Appendix E – Fisheries Agency EDR Review Comments and USACE Responses

From: Rerecich, Jonathan G CIV USARMY CENWP (USA) <Jonathan.G.Rerecich@usace.army.mil>
Sent: Tuesday, January 17, 2023 8:17 AM
To: FFDRWG
Subject: The Dalles AWS Backup Debris Management 60% Engineering Documentation Report review

Dear Fish Facility Design Review Work Group members:

Please find attached for your review The Dalles Dam Auxiliary Water Supply Backup Debris Management 60% Engineering Documentation Report.

This project is part of the Corps of Engineers' ongoing efforts to provide a reliable backup auxiliary water supply for the east fish ladder at The Dalles Dam to support operations during fish turbine rehabilitation and in the event one or both fish turbines are forced out of service. The report documents the alternatives evaluation developed by the Project Development Team and the recommended preferred alternative to carry forward to a 90% Engineering Documentation Report.

Your review of this Engineering Documentation Report is very important. The comment period is now open. You may send your written comments to Jon Rerecich at jonathan.g.rerecich@usace.army.mil, (503) 808-4779, by February 16, 2023.

Sincerely,

Jon Rerecich
Fish Passage Section
Environmental Resources Branch
USACE Portland District
503-808-4779
Jonathan.g.rerecich@usace.army.mil

From: Blane Bellerud - NOAA Federal <blane.bellerud@noaa.gov>
Sent: Friday, February 17, 2023 9:28 AM
To: Rerecich, Jonathan G CIV USARMY CENWP (USA) <Jonathan.G.Rerecich@usace.army.mil>
Subject: [Non-DoD Source] Re: The Dalles AWS Backup Debris Management 60% Engineering Documentation Report review

NMFS Comments on Dalles AWS debris cleaning system 60% Design

The Dalles AWS has gone from being a backup intended to be used primarily in emergencies, to plans to use it regularly. This is especially true during the fish turbine replacement period, So it is of great importance to fish passage at the Dalles. The combined approach appears to be reasonable, but relies primarily on indirect means of removing debris. It also includes a direct method using a crane operated brush. Assuming that a crane is always available if brushing is required, this may be acceptable. However, difficulties with cranes in the past cause me concern. There needs to be the capability to respond with direct action to remove debris when valve cycling and other indirect strategies fail. A system with built in capacity to operate the brush seems to be more certain than relying on the availability of a crane, the availability of deck crew to operate it and all the other potential delays that could lead to reduced fish passage efficiency at the Dalles if debris clogs the screen of the AWS.

Blane Bellerud Ph.D.

Dalles project Biologist

National Marine Fisheries Service

Thank you for your comments. USACE responses to comments are in blue.

1. The Dalles AWS has gone from being a backup intended to be used primarily in emergencies, to plans to use it regularly. This is especially true during the fish turbine replacement period, So it is of great importance to fish passage at the Dalles.

    - **Concur. Initially, the Auxiliary Water Supply Backup System (AWSBS) was intended to be used in emergencies if both fish units failed. Testing later revealed that if a single Fish Unit was out of service, the backup AWSBS system would improve the hydraulic performance of the East Fish Ladder and could be implemented during Fish Unit rehabilitation with an effective debris management system. The PDT preferred alternatives consist of both passive and active debris management strategies that can also be implemented following fish unit rehabilitation in the event one or both propeller fish units are forced out of service during fish passage season. We expect any fish unit forced outages post rehab would be infrequent and of short duration.**

2. The combined approach appears to be reasonable, but relies primarily on indirect means of removing debris. It also includes a direct method using a crane operated brush. Assuming that

a crane is always available if brushing is required, this may be acceptable. However, difficulties with cranes in the past cause me concern. There needs to be the capability to respond with direct action to remove debris when valve cycling and other indirect strategies fail.

