



Your Northwest renewables utility

December 29, 2016

VIA ELECTRONIC FILING

Kimberly D. Bose, Secretary
Nathaniel J. Davis, Sr., Deputy Secretary
Federal Energy Regulatory Commission
888 First Street NE
Washington, DC 20426

**Re: Jackson Hydroelectric Project, FERC No. 2157
License Article 415 Water Temperature Conditioning Plan Amendment for Phase 2
Structure Design Change**

Dear Secretary Bose:

With this filing, Public Utility District No. 1 of Snohomish County (the District) is requesting an amendment to the Water Temperature Conditioning (WTC) Plan, approved in License Article 415 of the License Order issued by the Commission on September 2, 2011, for the Jackson Hydroelectric Project (Project).

The intent of the WTC Plan is to modify Project operations to provide water temperatures that are beneficial to salmonids and other aquatic resources within the 6.4-mile reach of the Sultan River, immediately downstream of Culmback Dam (Reach 3), from the water in Spada Lake Reservoir. With the completion of volitional fish passage improvements at the Diversion Dam under Aquatic License Article 13: Diversion Dam Volitional Passage (DDVP) Plan occurring on December 30, 2016, the District is now actively working to plan the construction of the improvements necessary for Phase 2 of the WTC Plan to meet the modified temperature conditioning targets necessary to address the presence of anadromous fish within the reach. During this planning process, the District identified a number of challenges with the original design and developed a concept for a more robust facility for safely and reliably providing water for WTC in Reach 3.

As such, the District is requesting a modification to the Phase 2 structure that is identified in the WTC Plan Sections 2.2, 2.3, and 3; the new proposed Sections detailing the design for Phase 2 are included as Attachment 1. Documentation of consultation with the Aquatic Resource Committee (ARC)¹ regarding Attachment 1 is included as Attachment 2.

¹ The ARC consists of representatives from U.S. Forest Service, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Tulalip Tribes, WA Department of Ecology, WA Department of Fish and Wildlife, Snohomish County, City of Everett, City of Sultan, and American Whitewater

Original Design

The original concept identified in the WTC Plan approved by FERC in 2011 included the implementation of a floating intake, moored in the forebay impoundment provided by Culmback Dam. This intake would direct surface water from the reservoir impoundment into a subsurface conveyance system, ultimately leading conditioned flows to a secondary conveyance system through the dam and into the most upstream section of Reach 3. This facility would require in-water work for construction and ongoing maintenance. Additionally, this type of facility would be exposed to wind and wave action, floating debris in the Reservoir, and vandalism.

New Design

The new design concept is to divert water from the existing Power Tunnel into the most upstream section of Reach 3, at the base of Culmback Dam, via a proposed diversion tunnel. The proposed tunnel would range from 72 inches to 120 inches in diameter (depending on the type of construction) and be roughly 750 feet long. This design relies on the selective withdrawal capabilities of the existing Intake Structure in Spada Lake Reservoir.

Benefits of New Design

This concept has clear advantages over other alternatives in regard to system reliability and operational control. The design does not require a penetration of the morning glory spillway or the alteration of other Project facilities not originally intended for the conveyance of high volume water flows. The concept also allows for all the proposed piping and valves to be accessible for inspections, operations, and maintenance without the need for watercraft and certified divers. And finally, since the temperature of water entering the Power Tunnel is already controlled via the selective withdrawal capabilities of the existing intake structure it will only require minor alterations to operational protocols and the same selective withdrawal system can be used to meet the temperature objectives in Reach 3.

Request

The District is requesting approval of the modification to the WTC Plan as outlined in Attachment 1 by March 1, 2017. This will allow the District time to have contractors finalize plans for construction in an expedited manner. Due to time constraints with securing appropriate permits and contractors, weather conditions in the Spada Basin, and construction deadline of two years after completion of the DDVP, the District would appreciate an expedited review and approval of this WTC Plan amendment.

If you have any questions regarding this filing, please do not hesitate to contact Keith Binkley, Natural Resources Manager, at (425) 783-1769.

Sincerely,

/s/ Brad Spangler for

Tom DeBoer

Assistant General Manager of Generation, Power, Rates and Transmission Management

TADeBoer@snopud.com

(425) 783-1825

Enclosed: Attachments 1 and 2

Cc via email: ARC
 Chris White, FERC Portland Regional Office

ATTACHMENT 1

Modifications to Sections 2.2, 2.3, and 3 of WTC Plan

2.2. Phase 2 Implementation

2.2.1 Standards and Schedule

For Phase 2, the temperature performance standards associated with the RT are largely influenced by temperature patterns in the upper, epilimnetic portion of the reservoir above elevation 1,380 feet msl. The Phase 2 facility will provide access to warm water in the stratified reservoir epilimnion and the variable panel setting options will eliminate the reservoir elevation restriction associated with use of the auxiliary release line. Potential release volumes (and temperatures) associated with the 10-inch cone valve and hydro unit are known and predictable as they are located near the reservoir bottom and available for use at all times, excluding spillway inspections. The release volume of the WTC Tunnel and associated piping and valving will be sized to convey 115 cfs of warm water from the reservoir epilimnion via the selective withdrawal capabilities of the existing Intake Structure. The balance of the full 165 cfs hypothetical future flow will normally be provided by the 10-inch cone valve (45 cfs) and the existing small hydro unit (5 cfs); or through other revisions to the WTC Tunnel valving.

Once the water is released at the tailpool of Culmback Dam, general climatic conditions (air temperature and precipitation) influence temperature and streamflow. During summer, significant warming of the river can occur over the 6.4-mile reach (Reach 3) largely related to the presence of bedrock in the canyon. Variable accretion (side flows) can also influence seasonal temperatures with their effect being most pronounced in the fall and winter months. Performance standards must ensure that the State Water Quality Criteria are met, unless an approved variance is issued.

Performance standards will ultimately be defined by the ARC. The seasonal shaping and monthly distribution of the annual water budget will influence temperature in Reach 3. Temperature modeling will be used to incorporate the parameters outlined above and set draft performance standards. Longitudinal temperature monitoring will be used to verify and validate modeling results. Simplistic modeling of bioenergetics may also aid in refining performance standards.

2.2.2 Method of Release

The water release point options for Phase 2 will include the 10-inch cone valve, the small hydro unit, and the proposed WTC Tunnel. The hypothetical future flow from these three release points, in combination, will total approximately 165 cfs at reservoir elevation 1,430 ft. msl), including flows of approximately 45 cfs from the cone valve, 5 cfs from the small hydro unit, and 115 cfs from the WTC Tunnel.

Meeting the RT will require blending of seasonally available warm water from the proposed WTC Tunnel with cold water from the cone valve and small hydro unit. The small hydro unit runs constantly, releasing approximately 5 cfs of cold water ranging between 3 and 6 degrees Celsius to provide Culmback Dam station service. Therefore, blending hinges primarily on the relative use of the 10-inch cone valve and the proposed WTC Tunnel. When the reservoir is isothermal, the release location is largely irrelevant. However, when the reservoir is stratified blending of water temperatures can occur (typically April through October).

2.3 Limitations

The Phase 1 design limitations are the fixed inlet location (reservoir elevation) and the relatively small capacity of the auxiliary release line at 20 cfs. The Phase 2 WTC Tunnel design significantly improves the operational range of use with regard to reservoir elevation and provides for the delivery of up to 115 cfs of warm water for conditioning.

3. PHASE 2 WTC TUNNEL DETAILS

The original Phase 2 concept approved by FERC was developed in response to stakeholder requests for a structure that operated in a similar manner to the selective withdrawal structure at the intake to the power tunnel. As envisioned at the time, this concept called for a floating structure that collected the warmer water at the top of the reservoir. However, after further engineering review, the District identified many obstacles to the reliable operation and maintenance of this type of structure. These obstacles include underwater maintenance requirement, impacts from ice, wind and wave action, and exposure to vandalism, among others. As such, the District developed an improved and more reliable design for the Phase 2 structure which is discussed below.

3.1 Conceptual Plan and Drawings

The Phase 2 WTC project would utilize the existing Intake Structure and Power Tunnel, together with a proposed WTC Tunnel to deliver conditioned water to the head of Reach 3 of the Sultan River at the base of Culmback Dam (see Figure 2). If necessary, supplemental water could be provided via the Outlet Works and existing Auxiliary Release Line for additional temperature conditioning.

