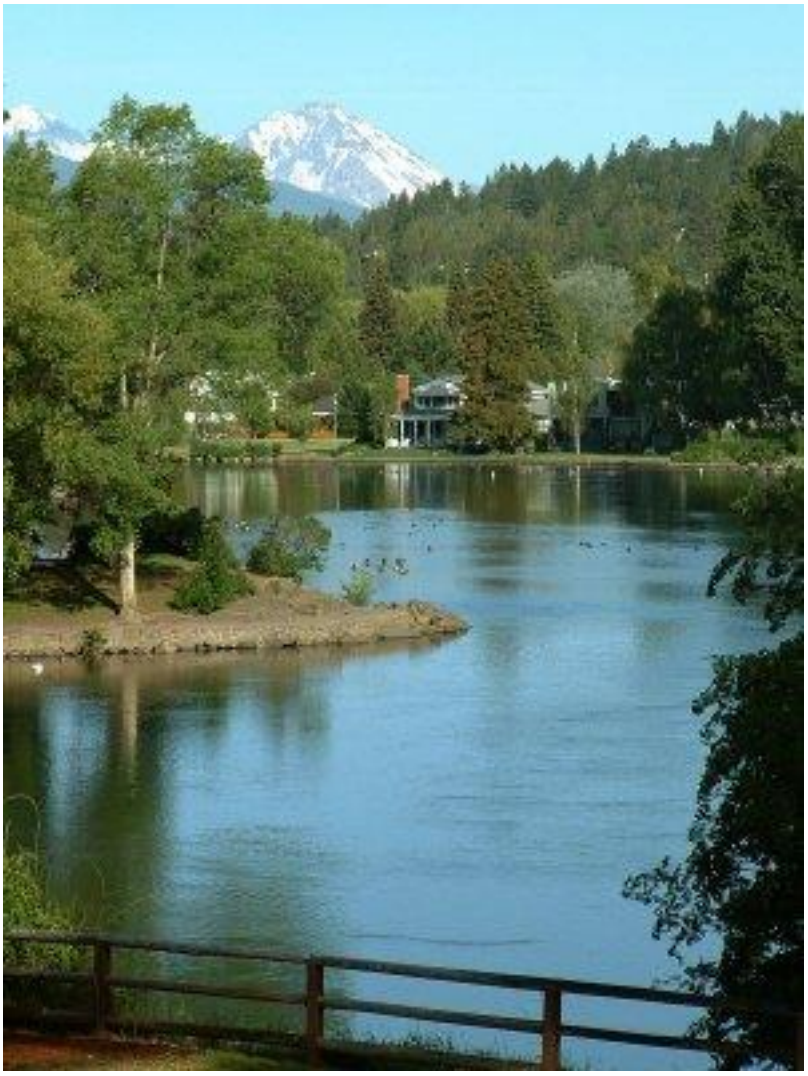

Mirror Pond Fish Passage Advisory Committee

OVERVIEW

This document summarizes the objectives, process, and recommendations of the Mirror Pond Fish Passage Advisory Committee's work from May 2021 – June 2023.

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Mirror Pond Fish Passage Advisory Committee: Final Report

PURPOSE

The Mirror Pond Fish Passage Advisory Committee (Committee) was commissioned jointly by The City of Bend and Bend Parks and Recreation District for the purpose of recommending a preferred fish passage option at the Newport Dam, located on the Deschutes River.

MEMBERSHIP

The Committee was comprised of diverse stakeholder viewpoints with the express intention of ensuring representation of a broad range of public values. Participants were selected for a range of organizations with expertise, interest, and governance authority related to fish passage around the Newport Dam. This included:

- The Bend Parks and Recreation District,
- The City of Bend,
- The Oregon Department of Fish and Wildlife,
- Pacific Power,
- Trout Unlimited, and
- The Upper Deschutes Watershed Council.

The United States Fish and Wildlife Service provided technical support and participated in a non-voting capacity. City Manager of Bend, Eric King, and BPRD Executive Director, Don Horton, served as conveners of the process, providing as-needed input and support throughout the process. (For details on Committee membership see Appendix A.)

PROCESS

Prior to launching the Committee, the facilitator interviewed Committee members to identify their values and ideal outcomes from the process. Committee members cited the following themes as guideposts to ensuring a quality outcome to the process:

- Affordable; available funding sources
- Effective fish passage
- Ecological enhancement of the river
- Fiduciary responsibility
- Fish screening
- Public input
- Public safety and use
- Select an option that makes sense regardless of whether/not the dam remains

For a full list of Committee members' interests see Appendix B. For a timeline of the full process, see Appendix C.

Phase 1 (May 2021 – February 2022)

Phase 1 of the Mirror Pond Fish Passage process engaged Committee members in learning about potentially viable fish passage options. A range of technical experts presented examples of fish passage options and discussed the benefits and drawbacks of each. The Committee visited Newport Dam to view the location in question and associated physical constraints. They also viewed the North Canal Dam to view a nearby example of functioning fish ladder. This process familiarized the Committee with important variables, including: details of the Newport Dam site, pros and cons of various fish passage structures, and design variables that enhance the effectiveness of fish passage.

Public input and outreach were conducted throughout Phase 1 in serval ways. First, all meetings were announced to the public 2 weeks before they were held. Public input was solicited at the end of each meeting. One interested stakeholder, the Bend Paddle Trail Alliance, made a presentation to the Committee to share thoughts on inclusion of human passage to the fish passage discussion. A website was developed and hosted by the Central Oregon Intergovernmental Council (COIC) where agendas, notes, and videos of the public meetings were made available.

Over a series of four meetings, the Committee developed a list of objectives they hoped to maximize with the preferred fish passage structure. These objectives were very general, and the need for specific, detailed information to inform the final decision was flagged and the Committee requested that a high-level analysis be completed to support their recommendations.

Pacific Power agreed to match $10K provided by Bend Parks and Recreation District for this purpose. The Upper Deschutes Watershed Council secured additional funding and at the request of the Committee, River Design Group was procured to complete an analysis of three fish passage options: a traditional fish ladder, a nature-like fish way, and a partial-spanning rock ramp. Later, a fourth option, a full-spanning rock ramp, was added to the list. The Committee paused for the summer months while River Design Group, , an engineering firm with expertise in fish passage construction, completed this analysis. Please see the schematics and report completed by River Design Group for a detailed overview of the four fish passage options considered. See Appendix G for more details.

Phase 2 (March 2022 – April 2023)

During the spring and summer of 2022, River Design Group completed a high-level analysis of the four fish passage options under consideration by the Committee. In the fall of 2022, the Committee convened to review the analysis. They also reviewed their initial objectives and, informed with detailed information, finalize the content of a 'discussion tool' identified specific,

measurable criteria by which key objectives could be evaluated. See Appendix D for more details.

Discussion Tool

This discussion tool was developed using the Structured Decision Model (SDM), an approach that organizes highly complex natural resource decisions into a framework that compares each alternative to the Committee's primary objectives and assesses the relative trade-offs of each. The tool does not provide an 'answer' or make the decision; rather, it offers a robust framework for comparing each fish passage alternative regarding the degree to which it meets the primary objectives.

The Committee prioritized the following objectives, which are explained in more detail in Appendix D:

- Effective fish passage
- Dam safety and hydroelectric operations
- Public safety and security
- Total cost
- Social and aesthetic considerations

Each objective was defined and measurable criteria for each were further identified. Experts in each topic area worked with River Design Group to assign each criteria a rating of:

- (+) alternative meets criteria and is superior to other alternatives
- (0) alternative meets criteria and is equal to other alternatives
- (-) alternative does not meet criteria

These ratings were only comparable across an individual criterion. For example, the criterion of "effectively passes all aquatic organisms" only offers a means of comparing the relative effectiveness of the fish passage, nature-like fishway, and rock ramp options in providing aquatic passage for organisms; ratings (-, 0, +) for this criterion are not comparable to the ratings of any other criterion, such as 'monitoring of fish'. The opportunity created by the discussion tool is for the Committee and the broader public to better understand the consequences and trade-offs of selecting any one fish passage option relative to other available options.

Ratings for each criterion were developed via consultation between River Design Group and Advisory Committee members with the most expertise in that particular topic. Oregon Department of Fish and Wildlife along with the United States Fish and Wildlife Service reviewed "effective fish passage" and assigned ratings to each criterion. Pacific Power did the same for 'dam safety and hydroelectric operations.' River Design Group provided ratings for 'public safety and security' as well as 'total cost.' Then the Committee as a whole reviewed and discussed the rationale behind each rating, asked questions, and modified the assessment, as decided by group consensus.

The Committee reviewed the 'social and aesthetic considerations,' ultimately recognizing that these were highly subjective and thus it wasn't possible to assign a meaningful rating to these criteria. Due to uncertainty regarding ongoing maintenance costs and episodic maintenance costs, these criteria were also dropped out of the discussion tool.

A summary of the final ratings of each criterion and an overview of the discussion tool are included in Appendix D.

Public Input

In addition to regular meeting notices, solicitation of public input at each Committee meeting, and updates to the COIC webpage, a public meeting was hosted in January of 2023 at the Eastside Bend Library. Over fifty members of the public attended the meeting and heard a presentation about the scope of the project, Committee process, and fish passage alternatives being considered. After a lengthy question and answer period, members of the public were encouraged to rotate through poster displays of the various fish passage options, ask questions and provide input. A survey was distributed at the meeting to solicit put input. The same form was made available online.

Public input was summarized and presented to the Committee at their next meeting in February. See Appendix E for a summary of public comments.

SCOPE OF THE DECISION

A major challenge for this process included clarifying and confirming the scope of the final decision. As with most natural resource decisions, selecting a preferred fish passage method was not a discrete, separate issue. This decision was inherently tied to many other variables that were difficult to disentangle from each other. Natural resource decisions frequently present like Russian nesting dolls, with one decision intrinsically nested within a series of related choices. The Committee grappled with a wide range of interrelated topics including:

- Future of the Dam: Although Pacific Power repeatedly confirmed it plans to retain the Newport Dam, concerns about the future of the dam remained. The Committee strove to ensure that any future investment in fish passage would be a wise investment whether or not the dam remained in place. This objective significantly informed the final recommendation--which has the most potential to remain viable with or without the dam present.

- Funding Sources: The Committee explored a range of options for funding the fish passage. Their interest was in ensuring their recommended fish passage option would not limit or constrain future funding potential. No designs were flagged as 'un-fundable.'

- Wise Investment: The Committee was very committed to ensuring that any money invested in fish passage would be a wise investment. As part of this discussion, the

Committee strove to quantify costs associated with maintenance, operation, repair if needed after a high-water event, and liability. Answers to these questions require more detailed design specifics and thus were finally set aside.

- Operations and Maintenance: Once fish passage is installed, some maintenance will be required and some organization will need to agree to own and maintain the structure. The Committee explored potential owners, however, without additional details it is unreasonable to expect any entity to agree to taking on this obligation. Answers to these questions will be more feasible once a more detailed design complete.

- Access and Easements: Depending on the location of the fish passage, an easement may be needed to ensure access through private property to install and maintain the fish passage structure. Don Horton made initial inquiries with adjacent landowners. He reported positive responses from those he contacted. While details of easements and access would need to be worked through, no barrier or obstacle were flagged at this stage.

- Water Flow: In order for fish passage to be effective, a minimum volume of water is required to flow through the structure. Attraction flows for fish are typically calculated as a percentage of the total flow, which varies throughout the year with seasonal changes in the river. Pacific Power has a right to all the flow, but is open to providing water for fish passage. An amount of 55cfs was discussed, then tabled since specifics will depend on site- and design-specific details. There is an interest in exploring an agreement with a range rather than a specific upper limit of flow to allow for seasonal flexibility.