- **The three-pronged strategy combines both indirect and direct means of removing debris. The passive (indirect) methods are floating debris boom and valve cycling with the use of level sensors to monitor head differentials. The last approach in the strategy is the direct method of debris removal using a dedicated hoist, rather than a crane, and brush system to engage with the trash racks.**

- **Project personnel have noted in the past that valve cycling alone has been effective. However, the longer operation of the AWSBS during Fish Unit rehabilitation may result in more debris accumulation compared to past experiences. If the first two methods of debris management are ineffective, the direct method of removing debris using the brush system would be implemented. Lastly, if the three-pronged debris management approach does not restore differentials to a safe operating range, as a last resort in an emergency, shutting off the AWSBS and pulling the trash racks to be pressure washed by project personnel on the deck could be requested.**

3. A system with built in capacity to operate the brush seems to be more certain than relying on the availability of a crane, the availability of deck crew to operate it and all the other potential delays that could lead to reduced fish passage efficiency at the Dalles if debris clogs the screen of the AWS.

- **If the debris boom and valve cycling are ineffective at restoring acceptable head differentials, both the preferred and next best alternatives have a dedicated hoist to operate the brush system and therefore will not rely on the project crane. Operation of the hoist and brush system will likely have to occur during regular project hours when maintenance crews are on site. The level sensors would provide the control room with real-time head differential readings across the intake. If the head differential reaches the two-foot differential trigger, the project will perform valve cycling. If feasible, the valve cycling should be limited to nighttime or non-peak fish passage hours.**

- **If approved by The Dalles Project, a pre-emptive cleaning schedule could be adopted similar to how Bonneville Maintenance structures the cleaning of Vertical Barrier Screens. For example: when head differential criteria is at or above a pre-determined level on a Thursday, the project could perform preemptive valve cycling or brushing prior to the weekend. This preemptive cleaning may help reduce extended outages and/or overtime labor burdens during the weekends. A schedule will be developed during the Design Documentation Report/Plans & Specs (DDR/P&S) phase of design.**

From: Tom Lorz <lort@critfc.org>
Sent: Thursday, February 16, 2023 1:24 PM
To: Rerecich, Jonathan G CIV USARMY CENWP (USA) <Jonathan.G.Rerecich@usace.army.mil>
Subject: [Non-DoD Source] Re: The Dalles AWS Backup Debris Management 60% Engineering Documentation Report review

I will not have time to write up a fancy doc but here are some of my comments

- I think the 3 prong approach is likely the best for this project; debris boom, brush system, and shutting off units and floating debris.
- On the debris boom how deep are we looking to have this sit. I am sure there is a depth cost relationship. I could not find how deep we are planning to have this boom sit, deeper better.
- For the brush system need to insure the current rake with the offset will work with the brush. Not that Bonneville is the gold standard for trash raking at the fish units but anything that was learned from that project should be incorporated.

Operationally we should figure out what the process will be to deal with debris, assume we need to know what kind of debris we have since some will react better to floating or brushing then others. So we may want to have some sort of process or criteria for when we float or brush. Seems like we should brush every so often to check to see if we are getting if anything and how easy it is to use as well as trying to stay in-front of debris build up.

If we find that the brush is not as effective as we would hope do we have a fall back or other types of material that could be tested to make sure we get the best cleaning possible. There might be a little trial and error necessary, but hence the question about reviewing Bonneville as well.

Hope that helps sorry I did not have more time to spend on this one. Looks to be going in a good direction

Thank you for your comments. USACE responses to comments are in blue.

1. I think the 3 prong approach is likely the best for this project; debris boom, brush system, and shutting off units and floating debris.

    - **Concur. Additionally, level sensors are included in the approach to monitor head differentials.**

2. On the debris boom how deep are we looking to have this sit. I am sure there is a depth cost relationship. I could not find how deep we are planning to have this boom sit, deeper better.

    - **The depth of the debris boom is not yet known at the 60% or 90% EDR phase. The debris boom depth will be determined using a Computational Fluid Dynamics model during the DDR phase. The preliminary alignment for the debris boom will encompass the area around the AWSBS intake located about 55' out from the upstream surface of the dam. The preliminary**

alignment has the east end of the boom intersecting the existing earthen embankment at the normal high pool elevation of 160 feet. The west end of the boom ties into the east end of Unit 22 intake.