3.1.1 Existing Intake Structure and Power Tunnel

The project would utilize the existing Intake Structure located near the left abutment of Culmback Dam, and its selective water withdrawal capability (see Figure 3). The structure includes a trashrack and three moveable panels operated by wire rope hoists. The upper panels consist of two individual bulkheads and the lower panel is a single bulkhead. The panels can be positioned in five primary configurations to selectively withdraw water of different temperature from the reservoir. A headgate allows isolation of the Power Tunnel downstream. The Power Tunnel is a 14-foot diameter un-lined tunnel in hard rock.

The proposed tunnel would convey water from the Power Tunnel to the base of Culmback Dam, a distance of approximately 750 feet (see Figures 4 and 5). The tunnel could range from approximately 72 to 120 inches in diameter, depending on the method of construction. A guard valve and energy dissipation valve would be located at the downstream outlet.

3.1.2 Flow Regulation

The structure will use a manually operated guard valve in series with a regulating valve.

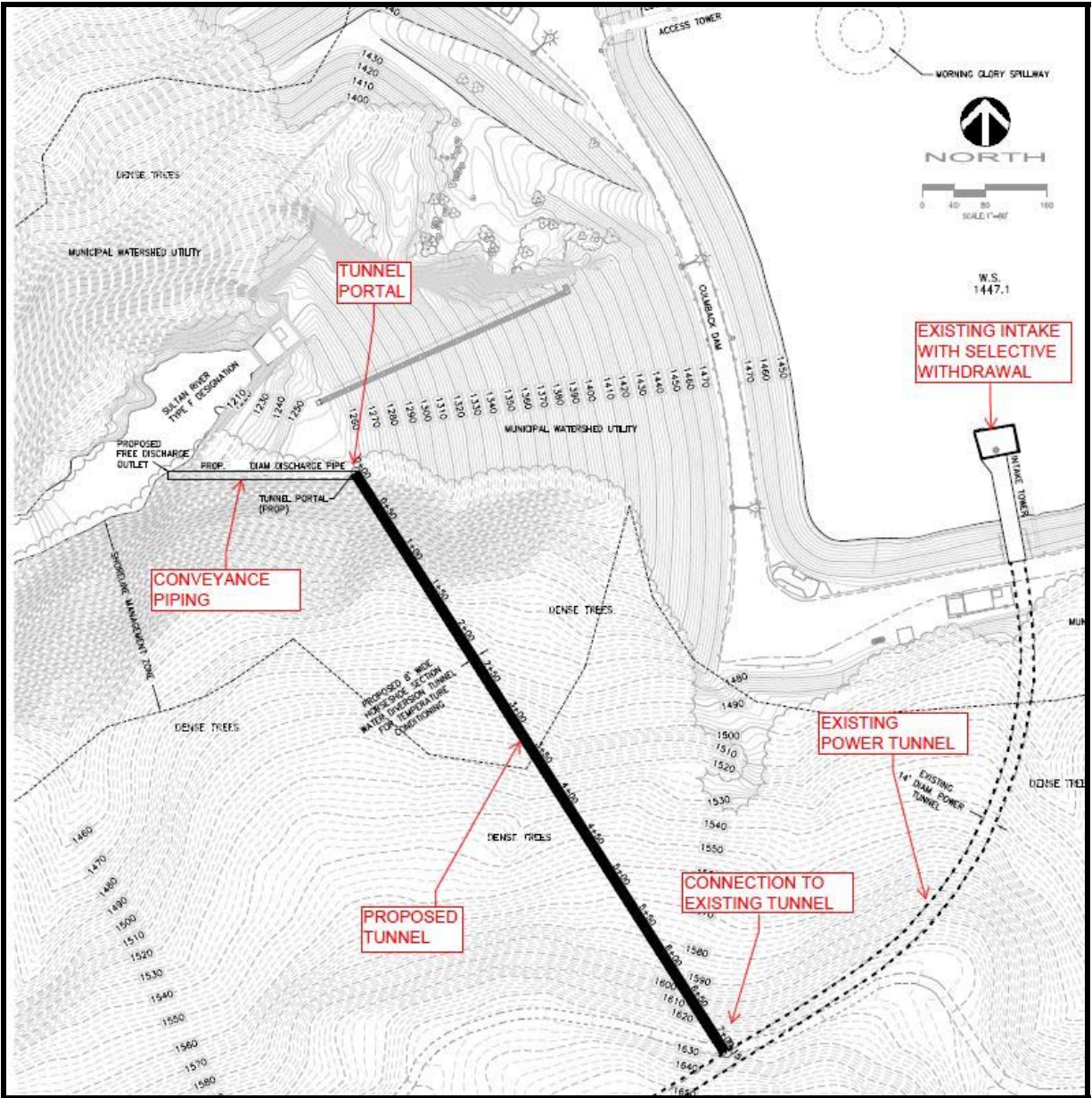


Figure 2. Plan sketch for Phase 2 concept.