- Fish 'Fall Back' Mortality and Screening: With fish passage comes the potential for fish to swim up-stream and then flow back downstream through the turbines, perhaps multiple times. In fact, monitoring of fish movement at the North Canal Dam indicated some fish seem to enjoy this 'chutes and ladders' experience, according to ODFW. The Committee had questions regarding how to minimize 'fall back' through the dam's turbines. Options could include locating the fish passage exit as far away from the dam turbines as possible. The use of bubblers or screens were also discussed. These considerations are being forwarded to the design committee for consideration at that time.

The Committee's discussion of these issues lays solid groundwork for next steps toward funding and implementation. The robust, holistic nature of the Committee's exploration ensured that the recommendation made is as viable as possible at this early stage in planning. The Committee agreed that the above variables are outside the scope of recommending a preferred fish passage option, so they set these questions aside. Details regarding these variables are highlighted in the final recommendation letter to the City of Bend and Bend Parks and Recreation District, with the understanding that these issues will be addressed during the next phase of the project.

RECOMMENDATION

After this lengthy and detailed process, the Committee reviewed:

- Their initial values and objectives (Appendix B)
- The criteria within the Discussion Tool matrix (Appendix D),
- The public input (Appendix E), and
- The report developed by River Design Group (Appendix G).

Each Committee member shared their top preference for a fish passage option and explained why they identified that option as the most viable. This discussion spanned two separate Committee meetings. At the end of that discussion, committee members unanimously selected the Nature-like fishway as their top choice because it:

- Provides effective fish passage.
- Provides passage for other aquatic organisms as well as for fish (unlike the traditional fish ladder).
- Does not interfere with dam maintenance or dam inspection activities (unlike the rock ramp options).
- Demonstrates a higher likelihood of ensuring public safety and security than either of the rock ramp options.
- Has a smaller foot-print than either of the rock ramp options.
- Is considered more aesthetically pleasing than a traditional fish ladder.
- May be more easily engineered into subsequent 'natural riverscape' in the event of dam decommissioning, in keeping with the 2015 community vision.
- Is the most cost effective of all options, especially compared to the two rock ramp options.

The Committee identified a traditional fish ladder as the second-best fish passage option of those considered. It was identified as less desirable because:

- It may be less aesthetically pleasing than a nature-like fish way.
- It would be more difficult to integrate into a 'natural riverscape.'

The Committee felt it was important to identify a second-best option in case some unforeseen and insurmountable roadblock emerges during the design and implementation of the nature-like fishway. They highlighted that the fish ladder is a "distant second" to the preferred nature-like fishway, but also emphasized that if unanticipated and intractable problems with the nature-like fishway arise, they recommend proceeding with the traditional fish ladder to ensure fish passage provided in a timely way.

ADDITIONAL CONSIDERATIONS

The Mirror Pond Fish Passage Advisory Committee offers the following further recommendations to the City and BPRD in support of maintaining the momentum built by this process to ensure that this important project moves forward expeditiously. The Committee recommends identifying and immediately authorizing a subset of the existing Committee to undertake the following activities:

- Raise funds to pay for the design and the implementation of the fish passage.
- Coordinate with technical experts to design the fish passage.
- Clarify additional details and information to ensure the success of this phase of design, including:
  - *Easements*: Clarify whether easements will be necessary to build the project.
  - *Ownership & Maintenance*: Clarify who will own and maintain the fish passage. As needed, secure an agreement that the owner will maintain the structure for a minimum of 10 years.
  - *Flow*: Clarify the amount of flow that will be routed through the fish passage. Explore options for allowing variable flow.
  - *Maximize Downstream Fish Passage Effectiveness*: design phase should consider concerns about downstream fish passage such as "fallback" and migration of native fish. For example, can these concerns be addressed by location of passage, amount of flow through nature-like fishway or by exploring the use of technologies such as bubblers, automated screening, or other approaches to improve downstream passage.
- Once fish passage is in place, collect data on fish passage effectiveness. As needed, explore measures to increase the effectiveness of upstream and downstream passage.

Given their expertise and decision-making authority, the Committee recommends this subset include: BPRD, the City of Bend, Pacific Power, the Upper Deschutes Watershed Council, River Design Group, Oregon Department of Fish and Wildlife, the United States Fish and Wildlife Service, and Trout Unlimited. This does not preclude inclusion of additional members.

It is the Committee's hope that fundraising for design purposes can start immediately and that design efforts may begin as early as the fall of 2023. The letter of recommendation is included in Appendix F.

CONCLUSION

After in-depth consideration of the social, ecological, and economic implications of the decision, the Mirror Pond Fish Passage Advisory Committee recommends a nature-like fishway as the preferred approach to fish passage at the Newport Dam site. If some unforeseen problem arises with this design, the traditional fish ladder is their 'distant second' recommendation. Timely provision of fish passage at this site is a priority. Toward this end, the Committee supports prompt authorization of a next-step effort led by a subset of this Committee with the purpose of

securing funding for design and implementation, addressing the variables and considerations outlined above, and championing completion of the vision described by this Committee as well as the goal of fish passage identified in the Community Vision of 2015.

ACKNOWLEGEMENT

The members of the Mirror Pond Fish Passage Advisory Committee worked tirelessly, devoting hundreds of hours to meetings, analysis, community-outreach, and thoughtful discussion. These dedicated individuals working on behalf of the central Oregon community as well as the leadership of Bend Parks and Recreation District and the City of Bend made this complex and challenging work possible.

The City of Bend provided funding for facilitation and coordination of the Committee. Bend Parks and Recreation District, Pacific Power, and the Upper Deschutes Watershed Council provided funding to procure technical support from River Design Group. Staff support was provided by the Central Oregon Intergovernmental Council and an independent consultant, Vernita Ediger.

Appendix A
Advisory Committee Composition

Advisory Committee Members

The AC was comprised of a suite of diverse stakeholder view points for the purpose of ensuring that consideration was given to the full breadth of public concerns. Those present represented organizations, each organization representing one vote. Thus organizations with multiple participants were not over represented in the final decision.

AC members included (listed alphabetically):

- Bend Parks and Recreation District, Nathan Hovekamp, Board Vice-chair
- City of Bend, represented by Gena Goodman Campbell, City Counselor
- Oregon Department of Fish and Wildlife, represented over the course of the decision by:
  - Eric Moberly, Assistant District Fish Biologist
  - Alan Ritchey, Fish Screening and Passage Program Manager
  - Jerry George, District Fish Biologist
- Pacific Power, represented by:
  - Matt Chancellor, Regional Business Manager
  - Peter Martins, Director of Civil Engineering and Dam Safety
- Trout Unlimited, represented by Mike Tripp
- Upper Deschutes Watershed Council, represented by Kris Knight, Executive Director

Technical Advisors to the Committee

Organizations that contributed to the discussion but were not formally part of the decision process include:

- United States Fish and Wildlife Service, represented by Dirk Renner, biologist

Conveners of the Process

Conveners who observed the process and provided as-needed support but were not voting members on the AC were:

- Bend Parks and Recreation District, represented by Don Horton, Executive Director
- The City of Bend, represented by Eric King, City Manager

Appendix B:
Mirror Pond Advisory Committee Desired Outcomes

Outcome Interests

- Affordable; available funding sources
- Effective fish passage
- Ecological enhancement of the river
- Fiduciary responsibility
- Fish screening
- Public input
- Public safety and use
- Select an option that makes sense regardless of whether/not the dam remains

Process Interests

- Frank and respectful conversation
- Invite public input
- Solicit technical assistance
- Develop a recommendation that is practical

Goals from the Vision:

- Retain Mirror Pond in near historic form
- Modify the dam to function more like a river
- Enhance habitat
- Enable fish passage
- Maintain or improve public spaces
- Reduce the frequency and quantity of future sediment removal efforts
- Identify funding source(s) other than tax dollars
- Build a public/private Partnership

Appendix C

Timeline: Mirror Pond Fish Passage Advisory Committee

Phase 1

Meeting 1: Interests, Concerns, and Plans (May 26, 2021)

Primary Objectives: Clarify scope of work as well as Advisory Committee's interests and concerns. Develop group structure and process needed for success. Set-up homework for meeting 2 success.

- Introduce and contextualize the effort
- Describe roles, responsibilities, and scope of work
- Advisory Committee Members share interests and concerns
- Group Agrees on:
  - Decision-making process
  - Technical advisors to invite
  - Outline for future meetings (to be updated as needed)
- Homework: Send relevant information regarding criteria for selecting fish passage to Ciara

Meeting 2: Criteria & Technical Experts (June 23, 2021)

- Check-in on group agreements: communication
- Update on process for the group
- High-level overview of fish passage options and examples
- Group discussion: refine/clarify interests and values, identify questions
- Fish passage 101 (time pending)
- Decision-making protocol (time pending)

Meeting 3: Field Trip (Aug 12, 2021)

- Tour of Newport/Mirror Pond Dam
  - Identify key site variables at Newport Dam
  - Discuss key variables to keep in mind for effective fish passage here
- Visit the North Canal Dam and view fish passage option
  - Discuss key variables to keep in mind for effective fish passage here
  - What can we learn about this fish passage example that informs our Mirror Pond work

Meeting 4: Design Criteria and Other Variables (Aug 25, 2021)

- Brief Review/Context:
  - Review interests and concerns
  - Review what we learned about fish passage options from Technical Experts
  - Discuss/Review what we learned about the Newport Dam Site:
    - Flow, variability, siltation, etc.
    - Viable options at the site
    - General sense of committee member preferences

- Begin developing criteria for fish passage selection: (develop a straw-man document for group discussion)
  - What makes for effective fish passage?
  - What are the specific site considerations to take into account?
  - What other issues should be taken into consideration? What else do we need to know?
- Discussion options for Weighing Variables: Weighted Matrix, etc.
  - What decision-making process will the group use?

Meeting 5: Continued Design Criteria and Other Variables (Sept 22, 2021)

- Utilize a refined matrix to discuss pros, cons and specifics
- Identify outstanding questions of Committee Members and discussion points
- Can we make a recommendation?

Secure Funding ($30-$50K) for Technical Input and Secure Technical Input

- Secure funding ($20K committed)
- Procure engineering firm—including SOW development
- Secure technical input: report and engagement with engineer

Phase 2:

Review of Technical Report, Solicitation on Public Input, Final Recommendation

Meeting 1: Presentation of Technical Report (Nov 7, 2022)

- Engineering firm provides an in-depth review of 3 fish passage options and assessment of the pros/cons of each, using the Advisory Committee's established criteria
- Advisory Committee members ask questions for clarification and understanding
- Members of the public are invited to comment and encouraged to review the documents and come to the public input and open house to enhance their understanding and provide additional input.

Meeting 2: Advisory Committee Discussion (December 15, 2022)

- Review and confirmation of the decision-criteria
- Review and confirmation of process and next-steps
- Q&A session of the Advisory Committee with the engineering firm
- Advisory Committee members ask questions for clarification and understanding
- Members of the public are invited to comment and encouraged to review the documents and come to the public input and open house to enhance their understanding and provide additional input.

Meeting 3: Public Input and Open House (Jan 30, 2023)

- Location: Bend Public Library, East Side *(in-person)*
- *First hour presentation and Q&A with the Public*
  - Vernita: Frame the scope/purpose for the public; clarify how public input will be used
  - Vernita: Share the timeline and process; include process for public input

  - Advisory Committee: Introduction of self and their role in the process
  - Scott: Give presentation
  - Q&A with public
- *Second hour*: Open House
  - Posters with illustrative graphics & info to provide clarity
    - Posters include information about the decision scope, process, and policy side-bars, as well as next-steps beyond the recommendation development.
    - Public to move through displays on their own time.
    - River Design to circulate through to answer questions.
    - Our staff to man displays to capture public input
    - Advisory Committee members to listen to public input and engage in conversation
  - Public input will be solicited at the event via paper and online forms
- Online:
  - Visual information will be posted online
  - Record the event
  - Public information will be solicited online via form

Synthesis of Public Comments

Between sessions public comments and questions will be synthesized and shared

Meeting 4: Review Public Comment & Fill in Discussion Tool (February 16, 2023)

- Share synthesis of public input/questions
- Advisory Committee asks River Design Group questions
- AC reviews engineering firm's assessment of discussion tool criteria
- AC fills in the remainder of the discussion tool together assessing each criterium
- Round robin assessment of individual preferences and concerns

Meeting 5: Committee Discussion (March 24, 2023)

- Q&A with River Design Group
- Review of Discussion Tool
- Discussion of key variables organized via the PRES model (Vernita to explain)
- Check-in to assess level of agreement –agreement possible?