3. For the brush system need to insure the current rake with the offset will work with the brush. Not that Bonneville is the gold standard for trash raking at the fish units but anything that was learned from that project should be incorporated.

   - **To clarify, the "current rake" concept is not based off the Bonneville brush/rake hybrid. The EDR preferred alternative utilizes a vertically hoisted brush which pushes debris up and down using flexible bristles. We can still use lessons learned from Bonneville for the hoist and maintenance, but the brush head will be different.**

   - **Further investigation and lessons learned from the modified rake that Bonneville Dam uses on their Fish Unit trash racks resulted in the PDT no longer pursuing a similar debris management solution for several reasons. The primary reasons being that the TDA AWSBS debris management design will not incorporate the use of the project crane and the lack of streamlined trash racks. The current trash racks of the AWSBS cannot be cleaned with a typical rake due to the vertical and horizontal members of the trash racks. These trash racks would cause snags with metal raking components engaging the trash rack and potentially damage the motor of either a dedicated hoist or the project's crane. At Bonneville, the large gantry crane is used for raking which can handle a large variety of hoisting forces that change while the modified rake collects debris. The TDA preferred and next best alternatives are designed to have a dedicated hoist and brush system. Instead of collecting, scraping, and hauling away debris like BON does for their trash raking, the brush system will push debris off and use the sweeping flow of the river to divert debris away from the intake while maintaining a near constant hoisting force the dedicated hoist can handle.**

4. Operationally we should figure out what the process will be to deal with debris, assume we need to know what kind of debris we have since some will react better to floating or brushing then others. So we may want to have some sort of process or criteria for when we float or brush. Seems like we should brush every so often to check to see if we are getting if anything and how easy it is to use as well as trying to stay in-front of debris build up.

   - **Concur. The PDT agrees that guidelines should be developed for how TDA may implement trash rack debris removal considering we have two methods – AWSBS shut down and brushing. A schedule will be developed with TDA project input during the DDR/P&S phase of design.**

   - **Based off of the ROV footage, a USACE botanist observed that the plants in the video on the trash racks at that time appear to be aquatic plant species that grow and root in muddy substrate and are not likely to be growing on the rack itself. The plants observed were soft, fragile, mostly composed of water, and should be able to break/tear if engaged mechanically.**

5. If we find that the brush is not as effective as we would hope do we have a fall back or other types of material that could be tested to make sure we get the best cleaning possible. There might be a little trial and error necessary, but hence the question about reviewing Bonneville as well.

   - **The PDT will continue to investigate utilizing several different sizes of brush bristle, with varying thicknesses, lengths, etc... It is likely that only one "size" of brush would be implemented since they are usually inserted into a rail/clamp style system, but we can have some variance in the actual bristles. We want to use the stiffest bristles possible that don't snap or break when they go over the protruding L-brackets.**

   - **If the three-pronged debris management approach does not restore differentials to a safe operating range, as a last resort in an emergency, shutting off the AWSBS and pulling the trash racks to be pressure washed by project personnel on the deck could be requested.**

From: Rerecich, Jonathan G CIV USARMY CENWP (USA) <Jonathan.G.Rerecich@usace.army.mil>
Sent: Wednesday, July 12, 2023 1:04 PM
To: FFDRWG
Subject: The Dalles AWS Backup Debris Management 90% Engineering Documentation Report review

Dear Fish Facility Design Review Work Group (FFDRWG) members:

Please find attached for your review The Dalles Auxiliary Water Supply Backup Debris Management 90% Engineering Documentation Report and pertinent information from the report appendices for FFDRWG review.

This project is part of the Corps of Engineers' ongoing efforts to provide a reliable backup auxiliary water supply for the east fish ladder at The Dalles Dam to support operations during fish turbine rehabilitation and in the event one or both fish turbines are forced out of service. The report documents the alternatives evaluation developed by the Project Development Team (PDT) and the recommended preferred alternative to carry forward to a Design Documentation Report.

Appendix E contains 60% review comments provided by National Marine Fisheries Service and Columbia River Inter-Tribal Fish Commission with PDT responses.