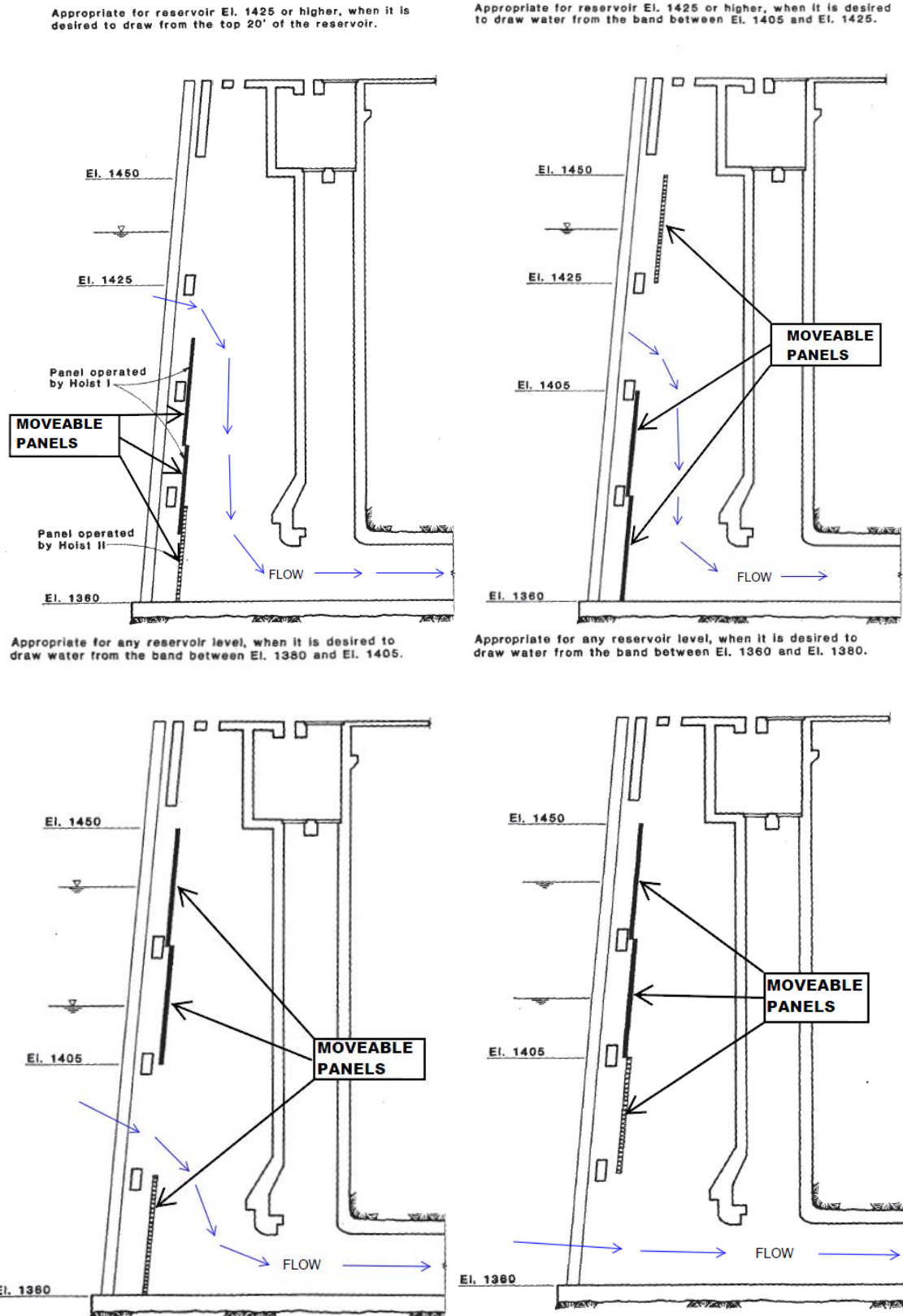
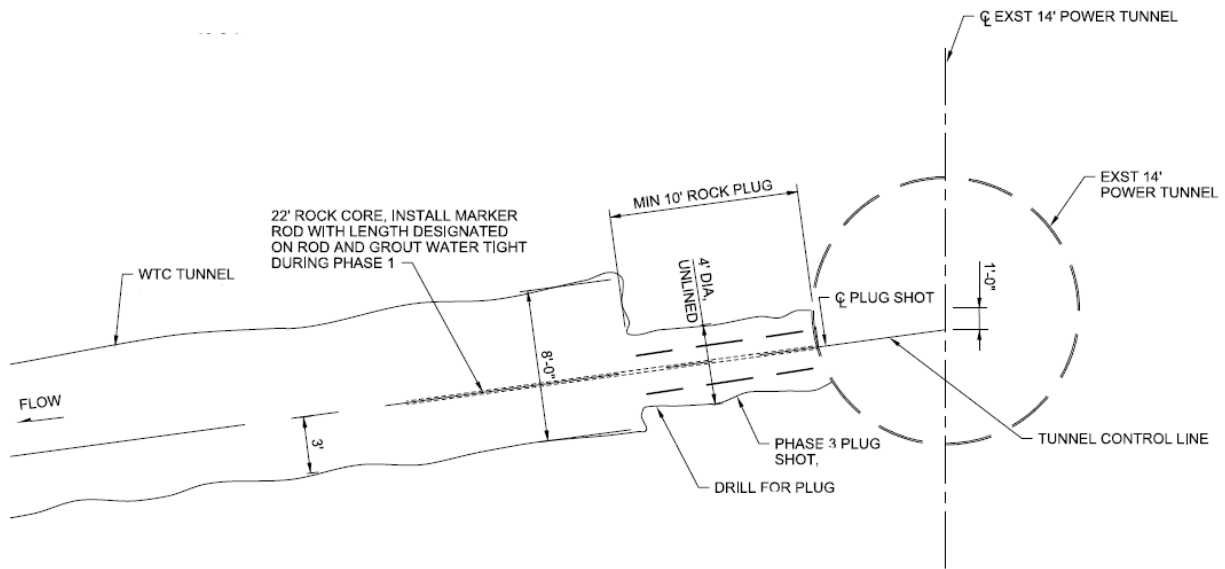
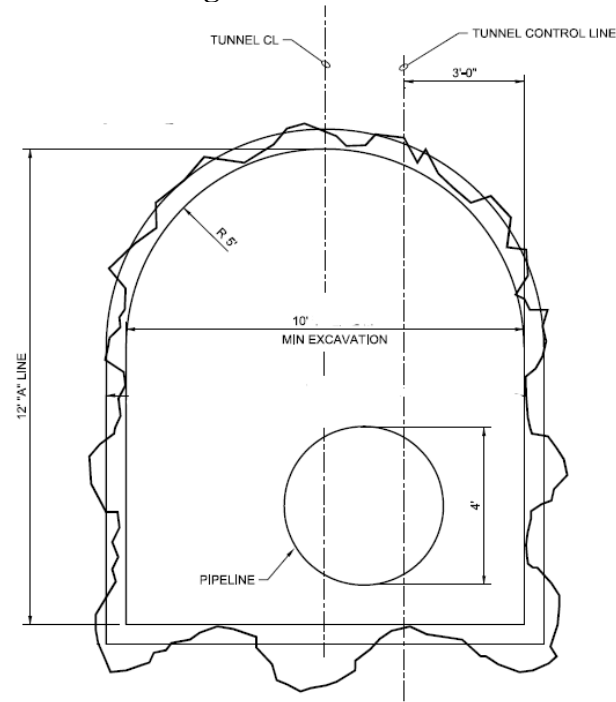


Figure 3. Typical panel configurations at existing intake structure.



Existing Power Tunnel Tie-in



Proposed WTC Tunnel Section

Figure 4. Tunnel sections.

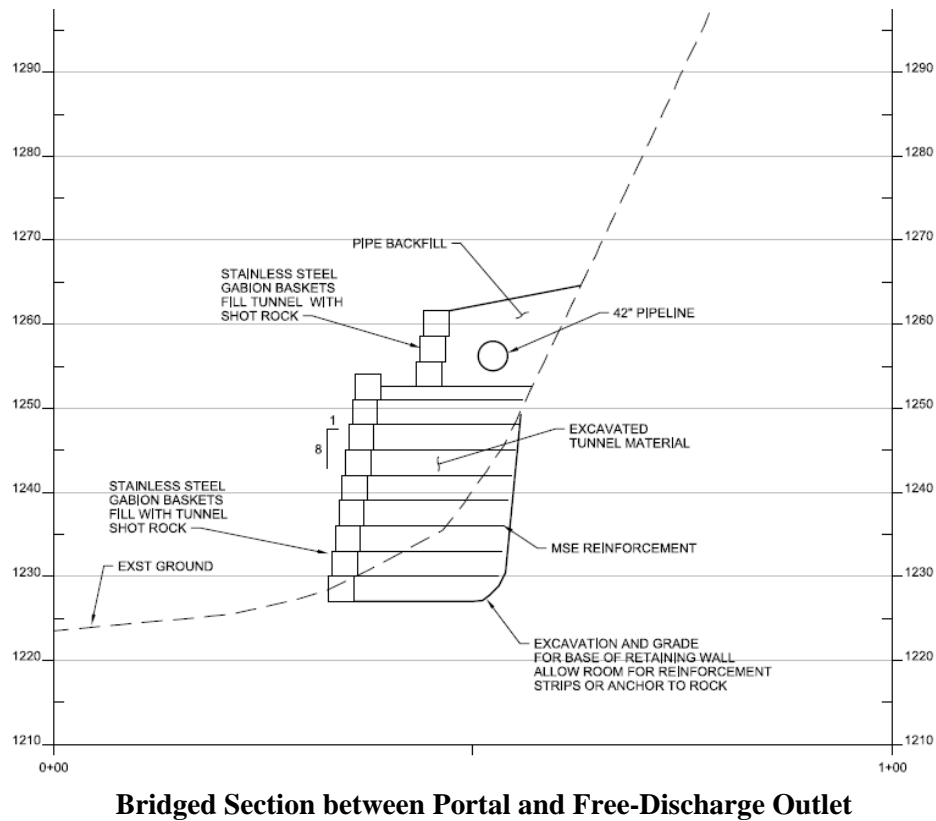
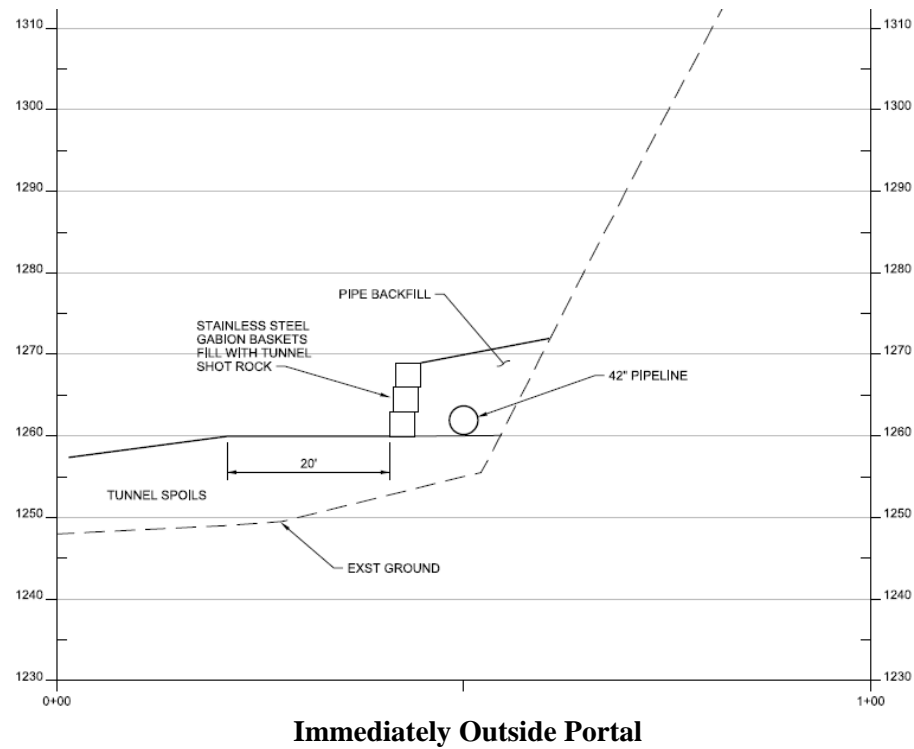


Figure 5. Conveyance piping plan sections.

