Grant County
PUBLIC UTILITY DISTRICT
Excellence in Service and Leadership

Priest Rapids Fish Forum

Conference Call

Wednesday, 4 March 2026
9:00 a.m. – 11:30 a.m.

FINAL MINUTES

PRFF Members

Michael Lucid, USFWS
Ralph Lampman, Keely Murdoch, YN
Nathan and Clayton Buck, Wanapum
Jason McLellan, Bret Nine, CTCR
Mike Clement, Chris Mott, Grant PUD
Tracy Hillman, Chair
Patrick Verhey, Laura Heironimus, WDFW
Melissa Peterson, Chad Brown, Ecology
Aaron Jackson, Carl Merkle, CTUIR
Steve Lewis, BIA
Pete McHugh, CRITFC

Meeting Attendees

Mike Clement, Grant PUD
Melissa Peterson, Ecology
Chris Mott, Grant PUD
Tygh Schuster, YN
Michael Lucid, USFWS
Pete McHugh, CRITFC
Laura Heironimus, WDFW
Nathan Buck, Wanapum
Mark Cecchini Beaver, Spheros
Binglei Gong, Spheros
Ralph Lampman, YN
Nate Patterson, YN
Jason McLellan, CTCR
Joseph LeMoine, Grant PUD
Todd Miller, WDFW
Tim Taylor, Grant PUD
Patrick Verhey, WDFW
Steve Lewis, BIA
Pradeep Mugunthan, Spheros
Tracy Hillman, Chair

Action Items:

- Laura Heironimus will update the White Sturgeon Spontaneous Autopolyploidy Guidance document based on recently published literature.
- Tracy Hillman will ask Ryan Harnish (PNNL) whether they estimate juvenile lamprey losses due to predation downstream from a dam. If so, how do they estimate losses due to predation

downstream from a dam? Would releasing live tagged juveniles below the dam (i.e., paired release) help estimate losses due to predation downstream from the dam? Finally, does Ryan have thoughts on using predation tags inserted into the dead fish to estimate losses due to predation downstream from a dam.

- Ralph Lampman will update the juvenile lamprey source table.
- Ralph Lampman will share language from the Fish Passage Center memo regarding juvenile lamprey studies.
- Members will review the potential options for temperature improvement identified in the attached TMDL WQAP presentation (see slides 16-21 in the attachment) and provide ideas or concepts for consideration by 1 April 2026.
- Mike Clement will ask Dave Robichaud to provide a short writeup on his power analysis and sample size calculations for conducting a juvenile Pacific Lamprey survival study in the Priest Rapids project area.
- Mike Clement will request that Dave Robichaud attend the PRFF April meeting to discuss his power analysis and sample size calculations.
- Members will review the draft Aquatic Invasive Species Control and Prevention Plan Annual Report and send their comments to Nate Dietrich by 1 April 2026.
- Members will review the draft 2025 White Sturgeon Management Plan Report and provide comments to Mike Clement by 5 March 2026.

I. Welcome and Introductions

Tracy Hillman welcomed everyone to the meeting and identified all attendees.

II. Agenda Review

The PRFF reviewed and approved the March agenda. Tracy Hillman reported that Gabriella Brill (ODFW) would not be able to present her work in John Day reservoir because of illness. Tracy will try to reschedule her presentation in April or May.

III. Approve February Meeting Notes

The PRFF reviewed and approved the 4 February 2026 meeting minutes.

IV. Review Action Items

The PRFF reviewed the following action items from the February meeting:

- Laura Heironimus will update the White Sturgeon Spontaneous Autopolyploidy Guidance document based on recently published literature. **Ongoing.**
- Melissa Peterson will share some slides or a weblink with the PRFF that describe the WQAP evaluation criteria. Complete. **Melissa shared the slide with the group on 2 March 2026.**
- Tracy Hillman will ask Ryan Harnish (PNNL) whether they estimate juvenile lamprey losses due to predation downstream from a dam. If so, how do they estimate losses due to predation downstream from a dam? Would releasing live tagged juveniles below the dam (i.e., paired release) help estimate losses due to predation downstream from the dam? Finally, does Ryan

have thoughts on using predation tags inserted into the dead fish to estimate losses due to predation downstream from a dam. **Ongoing. Tracy reported that Ryan has not responded because he is in the field.**

- Ralph Lampman will update the juvenile lamprey source table. **Ongoing.**
- Ralph Lampman will share language from the Fish Passage Center memo regarding juvenile lamprey studies. **Ongoing.**
- All members will review the YN presentation and the slides from Ryan Harnish. **Addressed during the meeting today.**
- Members will review the draft 2025 Pacific Lamprey Annual Report and provide comments to Mike Clement by 14 February 2026. **Complete. Grant PUD is reviewing the comments.**
- Members will review the draft 2025 White Sturgeon Management Plan Report and provide comments to Mike Clement by 5 March 2026. **Ongoing.**

V. Water Quality

Columbia River Water Temperature TMDL – After introducing representatives from Spheros (Mark Cecchini Beaver, Pradeep Mugunthan, and Binglei Gong), who are helping Grant PUD with the Priest Rapids Project Water Quality Attainment Plan (WQAP), Tim Taylor presented on the status of Grant PUD's WQAP process (see Attachment 1). He began by providing an outline of their presentation, which includes a recap of the Temperature Total Maximum Daily Load (TMDL), overview of the WQAP process, Priest Rapids Project operations and requirements, a list of potential temperature improvement options, and next steps. He said the objectives for today are to describe the purpose and need for the WQAP, outline the process for developing the WQAP, identify potential temperature improvement options, and solicit feedback from the PRFF.

