Northwest **Power** and **Conservation** Council

August 5, 2025

MEMORANDUM

TO: **Council Members**

FROM: **Jennifer Light, Director of Power Planning**

SUBJECT: **Proposed Changing Hydro Operations Scenario**

BACKGROUND:

Presenters: Jennifer Light, Dor Hirsh Bar Gai, Kate Self, John Shurts

Summary: The Power Division has proposed including a scenario in the Ninth Power Plan that explores the power system implications of changing hydro operations. This scenario is intended to provide information to inform the Ninth Power Plan by exploring how resource needs change with uncertainty in future hydro operations. Additionally, it is expected to inform the Council's Fish and Wildlife Program amendment process. Staff have developed a suite of proposed sensitivities to include in this scenario. These include:

- **Current Operations:** Sensitivity to reflect operations for 2026 and beyond to inform needs and provide a basis of comparison against other sensitivities. Staff propose to model spill operations as defined by the preferred alternative in the 2020 Columbia River System Operations Environmental Impact Statement (CRSO EIS); unless the Action Agencies provide alternate information on planned operations for 2026 by the end of August.
    - **Additional Alternate Operations:** Staff also propose a potential additional sensitivity that reflects the operations as defined by the 2023 Resilient Columbia Basin Agreement. This would be included given the uncertainty around future operations.

- **Limited Daily Flexibility:** Sensitivity to reflect power system implications of limiting the daily flexibility (changes in daily elevations and outflows).
- **Recommended Operations for Minimum Operating Pool (MOP) and Spill:** Sensitivity to analyze the power system impacts of the MOP and spill operations recommended by several entities. This would provide a piece of information to inform the Fish and Wildlife Program amendment process.

These proposed sensitivities have been informed by recommendations and comments on recommendations into the Fish and Wildlife Program amendment process, 2021 Power Plan analysis, and other considerations. At the August Council meeting, staff are seeking a head nod from members on this proposed scope.

Relevance: The Council is actively working through the amendment process for its Columbia River Basin Fish and Wildlife Program and the development of its Ninth Power Plan. Key to both processes is understanding of the region's current hydropower system operations and exploring considerations for changes to these operations.

Workplan: B. Development of Ninth Power Plan

Background: Hydro system operations provide an important nexus point between the Council's fish and wildlife and power planning responsibilities. On the fish and wildlife side, the Council must develop a program that protects, mitigates and enhances the fish and wildlife impacted by the operation of hydro projects on the Columbia River and its tributaries. This program builds upon the recommendations (and the comments on the recommendations) from the Federal and region's state fish and wildlife agencies, Tribes, and others. Both historically and today, these recommendations have included proposed operational changes to the hydro system for the benefit of fish in the Columbia River System.

On the power planning side, the Council must develop a power plan that puts forward a scheme for developing new resources to reduce or meet the Administrator's obligations. This includes the Administrator's obligations to implement the Council's fish and wildlife program; essentially recognizing that there may be changes to operations for fish and wildlife that would require the acquisition of new resources.

Staff anticipated that hydro operations for fish and wildlife would be a key issue to be addressed in the upcoming amendment process and have been working to create space to assess this issue through both its power planning and program amendment activities. Staff have been preparing the Council for this work through briefings and other discussions throughout the past year and a half (see more info below for links to those materials). After discussions with the Council and consideration of the recommendations and comments on the recommendations

into the Fish and Wildlife Program amendment process, staff prepared the final proposed scope for the Changing Hydro Operations Scenario.

More info: In May 2025, staff started the discussion around hydrosystem operations and exploring the intersection between the Council's program and power plan on this topic. In June 2025, staff presented early thinking on a range of potential options for power system analysis, based on the recommendations received in the Fish and Wildlife Program amendment process.

In March 2025, power staff presented on the "needs assessment" for the Power Plan, which will be a primary focus when analyzing the impacts of possible changes in hydrosystem operations on the region's power supply

The Fish and Wildlife Division has provided multiple briefings on the measures included in the Council's Fish and Wildlife Program and assessments of the actual implementation of the operations:

- An October 2023 presentation on the implementation of hydrosystem
- The September 2024 presentation on the hydrosystem categorical assessment
- The January 2025 documentation for the "Fish and Wildlife Program Performance Assessment, 1980-2022: Hydrosystem Category"
- A January 2025 presentation on hydrosystem operations with a focus on the sources for operations in decisions on Program measures and elsewhere

Finally, the Fish and Wildlife Division have provided the members with the full set of recommendations, and comments on the recommendations, on the amendment of the Council's Fish and Wildlife. The staff briefed the members on those recommendations at the June 2025 meeting and on the comments on the recommendations at the July 2025 meeting.