3.2 Preliminary Operating Plan

3.2.1 Functionality

The WTC Tunnel will allow for water to be drawn from the most desirable temperatures that exist in the water column between Spada Lake Reservoir elevation 1,360 and 1,450 feet msl. This will ensure that only warm water from the upper portion of the reservoir is collected by the intake. The flow of warm water will be regulated by a valve at the base of the WTC Tunnel just prior to its release into the river. A regulating valve control will allow the volume of warm water passing through the WTC Tunnel to be adjusted to conform to license requirements for instream flows and state water quality (temperature) criteria in Reach 3, the reach of the Sultan River between the Culmback Dam and the City of Everett's Diversion Dam. Simultaneous control of the existing 10-inch cone valve (and small hydro unit) will maintain the minimum instream flow release volume, mixing cold water with warm water to meet the stream flow temperature target.

3.2.2 Maintenance

Maintenance activities associated with use of the WTC Tunnel will include periodic inspection of the tunnel which will coincide with scheduled inspections for the existing Power Tunnel. Inspectors will evaluate rock fractures and look for degradation of the tunnel walls, including rock fall and/or spalling. The proposed rock trap will be cleaned of debris as required. Tunnel shutdowns will also provide an opportunity for the inspection of the conveyance piping interior.

The conveyance piping exterior will be inspected on a monthly basis, as this element will be readily accessible via the stairway on the face of Culmback Dam. Inspectors will evaluate protective coatings, look for leaks and exercise the valves during these visits. Mechanical valves will also receive periodic maintenance based on the manufacturer's specific recommendations. The specifics of these recommendations are not known at this time.

3.2.3 Reliability and Survivability

The existing Power Intake Structure, along with the integrated selective withdrawal capabilities, is a very robust structure that has been in service since 1982. There are no proposed changes to the configuration of the Intake Structure. Minor upgrades, including replacement of the moveable winch motors, installation of temperature probes, and other instrumentation, controls and electrical upgrades will be made to facilitate future operations.

The proposed WTC Tunnel will be constructed in rock and will be un-lined over the majority of its length. This is similar to the existing Power Tunnel which has performed well since its construction in 1982. The WTC Tunnel will include a grouted concrete plug and a short section lined with pipe located near the downstream portal. The location and design of these facilities will conform to current standard best practices for confinement of an unlined pressurized tunnel. In addition, downstream portions of the pipeline from the tunnel portal to the Sultan River will be configured to prevent damage from rock fall and to remain protected during large flood events.

3.3 Design Issues

3.3.1 WTC Tunnel

The identification of construction staging and access for the WTC Tunnel project are critical, and are dependent on the construction contractor's selected approach. It is anticipated that the tunnel will likely be excavated by a drill and blast operation. The ultimate size of the WTC tunnel will be subject to the contractor's means and methods; however, a minimum cross section will be specified in the construction documents. Spoils will be wasted at an existing bench area located at the toe of Culmback Dam and/or hauled elsewhere to an appropriate disposal site. Two brief outages of the existing Power Tunnel will be required for construction. Work will also be scheduled to avoid impacts to sensitive species, such as marbled murrelets.

3.3.2 Conveyance Piping

Steel conveyance piping will be provided for the downstream portion of the tunnel from a concrete plug to the portal. Exposed sections will be supported on saddles. HDPE or steel piping will likely be provided from the portal to the Sultan River, and will be covered in spoils retained within gabion basket walls. Additional pipe wall thickness, and appropriate coatings and linings, will be provided as necessary.

3.3.3 Guard and Control Valves

Both a guard valve and a control valve will be provided on the conveyance piping near the portal area. The guard valve will likely be a 36-inch diameter gate valve with a manual operator. The control valve will likely be a 24-inch diameter plunger valve with a motor operator. An open-channel discharge with air admission is assumed.

ATTACHMENT 2

Consultation Documentation of Modifications

Presler, Dawn

From: Presler, Dawn
Sent: Thursday, December 01, 2016 1:00 PM
To: 'Tim_Romanski@fws.gov' (Tim_Romanski@fws.gov); 'Bryden, Andy -FS'; 'Anne Savery'; 'Elizabeth Babcock - NOAA Federal'; 'Jim Miller (JMiller@everettwa.gov)'; 'Mick Matheson'; 'Thomas O'Keefe'; 'James (ECY) Pacheco' (JPAC461@ECY.WA.GOV); 'brock.applegate@dfw.wa.gov' (brock.applegate@dfw.wa.gov); 'Rustay, Michael'
Cc: Binkley, Keith; Schneider, Eric
Subject: JHP (FERC No. 2157) - WTC Plan amendment for Phase 2 for your expedited review
Attachments: 201612 DRAFT WTC Plan Amendment for ARC Review.doc

Dear ARC Members,

Attached is the revised Water Temperature Conditioning (WTC) Plan for the Phase 2 structure. As previously discussed at the ARC meetings, the District in its design review for the Phase 2 structure has determined that utilizing the existing intake structure is a superior method over the floating water structure to provide water for WTC in Reach 3 with more reliability for operation and maintenance and flexibility of withdrawal location within the water column.

Please review the updated Section 3 of the WTC Plan and provide comments back to me (and cc: to Keith). As discussed at the ARC meeting, we are requesting an expedited review in order to get this update before FERC soon for their review and approval; this will allow more opportunity to get the WTC Phase 2 structure built sooner than later to support the new anadromous species in Reach 3 if needed. Please submit comments, if any, to me by December 16; emails stating your support would be appreciated as well.

Sincerely,
Dawn Presler
Sr. Environmental Coordinator
(425) 783-1709

PUD No. 1 of Snohomish County
PO Box 1107
Everett, WA 98206-1107

Presler, Dawn

From: Presler, Dawn
Sent: Thursday, December 29, 2016 10:07 AM
To: 'Bryden, Andy -FS'
Cc: Vacirca, Richard -FS
Subject: RE: JHP (FERC No. 2157) - WTC Plan amendment for Phase 2 for your expedited review

Hi Andy,
Yes, the new tunnel/pipe would be on District property and not on USFS lands. Thanks for your input/approval.

Happy New Year!

Dawn

From: Bryden, Andy -FS [mailto:abryden@fs.fed.us]
Sent: Thursday, December 15, 2016 4:20 PM
To: Presler, Dawn <DJPresler@SNOPUD.com>
Cc: Vacirca, Richard -FS <rvacirca@fs.fed.us>
Subject: RE: JHP (FERC No. 2157) - WTC Plan amendment for Phase 2 for your expedited review

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DP~

Looking at the maps, I assume this stays off forest service lands. If so, I am good with the proposed modification to facilities for improving our ability to shape release temperatures.