Mark (Spheros) provided some background on the Columbia and Lower Snake Rivers Temperature TMDL. He indicated that the TMCL area includes the mainstem Columbia River in Washington and Oregon and the Lower Snake River in Washington. The TMDL defines temperature targets using 0.3˚C allowable heat load for the critical period June-October. The TMDL does not allocate heat loads to climate change, sources in Canada, or sources upstream of the boundaries in Idaho and Canada. Mark added that the TMDL sets temperature targets at each dam's tailrace. Targets are derived from water quality criterion and the 0.3˚C allowance. The target attainment requires all upstream sources to meet allocations. Mark indicated that the allowable head load (0.3˚C) is equally divided among three sources: NPDES point sources, tributaries, and dam impoundments. Heat load allocations for dam impoundments are implemented via WQAPs for each of the 15 dams in the TMDL area.

Mark then briefly described the WQAP process. He identified the regulatory drivers (e.g., FERC requirements, Ecology certification, TMDL, etc.) and explained the process and objectives of the WQAP. He indicated that Grant PUD must consider a range of temperature improvement options (universe of options), identify which ones are reasonable and feasible temperature improvement options, and then address the project's heat contribution. Mark said there are two phases to the evaluation. The first is WQAP development (screening of improvement scenarios) and second is WQAP implementation (detailed analysis of improvement scenarios).

Tim indicated that Grant PUD must evaluate improvement options in light of key project considerations such as operational requirements (e.g., normal pool elevations, functional elevations for existing structures, etc.), safety, recreation, cultural resources, fish passage (e.g., operation of ladders and

bypass), and previous modeling. Binglei (Spheros) presented figures showing monthly river flows and water elevation changes measured at Rock Island, Wanapum, and Priest Rapids dams. Tim noted that the increase in water elevation in the Priest Rapids forebay in November represents the period when Grant PUD is implementing reverse load factoring to protect fall Chinook Salmon spawning. Binglei also presented figures showing monthly water temperatures measured at Rock Island, Wanapum, and Priest Rapids dams.

Binglei then walked the PRFF through the potential temperature improvement options. She said the first step is to identify the universe of potential options. These options are intended as a starting point for evaluation and have not been assessed for temperature benefit or feasibility. She noted that there are four categories of options: operational, structural, in-river, and riparian and hyporheic. Operational options include pool elevation flexibility and operations at minimum operating pool. These options aim to change reservoir heat load and thermal dynamics. Structural options include selective withdrawal structure, temperature curtain, low-level outlet, forebay mixing enhancement, and fishway temperature enhancement. These options are generally used in thermally stratified reservoirs. In-river options include on-reservoir shade structures, which aim to reduce solar heating, evaporative cooling towers, and mechanical chillers. The latter two perform best with suitable meteorological conditions and energy requirements. Lastly, riparian and hyporheic options include riparian planting/shoreline restoration, managed aquifer recharge, and tributary enhancement. These aim to reduce solar heating and promote cold-water refugia.

Tim then talked about next steps. He said the goal today was to present the universe of temperature improvement options and seek feedback from the PRFF on the options presented and whether there are additional options that should be considered. Tim wants to make sure the list of options is as comprehensive as possible. Once the list of options is complete, Grant PUD will start the screening/evaluation process and plans to meet with the PRFF to discuss the screening process and results. Tim asked the PRFF for feedback.

Steve Lewis asked who the “judge and jury” is on whether proposed options are reasonable and feasible. Steve said there could be disagreements among parties on what is reasonable and feasible. Pradeep Mugunthan responded that the final determination is made by Ecology. Grant PUD will propose improvement options and Ecology will decide whether they agree with the proposed options. Tim added that Grant PUD will work with Ecology and the PRFF throughout the evaluation process. Grant PUD wants this process to be as transparent as possible. Tim said there will be several opportunities for collaboration and review of options.

Pete McHugh asked whether the temperature model is already calibrated for the project area. If so, the evaluation of options should not be a big lift. Tim said yes, they will leverage the existing CE-QUAL-W2 model to assess benefits from improvement options. Binglei added that they will work with Ecology to make sure the modeling work lines up with the TMDL.

Steve Lewis asked whether the proposed temperature modeling effort would add to or validate the fish passage modeling that was conducted many years ago. The purpose would be to avoid implementing options that could potentially harm fish passage at the dams but also consider options that may improve fish passage. Pradeep responded that the models used for fish passage assessments were computational fluid dynamic models that have a much finer resolution than the temperature model used in the attainment plan. He added that the models used for this exercise will be 1-D or 2-D models, not 3-D models. Tim added that he thought the early water quality models used for fish passage focused on total dissolved gas (TDG), not so much on temperature.