Your review of this Engineering Documentation Report is very important. The comment period is now open. You may send your written comments to Jon Rerecich at jonathan.g.rerecich@usace.army.mil, (503) 808-4779, by August 11, 2023.

Sincerely,

Jon Rerecich
Fish Passage Section
Environmental Resources Branch
USACE Portland District
503-808-4779
Jonathan.g.rerecich@usace.army.mil

From: Tom Lorz <lort@critfc.org>
Sent: Tuesday, August 15, 2023 5:33 PM
To: Rerecich, Jonathan G CIV USARMY CENWP (USA) <Jonathan.G.Rerecich@usace.army.mil>; Macdonald, Jacob B CIV USARMY CENWP (USA) <Jacob.Macdonald@usace.army.mil>
Cc: Trevor Conder -NOAA Federal <trevor.conder@noaa.gov>; 'Blane.Bellerud@noaa.gov' <blane.bellerud@noaa.gov>
Subject: [Non-DoD Source] TDA AWS Comments

Dear Sirs/Madams

Appreciate the opportunity to comment and for the presentation that was made at FFDRWG. Sorry I did not get the comments in sooner.

Overall I appreciate the thought and direction that the COE has taken on implementing this debris cleaning system for the AWS. We just need to insure that we have a robust system that can operate for at least 2 years consistently during the fish units outages. The East Ladder makes up the vast majority of adult passage and any impacts to that ladder should be avoided. This is our number one priority. While we support the COE efforts to come up with low cost options, this should not be the primary driver of the selection process, minimizing risks to ESA listed species needs to be a top priority. We look forward to continued work on this important topic.

I agree with the multi-prong approach to dealing with debris but need more details on the some of the approaches.

The debris boom makes a lot of sense but need some level of detail on length, depth how it will be anchored, ect. This could become a very expensive addition and if costs become a concern alternatives options should be considered. It might be more cost effective to make a more robust racking system that is less reliant on a debris boom. Furthermore what criteria are going to be used in modeling and the design of the boom. Is there a certain style debris that will be the focus of the design, ie vegetative, large woody debris, smaller material, ect, all the above? We would like to participate in the selection of variables that will be used in the design, or at least have a discussion at future FFDRWG.

While I support using a raking system I would rather go with a more tried and true method than use a relative uncommon rotary system. My understanding is that the rotary system is not commonly used at other locations. What we need to know is are these locations similar to size and use, as well as the conditions being contemplated here. How well do they work and what type of maintenance do they require. Additional maintenance issues should be avoided from both a time and cost standpoint given the current state of the O&M budget.

I would suggest we look at the second preferred option of modifying the rack so a more typical rake system can be used with the proposed hoist. While the upfront cost may be more, the risk of failure and additional maintenance make this a more attractive option. Fewer moving parts will reduce the chance of issues arising as well as likely making repairs easier. The less complicated a system can be the better. Depending on the costs of the boom it may be work out cost wise to be similar if you eliminate the boom and just modify the rack and rake to a more robust system if costs become a concern. I strongly support getting a dedicated hoist for whichever option is selected as well as a dedicated senor to measure draw down.

Tom Lorz
CRITFC

Thank you for your comments. USACE responses to comments are in blue.

1. Overall I appreciate the thought and direction that the COE has taken on implementing this debris cleaning system for the AWS. We just need to insure that we have a robust system that can operate for at least 2 years consistently during the fish units outages. The East Ladder makes up the vast majority of adult passage and any impacts to that ladder should be avoided. This is our number one priority. While we support the COE efforts to come up with low cost options, this should not be the primary driver of the selection process, minimizing risks to ESA listed species needs to be a top priority. We look forward to continued work on this important topic.

    - **The East Fish Ladder performance and the importance of this structure to provide an upstream passage route for adult ESA listed salmonids and other fishes has been the main driving factor during the alternative selection process for debris management while operating the Auxiliary Water Supply Backup System (AWSBS). This is supported through the evaluation criteria and weighted paired comparisons containing scores for each alternative (Section 3.3 in EDR). Fish ladder performance was the highest weighted evaluation criteria selected by both the Product Delivery and Value Engineering teams.**

      The evaluation criteria were weighted out of 100% in the following breakdown: fish ladder performance (22.4%), head differentials <2.0' (16.6%), monitor remotely (15%), minimize shutdowns (13.7%), number and complexity of maintenance cycles (12.4%), construction schedule (7.9%), construction complexity (6.9%), and operate remotely (5.1%). After the initial alternative screening, the four most feasible alternatives remained that were all closely scored. However, it became clear to the PDT members that no single alternative would remove debris as sufficiently and as confidently alone when compared to a multiple alternative approach.