Meeting 6: Committee Recommendation (March 28, 2023)

- Brief reference to Discussion Tool
- Round robin assessment of individual preferences and concerns
- Recommendation

Follow-up

- Media follow-up Immediately After Recommendation
- Draft report on the process
- Formally Present to City/BPRD (June 14, 2023)

Appendix D
Discussion Tool

Appendix D
DISCUSSION TOOL

Overview of Discussion Tool

Constraints and Purpose: This tool is designed to support a conversation about the preferred fish passage option. It is **NOT** designed to generate a decision. Each alternative provides some desirable and some undesirable trade-offs. The purpose of this matrix is to outline those trade-offs as best as possible, given the many unknowns that are inherent in this recommendation process. Those elements that fall outside the Advisory Committee's charge (to recommend a preferred fish passage option) will be highlighted—and clearly identified as outside of the recommendation process

First Step on the Recommendation Process: Fill in the Matrix
Purpose: To the degree possible, understand the trade-offs associated with each fish passage option.
Purpose: To ground the Advisory Committee's recommendation in the criteria the committee has identifies as import.
Step 1:

- Engineering firm will complete sections of the matrix relevant to its expertise. Engineering firm will secure input from entities with expertise on relevant sections:
    - IE: Fish passage: ODFW and FWS
    - IE: Dam safety and hydroelectric production: Pacific Power and Oregon Department of Water Resources
- Assessment will use the following approach:
    - (+) alternative meets criteria and is superior to other alternatives
    - (0) alternative meets criteria and is equal to other alternatives
    - (-) alternative does not meet criteria

Step 2:

- Collectively, Advisory Committee members will review the information provided
- Collectively, Advisory Committee members will discuss and assess the remaining metrics:
- When done, review all criteria under each heading and use the same system to assign +, 0, of – to the overall category (effective fish passage, fiscal responsibility, etc). These will be assigned a correlating color to make evaluations visually: red (not desirable) yellow (neutral) green (desirable)

Second Step of the Recommendation Process: Discussion and Decision

- Advisory Committee members will discuss the trade-offs associated with each fish passage option
- A consensus process will be used to identify the recommended fish passage alternative

Consideration	Fish Ladder	Nature-like Fishway	Partial-Spanning Rock Ramp	Full-Spanning Rock Ramp
A. EFFECTIVE FISH PASSAGE Design maximizes the viability of upstream- and down-stream fish and aquatic organism passage across a broad range of water flows.				
• **Meets state and federal standards for passage:** Minimum required or this project	0	0	0	0
• **Effectively passes all aquatic organisms** upstream and/or downstream	-	0	0	0
• **Takes into account potential future scenarios** (stream flows and potentially other species that may become concerns (lamprey, inverts, amphibians)	-	0/-	0	0
• **Fish passage location:** Location is desirable from perspective of attractant flows	0	0	0/+	+
• **Reduced Need for Screening:** Location of alternative reduces the likelihood of fish mortality as a result of "fallback" or juvenile fish movement through the unscreened hydro-facility	0	0	0	0
• **Provides passage at a broad range of stream flows:** Considers future climate conditions and need for variable attractant flows given different water availability and power generation needs.	0	0/+	0/+	0/+
• **Effective into the foreseeable future:** Fish passage will remain effective even if ownership at the site changes, power is no longer generated at the site.	0/-	0/-	0/+	0/+
• **Monitoring of Fish:** Alternative allows access for ODFW to monitor effectiveness of fish passage	+	0	0	0

B. Dam Safety & Hydroelectric Operations Design does not negatively impact dam safety or hydroelectric operations	**Fish Ladder**	**Nature-like Fishway**	**Partial-Spanning Rock Ramp**	**Full-Spanning Rock Ramp**
• **Hydro-Facility's Operation Costs:** Alternative does not impact the cost of operating the hyrdo-facility nor energy generation beyond the loss of up to XX - XX CFS of water	0	0	-	-
• **Dam Maintenance**: Alternative does not impede/block maintenance work to the existing dam structure and does not increase the cost of maintaining the existing dam structure.	0	0	-	-
• **Dam Inspection:** Alternative allows inspection of the crib and other dam structures	0	0	-	-
C. PUBLIC SAFETY & SECURITY Risk to public safety is as low as possible				
• **Security:** Alternative can be separated via a fence or other security measure to prevent public from accessing the dam.	+	0	-	-
• **Public Safety & Unauthorized Public Use**: Alternative does not present a perceived public recreational amenity and thus does not attract unauthorized public use.	+	0	-	-
• **Floodflow Routing:** Alternative does not increase the upstream or downstream elevation of the water surface under any flood flow event.	+	0	-	-
• **State Regulations:** Alternative meets state dam safety regulations (must meet dam safety regulations; meeting dam safety regs may be expensive)	0	0	-	-

D. TOTAL COST Total cost of alternative including initial capital and ongoing operation and maintenance costs	**Fish Ladder**	**Nature-like Fishway**	**Partial-Spanning Rock Ramp**	**Full-Spanning Rock Ramp**
• **Capital Cost:** Expense for building and installing the alternative in 2023 dollars. (+= lowest, 0= middling, - = highest)	0	+	-	-
• **Ongoing Maintenance Costs:** Alternative's expected regular maintenance cost (+= lowest, 0= middling, - = highest)				
• **Episodic Maintenance Costs:** Unanticipated maintenance costs as a result of episodic waterflow events (+= lowest, 0= middling, - = highest)				
E. Social & Aesthetic Considerations Additional elements of importance to the community	**Fish Ladder**	**Nature-like Fishway**	**Partial-Spanning Rock Ramp**	**Full-Spanning Rock Ramp**
• **Aesthetics/Viewscape:** The alternative is aesthetically pleasing to the neighbors and larger community—subjective/opportunity to mitigate				
• **Alignment with 2015 Community Vision**: The alternative aligns with the Mirror Pond Vision to "modify the dam to function more like a river" while also "retaining Mirror Pond in near historic form"				

Appendix E
Public Input

Summary of Public Input

Effective Fish Passage:

- Suggestion to remove the dam
- Select the most effective passage regardless of cost
- Effective fish passage should consider passing multiple fish/aquatic species
- It is vital to ensure there will be adequate water to attract fish for up- and down-stream migration
- Add a VAKI camera to the concrete fish ladder to provide information on fish passage usage (Example: Opal Springs fish ladder)
- Concern about investing in fish passage given Pacific Power's ability to divest of the dam.

Expressed Preference for Alternatives:

- Partial-spanning rock ramp
- Preference for Full-spanning Rock Ramp
  - Concerned about low flows and high temperatures in the boulder field curing the summer.
  - Consider design that provides frog ponds to supply habitat for ESA (spotted frog)
  - Consider locating fish passage structure nearer to the PGE powerplant where most of the river flow is planned to improve fish attraction flows and make summer and low flow passage easier.
- Nature-like Fishway
  - Smaller change to the area
  - Allows best fish passage
  - Aesthetic considerations

Expressed Preference Against Alternatives:

- Strong preference AGAINST Full-spanning Rock Ramp
  - Huge change
  - Does not appear to be a better fish passage option
  - Impacts other animals and vegetation in a significant manner

Dam Safety and Hydroelectric Operations

- Remove the dam
  - Hydropower production is extremely limited

Public Safety

- Remove the dam
- Don't make it enticing to check out
- Use signage like the signage at the Colorado whitewater park take-out
- Install a system to inhibit humans from accessing the feature
- Access is already readily available in this area and people access it often
- The Fish Ladder would add a new dimension of public safety concern

Questions

- Can the dam function safely into the future? Will rate payers continue to subsidize this facility?
- What are the consequences if the State condemns the dam as unsafe?
- How will downstream homeowners' insurance rates be impacted if the dam isn't structurally sound?
- How will people be prevented from using the fish ladder or either rock ramp option as a recreational attraction?

Total Cost

- We need to consider total costs upfront
- Not a major concern at this time
- Full-spanning Rock Ramp appears to be the most costly without added benefits.
- Most important is efficacy of passage alternatives, regardless of cost
- Total cost should include estimated capital and annual maintenance costs for each alternative.
- Consider life-time costs including dam maintence, liability, sediment removal, deconstruction costs.

Questions

- Should license holders & tax payers foot the bill for this?
- Is this a wise use of tax payer's funds?
- Would it be cheaper to get rid of the dam?
- Why are the City of Bend & Parks & Rec included in this committee? Will they help pay for the fish passage?

Aesthetic Considerations

- Prioritize fish passage over aesthetics
- The current dam is ugly and anything is an improvement.

Preferences and Concerns

- Full-spanning rock ramp would ruin the view for nearby neighbor by removing all sorts of natural vegetation and small islands. Birds nest and herons fish there.
- A natural rock retaining wall could be used instead of cement in nature-like fishway or either rock ramp. Please consider using natural materials as much as possible.
- Fish ladder is too industrial for a very visible part of the river and over the bridge.
- On the Nature-like Fishway, please do not use concrete/cement for the west edge end wall. The residences on the west side of the bank already face a large concrete wall from Pacific Power. Rock could make the aesthetic acceptable.
- Partial-spanning Rock Ramp is larger than the Nature-like Fishway with more impact on the area.
- Partial-spanning Rock Ramp would destroy large portion of habitat and change the entire area.

Appendix F
Letter of Recommendation

June 5, 2023

Dear City of Bend and Bend Parks and Recreation District,

The Mirror Pond Fish Passage Advisory Committee (Committee) was commissioned in the spring of 2021 by the City of Bend (the City) and Bend Parks and Recreation District (BPRD) to recommend a preferred fish passage option at the Newport Dam. After careful deliberation, the Committee recommends the nature-like fishway as the preferred approach to providing fish passage at this site.

The nature-like fishway was selected from among four alternatives: a fish ladder, a nature-like fishway, a partial-spanning rock ramp, and a full-spanning rock ramp. Each of these alternatives were compared for their relative ability to meet the following objectives identified by the Advisory Committee:

- Ensure effective fish passage.
- Maintain dam safety and effective hydroelectric operations.
- Maintain public safety and security.
- Limit total cost for construction and ongoing maintenance.
- Address social and aesthetic considerations raised by the public.

Based on a high-level analysis completed by the engineering firm River Design Group, the comparison of these alternatives highlighted the inherent trade-offs offered by each approach to fish passage. The nature-like fishway was selected as the best option because it:

- Provides effective fish passage.
- Provides passage for other aquatic organisms as well as for fish (unlike the traditional fish ladder).
- Does not interfere with dam maintenance or dam inspection activities (unlike the rock ramp options).
- Demonstrates a higher likelihood of ensuring public safety and security than either of the rock ramp options.
- Has a smaller foot-print than either of the rock ramp options.
- Is considered more aesthetically pleasing than a traditional fish ladder.
- May be more easily engineered into subsequent ‘natural riverscape’ in the event of dam decommissioning, in keeping with the 2015 community vision.
- Is the most cost effective of all options, especially compared to the two rock ramp options.

The Committee identified a traditional fish ladder as the second-best fish passage option of those considered. It was identified as less desirable because:

- It may be less aesthetically pleasing than a nature-like fish way.
- It would be more difficult to integrate into a 'natural riverscape.'

The Committee feels it is important to identify a second-best option in case some unforeseen and insurmountable roadblock emerges during the design and implementation of the nature-like fishway. Although the fish ladder is a "distant second" to the preferred nature-like fishway, if further detailed analysis reveals unanticipated and intractable problems with the nature-like fishway, the Committee recommends proceeding with the traditional fish ladder to ensure the goal of fish passage is accomplished swiftly, rather than rebooting a lengthy recommendation process.