Ralph Lampman asked what happens if all the options are evaluated and we find that there are no reasonable or feasible options to implement? Melissa Peterson reminded everyone that it is Ecology who approves the WQAP. She said the PRFF provides review and input, but ultimately it is Ecology who approves the plan. Tim added that Grant PUD set up this collaborative process so when the WQAP is submitted to Ecology, they will hopefully be able to approve it.

Given the limited number of options to implement within the project area, Pete asked whether there is a process for evaluating the effects of all options implemented across the TMDL area? Melissa said this will not be covered under the individual WQAPs but rather within the TMDL. The WQAPs will provide data that Ecology can use in their RBM10 model to conduct a more system-wide assessment.

Steve asked about the options and scope of restoration actions in tributaries. Tim responded that tributary options would be limited to tributaries draining into the Priest Rapids project area. This is because the WQAP is specific to the project area. Pradeep added that at this stage they are only identifying the universe of potential options. Screening will occur later.

Melissa recommended that everyone review Table 6.6 in the TMDL (beginning on page 55). She said this table will come up repeatedly during the evaluation criteria process. She said members are welcome to ask her if they have questions regarding the table.

Members will review the universe of options and provide feedback and identify additional options for discussion during the April PRFF meeting.

Other Water Quality Items – No additional water quality items were discussed.

VI. White Sturgeon

White Sturgeon Hatching and Rearing – Tygh Schuster provided an update on the status of juvenile White Sturgeon at the Yakama Nation Sturgeon Facility. He said the fish are looking good and they continue to grow. Based on recent sampling, the current tank counts and average fish weights are as follows:

- Tank 1: 351 fish at 74.43 grams/fish
- Tank 2: 336 fish at 82.55 grams/fish
- Tank 3: 28 fish at 69.42 grams/fish
- Tank 4: 822 fish at 57.76 grams/fish
- Tank 5: 198 fish at 50.11 grams/fish
- Tank 6: 186 fish at 70.17 grams/fish

Tygh indicated that mortality rates are relatively low; however, some of the smaller fish (dinks) are dying.

Mike Clement stated that Grant PUD and the Yakama Nation plan to mark/tag and test for autopolyploidy during the week of 23 March. He expects it will only take 2-3 days to mark/tag and test the fish.

Other White Sturgeon Items – Mike Clement reported that Grant PUD is planning to collect broodstock for the White Sturgeon program during the last two weeks of May, depending on water temperatures.

VII. Pacific Lamprey

Juvenile Pacific Lamprey Survival Studies (joint meeting with the Rocky Reach Fish Forum) – Tracy Hillman reminded members that they had an action item from last month: members will be prepared to respond to the following questions posed by the Yakama Nation: (1) what difference in survival rates would change mitigation response? (2) why is salmonid-level standard error (SE) needed when the license does not require multi-year averaging or compliance testing? (3) what happens if salmonid-level SE is not achievable? and (4) what are appropriate and reasonable methodologies in the context of lamprey biology and feasibility? Tracy also reminded members that they previously supported survival studies conducted at the scale of the dams and the use of the Virtual Release/Dead-Fish Correction (ViRDCt) model. Tracy added that Ryan Harnish (PNNL) was unable to respond to the PRFF's following questions:

- Did PNNL estimate juvenile lamprey losses due to predation downstream from a dam?
- If so, how did PNNL estimate losses due to predation downstream from a dam?
- Would releasing live tagged juveniles below the dam (i.e., paired release) help estimate losses due to predation downstream from the dam?
- Does PNNL have thoughts on using predation tags inserted into the dead fish to estimate losses due to predation downstream from a dam?

Tracy asked each member to respond to the questions posed by the Yakama Nation last month. Ralph Lampman provided the YN responses during the meeting last month. What follows is a summary of responses from other members.

Grant PUD: Mike Clement stated that Grant PUD's position has not changed regarding SE, sample size, and source fish. Regarding the first question, they do not completely understand why we are asking what difference in survival would change mitigation response. He said the survival rate will affect the level of mitigation needed and to identify the mitigation level now is putting the cart before the horse. Regarding the second question, Mike said Grant PUD believes we do need a SE target and if there is no target, it will be difficult to identify an appropriate level of mitigation. For Grant PUD to identify possible mitigation, they want the survival estimate to have a high level of precision. Regarding the third question, Mike said Grant PUD's position is a SE target of 2.5%, which will require about 1,150 juvenile lamprey per project; thus, 2,300 juveniles will be needed to conduct a survival study in the project area. Mike said Grant PUD does not believe they will be able to capture and tag 2,300 actively migrating juvenile lamprey. He added that he will not place a million-dollar tag order without knowing for certain that there will be enough juvenile lamprey to conduct a valid survival study. Therefore, Grant PUD is not interested in doing a survival study unless it can be conducted correctly. As for the final question, Mike believes the PRFF can come to agreement on appropriate and reasonable methods based on feasibility and the biology of juvenile lamprey. He added that Grant PUD has been doing juvenile salmonid survival studies for over 30 years, and they know how to conduct valid survival studies. What is precluding a valid juvenile lamprey survival study is the lack of actively migrating juvenile lamprey.