    - **The preferred alternative provides a technically feasible multi-faceted debris management strategy. The team evaluated the final two alternatives by reviewing the construction challenges, debris removal benefits and cost benefit ratio. The significant cost increase of the second alternative did not equate to a significant increase in debris removal or performance of the trash rack.**

2. I agree with the multi-prong approach to dealing with debris but need more details on the some of the approaches.

   The debris boom makes a lot of sense but need some level of detail on length, depth how it will be anchored, ect. This could become a very expensive addition and if costs become a concern alternatives options should be considered. It might be more cost effective to make a more robust racking system that is less reliant on a debris boom.

    - **Alternative 4-1, the debris boom, will have design advancement during the Design Documentation Report (DDR) phase. The preliminary placement for the debris boom will encompass the area around the AWSBS intake and fish ladder exit, located about 55' out from the upstream surface of the dam. The preliminary alignment has the east end of the boom intersecting the existing earthen embankment at the normal high pool elevation of 160 feet. The west end of the boom ties into the upstream side of Unit 22. For cost estimating purposes,**

a 4-foot-deep debris boom skirt was assumed based on the maximum available skirt depths identified on vendor sites.

- **The PDT agrees with your comment and additional text has been added to Section 6.2, Recommendations -**

  "Note: During 90% EDR FFDRWG review, written comments were provided regarding the cost effectiveness of the debris management system and the criteria to be used in modeling the design of the debris boom. During final report preparation, the PDT determined that additional investigation is warranted due to uncertainty surrounding the effectiveness of the debris boom and its contribution to overall debris management of the backup AWS. This is based on field observations of debris accumulation across project forebay water intakes and the most prevalent types of material that have impacted the backup AWS system intake, neutrally buoyant and seasonal vegetative debris. The PDT will continue to investigate methods to evaluate debris effectiveness of the boom during DDR, possibly using CFD modeling already planned to identify boom design requirements."

  The Recommendations section also includes additional DDR actions for the design analysis of the brushing system hoist sizing, electrical load due to brush system friction, and potential upgrades that may be needed for the FCQ7 motor control center electrical unit.

3. Furthermore what criteria are going to be used in modeling and the design of the boom. Is there a certain style debris that will be the focus of the design, ie vegetative, large woody debris, smaller material, ect, all the above? We would like to participate in the selection of variables that will be used in the design, or at least have a discussion at future FFDRWG.

   - **Discussions at FFDRWG and DDR reviews will continue to allow for both CRTIFC's and other agency participation in the selection of variables for the design of the debris boom. Computational Fluid Dynamics (CFD) modeling will be utilized to determine hydraulic forces on the boom which are important for determining measurements of the boom, placement location in the forebay, and determining the appropriate anchor types and location points. The CFD modeling is expected to be completed by June 2024.**

   - **The Dalles Project personnel state that the debris commonly observed near the area of the AWSBS intake and the East Fish Ladder exit are generally beaver sticks and other small sized twigs in the late winter through early spring. During the remaining seasons, personnel typically observe milfoil and other soft aquatic vegetation types. Appendix A of the EDR contains photos that demonstrate the types of vegetation discovered on the AWSBS trash racks during an ROV inspection. The debris observed includes but is not limited to: Eurasian Water-Milfoil, Curly Leaf Pondweed, and Coontail (Washington State Department of Ecology Celilo Reservoir Aquatic Vegetation Monitoring website).**

4. While I support using a raking system I would rather go with a more tried and true method than use a relative uncommon rotary system. My understanding is that the rotary system is not commonly used at other locations. What we need to know is are these locations similar to size and use, as well as the conditions being contemplated here. How well do they work and what type of maintenance do they require. Additional maintenance issues should be avoided from both a time and cost standpoint given the current state of the O&M budget.