While the charge of the Mirror Pond Fish Passage Advisory Committee is now complete, we further recommend that the City and BPRD promptly establish a next-step process to ensure that the momentum of this important project continues. We recommend identifying and immediately authorizing a subset of the existing Committee to undertake the following activities:

- Raise funds to pay for the design and the implementation of the fish passage
- Coordinate with technical experts to design the fish passage
- Clarify additional details and information to ensure the success of this phase of design, including:
  - *Easements*: Clarify whether easements will be necessary to build the project.
  - *Ownership & Maintenance*: Clarify who will own and maintain the fish passage. As needed, secure an agreement that the owner will maintain the structure for a minimum of 10 years.
  - *Flow*: Clarify the amount of flow that will be routed through the fish passage. Explore options for allowing variable flow.
  - *Maximize Downstream Fish Passage Effectiveness*: design phase should consider concerns about downstream fish passage such as "fallback" and migration of native fish. For example, can these concerns be addressed by location of passage, amount of flow through nature-like fishway or by exploring the use of technologies such as bubblers, automated screening, or other approaches to improve downstream passage.
- Once fish passage is in place, collect data on fish passage effectiveness. As needed, explore measures to increase the effectiveness of upstream and downstream passage.

It is the Committee's hope that fundraising for design purposes can start immediately and that design efforts may begin as early as the fall of 2023.

Given their expertise and decision-making authority, we recommend this subset include: BPRD, the City of Bend, Pacific Power, the Upper Deschutes Watershed Council, River Design Group, Oregon Department of Fish and Wildlife, the United States Fish and Wildlife Service, and Trout Unlimited. This does not preclude inclusion of additional members.

Members of the Mirror Pond Fish Passage Advisory Committee may be reconvened as needed to provide as-needed input to inform the next phase of the process. This group reports its willingness to serve as an as-needed resource to support timely completion of this project.

Sincerely,

Matthew Chancellor
Pacific Power

Peter Martins (non-voting)
Pacific Power

Jerry George
Oregon Department of Fish and Wildlife

Gena Goodman-Campbell
City of Bend

Nathan Hovekamp
Bend Parks and Rec

Kris Knight
Upper Deschutes Watershed Council

Alan Ritchey
Oregon Department of Fish and Wildlife

Mike Tripp
Trout Unlimited

Dirk Renner (non-voting)
U.S. Fish and Wildlife Service

Appendix G
River Design Group Report

Mirror Pond
Fish Passage Feasibility & Preferred Alternative Selection

November 7, 2022

PACIFICORP

Bend Park & Recreation DISTRICT

RDG RIVER DESIGN GROUP

~1916 — Dam

Hydroelectric dam is built, approx. 18 ft high

1996 — FERC

FERC no longer requires hydropower license for dam

2000's — Studies

Several committees and studies regarding sediment and dam removal

2021 — Fish Passage

Advisory Committee recommends fish passage alternatives

2022 — Today

Feasibility study for fish passage alternatives

+2022 — Next Steps

Identify preferred alternative for fish passage

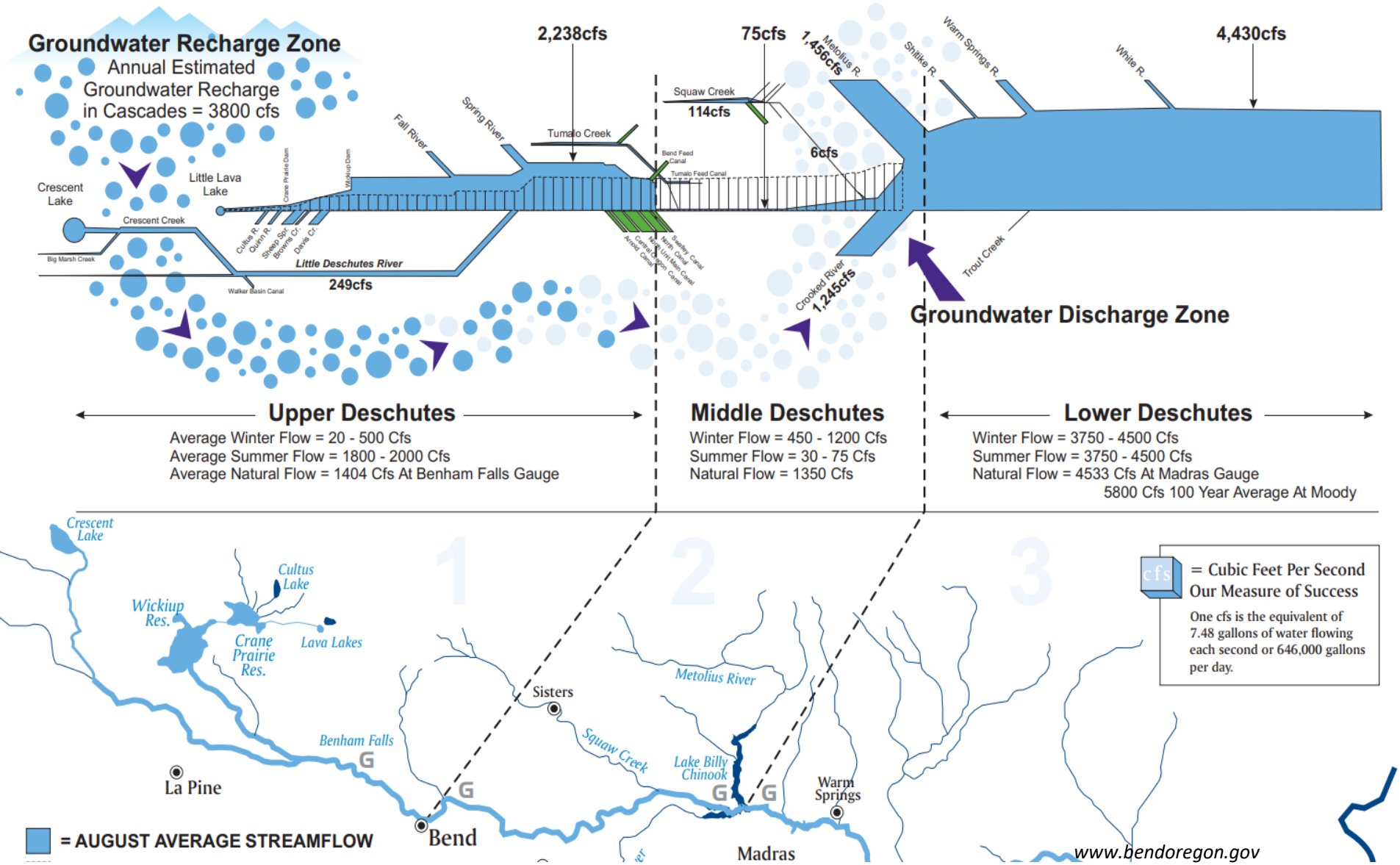
Design Objectives

1. Ensure **effective fish passage** conditions
2. Financial investment is **fiscally responsible**
3. **Human safety** is assured, and risk of harm is limited

Design Objectives Measured by

- Meets **ODFW and NMFS fish passage criteria**
- Project **cost**
- Design creates **safe environment**