Proposed Changing Hydro Operations Scenario

Jennifer Light, Dor Hirsh Bar Gai, Kate Self, John Shurts

August 13, 2025

Northwest **Power** and **Conservation** Council

Goal for Discussion

- Staff has developed a proposed path forward for the Changing Hydro Operations Scenario to be included in the Ninth Power Plan analysis and help inform the Fish and Wildlife Program Amendment Process
- Today, staff is seeking a head nod from the Council on this proposed approach, plus any feedback that will inform staff analysis

Discussion Outline:

1. Introduction
2. Approach to “Current” Operations Sensitivity
3. Proposed Sensitivity: Limited Daily Flexibility
4. Proposed Sensitivity: Recommended MOP and Spill Operations
5. Timeline and Next Steps

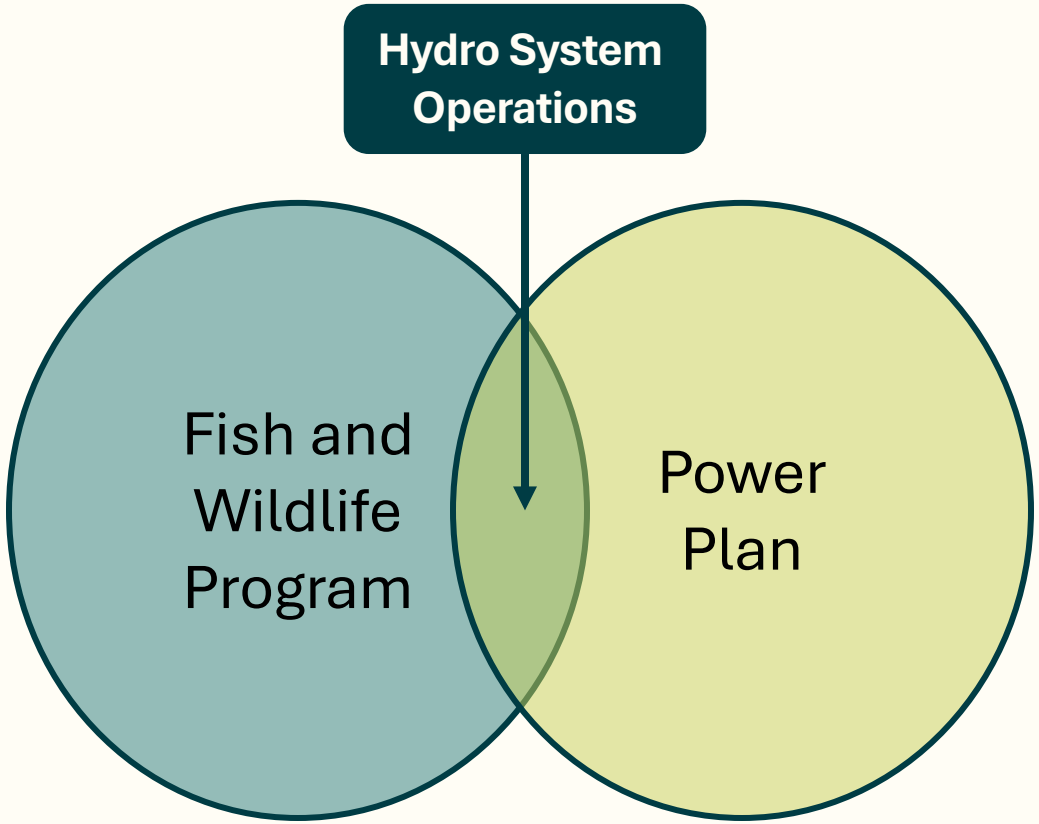
Northwest **Power** and **Conservation** Council

Why Include a Changing Hydro Operations Scenario?

- Staff planned on including a scenario to understand the power system impacts of changing hydro system operations, recognizing the uncertainty in hydro operations over the power plan horizon
- With overlapping timelines between the Ninth Power Plan and Fish and Wildlife Program amendment process, staff also proposed using this scenario to assess the power system implications of recommended changes to hydro operations
  - This type of analysis to support the Fish and Wildlife Program is not new
- This scenario is intended to provide insight on how power system needs might change under different hydro conditions, providing a piece of information to inform the Council's processes

Remember: Hydro System Operations is a Key Nexus in the Council's Work

Program based on recommendations, including operational changes to the hydro system for the benefit of fish. In doing so, the program must ensure the region can maintain an adequate, efficient, economical, and reliable power supply.



Power plan puts forward a scheme for resources to meet or reduce Bonneville's obligation, including its ability to implement the Council F&W program. This recognizes that there may be changes to operations for fish that require new resources.

Overlap in circles is bigger than it appears!

How Will This Scenario Support the Council's Work?