Ralph commented that even if you set the SE target at 2.5% and achieve it during a survival study, that does not necessarily mean that the survival rate will not change from year to year. That is, in one year you may estimate a relatively high survival rate with a 2.5% SE, while the estimate in another year may be relatively low with a 2.5% SE. The first question is getting at the change in mitigation given survival rate differences. In other words, how would mitigation change if there were large or small changes in survival? Ralph added that at this time we need to understand the "big picture," which is to conduct a survival study and estimate overall survival rate through the dams and what routes they take through

the dams. He also recalled the need to identify a survival "buffer" if there is only a one-year study. Finally, Ralph noted that based on PNNL work, the sample size would be 300-500 juveniles per dam, not >1,000 pre dam. Ralph asked how the >1,000 sample size was estimated.

Mike responded that Dave Robichaud (LGL) conducted power analysis and sample size calculations based on PNNL data and using the ViRDCt model. He said the sample size was calculated based on estimating route-specific survival rates, as required in the Pacific Lamprey Management Plan. Because Dave's results are not consistent with PNNL's, members requested that Dave provide a short description or memo of his analyses. They also requested that he attend the next PRFF meeting to describe his analyses and results. This will help the PRFF better understand how many juveniles will be needed to conduct a valid survival study.

Umatilla: Pete McHugh commented that both lamprey and salmonids are equally important in terms of conservation and restoration. He pointed out that decades of research (using fyke nets, ballon tags, radio telemetry, hydro-acoustics, etc.) informed current salmonid survival studies. We do not have the benefit of decades of research on juvenile lamprey. Therefore, there will be some uncertainties associated with a juvenile lamprey study; however, we should not avoid conducting survival studies with juvenile lamprey just because we do not have decades of information to inform a study that will result in a highly precise survival estimate. We do have useful information from the PNNL studies, and it seems appropriate at this time to move forward with a study that does not require a small SE. Therefore, he agrees with Ralph that a survival study should not be set up with such a high-level of precision. A study conducted with less precision and perhaps fewer fish will provide useful information on juvenile lamprey passage and survival through the dams in the project area.

USFWS: Michael Lucid offered his thoughts based on the caveat that he is new to the hydropower world and may not fully understand all the nuances associated with dam survival studies. He believes juvenile survival rates will vary from year to year and may be greater than 10%. Therefore, the level of mitigation should be identified with this variation in mind. Regarding the second and third questions, Michael indicated that he agrees with previous comments on being flexible on setting a SE target. As stated previously, we do not have decades of information to inform the SE question; therefore, we should identify a possible target, which helps determine sample size, and not throw out the study if we do not achieve the predetermined SE. Although he appreciates Grant PUD's concerns, Michael agrees with Douglas PUD's approach of trying to achieve a SE of 5%. He added that results from a survival study, regardless of the SE, will be useful to the PRFF. Lastly, regarding question 4, Michael said he believes we can all agree on the methodology, but it will come down to whether we have enough fish to conduct the study.

WDFW: Laura Heironimus and Patrick Verhey echoed the thoughts of Pete, Michael, and Ralph. Laura reiterated her comment from meetings past that we will not be able to conduct the "perfect" study. However, as others have said, we have useful information from PNNL studies that will inform a juvenile survival study in the project area. She added that it will be useful to understand how Dave calculated sample size, because sample size and source fish appear to be the main issues within the group.

BIA: Steve Lewis said he agrees with what others (YN, Umatilla, USFWS, and WDFW) have offered. He asked whether there are enough fish available to conduct a study if the SE target was set at 5% rather than 2.5%. That is, could we capture 300-500 fish (600-1,000 fish for the entire project area) to do a study with a SE target of 5%, similar to what Douglas PUD is proposing? Ralph responded that he needs to update his source-fish spreadsheet, but he believes source fish can be collected from multiple locations upstream from the project area. He is confident that the sample size can be achieved if level 2 sources (downstream sources, e.g., from the Yakima River) are included in the study. The group will need to discuss whether all projects are evaluated in the same year or if there is a need to stagger the

studies because of potentially limited source fish. Ralph prefers the studies to be conducted in the same year but acknowledges that it may not be possible if there are not enough fish available.

Ecology: Melissa Peterson said she agrees with the responses by others. She likes the idea of a 5% SE target and believes it may be necessary to stagger the studies among the PUDs if source fish is an issue.

CTCR: Jason McLellan said he has the same thoughts as others.

Wanapum: Nathan Buck indicated that he is somewhat in line with Grant PUD. If a 2.5% SE target is not achievable, he thought a 3% SE target would be reasonable to consider.

As stated before, Laura would like to see all the survival studies conducted in the same year. However, based on Ralph's comment that studies may need to be staggered depending on available fish, she recommends that all the dams be wired to detect tagged juvenile lamprey released at locations upstream from the study area. That is, if survival studies are implemented upstream from the project area, Priest Rapids and Wanapum dams should be wired to detect those tagged fish even if Grant PUD is not releasing tagged fish in the project area. This will provide additional information on tagged lamprey moving through the system.