Water / Flow

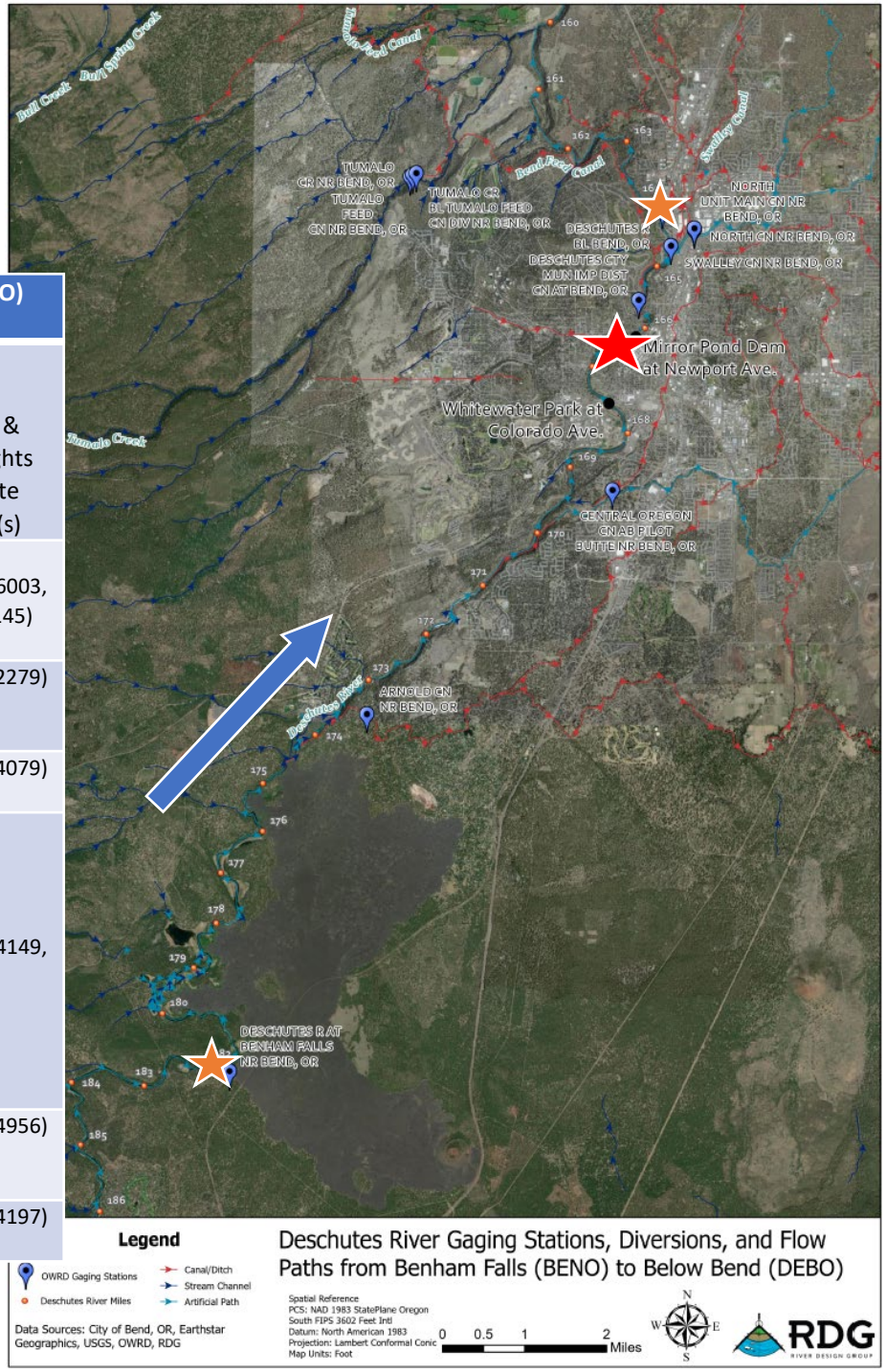


www.bendoregon.gov

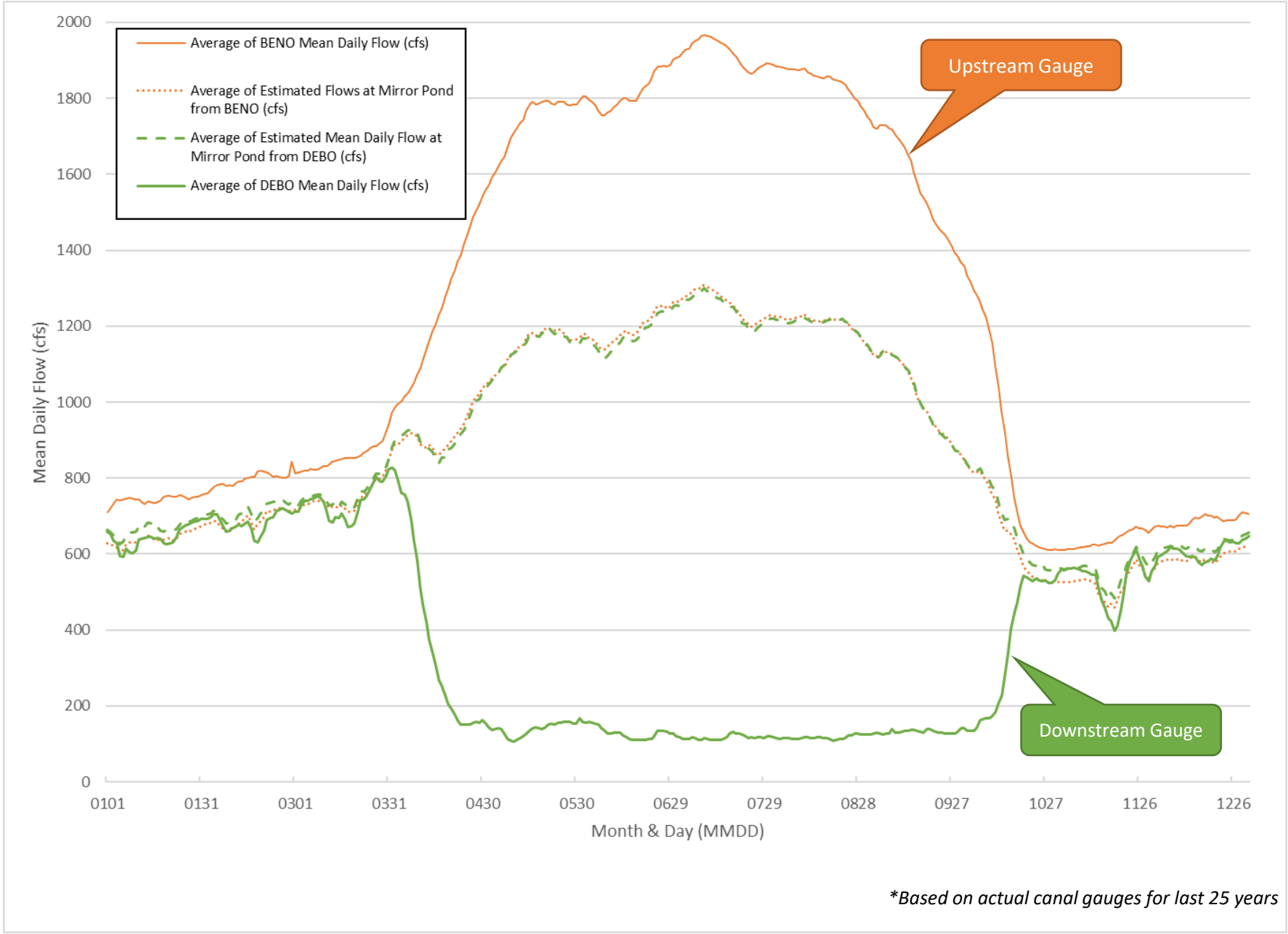
Diversions

Table 1. Summary of diversions from the Deschutes River between Benham Falls (BENO) and Below Bend (DEBO) streamflow gages

River Mile at Diversion	Name	Irrigation District	Priority Date	Point of Diversion Maximum Rate (cfs) from OWRD	Point of Diversion Estimated Rate (cfs) from OWRD	Purpose & Water Rights Certificate Number(s)
164.8	Swalley Canal	Swalley	1899	162 (63 + .435 + 49.14 + 47.69 + 1.81 + 0.45)	162 (63 + .435 + 49.14 + 47.69 + 1.81 + 0.45)	Irrigation (86003, 94457, 74145)
164.8	North Unit Main Canal	North Unit	1913	1,101	367	Irrigation (72279)
164.8	North Canal	North Unit	1913	18.56	6.19	Irrigation (94079)
165.9	Bend Feed Canal	Deschutes County Municipal Improvement District (aka Tumalo Irrigation District)	1905	9.5	9.5	Irrigation (74149, 76466)
169.9	Central Oregon Canal	Central Oregon	1900	1,281.51 (769.24 + 512.27)	1,281.51 (769.24 + 512.27)	Irrigation (94956)
174.6	Arnold Canal	Arnold	1905	150	21.43	Irrigation (74197)

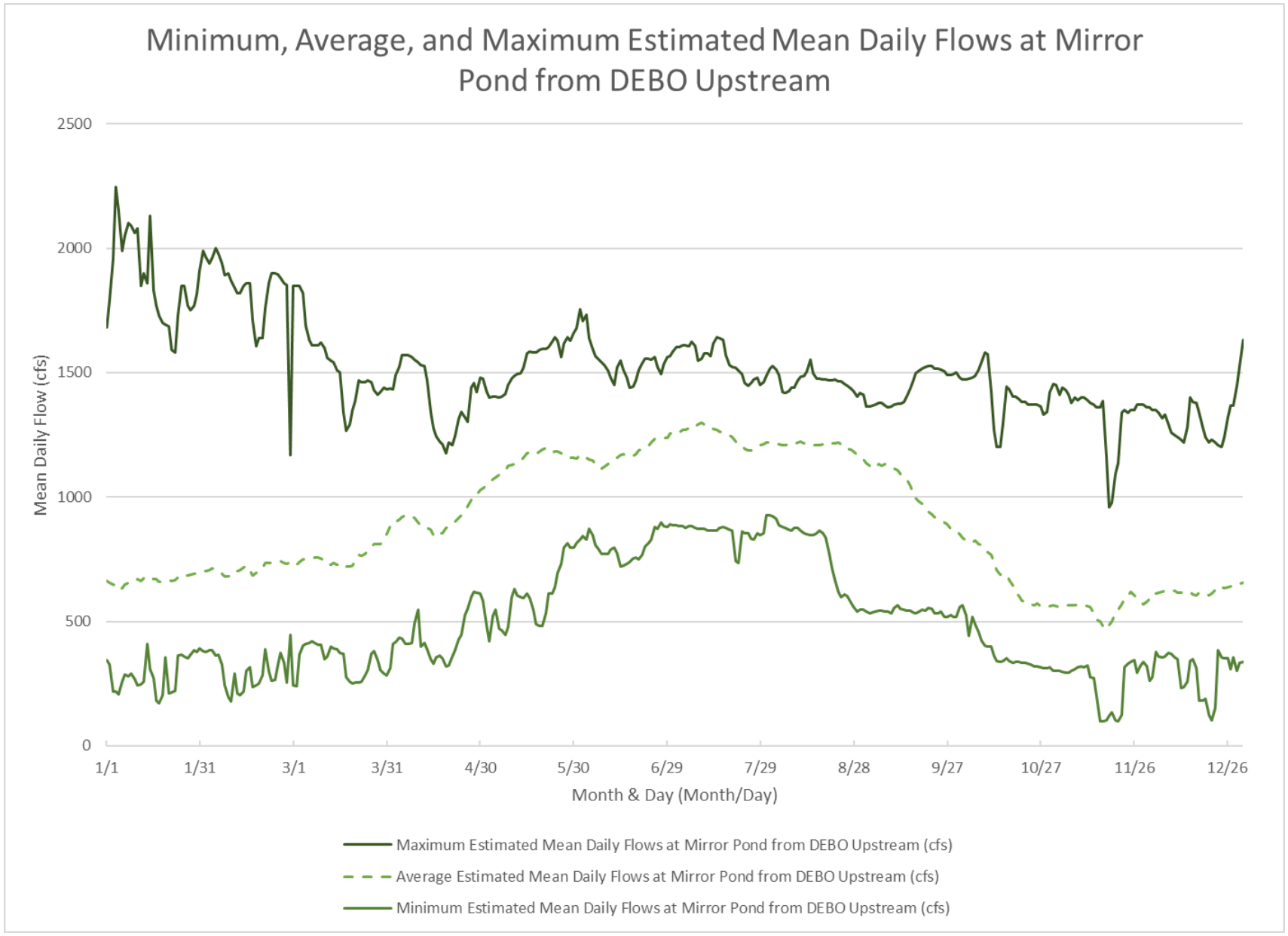


Water / Flow



*Based on actual canal gauges for last 25 years

Water / Flow


Minimum, Average, and Maximum Estimated Mean Daily Flows at Mirror Pond from DEBO Upstream
Mean Daily Flow (cfs)
2500
2000
1500
1000
500
0
1/1
1/31
3/1
3/31
4/30
5/30
6/29
7/29
8/28
9/27
10/27
11/26
12/26
Month & Day (Month/Day)
Maximum Estimated Mean Daily Flows at Mirror Pond from DEBO Upstream (cfs)
Average Estimated Mean Daily Flows at Mirror Pond from DEBO Upstream (cfs)
Minimum Estimated Mean Daily Flows at Mirror Pond from DEBO Upstream (cfs)

Fish Passage Flows

NOAA Fisheries WCR Anadromous Salmonid Design Manual - NMFS 2022

4.2 Design Low Flow for Fish Passage

Design low flow for fishways is the average daily streamflow that is exceeded 95% of the time during periods when migrating fish are normally present at the site.

This is determined by summarizing the previous 25 years of mean daily streamflow occurring during the fish passage season, or by an appropriate artificial streamflow duration methodology (if streamflow records are not available). Shorter data sets of streamflow records may be useable if they encompass a broad range of flow conditions. The fish passage design low flow is the lowest streamflow for which migrants are expected to be present, migrating, and dependent on the proposed facility for safe passage.

4.3 Design High Flow for Fish Passage

Design high flow for fishways is the average daily streamflow that is exceeded 5% of the time during periods when migrating fish are normally present at the site.