Cheers



Andy Bryden
Skykomish Ranger District Recreation Staff Officer
Stevens Pass Ski Area Administrator

Forest Service
Mt. Baker - Snoqualmie National Forest

p: 360-677-2214
f: 360-677-2450
abryden@fs.fed.us

PO Box 305
74920 NE Stevens Pass Highway
Skykomish, WA 98288
www.fs.fed.us



Caring for the land and serving people

From: Presler, Dawn [<mailto:DJPresler@SNOPUD.com>]

Sent: Thursday, December 01, 2016 1:00 PM

To: 'Tim_Romanski@fws.gov' (Tim_Romanski@fws.gov) <Tim_Romanski@fws.gov>; Bryden, Andy -FS <abryden@fs.fed.us>; 'Anne Savery' <asavery@tulaliptribes-nsn.gov>; 'Elizabeth Babcock - NOAA Federal' <elizabeth.babcock@noaa.gov>; 'Jim Miller' (JMiller@everettwa.gov)' <JMiller@everettwa.gov>; 'Mick Matheson' <mick.matheson@ci.sultan.wa.us>; okeefe@americanwhitewater.org; 'James (ECY) Pacheco' (JPAC461@ECY.WA.GOV) <JPAC461@ECY.WA.GOV>; 'brock.applegate@dfw.wa.gov' (brock.applegate@dfw.wa.gov) <brock.applegate@dfw.wa.gov>; 'Rustay, Michael' <mike.rustay@co.snohomish.wa.us>

Cc: Binkley, Keith <KMBinkley@SNOPUD.com>; Schneider, Eric <EASchneider@SNOPUD.com>

Subject: JHP (FERC No. 2157) - WTC Plan amendment for Phase 2 for your expedited review

Dear ARC Members,

Attached is the revised Water Temperature Conditioning (WTC) Plan for the Phase 2 structure. As previously discussed at the ARC meetings, the District in its design review for the Phase 2 structure has determined that utilizing the existing intake structure is a superior method over the floating water structure to provide water for WTC in Reach 3 with more reliability for operation and maintenance and flexibility of withdrawal location within the water column.

Please review the updated Section 3 of the WTC Plan and provide comments back to me (and cc: to Keith). As discussed at the ARC meeting, we are requesting an expedited review in order to get this update before FERC soon for their review and approval; this will allow more opportunity to get the WTC Phase 2 structure built sooner than later to support the new anadromous species in Reach 3 if needed. Please submit comments, if any, to me by December 16; emails stating your support would be appreciated as well.

Sincerely,

Dawn Presler

Sr. Environmental Coordinator

(425) 783-1709

PUD No. 1 of Snohomish County

PO Box 1107

Everett, WA 98206-1107

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CERTIFICATE OF SERVICE

I hereby certify that I have this day served via e-mail a copy of the foregoing filing upon each person on the Project's Aquatic Resource Committee in accordance with ordering paragraph K of the Project license issued by the Federal Energy Regulatory Commission on September 2, 2011.

Dated at Everett, Washington, this 29th day of December, 2016.



Dawn Presler, Sr. Environmental Coordinator
Public Utility District No. 1 of Snohomish County
PO Box 1107
Everett, WA 98206-1107
Phone: (425) 783-1709
E-mail: DJPresler@snopud.com

Presler, Dawn

From: Presler, Dawn
Sent: Thursday, December 29, 2016 12:42 PM
To: "Tim_Romanski@fws.gov" (Tim_Romanski@fws.gov); 'Vacirca, Richard -FS'; 'Elizabeth Babcock - NOAA Federal'; 'Anne Savery'; "James (ECY) Pacheco" (JPAC461@ECY.WA.GOV); "brock.applegate@dfw.wa.gov" (brock.applegate@dfw.wa.gov); 'Rustay, Michael'; 'Mick Matheson'; 'Jim Miller (JMiller@everettwa.gov)'; 'Thomas O'Keefe'
Cc: Binkley, Keith; 'Ludwig, Noel - FS'
Subject: JHP (FERC No. 2157) - cc WTC Plan Phase 2 amendment request to FERC
Attachments: 20161229 Jackson P2157 re WTC Plan Phase 2 amendment.pdf

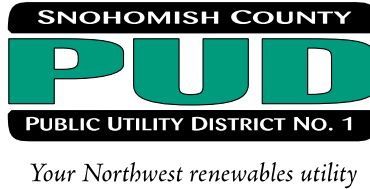
Dear ARC Members:

Attached is your cc of the amendment request to the Water Temperature Conditioning Plan regarding the Phase 2 component that I will be e-filing with FERC shortly. If you have any questions about the filing, please let Keith know.

Happy New Year!

Dawn Presler
Sr. Environmental Coordinator
(425) 783-1709

PUD No. 1 of Snohomish County
PO Box 1107
Everett, WA 98206-1107



May 20, 2016

VIA ELECTRONIC FILING

Kimberly D. Bose, Secretary
Nathaniel J. Davis, Sr., Deputy Secretary
Federal Energy Regulatory Commission
888 First Street NE
Washington, DC 20426

**Re: Jackson Hydroelectric Project, FERC No. 2157
License Article 415 Water Temperature Conditioning Plan, Updated for Additional
Monitoring for FERC Approval**

Dear Secretary Bose:

Public Utility District No. 1 of Snohomish County (the District) is providing a proposal for Commission review and approval regarding additional monitoring within Reach 3 (upstream of the City of Everett's Diversion Dam) of the Sultan River pursuant to the License Article 415 Water Temperature Conditioning Plan (WTC Plan) for the Jackson Hydroelectric Project (Project). The WTC Plan, approved with the License as Article 415, identified a Year 5 monitoring component contingent upon need based on data collection efforts in Years 1 and 3. The District provided the cumulative results of all monitoring in a report to the Aquatic Resources Committee (ARC) after completion of the Year 3 effort. This information was reviewed by the ARC and provided input into the need and justification for Year 5 monitoring.

The introduction of anadromous salmon and steelhead into Reach 3 of the Sultan River is the logical outcome of the implementation of fish passage as outlined in the Diversion Dam Volitional Passage (DDVP) Plan; passage construction is planned for completion by the end of October 2016. As such, data collection efforts need to be relevant for the future species utilization and flow management within Reach 3. The District has discussed with various ARC members and during the workshop held on March 14, 2016, the validity of future data collection with regard to past data collection efforts and confidence in the results of data collection efforts (see Attachment 1 for consultation documentation). Based on that consultation, the ARC agreed to a continued but modified monitoring effort under Section 4.1 Temperature Monitoring (see Attachment 2) and Section 4.2 Biological Response Monitoring (see Attachment 3). As such, the District proposes that the Commission review and approve the following monitoring:

WTC Plan Section 4.1 Temperature Monitoring

For Year 5 of Phase 1 and For Phase 2 Monitoring:

The District is proposing to modify the program for monitoring of water temperature in Reach 3. These modifications would commence in 2016 and remain in place through 2023 coincident with the fifth year of Phase 2 of the Water Temperature Conditioning program. This monitoring program is intended to characterize variation in temperature patterns tied to structural improvements (Table 1), operational changes, including increased minimum flows in 2020, and climatic conditions. Data will be summarized annually and presented to the ARC for review.

Table 1. Chronology of Water Temperature Conditioning improvements for Reach 3 of the Sultan River, Jackson Hydroelectric Project.

Calendar Year	WTC Phase and Year
2016	WTC Phase 1, Year 5
2017	WTC Phase 1, Year 6
2018	WTC Phase 1, Year 7
2019	WTC Phase 2, Year 1
2020	WTC Phase 2, Year 2
2021	WTC Phase 2, Year 3
2022	WTC Phase 2, Year 4
2023	WTC Phase 2, Year 5

Commencing in 2016, monitoring will occur at stations listed below (Table 2). Future monitoring needs will be reassessed in 2023 and filed with FERC consistent with WTC Plan Section 5.2.

Table 2. Monitoring 2016-2023.

River Mile	Past Program	Future Program	Rationale for change
16.1	Year-round sampling	Year-round sampling	No change, per WQMP
15.5	Not sampled	Sampled seasonally (April through October)	New station, further downstream, to allow for full mixing
14.3	Year-round for a minimum of 3 and maximum of 5 years	Sampled seasonally (April through October)	Confidence in existing dataset and modeling results, sampling tied to WTC operation, avoid high flow season to minimize loss of equipment / data
12.8	Year-round for a minimum of 3 and maximum of 5 years	Eliminated	Confidence in existing dataset and modeling results, landslide precludes safe access
11.3	Year-round for a minimum of 3 and maximum of 5 years	Sampled seasonally (April through October)	Confidence in existing dataset and modeling results, sampling tied to WTC operation, avoid high flow season to minimize loss of equipment / data
9.8	Year-round sampling	Year-round sampling	No change, per WQMP
Big Four Creek	Year-round	Eliminated	Data of limited value / relevance

WTC Plan Section 4.2 Biological Response Monitoring

For Year 5 Monitoring:

To supplement the existing record on fish growth, the District proposes to:

- analyze scale samples collected during 2012 (Year 1),
- collect samples from a minimum of 20 and a maximum of 40 fish during 2016 (Year 5),
- analyze scale samples collected during 2016 (Year 5), and
- prepare a brief technical report summarizing changes in growth rates between the baseline condition and Years 1, 3, and 5 of Phase 1 of the WTC Program.