Mike Clement agreed to reach out to Dave Robachaud to see whether he can provide a summary of his power analyses and sample size calculations to the PRFF. In addition, Mike will see whether Dave can join the PRFF meeting in April to discuss his analysis. Tracy and Ralph will try to get Ryan Harnish to respond to the questions identified during the last meeting. Steve Lewis recommended that Dave also evaluate whether the release of 300 tagged juveniles at each of the projects in the same year would increase the precision of the survival estimate. Mike said he would discuss this with Dave.

Ralph noted that it may be more important at this time to estimate overall dam passage survival rather than try to estimate route-specific survival rates. Mike responded that Grant PUD's requirement is to estimate route-specific survival rates.

Ralph requested some time to discuss source fish. He asked Grant PUD to share what they are thinking regarding source fish for a juvenile survival study in the project area. Mike said Grant PUD would use juveniles collected within or upstream of the FERC project boundary. Collecting fish from any other location would violate one of the assumptions of the model. Thus, fish collected in tributaries or at mainstem dams upstream from the Priest Rapids project area could be used in a survival study provided they are actively migrating fish. Mike added that juveniles collected from downstream sources could be used in the dead-fish component of the study. That is, live fish must come from upstream sources, dead fish can come from anywhere.

Other Pacific Lamprey Items – No additional Pacific Lamprey items were discussed.

VIII. Administration

Mike Clement reported that Grant PUD sent out the draft 2025 White Sturgeon Management Plan Annual Report to the PRFF on 3 February. Comments are due to Mike by 5 March. He also noted that Grant PUD sent the draft 2025 Aquatic Invasive Species Control and Prevention Plan Annual Report to the PRFF on 11 February. Comments are due to Nate Dietrich by 1 April.

IX. Adjourn

With no additional business to discuss, Tracy Hillman adjourned the meeting at 11:30 am.

X. Next Meeting

The next meeting of the PRFF will be on Wednesday, 1 April 2026.

Attachment 1

Presentation by Grant PUD and Spheros on the Priest Rapids Water Quality Attainment Plan: Background and Process Overview

Roadmap

Welcome, Introductions, and Workshop Objectives

01 Temperature Total Maximum Daily Load (TMDL) Recap

02 Water Quality Attainment Plan (WQAP) Process

03 Priest Rapids Project Operations and Requirements

04 Potential Temperature Improvement Options

05 Next Steps

Introduction

Workshop Objectives

- Describe the purpose and need for the WQAP
- Outline the process for developing the WQAP
- Outline potential temperature improvement options and solicit Priest Rapids Fish Forum input

3

1

Columbia and Lower Snake Rivers Temperature TMDL

TMDL Recap

TMDL Overview

- TMDL area: mainstem Columbia in WA and OR, Lower Snake in WA
- Defines temperature targets using 0.3°C allowable heat load for June – October critical period
- Divides 0.3°C allowable heat load equally among three source categories
- Does not allocate heat loads to climate change, sources in Canada, or sources upstream of the boundaries in ID and Canada

Columbia and Lower Snake Rivers Temperature Total Maximum Daily Load

U.S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 155
Seattle, WA 98101-3188