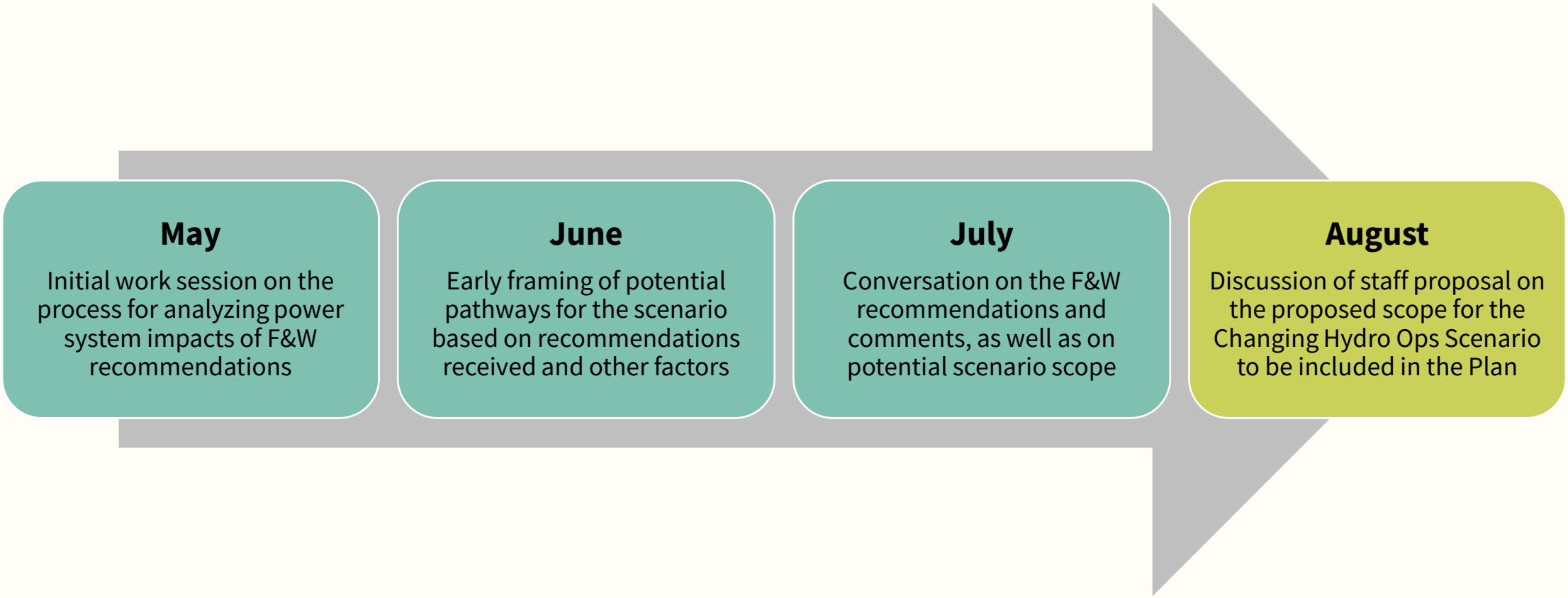
What this analysis does:

- Provides information on how different hydro system operations change power system needs
- Provides a **piece of information** to inform the Council's decision making on:
  - Recommendations into the Fish and Wildlife Program Amendment process
  - New resource recommendations included in the Ninth Power Plan

What this analysis does not do:

- Lock the Council into including any specific recommendations in the Fish and Wildlife Program
  - Power system impacts are only one piece of the many factors the Council will consider when deciding on the Fish and Wildlife Program
- Provide all the information needed to inform the Ninth Power Plan

Process to Date



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Proposal

Include a sensitivity based on the 2020 CRSO EIS preferred alternative to represent the “current” operations of the system, which will provide a basis from which to develop other sensitivities and inform on power system needs under these operations (assuming they hold for the next 20 years).

Conduct an additional sensitivity to understand power system implications of operations, based on 2023 RCBA.

What are “Current” Operations?

- For the 2024 and 2025 season, current operations consisted of:
  - Fish mitigation operations defined in BiOps and the 2023 Resilient Columbia Basin Agreement
  - Current Canadian River Treaty operations based on the Agreement in Principle*
  - Other requirements for flood control, recreation, transportation, etc.
- On June 12, President Trump issued a Presidential Memorandum withdrawing from the 2023 RCBA and revoking President Biden’s Memorandum on Resorting Healthy and Abundant Salmon, Steelhead, and Other Native Fish Populations in the Columbia River Basin
- The question is now, what will operations be in 2026 (and beyond)?

*This came into effect for the 2025 season.

What to Model for Current Operations?

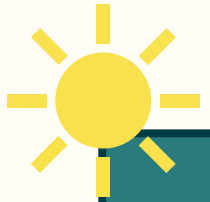
- Currently, we do not know what operations will be for 2026
- If we do not have clarity by August 31, staff proposes selecting a specific operation to represent “current operations” and consider the other as a sensitivity to capture potential uncertainty around future operations

Proposed “Current Operations”: BiOp	Proposed Alternate Sensitivity: RCBA
Legally, until another agreement is in place, the system should revert to the operations as defined in the BiOps	Provides a concrete set of operations to use to explore uncertainty around future spill by providing a “steady” spill option

Key Differences in Spill Operations Between the 2020 BiOp and 2023 RCBA

Spring

Change from the “Flex Spill”(16 hr/8 hr) regime under the BiOp to a steady 24-hour spill at 125% TDG



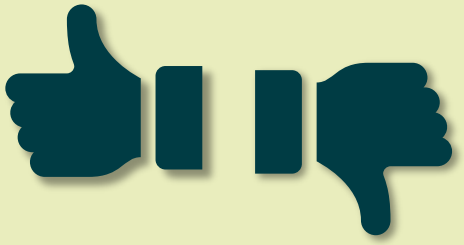
Summer

Change in date for the end of performance spill from August 14 under the BiOp to July 31 under RCBA

Fall

Updated spill values in the RCBA for lower Snake and McNary and John Day in the lower Columba