If you have any questions regarding the monitoring proposals for the WTC Plan, please do not hesitate to contact Keith Binkley, Natural Resources Manager, at (425) 783-1769.

Sincerely,

/s/ Giuseppe Fina

Giuseppe Fina
Interim Assistant General Manager of Generation
GFina@snopud.com
(425) 783-1825

cc: ARC

Attachment 1

Consultation Documentation

ARC Reach 3 Monitoring Workshop

Summary

March 14, 2016

Present:

- ❖ District – Keith Binkley, Dawn Presler
- ❖ Tulalip Tribes – Anne Savery
- ❖ U.S. Forest Service – Andy Bryden
- ❖ WA Department of Ecology – Jim Pacheco
- ❖ WA Department of Fish and Wildlife – Brock Applegate

Absent:

- ❖ American Whitewater – Tom O’Keefe
- ❖ City of Everett – Jim Miller (expressed not interested in participating)
- ❖ City of Sultan – Mick Matheson (expressed not interested in participating)
- ❖ National Marine Fisheries Service – Steve Fransen (retired, no replacement assigned)
- ❖ Snohomish County – Mike Rustay
- ❖ U.S. Fish and Wildlife Service – Tim Romanski

TOPICS DISCUSSED

Keith reviewed the chronology of the major components related to fishery/aquatic habitat resource since the License was issued in September 2011. These included:

- 2010 / 2011 - Baseline Monitoring for Phase 1 of Water Temperature Conditioning (WTC) Plan
- 2011, Sept. - License Issuance, valves installed for Phase 1 WTC, revised minimum instream flow schedule for each reach
- 2012 - Year 1 Monitoring for Phase 1 WTC. Passage restored at Marsh Creek Slide
- 2013 – Diversion Dam Volitional Passage (DDVP) Plan trigger met within Diversion Dam Index Area for steelhead
- 2014 - Year 3 Monitoring for Phase 1 WTC
- 2016 - Year 5 Monitoring for Phase 1 WTC (to be determined by ARC today). Construction of fish passage at the City of Everett’s Diversion Dam by end of October; anadromous fish likely to be in Reach 3 starting in October
- 2018 – construction of Phase 2 WTC within two years of passage completion
- 2020 – increase in minimum instream flow budget for Reach 3 in water year 2020-2021

As noted by the events, the Sultan River has been in flux and will continue to be through the timing of the increased water budget for Reach 3 in 2020. Keith noted that this plays into the monitoring of Reach 3 as the District wants to only gather data that will be relevant for future management, as anadromous fish will likely be in Reach 3 starting in October 2016.

Keith reviewed the document discussing current license obligations for monitoring in Reach 3. These obligations include:

- *Process Flow Plan* –
 - The group discussed the amount and transport of gravel, sediment, and wood in Reach 3. Blue Mountain supplies a lot of gravel and sediment to this reach as evidenced in the relicensing studies and work done by DNR on Landslide Hazard classifications. Through an ongoing and long history of debris flows, Blue Mountain (just downstream of Culmback Dam) has and continues to supply significant quantity of material that is transported through the system under natural high flows, process flows, and spill events. Keith noted that the area between Stringer Bridge and Big Four Creek (~3 miles) has good spawning gravels/sediment. There are 2 permanent reference transects in Reach 3 (RM 14.3 and RM 9.8); 8 total in the river. To date, baseline data and data from one post-high flow event have been collected: survey of cross sectional profiles, photos, and pebble counts. The Plan has a mechanism for review and adaptive management every 10 years. **Keith is to send Jim copies of the transect data Excel file.** Andy noted that FishViews, a Google Earth-type product, provides “street views” of river stretches correlated to LiDAR, and collects various other types of additional information as it moves through the system. Keith noted the restrictive/canyon, hazardous boating challenge nature of Reach 3 may make something like that difficult to apply to Reach 3 of the Sultan River.
- *WTC (temperature)* - RM 16.1 and RM 9.8, continuous, year-round for term of license per Water Quality Monitoring Plan and WTC Plan Phase 1; RM 14.3, 12.8, 11.3 and Big Four Creek, continuous, year-round, for a minimum of 3 and a maximum of 5 years per Phase 1 of WTC Plan.
 - Keith noted the various locations that water temperature is taken under the WTC and WQM Plans. Anne noted that she and Mike Crewson were discussing with Jenni Whitney from WDFW how the Sultan River and Spada Lake Reservoir might be used for providing thermal refuge during drought situations, and that perhaps they want to rethink the water temperature conditioning program. Anne stated that they do not believe that the process flows are bringing in any statistically larger numbers of hatchery spawners. Relative to Reach 3, Keith noted that the cooler amount of water from Reach 3 (average 28 cfs) is relatively small in volume compared to Reaches 2 (100 to 200 cfs) and 1 (300 cfs); by the time the water from Reach 3 combines with Reaches 2 and 1 there would not be any noticeable temperature change than what was already in Reaches 2 and 1. He questioned the necessity of collecting temperature data at all of these locations moving forward, as the District is not inclined to collect data without a Project-related purpose. For instance, Keith questions the utility of the Big Four site, and perhaps making the data collection seasonal rather than year round makes better sense. Anne requested that we continue temperature monitoring at sites where we anticipate steelhead and Chinook spawning will take place. As part of the WTC program, Keith is having the panel positions from the intake structure reviewed and

fine-tuned. **Keith will develop a proposal for Year 5 and Phase 2 for water temperature monitoring, and the WTC will be discussed at the next ARC meeting.**

- *WTC (fish growth)* – sampling took place at river miles 11.3 and 14.3.
 - The group discussed the results of the Year 3 monitoring and applicability of doing Year 5 data collection considering the flows will be changing this coming water year (WY 16-17) with the reintroduction of anadromous fish in Reach 3 and due to the construction of volitional fish passage at the Diversion Dam. Anne stated that the periphyton data was inconclusive/did not show a real trend, and that the fish sampling size was so small one cannot determine a trend there as well. Keith and Anne both expressed interest in any Year 5 monitoring being focused on growth rate and using a larger sample size if possible. Scales taken and analyzed in 2010 and 2014 indicate increased growth rates, Scales were also taken in 2012 (Year 3) but have not been analyzed. **Keith will develop a proposal for Year 5 monitoring that will also include Year 3 scale analysis, and it will be discussed at the next ARC meeting.**
- *Fish Surveys in Reach 3*
 - Keith reviewed the future requirement for fish surveys/monitoring in Reach 3. Both the Fisheries and Habitat Monitoring Plan and the Diversion Dam Volitional Passage require one index area above the Diversion Dam for monitoring (located somewhere between RM 9.8 and 11.3). Keith noted logistical and safety concerns for this reach as it would take hiking and hauling equipment through the canyon. All surveys above the powerhouse are foot surveys. Keith also acknowledges that the ARC biologists may have concerns with only 1 index site in this reach. Plus there is likely a desire to know what type, how many, and when the fish are in Reach 3 so the flows can be properly scheduled for the water year and/or adaptively managed if allowed by the license based on real-time events (early/late returns). As previously vetted with the ARC, the Habitat Fund would be a good way to fund the purchase of a hydroacoustic or camera or other technology to gather fish passage at the Diversion Dam. The previously discussed use of the Seattle City Light's equipment is no longer an option. **He has a pros/cons document regarding the different types of technologies that will get routed to the ARC for review and consideration so a Fish Habitat Enhancement Plan proposal for this type of technology can be submitted to the ARC for immediate action (considering construction activities taking place this summer at the Diversion Dam). This item will be added to the next ARC meeting.** Anne stated that the Tulalip Tribes is interested in collecting DNA, scales, and otolith samples which the Tulalip would pay for and analyze at their labs. She also stated that tissue samples from rainbow trout taken approximately 5 years after the Diversion Dam volitional passage takes place to see if marine-derived nutrients are making its way into the population.