August 13, 2021

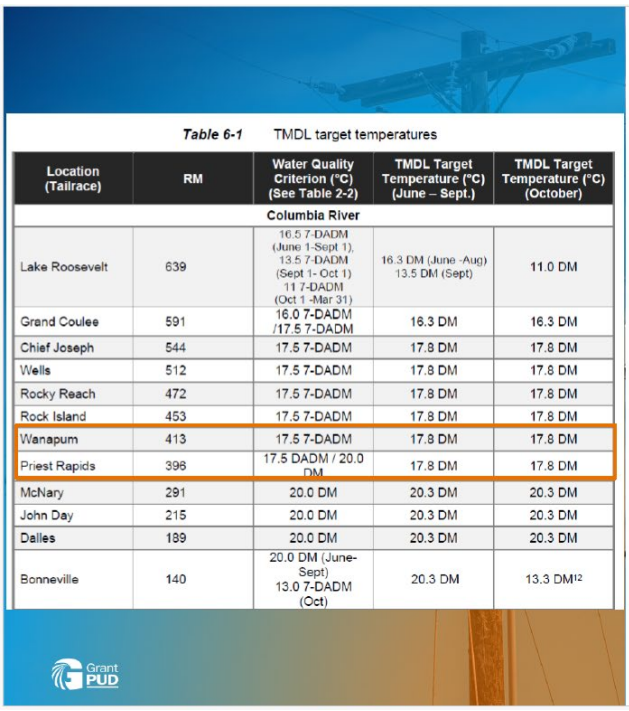


Table 6-1 TMDL target temperatures

Location (Tailrace)	RM	Water Quality Criterion (°C) (See Table 2-2)	TMDL Target Temperature (°C) (June – Sept.)	TMDL Target Temperature (°C) (October)
Columbia River				
Lake Roosevelt	639	16.5 7-DADM (June 1-Sept 1), 13.5 7-DADM (Sept 1- Oct 1) 11 7-DADM (Oct 1 -Mar 31)	16.3 DM (June -Aug) 13.5 DM (Sept)	11.0 DM
Grand Coulee	591	16.0 7-DADM /17.5 7-DADM	16.3 DM	16.3 DM
Chief Joseph	544	17.5 7-DADM	17.8 DM	17.8 DM
Wells	512	17.5 7-DADM	17.8 DM	17.8 DM
Rocky Reach	472	17.5 7-DADM	17.8 DM	17.8 DM
Rock Island	453	17.5 7-DADM	17.8 DM	17.8 DM
Wanapum	413	17.5 7-DADM	17.8 DM	17.8 DM
Priest Rapids	396	17.5 DADM / 20.0 DM	17.8 DM	17.8 DM
McNary	291	20.0 DM	20.3 DM	20.3 DM
John Day	215	20.0 DM	20.3 DM	20.3 DM
Dalles	189	20.0 DM	20.3 DM	20.3 DM
Bonneville	140	20.0 DM (June-Sept) 13.0 7-DADM (Oct)	20.3 DM	13.3 DM[12]

TMDL Recap

Temperature Targets

- TMDL sets temperature targets at each dam's tailrace
- Targets derived from water quality criterion and 0.3°C allowance
- At boundary for criteria, the more stringent criterion applies
- Target attainment requires all upstream sources to meet allocations

6

TMDL Recap

Heat Load Allocations

0.1°

NPDES Point Sources

Implemented via permit-specific wasteload allocations

0.1°

Tributaries

Implemented via 23 major tributaries remaining within 0.5° of natural condition

0.1°

Dam Impoundments

Implemented via WQAPs for each of the 15 dams in the TMDL area

7

2

WQAP Process

Regulatory Drivers

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: Joseph T. Kelliher, Chairman;
Suedeen G. Kelly, Marc Spitzer,
Philip D. Moeller, and Jon Wellinghoff.

Public Utility District No. 2 of Grant County, Washington — Project No. 2114-116

ORDER ISSUING NEW LICENSE

(Issued April 17, 2008)

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

IN THE MATTER OF GRANTING A WATER QUALITY CERTIFICATION to: Public Utility District No. 2 of Grant County, Washington in accordance with 33 USC 1341 (FWPCA section 401), RCW 90.48.260 and WAC 173.201A

ORDER NO. 4219 Relicensing of the Priest Rapids Hydroelectric Project (FERC No. 2114) on the Columbia River, Grant County, Washington

Columbia and Lower Snake Rivers Temperature Total Maximum Daily Load

WAC 173-201A-510 Means of implementation.
(5) Compliance schedules for dams

Process & Objectives

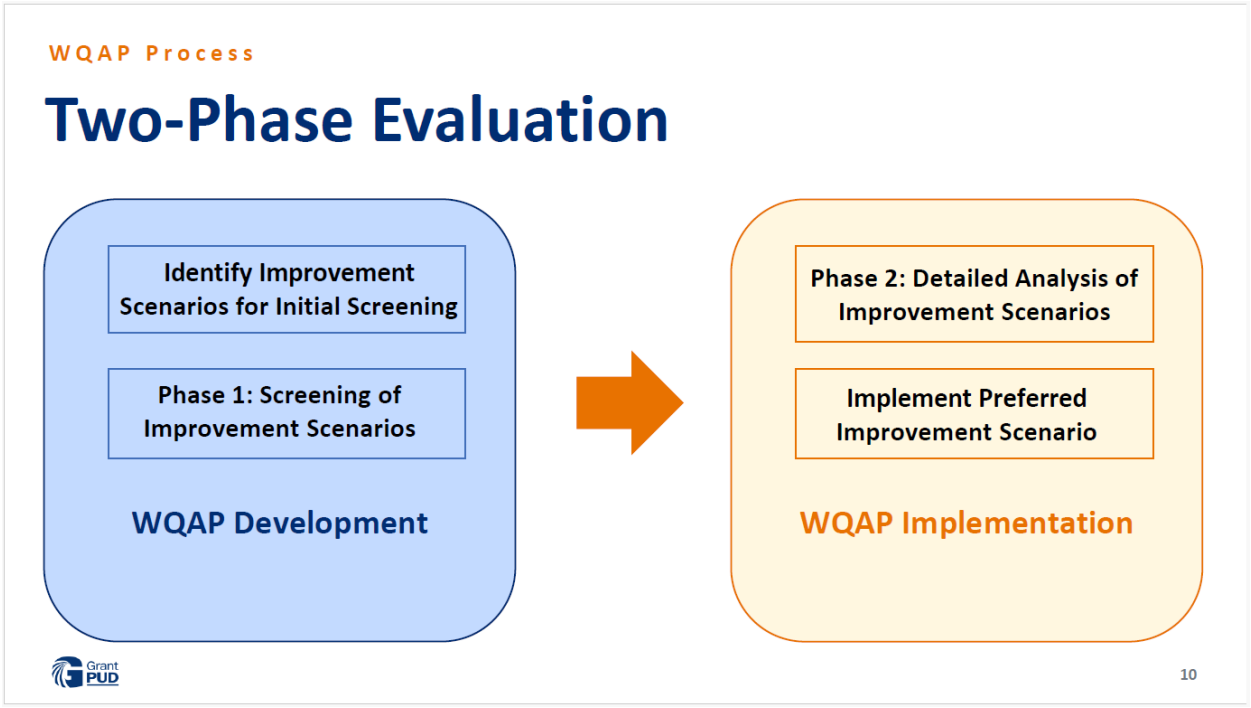
Consider a range of temperature improvement options