Proposal



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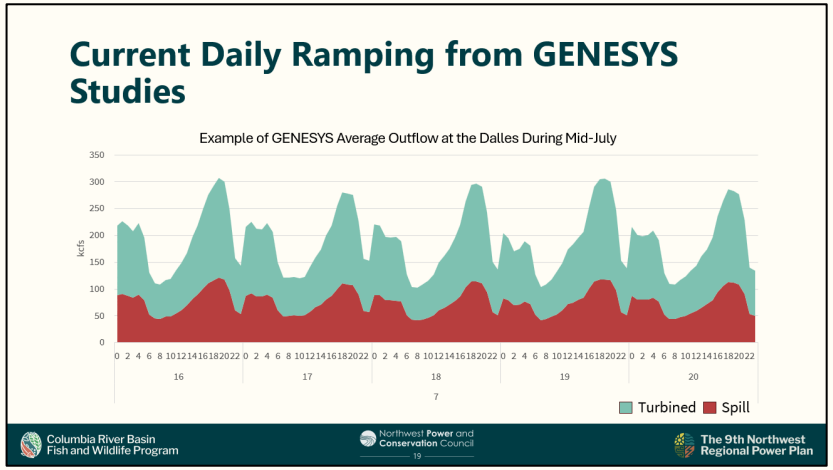
Include a sensitivity that analyzes the power system implications of limiting the hydro system's ability to change daily elevations and outflows.

Reminder of the Problem Statement

- **2014 Fish and Wildlife Program:** Contains measures recommended by the state and tribal fish managers calling on the system operations to minimize or reduce daily flow fluctuations
- **2021 Power Plan:** Indicated that increasing these fluctuations may be one route for system adequacy as the flexibility in hydro increases the power system's ability to respond to economic and power considerations, including reserves, and support the integration of renewables as loads increase
- **Current Amendment Process:** Several entities submitted recommendations and comments that the program should contain measures reducing ramping and flow fluctuations; Others asked the Council to take actions to increase system flexibility

From May:



Rationale for Limiting Daily Flexibility

- Changes in flows can directly affect migratory fish by slowing or even temporarily reversing migration
  - Disorientation
  - Increased energy expenditure
  - Predation risk
  - Prolonged exposure to high temperatures
  - Exposure of spawning areas
  - Increased turbidity
- Changes can also affect resident species by changing food web dynamics or temperatures in the reservoir, for example

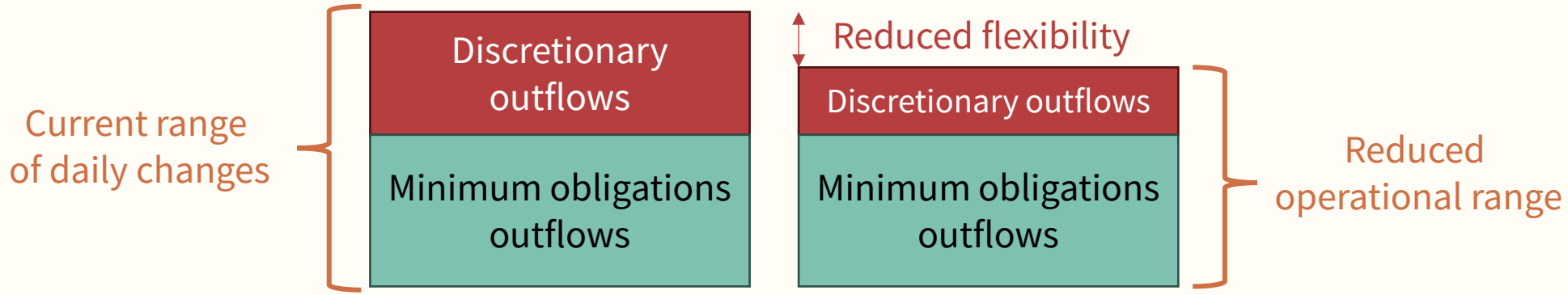
Ramping/changing flows and pools

Recommendations to the F&W Program included:

- Ramping rate limitations to reduce adverse impacts from hourly and weekly load following operations
- Minimizing within-day flow fluctuations
- Eliminating zero-flow operations
- Developing minimum flow requirements