Presler, Dawn

From: Presler, Dawn
Sent: Thursday, April 14, 2016 10:06 AM
To: 'Tim_Romanski@fws.gov' (Tim_Romanski@fws.gov); 'Anne Savery (asavery@tulaliptribes-nsn.gov)'; 'Bryden, Andy -FS'; 'James (ECY) Pacheco' (JPAC461@ECY.WA.GOV); 'brock.applegate@dfw.wa.gov' (brock.applegate@dfw.wa.gov); Gaddis, Brett (Brett.Gaddis@co.snohomish.wa.us); 'Mick Matheson'; 'Jim Miller (JMiller@everettwa.gov)'; 'Thomas O'Keefe'
Cc: 'Rustay, Michael'; Binkley, Keith
Subject: JHP (FERC No. 2157) - ARC mtg April 19 at 1:30 - materials
Attachments: 20160419 ARC Q Conditions Update.pdf; 201604 Year 5 fish growth monitoring.pdf; 201604 Year 5 and Phase 2 temp monitoring proposal.pdf; 20160419_Agenda.docx; JHP (FERC No. 2157) - A-LA 9: WY2016-2017 Reach 3 flow schedule for your review ; 20160314 workshop mtg summary.docx; Fish Detection at DDAM; FW: Scale Analysis; Reach 3 flows for Water Year 2016; 201604 CH2 Memo re Phase 2 Structure.pdf

Hello ARC Members:

Attached are the agenda, standard conditions, March 14 workshop meeting summary, proposals for fish growth and water temperature monitoring under the Water Temp Conditioning Plan, and memo from CH2 regarding Phase 2 Water Temperature Conditioning structure. I previously sent out the Reach 3 flow schedule for WY2016-2017 but included it here for convenience. Keith previously sent out the options for fish detection at the Diversion Dam under the Fish Habitat Enhancement Plan to a few ARC members after the workshop but I included it here for everyone's review.

As you can see from the agenda, we have Forterra coming to present their information and some lengthy discussions on other topics, so in-person attendance would be ideal if it works with your schedule.

Dawn Presler

Sr. Environmental Coordinator
(425) 783-1709

PUD No. 1 of Snohomish County
PO Box 1107
Everett, WA 98206-1107

ARC Meeting Summary

April 19, 2016

Present:

- ❖ City of Everett – Jim Miller
- ❖ District – Keith Binkley, Dawn Presler, Eric Schneider
- ❖ Snohomish County – Brett Gaddis for Mike Rustay
- ❖ Tulalip Tribes – Anne Savery
- ❖ U.S. Forest Service – Andy Bryden
- ❖ WA Department of Ecology – Jim Pacheco
- ❖ WA Department of Fish and Wildlife – Brock Applegate

Absent:

- ❖ American Whitewater – Tom O’Keefe
- ❖ City of Sultan – Mick Matheson
- ❖ National Marine Fisheries Service
- ❖ U.S. Fish and Wildlife Service – Tim Romanski

TOPICS DISCUSSED

1. Additional agenda items – none.

2. Forterra presentation

See attached presentation slides. Forterra received a pass-through grant from Snohomish County which passed from Ecology which passed from EPA to conduct the work. The mapping exercise looked at land acquisition that would be good for habitat conservation and at high risk for development, in order to preserve the hydrological functions of the river system. It focused on unprotected privately owned lands in the Skykomish Basin from Stevens Pass to Monroe. The mapping tool does not identify: 1) priorities, 2) restoration potential, and 3) opportunity for purchase. It is a living tool that can be changed with changes in the environment or ownership or weighting. The group discussed ways to manipulate the weighting to get to prioritize areas/property types based on individual agency goals. Forterra will share its full report and GIS data with those interested, please contact Darcey.

3. Conditions Update

The Standard Conditions sheet was routed for review prior to the meeting. Keith noted that the El Nino pattern may be flipping to a La Nina pattern.

4. Reach 3 Monitoring

Keith reviewed the discussion from the Reach 3 monitoring workshop and the materials provided to the ARC for the proposed Reach 3 future monitoring. Of note, Keith stated that Big Four Creek water temperature monitoring was added to the plan during its development; however, the creek

does not provide a significant amount of flow to the Sultan River, has no fishery, is high gradient, and does not drive temperature dynamics of the Sultan River. As such, temp monitoring is proposed to stop at that location. Monitoring at RM 12.8 is no longer possible due to a landslide that precludes safe access. The District's proposal retains seasonal (April through October) monitoring through 2023 at all remaining sites and includes year-round monitoring at RM 16.1 and RM 9.8.

For the biological monitoring component, the general consensus from the monitoring workshop was that the Year 5 effort should focus on growth rates of resident rainbow trout. The District's proposal calls for the collection of scale samples for subsequent age/growth rate analysis. Scale samples collected during 2012 would also be analyzed resulting in a data set that encompasses 2010 (baseline), 2012 (Year 1), 2014 (Year 3), and 2016 (Year 5).

ACTION ITEMS:

- ARC – comments on Reach 3 monitoring of temperature and growth rates due by May 6.

5. Water Temperature Conditioning Phase 2

The District hired CH2 to provide engineering services for the Phase 2 WTC structure. They reviewed the concept originally proposed in the WTC Plan and identified multiple constraints with the structure, including requirements of: underwater construction, maintenance via divers and water access, submerged valves, farther into reservoir outside log boom (access by boat, vandalism), and exposure to the elements and floating debris, among others. As such, they looked into 20 other options for providing temperature conditioning according to plan criteria. The recommended design is to tap into the power tunnel just downstream of the intake, with a new ~750-foot tunnel delivering the instream flow directly into the tailwater of Culmback Dam. The existing control panels associated with the Stage 2 Selective Withdrawal Structure will, during periods when the reservoir is stratified allow for selection of where in the water column to draw the water based on water temperature needs and requirements, including the use of other outlets as well per the WTC Plan. It is a fixed facility that would face fewer impacts (not exposed to the environment and recreationalists, less maintenance, maintenance on land) and increase reliability. The group discussed operational scenarios for drought conditions (it could provide colder water from bottom), power off (only would be functional during operation), scheduled outages, timing of use (from ~April – October when there's thermocline), amount of flow (per the requirements of the plan/settlement agreement), etc. Anne stated that the tunnel should be sized to deliver the full flow.

Forrest Olson (CH2) reviewed the water temperature modeling information for the Project. When contemplating water temperature conditioning, one needs to consider the volume of water, fish presence and life stage, and meeting Ecology's water quality standards in each of the reaches when developing a program of compatibility between reaches. For instance, the relatively low release volume in Reach 3 results in a greater rate of longitudinal warming compared to that in Reach 2 and Reach 1. The current temperature regime "targets" in the WTC Plan were focused on

resident fish; with the introduction of anadromous fish this fall, the temperature targets will need to be re-evaluated. Keith will set up a meeting to discuss water temperature targets for anadromous fish and balancing it with instream flow needs. Anne noted that Daryl Williams would be involved with design and Mike Crewson with water temperature targets.

ACTION ITEMS:

- Keith – set up meeting with ARC to discuss design and temp targets
- Keith – develop proposal for ARC review

6. Reach 3 Flows for Water Year 2016-2017

Keith reviewed the proposal (and associated Excel tool routed) to the ARC for review and input into the modified flow schedule. The flow schedule is shaped based on the flow budget, anticipated accretion, minimizing flow during DDVP construction activities, anadromous fish spawning in the fall, and steelhead spawning in the spring. DDVP in-water work is allowed through October 1; however, Keith hopes it is done earlier and has shaped the flows accordingly. The group agreed to caveat the flow schedule that if in-water work does extend passed the September 21 day, the schedule will stay at 20 cfs and will redistribute the budget for use at a later time within the water year.

ACTION ITEMS:

- Dawn – update the Reach 3 flow schedule proposal to add a caveat for construction activity and redistribution of flow

7. Ramping Rate Evaluation Plan Supplement

Jason Shappart (Meridian Environmental) reviewed the field work conducted under the RREP Supplement to-date; these included: habitat unit data, photos, wood counts, 20 cross-sections, ramp rate test. Due to the drought condition last year, data collection did not occur at 300 cfs. Was at 200 cfs, then the rainy season came and was not below 1,000 cfs through December. High flow events in November and December changed the side channel conditions.