Mirror Pond

- Low Fish Passage Flow = ± 393 cfs
- High Fish Passage Flow = ± 1,424 cfs

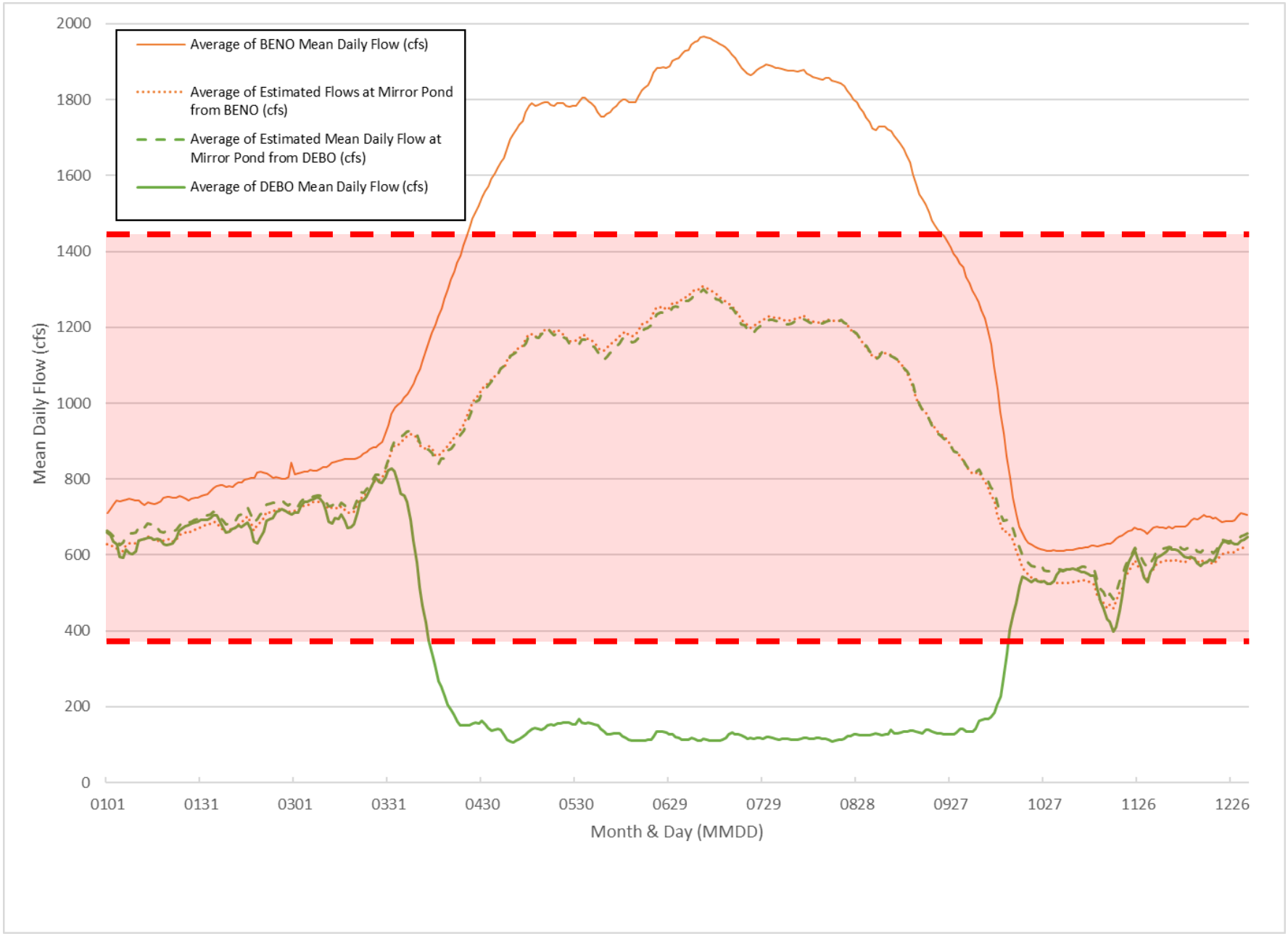
Fish

Upper Deschutes River - Focal Species General Periods of Occurrence

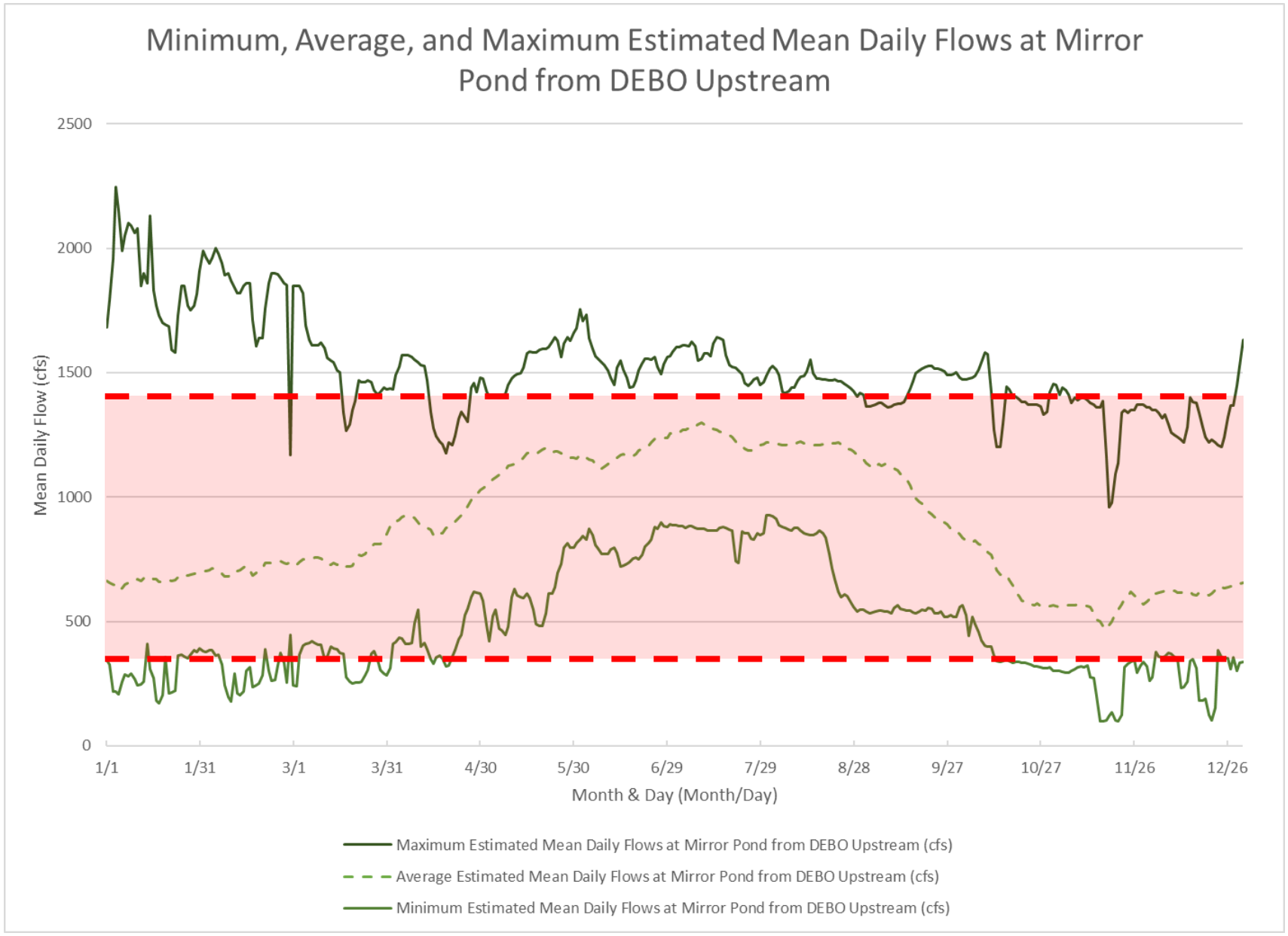
Rev 20221017

Species	Life Stage	Jan		Feb		Mar		Apr		May		June		Jul		Aug		Sept		Oct		Nov		Dec	
		1-15	16-31	1-15	16-28	1-15	16-31	1-15	16-30	1-15	16-31	1-15	16-30	1-15	16-31	1-15	16-31	1-15	16-30	1-15	16-31	1-15	16-30	1-15	16-31
Redband Trout	Migration and Spawning																								
	Incubation and Emergence																								
	Rearing																								
Mountain Whitefish	Migration and Spawning																								
	Incubation and Emergence																								
	Rearing																								
Bull Trout - *Extirpated*	Migration and Spawning																								
	Incubation and Emergence																								
	Rearing																								

Water / Flow


Average of BENO Mean Daily Flow (cfs)
Average of Estimated Flows at Mirror Pond from BENO (cfs)
Average of Estimated Mean Daily Flow at Mirror Pond from DEBO (cfs)
Average of DEBO Mean Daily Flow (cfs)
Mean Daily Flow (cfs)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
0101
0131
0301
0331
0430
0530
0629
0729
0828
0927
1027
1126
1226
Month & Day (MMDD)

Water / Flow


Minimum, Average, and Maximum Estimated Mean Daily Flows at Mirror Pond from DEBO Upstream
Mean Daily Flow (cfs)
2500
2000
1500
1000
500
0
1/1
1/31
3/1
3/31
4/30
5/30
6/29
7/29
8/28
9/27
10/27
11/26
12/26
Month & Day (Month/Day)
Maximum Estimated Mean Daily Flows at Mirror Pond from DEBO Upstream (cfs)
Average Estimated Mean Daily Flows at Mirror Pond from DEBO Upstream (cfs)
Minimum Estimated Mean Daily Flows at Mirror Pond from DEBO Upstream (cfs)

Fish Passage: Fish Ladder Criteria

5.2 Fishway Entrance

5.2.1 Description and Purpose

A fishway entrance is a gate or slot through which fishway attraction flow is discharged in a manner that encourages and allows adult fish to enter the upstream passage facility. The fishway entrance is often the most difficult (Bates 1992)—yet most critical—component to design for an upstream passage system, particularly at dams (Clay 1995). Fishway entrances should be placed to ensure that fish are attracted to and enter the best passage routes past the passage impediment throughout the entire design flow range. The most important aspects of fishway entrance design are as follows:

- Location of the entrance
- Pattern and amount of flow from the entrance
- Approach channel immediately downstream of the entrance
- Flexibility in adjusting entrance flow to accommodate variations in tailrace elevation, stream or river flow, and project operations

5.2.2 Specific Criteria and Guidelines – Fishway Entrance

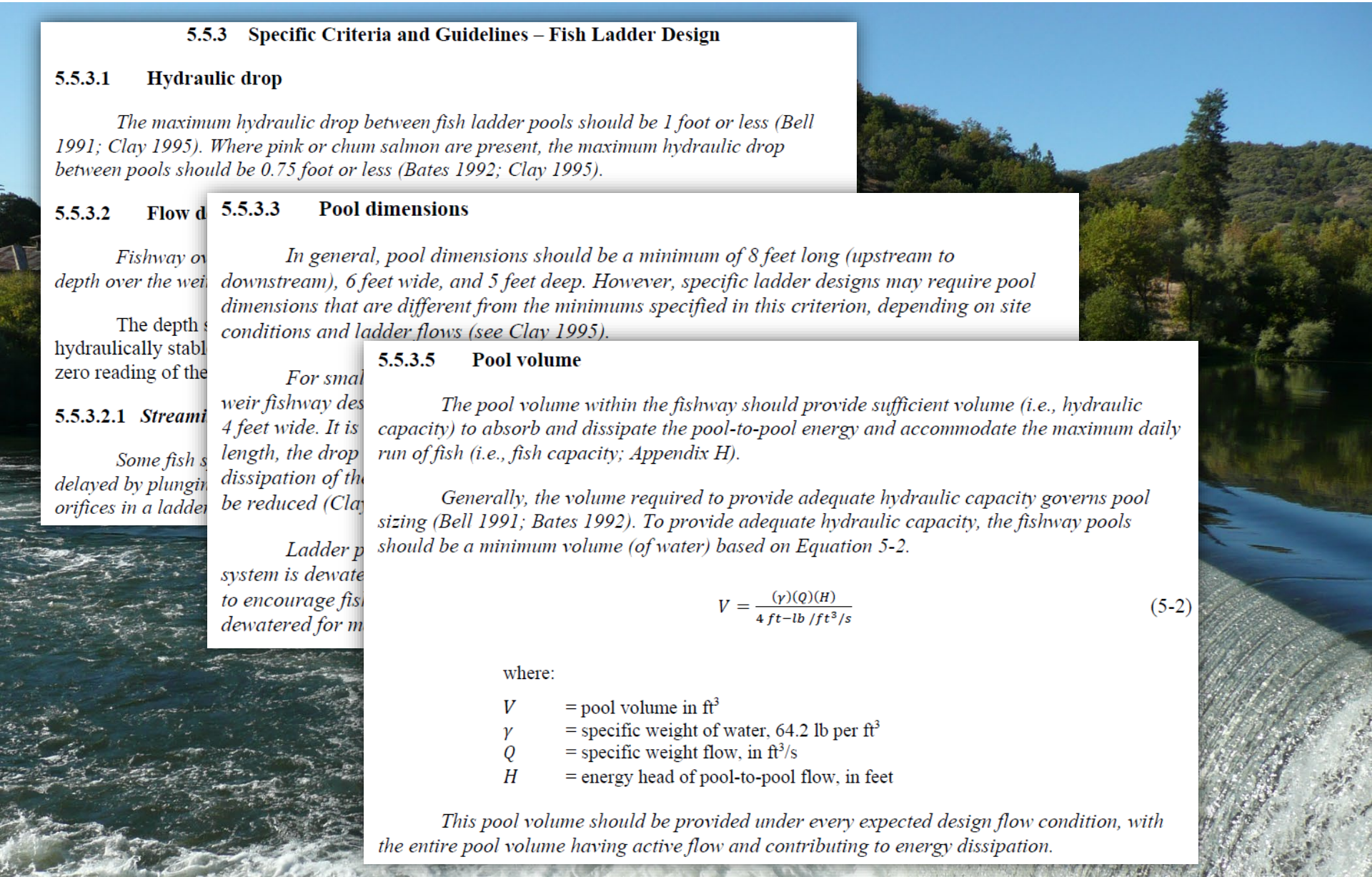
5.2.2.4 Attraction flow

Additional attraction flow from the fishway entrance is needed to extend the area of intensity of velocity of the outflow (from the entrance) to increase fish attraction into the entrance (Clay 1995). Attraction flow from the fishway entrance should be between 5% and 10% of the fish passage high design flow (Chapter 4). For smaller streams, NMFS may conclude that attraction flows up to 100% of streamflow may be required.