Impact of Limiting Flexibility from Power Perspective

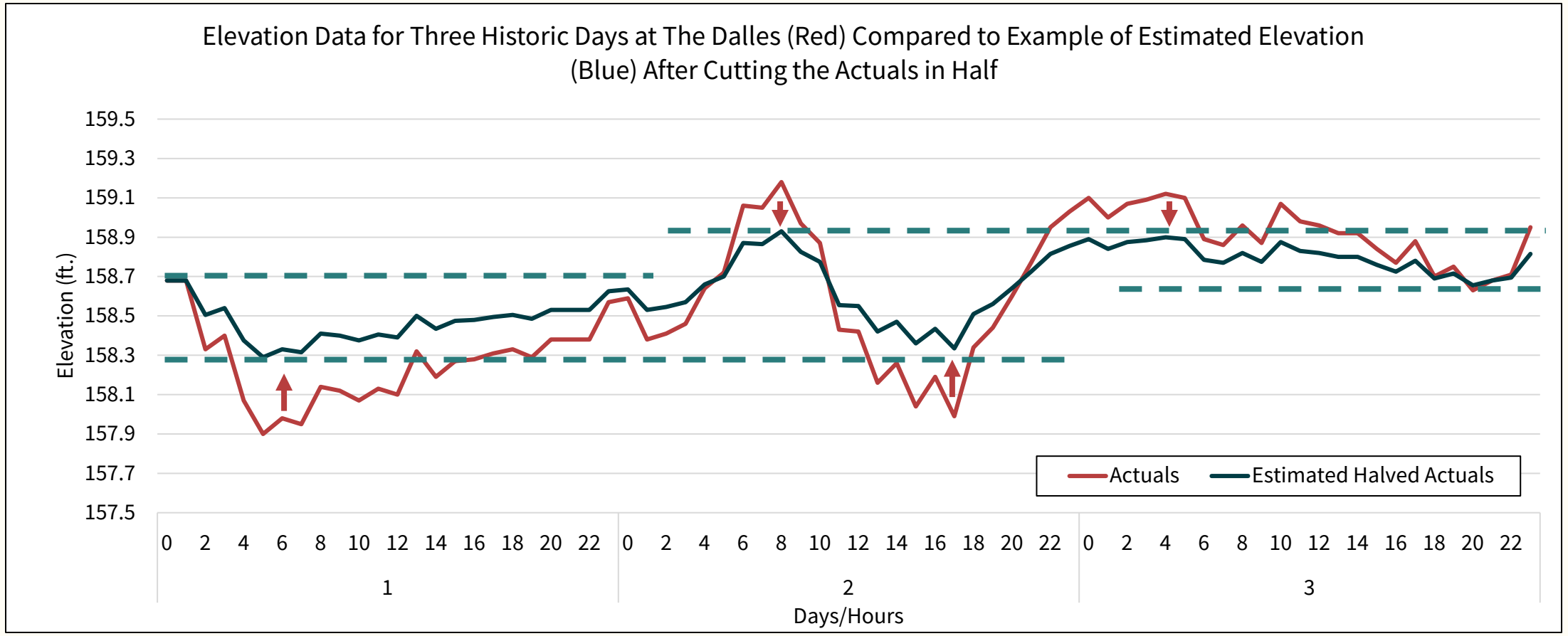
- Limiting daily changes to elevations and outflows leads to more stable conditions for fish
- Limited operational range limits the ability of the project to respond to power needs (flexibility)
- Specifically, once minimum power and outflow obligations are met, there are less discretionary outflows available for reserves and market interactions (reducing the ability of the project to respond to renewable energy integration and economics)



Modeling Limited Flexibility

- Council has not received specific recommendations on how much or how to limit the daily ramping of the system, so staff has developed an approach that it believes addresses the recommendations
- Focus is on the lower Columbia River and lower Snake River projects, as these projects have been the general focus for migrating juveniles and do not currently have elevation ramp constraints
  - These projects do have outflow hourly rates, and current operations are within those rates
- Modeling approach is to set ramping limits based on historic changes to elevations and outflows
  - Cut the historic outflows and elevation changes at each project in half, which will reduce the amount the project ramps and seek to keep flows more steady
  - Modify available reserves based on the reduction in discretionary outflows available at each project

Example: Approach to Modeling Reduced Elevation Changes at The Dalles

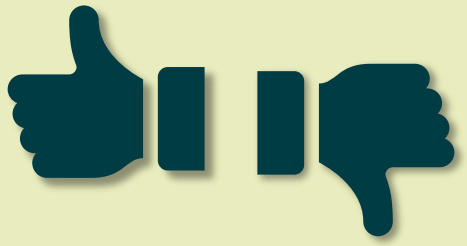


Why Not Assess Increased Flexibility?

- Council received recommendations, and comments on recommendations, calling on the Council to explore opportunities to maintain or increase hydro generation and explore additional system flexibility
- Despite staff initially identifying this as a potential pathway for analysis, after further consideration, staff does not recommend scoping out an additional sensitivity assessing increased hydrosystem flexibility at this time
- Primary rationale is that it is not clear to staff that there is more room for the power system to flex while maintaining the other hydrosystem priorities
- If early analysis shows us different information, the Council could revisit and potentially add this as a sensitivity

Proposal

Include a sensitivity that analyzes the power system implications of limiting the hydro system's ability to change daily elevations and outflows.



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Proposal

Include a sensitivity that models the specific minimum operating pool (MOP) elevations and limits and the spill operations recommended by the states and tribes to provide insight on the power system implications of these potential operations.

Recommendations on Hydrosystem Operations Around Pool Levels, Spill, and Water Transit Times

- Multiple entities submitted a set of recommendations to the Council to change how the Corps of Engineers operates the run-of-the-river projects in the lower Columbia and Snake in spring and summer, specific recommendations regarding both pool levels and summer spill
- These recommended operating measures came after a more general recommendation to have the program endorse the concept of reducing water transit times (WTT) though the system, with a recommended set of WTT targets for spring and summer.
- The recommendations also called for the program, via spill operations, to achieve powerhouse encounter rates below 1 and to “achieve the greatest biological benefit while avoiding biological harm”- all intended in support of the program’s 2-6% SAR goal
- The recommendations and subsequent comments also include a process recommendation: Use the Council’s program to facilitate collaboration between the federal action agencies, fish and wildlife agencies and tribes, and others to evaluate possible actions that may support achieving lower WTTs (or the lowest WTT possible)

Recommended Operations and WTT Targets

Minimum Operating Pool (MOP) Operations	Spill Operations	Water Transit Time Targets

• Operate projects at MOP from March 1 through September 30
• Lower Snake Projects: Hold elevations to 1.0’ hard constraint and 0.5’ soft constraint
• Lower Columbia Projects: Hold elevations to 1.5’ hard constraint and 1.0’ soft constraint
	• Extend summer “performance standard” spill through August 30 (currently ends July 30)	• Spring:
		  • 8 days from Wells/Lower Granite to Bonneville
		• Summer:
		  • 5 days from Wells to McNary
		  • 8 days from McNary to Bonneville
		  • 13 days from Lower Granite to Bonneville

Why the Focus on Water Transit Times?

