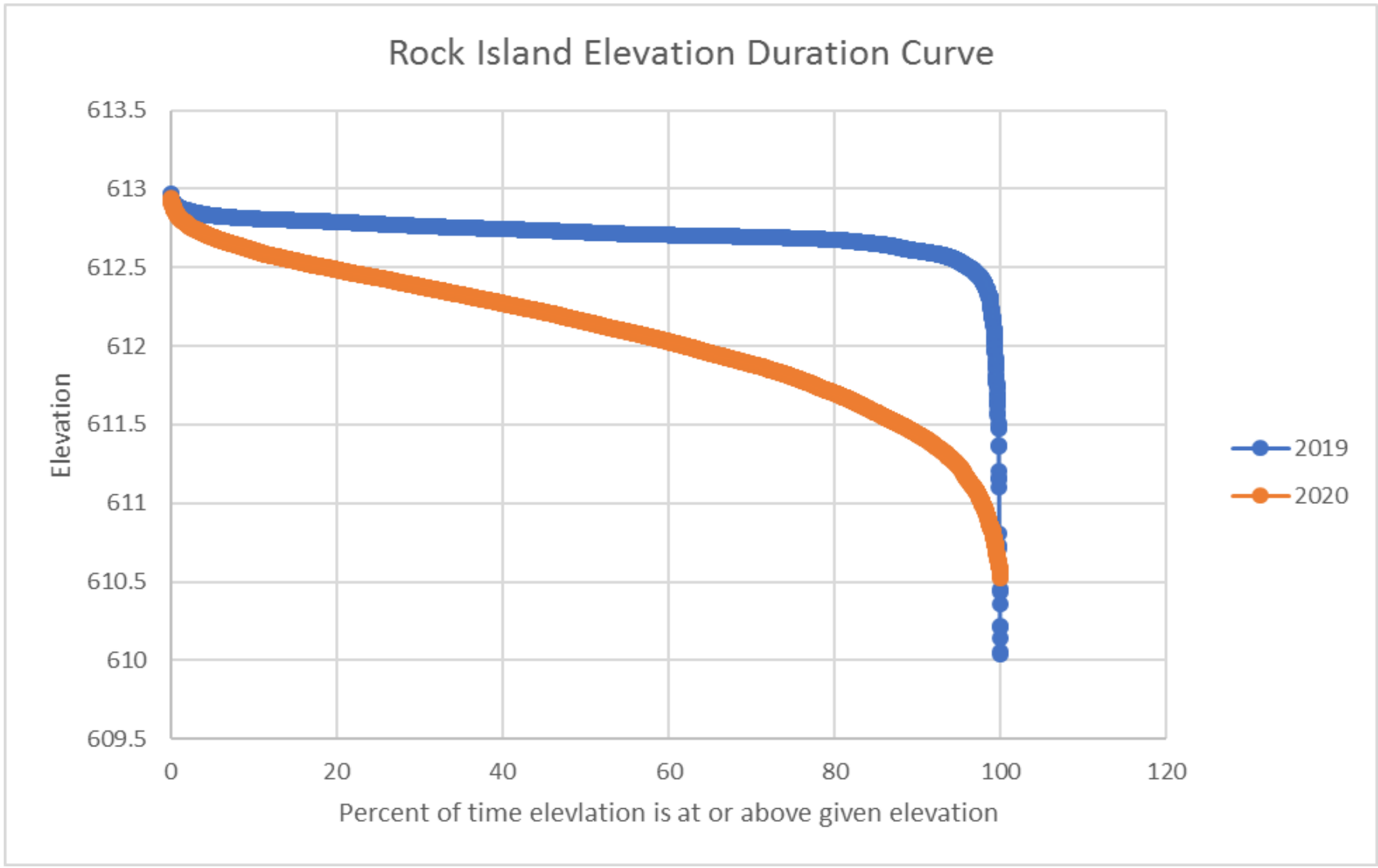

Stakeholder Feedback

Three contacts concerned about low water and fluctuations

One contact asking about future low water for surveying project

District staff witnessed increased use of sandbars and beaches during periods of lower elevations

Hurst Landing residents provided a letter to the District about their experience and concerns with river levels on the Rock Island reservoir

» Response Team members drafted response to letter

» Finalize and distribute by Justin Erickson – Managing Director District Services

Plan for Reevaluating Buffers

- Team committed to re-evaluating buffers after one year of independent operations
- Based on compliance criteria and operations so far, G&T and EP&T agree that the buffers may no longer be needed, pending testing results
- Recommend testing in step-wise fashion, allowing operations and participants to gain comfort and confidence as restrictions are eased through testing process
- Operations are fluid and will continue to be monitored
- Removing operational buffers unlikely to lead to lower elevations and negative impacts on customers/recreational users

Key Takeaways

- Broad organizational support for the effort - key to a successful outcome
- Implementation of a robust project management framework was critical
- Team experience and expertise ensured technical challenges were easily met
- Minimal response from customers/recreational users/participants

Next Steps

- Continue to monitor operations and associated customer/recreational user feedback
- We want to get better - continual re-evaluation of operations to identify improvement opportunities
  - Multi-business unit, multi-stakeholder concerted effort
  - Work to refine tradeoffs between recreational use and the financial impacts of lost flexibility
- Phase II
  - Unit commitment/unit level setpoints

    Efficiency gains – real dollars

    Developing business case by evaluating efficiency gains

    More responsive to operational, asset management and engineering concerns
  - Offline/study capability
  - Knowledge transfer