Mirror Pond

- Attraction Flow Min = ± 72 cfs
- Attraction Flow Ideal = ± 144 cfs

Fish Passage: Fish Ladder Criteria



5.5.3 Specific Criteria and Guidelines – Fish Ladder Design

5.5.3.1 Hydraulic drop

The maximum hydraulic drop between fish ladder pools should be 1 foot or less (Bell 1991; Clay 1995). Where pink or chum salmon are present, the maximum hydraulic drop between pools should be 0.75 foot or less (Bates 1992; Clay 1995).

5.5.3.2 Flow d

Fishway ov
depth over the wei

The depth
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5.5.3.2.1 *Streami*

Some fish s
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5.5.3.3 Pool dimensions

In general, pool dimensions should be a minimum of 8 feet long (upstream to downstream), 6 feet wide, and 5 feet deep. However, specific ladder designs may require pool dimensions that are different from the minimums specified in this criterion, depending on site conditions and ladder flows (see Clay 1995).

For smal
weir fishway des
4 feet wide. It is
length, the drop
dissipation of th
be reduced (Cla

Ladder p
system is dewate
to encourage fis
dewatered for m

5.5.3.5 Pool volume

The pool volume within the fishway should provide sufficient volume (i.e., hydraulic capacity) to absorb and dissipate the pool-to-pool energy and accommodate the maximum daily run of fish (i.e., fish capacity; Appendix H).

Generally, the volume required to provide adequate hydraulic capacity governs pool sizing (Bell 1991; Bates 1992). To provide adequate hydraulic capacity, the fishway pools should be a minimum volume (of water) based on Equation 5-2.

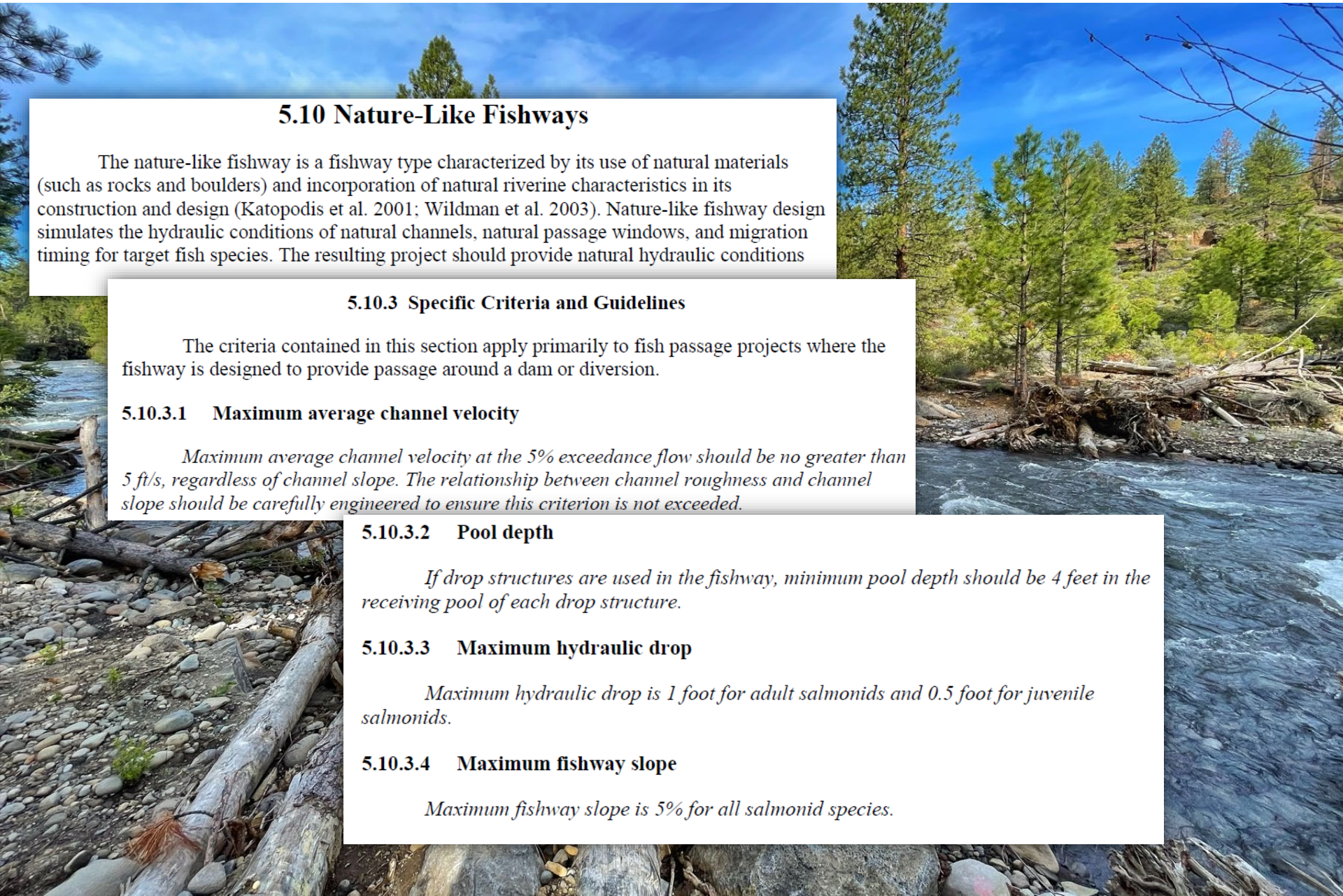
$$V = \frac{(\gamma)(Q)(H)}{4\ ft\text{-}lb\ /ft^3/s} \qquad (5\text{-}2)$$

where:

V = pool volume in ft^3
γ = specific weight of water, 64.2 lb per ft^3
Q = specific weight flow, in ft^3/s
H = energy head of pool-to-pool flow, in feet

This pool volume should be provided under every expected design flow condition, with the entire pool volume having active flow and contributing to energy dissipation.

Fish Passage: Nature-Like Fishway Criteria



5.10 Nature-Like Fishways

The nature-like fishway is a fishway type characterized by its use of natural materials (such as rocks and boulders) and incorporation of natural riverine characteristics in its construction and design (Katopodis et al. 2001; Wildman et al. 2003). Nature-like fishway design simulates the hydraulic conditions of natural channels, natural passage windows, and migration timing for target fish species. The resulting project should provide natural hydraulic conditions

5.10.3 Specific Criteria and Guidelines

The criteria contained in this section apply primarily to fish passage projects where the fishway is designed to provide passage around a dam or diversion.

5.10.3.1 Maximum average channel velocity

Maximum average channel velocity at the 5% exceedance flow should be no greater than 5 ft/s, regardless of channel slope. The relationship between channel roughness and channel slope should be carefully engineered to ensure this criterion is not exceeded.

5.10.3.2 Pool depth

If drop structures are used in the fishway, minimum pool depth should be 4 feet in the receiving pool of each drop structure.

5.10.3.3 Maximum hydraulic drop

Maximum hydraulic drop is 1 foot for adult salmonids and 0.5 foot for juvenile salmonids.

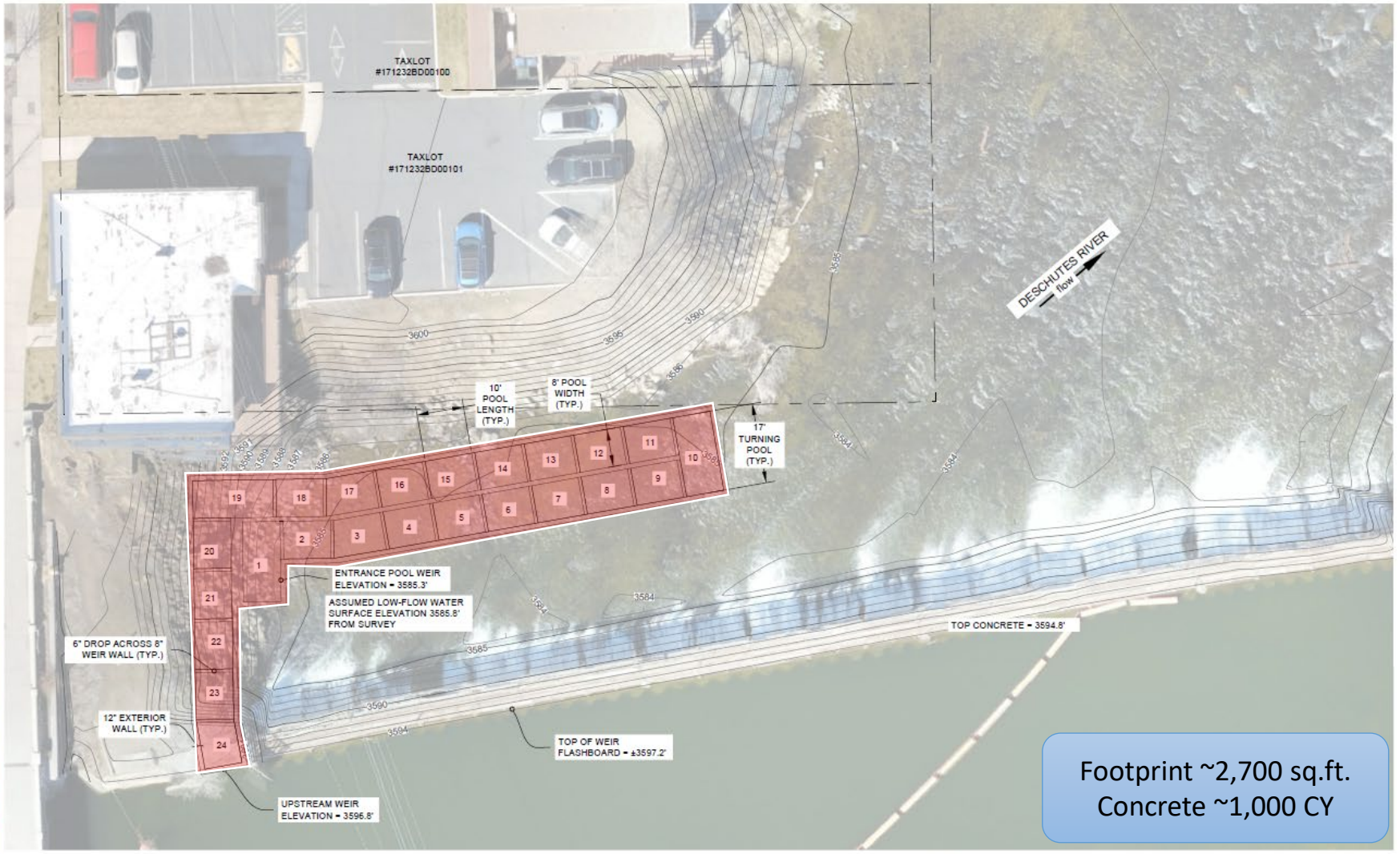
5.10.3.4 Maximum fishway slope

Maximum fishway slope is 5% for all salmonid species.