↓

Identify reasonable and feasible temperature improvements

↓

Address the Project's heat contribution


WQAP Process
Two-Phase Evaluation
Identify Improvement Scenarios for Initial Screening
Phase 1: Screening of Improvement Scenarios
WQAP Development
Phase 2: Detailed Analysis of Improvement Scenarios
Implement Preferred Improvement Scenario
WQAP Implementation
10


3
Priest Rapids Project Operations and Requirements

Project Operations and Requirements

Key Project Considerations

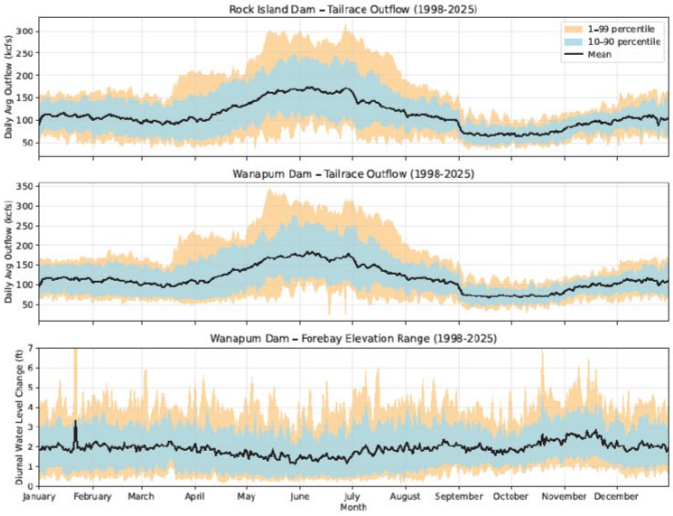
- Operational (e.g., normal pool elevations, functional elevations for existing structures)
- Safety
- Recreational
- Cultural
- Fish passage (e.g., ladders and bypass)
- Previous modeling (i.e., Perkins et al. 2002, NHC 2016)

Grant PUD

12

Project Operations and Requirements

Wanapum Flows and Water Level Changes



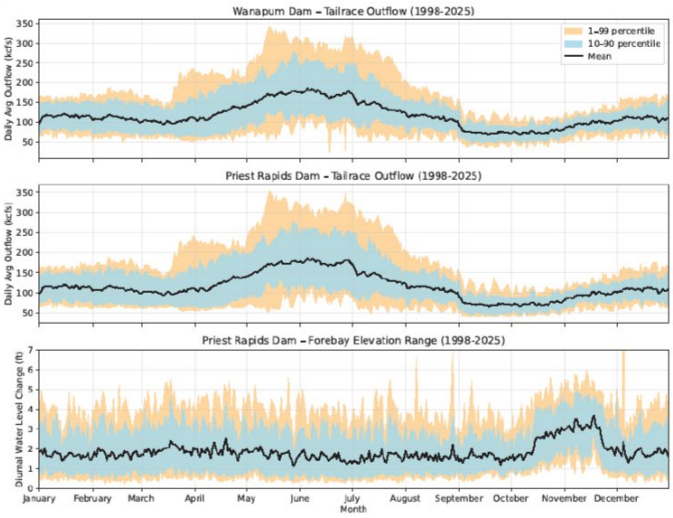
Data Source:
Columbia River DART

Grant PUD

13

Project Operations and Requirements

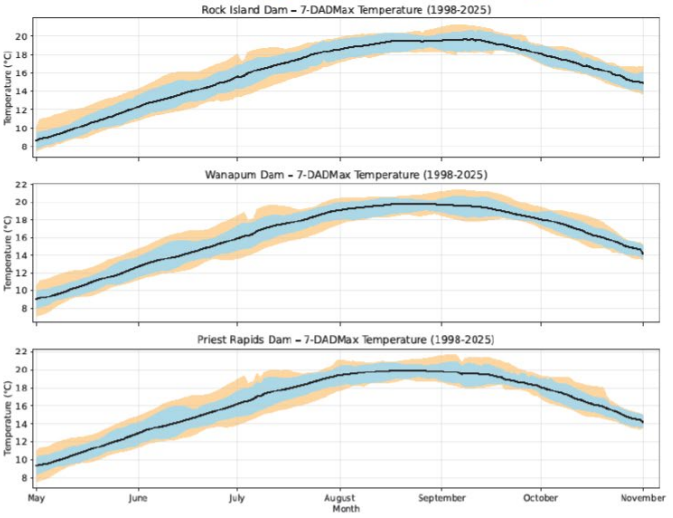
Priest Rapids Flows and Water Level Changes