- Discussion around WTT and the relationship to fish survival can be addressed more thoroughly through the Fish and Wildlife Program amendment process
- However, high level:
  - Recommending entities see reducing WTT as an important element of meeting SAR goals for salmon and steelhead
  - Research shows a correlation between shorter WTTs and faster juvenile salmon and steelhead migration; although this relationship is stronger for some stocks than others, and both WTT and powerhouse encounters are known predictors of freshwater experience for juveniles
  - While the relationship between WTT and SAR rates is complicated, there is evidence to show that WTT during outmigration can be a factor in improved SARs

Power System Analysis Around WTT

- There is a spectrum of potential analytical paths around operations aimed to reduce WTT

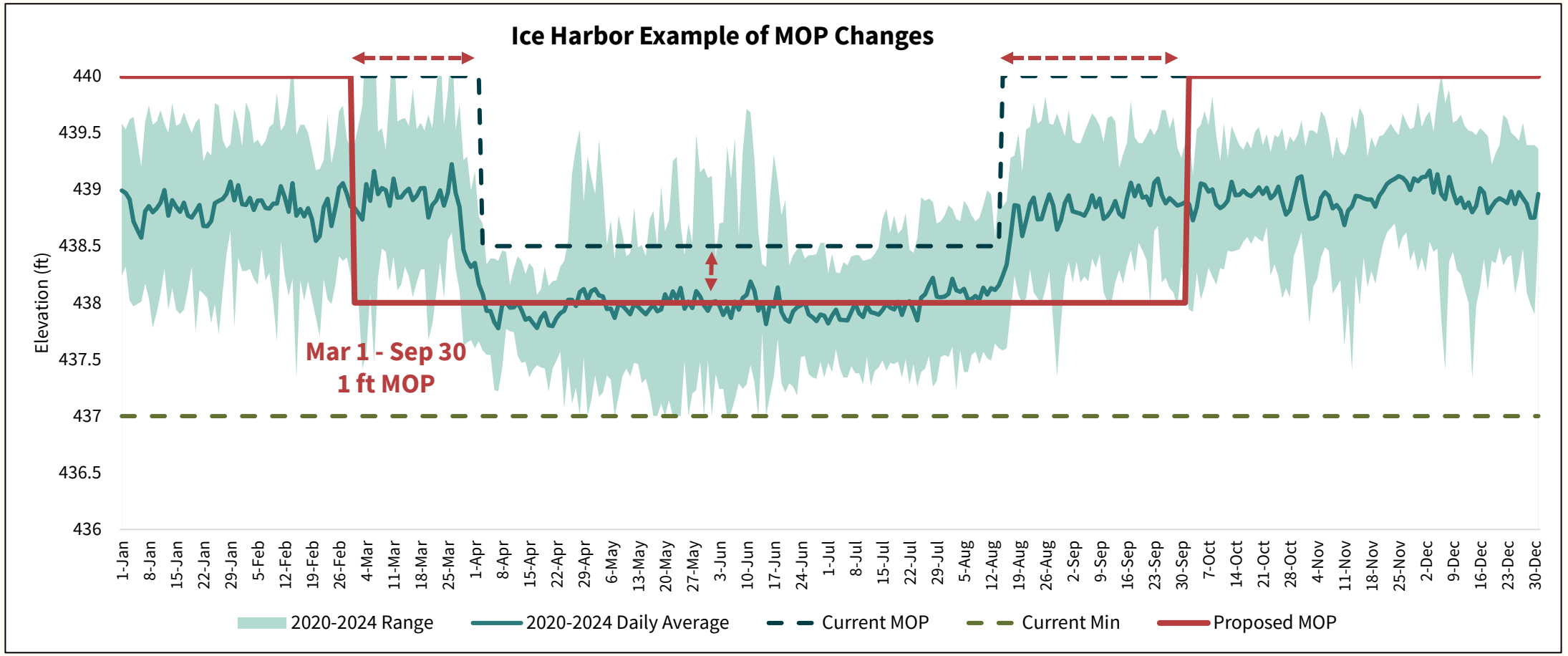
- All changes in pool elevations have effects on other uses, but operational changes more extreme than the MOP operations would likely impact other uses to a much greater degree *and* require further authorizations
- Given that, for the purposes of this Power Plan, staff proposes to specifically model the MOP operations recommended using what staff understands to be the minimum operating pool levels and analyzing the effects of maintaining the pool levels within the limits recommended
  - The Council could model the power system implications of other elements at some point in the future (outside of this power plan process) should there be other specific operations to analyze

Proposed MOP Operations to be Modeled for Lower Snake Projects

- In the lower Snake there are current MOP operations with a 1.5’ hard constraint and a 1.0’ soft constraint
- Joint entity recommended operations would tighten these elevations to a 1.0’ hard constraint and a 0.5’ soft constraint