When developing alternatives, a multitude of regulatory criteria and constraints

- Flow, attraction and passage
- Slope, longitudinal profile
- Drop and/or discrete steps in water surface
- Fish species and timing for migration
- Entrance and exit of passage facilities

Alternative 1 – Conventional Fish Ladder



Footprint ~2,700 sq.ft.
Concrete ~1,000 CY

1 FISH LADDER PLAN VIEW
1" = 20'

DRAFT

RDG RIVER DESIGN GROUP
236 Wisconsin Avenue, Whitefish, MT 59937, 406.862.4927
311 SW Jefferson Avenue, Corvallis, OR 97333, 541.738.3500

FISH LADDER
ALTERNATIVE 1
MIRROR POND IN BEND, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
*	3/12/2024	MCK	DRAFT	SW

PROJECT NUMBER
RDG-22-070

DRAWING NUMBER
3.0

Drawing 4 of X

Fish Ladder

Fish Ladder Retrofit

Opal Springs, Oregon
credit Bend Bulletin

Thompson Falls, Montana

Fish Ladder Retrofit

Fish Ladder Retrofit

Fish Ladder Retrofit

Alternative 2 – Nature Like Fishway

Footprint ~5,100 sq.ft.
Concrete ~350 CY
Rock ~1,000 CY

1 NATURE-LIKE FISHWAY PLAN VIEW
1" = 20'

DRAFT

RDG RIVER DESIGN GROUP
236 Wisconsin Avenue, Whitefish, MT 59937, 406.862.4927
311 SW Jefferson Avenue, Corvallis, OR 97333, 541.738.2920

NATURE-LIKE FISHWAY
ALTERNATIVE 2
MIRROR POND IN BEND, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
*	11/04/22	MCK	DRAFT	SW

PROJECT NUMBER
RDG-22-070

DRAWING NUMBER
4.0

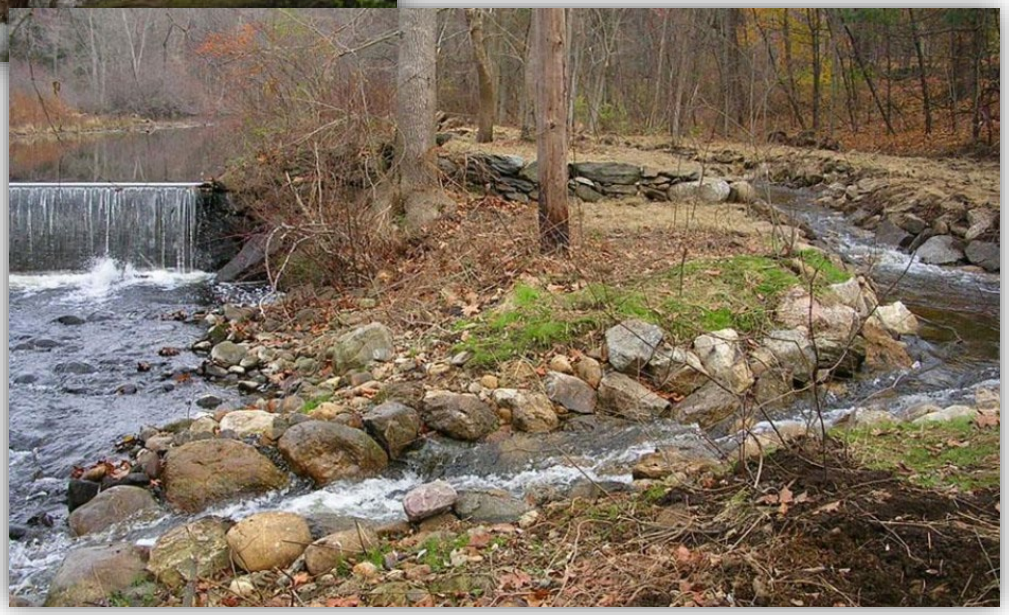
Drawing 5 of X

Nature-like Fishway

Nature-like Fishway

Credit: Ribble River Trust, United Kingdom

Credit: Jessica Pica, Milone & MacBroom



Alternative 3 – Roughened Channel

1 ROUGHENED CHANNEL PLAN VIEW
1" = 20'

DRAFT

RDG RIVER DESIGN GROUP
236 Wisconsin Avenue, Whitefish, MT 59937, 406.862.4927
311 SW Jefferson Avenue, Corvallis, OR 97333, 541.738.2920

ROUGHENED CHANNEL
ALTERNATIVE 3
MIRROR POND IN BEND, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
*	11/04/22	MCK	DRAFT	SW

PROJECT NUMBER
RDG-22-070

DRAWING NUMBER
5.0

Drawing 6 of X

Roughened Channel

RECLAMATION
Managing Water in the West

Rock Ramp Design Guidelines

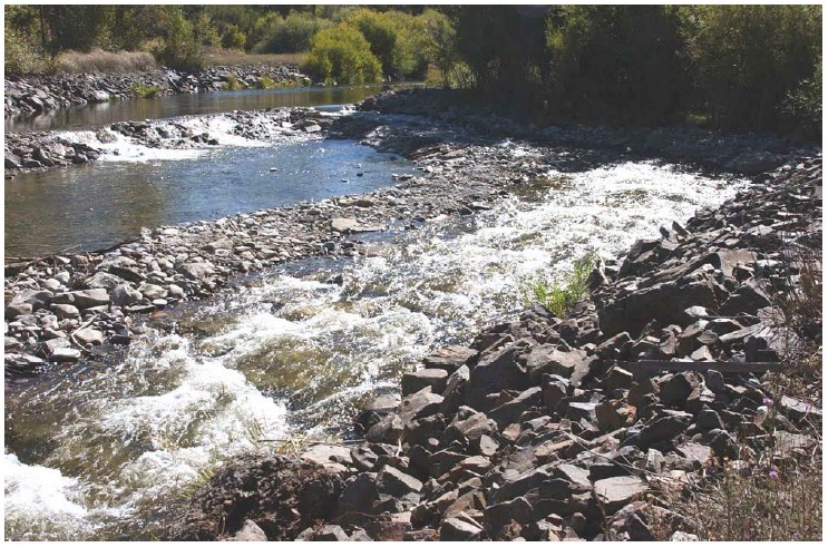


Figure 10. Before (top) and after (bottom) photos of a rock-ramp rapids fishway constructed at Riverside Dam at East Grand Forks, MN

Roughened Channel

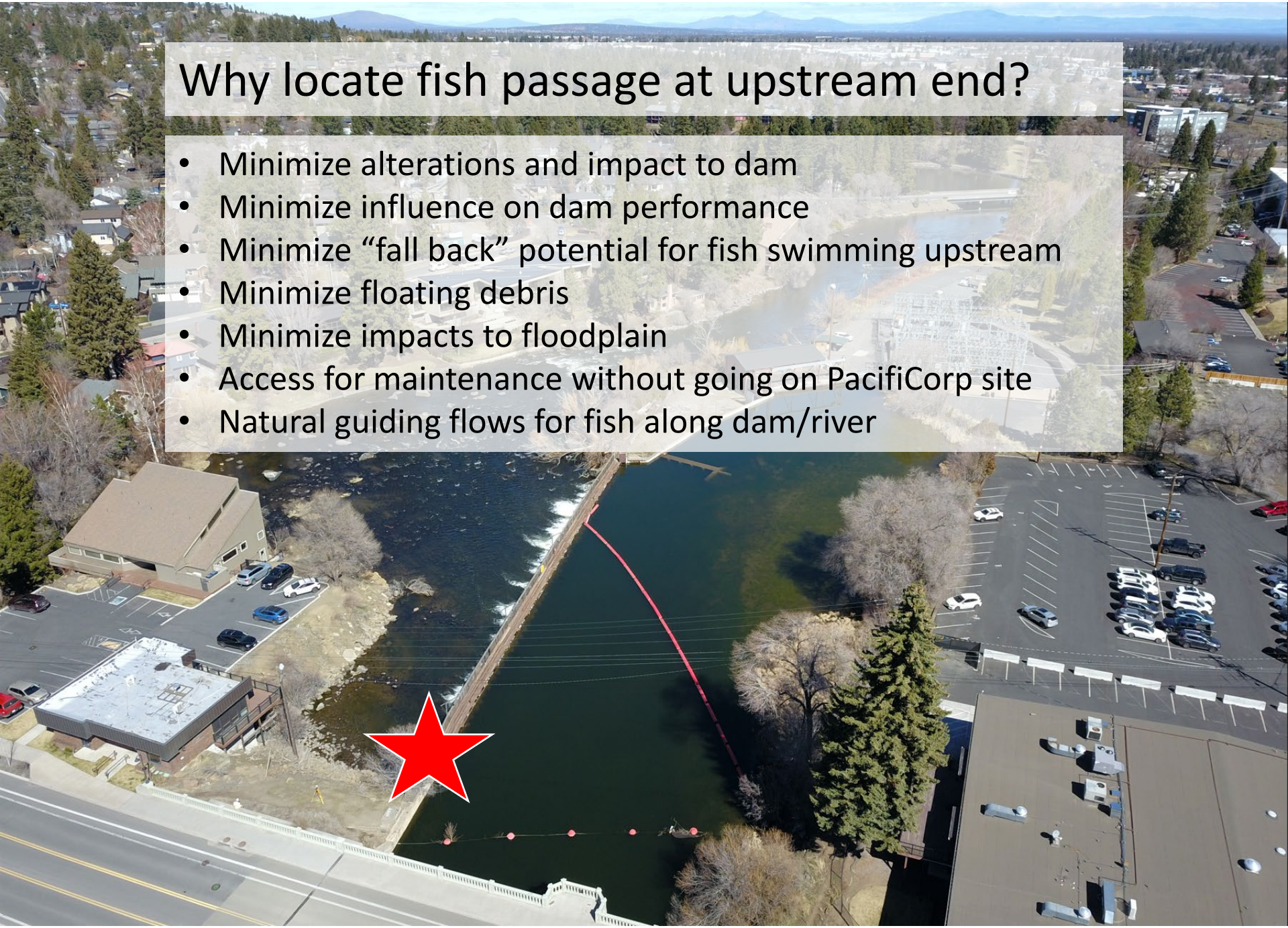
Deep Creek, Oregon

Roughened Channel

Whychus Creek, Oregon

Why locate fish passage at upstream end?

- Minimize alterations and impact to dam
- Minimize influence on dam performance
- Minimize “fall back” potential for fish swimming upstream
- Minimize floating debris
- Minimize impacts to floodplain
- Access for maintenance without going on PacifiCorp site
- Natural guiding flows for fish along dam/river



What is the likely operation and maintenance?

Alt 1 – Conventional Fish Ladder

- Operation is self-regulated
- More susceptible to blockage, remove floating debris, sticks, macrophytes, etc. on a weekly basis
- Clean upstream flow control area weekly or every other week

Alt 2 – Nature Like Fishway

- Operation is self-regulated
- More susceptible to blockage, remove floating debris, sticks, macrophytes, etc. every other week
- Adjust rocks in fishway occasionally (once per year)

Alt 3 – Roughened Channel

- Operation is self-regulated
- Remove floating debris, sticks, macrophytes, etc. once per month
- Adjust or add rock in fishway occasionally (once per year) with equipment

Committee Selection Criteria Matrix

Table 1. Summary of the expected impact each alternative would have on site constraints, environmental conditions, social aspects, and economic factors.

	Alt 1 Fish Ladder	Alt 2 Nature-Like Fishway	Alt 3 Roughened Channel
Site Constraints			
PacifiCorp Dam and Infrastructure	+	+	-
PacifiCorp Hydropower Generation	+	+	o
Public Access & Safety	+	o	-
Adjacent Private Landowners*			
Newport Ave Bridge*			
FEMA Floodplain*			
Floating Material			
Environmental Conditions			
Fish Passage Criteria (State & Federal)*			
Fish Screening for Hydropower Intake			
River Continuity			
Water Quality			
Impacts to 100-year Floodplain*			
Social Aspects			
Recreation			
Viewscape			
Education			
Economic Factors (Fiscal Responsibility)			
Initial Cost of Project			
Yearly, On-going O&M			
City / PacifiCorp Funding Options			
Outside Funding Options			
Regulatory Compliance*			
Property Values			
Public Safety & Liability