Data Source:
Columbia River DART

Project Operations and Requirements

Temperatures through the Project



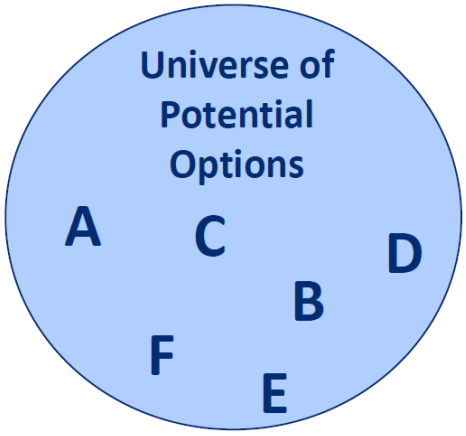
Data Source:
Columbia River DART

4

Potential Temperature Improvement Options

Initial Notes

- The following lists of potential options are intended as a starting point for evaluation
- These options have not been assessed for temperature benefit or feasibility in the context of the Priest Rapids Project



Potential Temperature Improvement Options

Operational Options

- Pool Elevation Flexibility
- Operate at Minimum Operating Pool

Aim to change reservoir heat loading and thermal dynamics

Grant PUD

18

Potential Temperature Improvement Options

Structural Options

- Selective Withdrawal Structure
- Temperature Curtain
- Low Level Outlet
- Forebay Mixing Enhancement
- Fishway Temperature Enhancement

Typically used in thermally stratified reservoirs

Grant PUD

19

Potential Temperature Improvement Options

In-River Options

- On-Reservoir Shade Structures
  - Aim to reduce solar heating
- Evaporative Cooling Towers
- Mechanical Chillers

Perform best with suitable meteorological conditions and energy requirements

Grant PUD

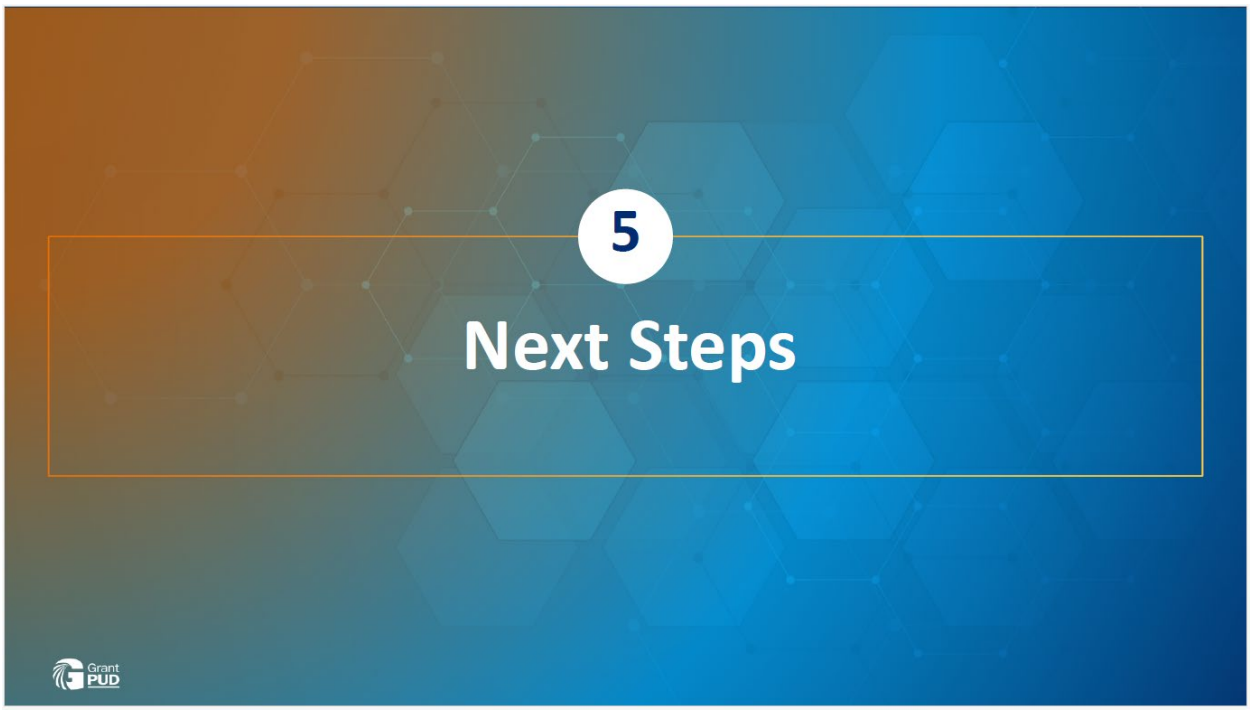
Potential Temperature Improvement Options

Riparian and Hyporheic Options

- Riparian Planting/Shoreline Restoration
- Managed Aquifer Recharge
- Tributary Enhancement

Aim to reduce solar heating and promote cold water refugia

Grant PUD



Next Steps

Feedback

- Comments on options presented today
- Additional options to consider

Screening

Later Meeting

- Review available screening results

23


Questions?
Grant PUD
Powering our way of life.


Thank You
Grant PUD
Powering our way of life.