Project	Current Pool Elevation Operations (ft)	Recommended MOP Operations (ft)
Lower Granite	733-734.5	733-734
Little Goose	633-634.5	633-634
Lower Monumental	537-538.5	537-538
Ice Harbor	437-438.5	437-438

Example: Changes to MOP at Ice Harbor

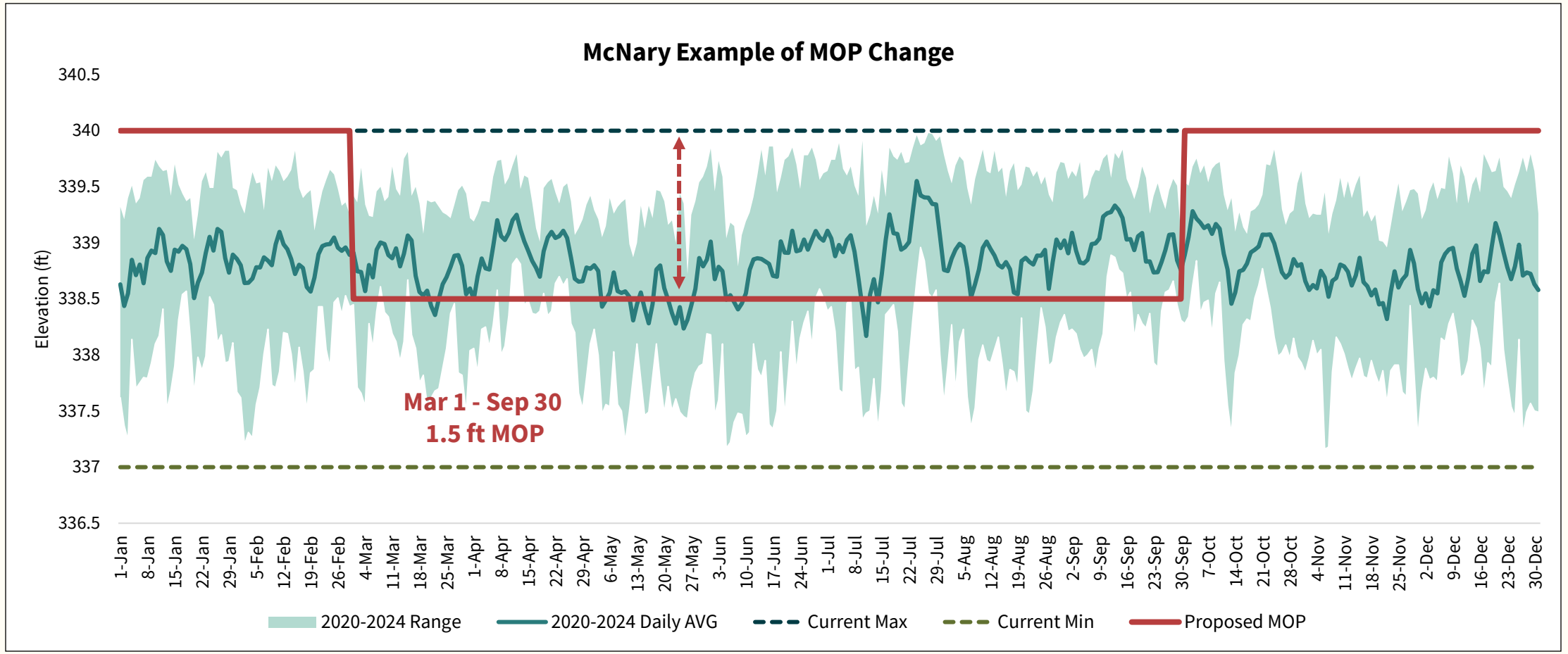


Proposed MOP Operations to be Modeled for Lower Columbia Projects

- Staff started with the normal operating range for these projects and used the minimum of that to represent the minimum operating pool as the basis to define the proposed spill season MOP constraints for modeling
- Joint entity recommended operations keep elevations to a 1.5’ hard constraint and a 1.0’ soft constraint

Project	Current Pool Elevation Operations (ft)	Proposed MOP Operations for Modeling (ft)
McNary	337-340	337-338.5
John Day	262-266.5	262.5-264
The Dalles	157-160	157-158.5
Bonneville	71.5-76.5	71.5-73

Example: Proposed MOP for McNary



Note on MOP for Lower Columbia Projects

- During additional conversations with some of the staff of the entities that recommended the MOP operating limits, we discovered that what they mean by "MOP" may be operating levels lower than what Council staff understands the Corps to mean by MOP levels (see table for the difference)
  - At some of these projects, these levels are more ordinarily known as "spillway crest" operations

Project	Staff Proposed MOP for Modeling (ft)	State/Tribal Draft MOP Elevations (ft)
McNary	337-338.5	335-336.5
John Day	262.5-264	257-258.5
The Dalles	157-158.5	155-156.5
Bonneville	71.5-73	70-71.5

- More discussions are needed to clarify the recommendation, but even so, staff propose modeling MOP based on what we understand to be the current normal operating pools:
  - The state/tribe proposed elevations (as currently understood) conflict to a greater degree with other current operations (e.g. navigation, irrigation, adult fish ladder) and thus might benefit from a longer and broader planning process
  - While not 100% aligned, modeling MOP as proposed will inform the discussion
  - Council could later pursue other analysis (outside of this Power Plan) to understand the connection between the state/tribe proposed elevations and changes to WTT

Spill Recommendations

- As noted above, several entities also included recommendations for spring and summer spill to “achieve the greatest biological benefit while avoiding biological harm” and to achieve powerhouse encounter rates below 1 in support of the 2-6% SAR goal
- Key to these recommendations is that they extend summer spill through August (currently ends on July 31 under RCBA and August 14 under the 2020 BiOp)
- For this sensitivity, staff propose to include these spill operations as well, making them additive to what was the spill operation in the RCBA, by modeling 125% TDG for 24 hours a day in the spring and performance standard spill in the summer

Proposal

Include a sensitivity that models the specific minimum operating pool (MOP) elevations and limits and the spill operations recommended by the states and tribes to provide insight on the power system implications of these potential operations.