I would suggest we look at the second preferred option of modifying the rack so a more typical rake system can be used with the proposed hoist. While the upfront cost may be more, the risk of failure and additional maintenance make this a more attractive option. Fewer moving parts will reduce the chance of issues arising as well as likely making repairs easier. The less complicated a system can be the better. Depending on the costs of the boom it may be work out cost wise to be similar if you eliminate the boom and just modify the rack and rake to a more robust system if costs become a concern. I strongly support getting a dedicated hoist for whichever option is selected as well as a dedicated senor to measure draw down.

- **According to brush manufacturers, motorized rotary brushes will be more effective at removing debris than a standard strip brush and will be the primary target of design. If this proves to be infeasible, static strip brushes can be used. This brush would need to interface with the current trash rack panels and work around or over the L-brackets that protrude approximately one-inch from the upstream face of the grating. Brush manufacturers have provided recommendations for flexible nylon material length and stiffness to engage and dislodge debris from the rack. A well-balanced configuration will be investigated further during DDR.**

  Even with a total trash rack replacement, a conventional raking system is still likely infeasible. Due to the required size of the new trash rack (25' x 65'), it would still need to be constructed in smaller stackable panels. It would be very unlikely that the tight clear spacing of 0.75" could be perfectly aligned at the interface of each panel or maintained perfectly across the entire depth. Therefore, conventional rake teeth that travel between the vertical members of the rack face would have to be undersized and would still run the risk of snagging on misaligned or tight sections of the clear spacing.

  A dedicated hoist would have to be greatly oversized to account for potential snagging and uneven lifting forces caused by this tight spacing and the weight of debris that the rake picks up. The project does not have a debris lay down area and wishes to avoid handling and hauling away debris pulled up by the rake if possible. For these reasons, a brushing system would still be used regardless of new trash racks. Furthermore, the new brush would still be a backup strategy to valve cycling, which to date has proven effective at freeing enough debris to restore a safe operating head differential.

  The brush could be much stiffer and sit closer to the face of the rack with new trash racks, in turn having a higher probability of debris removal. However, the high additional cost and low benefit of alternative 10 (second best) when comparing the cleaning performance to alternative 11 (preferred) is unsatisfactory.

- **The brush system will only be operated if valve cycling and floating debris does not restore a safe operating head differential of less than 2.0'. The project has demonstrated that cycling the valves and allowing debris to float off has restored a safe operating head differential each time the AWSBS has required a debris removal cycling (see Table 2-3, AWSBS Operation Data in EDR). The water level sensors will allow the project to have real-time access to head differential measurements across the intake and will be able to determine when the valve cycling is required to occur. This immediate view of head differentials allows the project to**

plan for shut down of the system during times that will reduce impacts to adult salmonid passage in the East Ladder.

Although the rotary brush system used in this application is novel, components of the rotary brush system have been reliably used in different applications throughout the district. For example, electrical winch hoists with wire ropes have been used to reliably position adjustable fishway entrance gates. Submersible motors are used at projects to rotate Submersible Traveling Screens (STSs). Submerged rotary brushes are used at all count station windows in the adult fish ladders.

Lastly, the design will also incorporate a fail-safe mode into the brush system design. A manual lock mode for the rotary brush will be incorporated into the design to allow for the rotary brush to lock into place and still be utilized and moved using the dedicated hoist if the submersible motor were to fail.

5. Depending on the costs of the boom it may be work out cost wise to be similar if you eliminate the boom and just modify the rack and rake to a more robust system if costs become a concern. I strongly support getting a dedicated hoist for whichever option is selected as well as a dedicated senor to measure draw down.

- **The preferred alternative will utilize dedicated hoists and sensors. The PDT intends to continue to evaluate the effectiveness of the debris boom in the DDR. We concur that *IF* the debris boom is no longer pursued, we would investigate utilizing those funds for more robust components of the brushing system. For example, electrical panel upgrades to utilize a larger motor and hoist size than what is priced out currently with existing electrical panel constraints.**