The analysis should provide information on the effects of these additional operations on water transit times.

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Timeline for Hydro Operations Scenario

Step 1
May – August

Scope sensitivities to explore power system implications of different operations to inform both F&W and power processes

Step 2
August – Early September

Update GENESYS with hydro operations as defined by the scoped sensitivities, fine tuning elements if needed

Step 3
September – October

Conduct a needs assessment for each sensitivity to provide information power system implications

Step 4
November and Beyond

Conduct remaining elements of scenario modeling, including the New Resource and Transmission Risk Scenario

Shifting to Needs Assessments

- Next step is the needs assessment, which will explore the gaps between existing system capabilities and future load needs
- For each sensitivity, staff will update the relevant hydro operations in GENESYS, thereby changing the existing system capabilities, to analyze how needs change under those conditions
- Staff plan to bring all the results of the needs assessment (and relevant market availability results) to the October meeting

Additional Slides

2020 BiOp Spill Operations (i.e. Flex Spill)

Project	Spring Operation Lower Snake: 4/3-6/20 Lower Columbia: 4/10-6/15	Summer Operation Lower Snake: 6/21-8/14 Lower Columbia: 6/16-8/14	Summer Operation 8/15-8/31
Lower Granite	16 hr: 125% TDG; 8 hr: 20 kcsf	18 kcsf	RSW or 7 kcsf
Little Goose	16 hr: 125% TDG; 8hr: 30%	30%	ASW or 7 kcsf
Lower Monumental	16 hr: 125% TDG; 8 hr: 30 kcsf	17 kcsf	RSW or 7 kcsf
Ice Harbor	16 hr: 125% TDG; 8 hr: 30%	30%	RSW or 8.5 kcsf
McNary	16 hr: 125% TDG; 8 hr: 48%	57%	20 kcsf
John Day	16 hr: 125% TDG; 8 hr: 32%	35%	20 kcsf
The Dalles	24 hr: 40%	40%	30%
Bonneville	16 hr: 125% TDG; 8 hr: 100 kcfs	95 kcsf	50 kcsf

RSW = removable spillway weir
ASW = auxiliary spillway weir

2023 RCBA Spill Operations

To compare to the 2020 BiOp spill operations, those are included in the crossed-out text

See changes in spring spill, change in summer operations dates, and small changes in late summer spill

Project	Spring Operation Lower Snake: 4/3-6/20 Lower Columbia: 4/10-6/15	Summer Operation Lower Snake: 6/21-7/31 ~~8/14~~ Lower Columbia: 6/16-7/31 ~~8/14~~	Summer Operation ~~8/15~~ 8/1-8/31
Lower Granite	24 hr: 125% TDG ~~16 hr: 125% TDG; 8 hr: 20 kcsf~~	18 kcsf	SW flow ~~RSW or 7 kcsf~~
Little Goose	24 hr: 125% TDG ~~16 hr: 125% TDG; 8hr: 30%~~	30%	ASW or 7 kcsf
Lower Monumental	24 hr: 125% TDG ~~16 hr: 125% TDG; 8 hr: 30 kcsf~~	17 kcsf	SW flow or 8 kcsf ~~RSW or 7 kcsf~~
Ice Harbor	24 hr: 125% TDG ~~16 hr: 125% TDG; 8 hr: 30%~~	30%	SW flow or 9 kcsf ~~RSW or 8.5 kcsf~~
McNary	24 hr: 125% TDG ~~16 hr: 125% TDG; 8 hr: 48%~~	57%	20 kcsf
John Day	16 hr: 40%; 8 hr: 125% TDG ~~16 hr: 125% TDG; 8 hr: 32%~~	35%	20 kcsf
The Dalles	24 hr: 40%	40%	30%
Bonneville	24 hr: 125% TDG ~~16 hr: 125% TDG; 8 hr: 100 kcfs~~	95 kcsf	50 kcsf

Limited Daily Flexibility Approach (1)

- Providing comments into the 2021 Power Plan, CRITFC recommended the Council do a study that *"limited the daily fluctuations in the Columbia and Snake river flows between April 1 and August 31 such that the differences between highest and lowest hourly flow levels measured in any day at appropriate control points such as The Dalles Dam and Lower Granite Dam is no more than 20 percent and during the remainder of the year the difference is no greater than 35 percent."*
- While modeling this specific operation is not feasible in the model (ramps are a global assumption that cannot be modified monthly), the graphic on the following slide shows that staff's proposed approach of halving the historic changes in outflows ends up with an approach similar to this suggested exercise

Limited Daily Flexibility Approach (2)