The group discussed what should be done and/or salvaged from previous data collection effort. The group concluded that given the occurrence of the high flow event during late 2015, salvaging data from the 2015 habitat survey for long term monitoring was not desired. The recommendation was to conduct a new habitat survey at the desired flow. This survey will include collection of a longitudinal profile in side channels 1 and 4, measurements of habitat units and channel cross sections and wood counts. All data will be geo-referenced to the existing control network.

The portion of the overall evaluation that involved a ramping rate test was successfully completed during 2015.

An extension request to FERC will be needed as the deadline to submit the final report is June 2016.

ACTION ITEMS:

- Keith – work with Jason Shappart to develop scope of work associated with wrapping up the RREP Supplement

END ARC MEETING

Presler, Dawn

From: Anne Savery <asavery@tulaliptribes-nsn.gov>
Sent: Friday, May 06, 2016 7:00 AM
To: Applegate, Brock A (DFW); Binkley, Keith; Pacheco, James (ECY); Andrew Bryden (abryden@fs.fed.us); Rustay, Michael; 'Thomas O'Keefe'; 'Tim_Romanski@fws.gov' (Tim_Romanski@fws.gov); Jim Miller (JMiller@everettwa.gov); 'Mick Matheson'
Cc: Presler, Dawn; Whitney, Jennifer L (DFW)
Subject: RE: Water Temperature Conditioning Monitoring Plan Review ARC 2Q - status of technical discussions -- Jackson Hydro

Tulalip concurs with the proposed changes to the Water Temperature Conditioning Monitoring Plan.

Anne Savery
Hydrologist
503-984-0667

From: Applegate, Brock A (DFW) [Brock.Applegate@dfw.wa.gov]
Sent: Thursday, May 05, 2016 2:35 PM
To: Binkley, Keith; Pacheco, James (ECY); Anne Savery; Andrew Bryden (abryden@fs.fed.us); Rustay, Michael; 'Thomas O'Keefe'; 'Tim_Romanski@fws.gov' (Tim_Romanski@fws.gov); Jim Miller (JMiller@everettwa.gov); 'Mick Matheson'
Cc: Presler, Dawn; Whitney, Jennifer L (DFW)
Subject: RE: Water Temperature Conditioning Monitoring Plan Review ARC 2Q - status of technical discussions -- Jackson Hydro

Hi Keith, WDFW has reviewed the Water Temperature Conditioning Plan Monitoring. We have no comments.

Sincerely, Brock

Brock Applegate
Renewable Energy/Major Projects Mitigation Biologist Washington Department of Fish and Wildlife P.O. Box 1100
111 Sherman St. (physical address)
La Conner, WA 98257-9612

(360) 466-4345 x244 (office)
(360) 789-0578 (cell)
(360) 466-0515 (fax)

From: Binkley, Keith [mailto:KMBinkley@SNOPUD.com]
Sent: Thursday, April 21, 2016 2:46 PM
To: Applegate, Brock A (DFW); Pacheco, James (ECY); Anne Savery (asavery@tulaliptribes-nsn.gov); Andrew Bryden (abryden@fs.fed.us); Rustay, Michael; 'Thomas O'Keefe'; 'Tim_Romanski@fws.gov' (Tim_Romanski@fws.gov); Jim Miller (JMiller@everettwa.gov); 'Mick Matheson'
Cc: Presler, Dawn
Subject: ARC 2Q - status of technical discussions

ARC members – thanks for hanging in for the long meeting on Tuesday. Minutes from the meeting are forthcoming. I also prepared the attached “road map” to help streamline our continued discussions. As you will see, it is a quick summary of the status of agenda items 4 through 8.

- Items 4, 5, and 8 are straight forward. Related to Item 8, you will see other habitat monitoring that will be conducted this year as a result of the “significant high flow event” that occurred in November.
- Item 6 (WTC Phase 2) will be discussed at an upcoming workshop to be scheduled within the next month.
- Item 7 is in development so what you see is simply the current direction that the District is headed towards in its FHE proposal for fish detection at the DDAM.

I hope you will find this helpful and that it makes things easier.

Keith

Keith Binkley
Manager of Natural Resources
Snohomish County Public Utility District
425 783 1769 (office)
425 293 6201 (cell)

Attachment 2

Temperature Monitoring Proposal to ARC

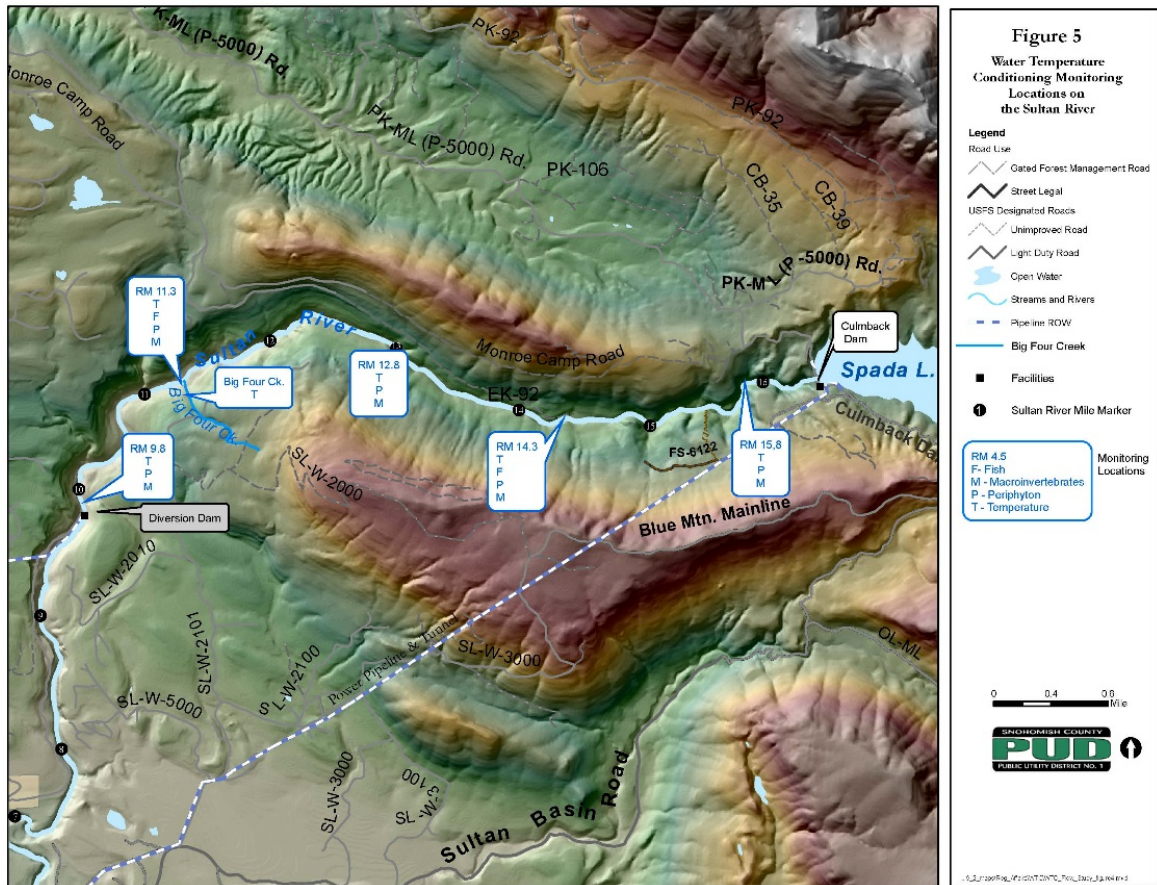
***License Article 415 Water Temperature Conditioning Plan:
For Year 5 of Phase 1 and For Phase 2 Water Temperature Monitoring Proposal***

The development of this proposal was a cooperative effort between Public Utility District No. 1 of Snohomish County (the District) and members of the Aquatic Resource Committee (ARC) to identify water temperature monitoring needs in Reach 3 for Year 5 of Phase 1 and for Phase 2 of the Water Temperature Conditioning (WTC) Plan for the Jackson Hydroelectric Project (Project).

Background:

The WTC Plan was approved by the ARC prior to filing it with the FERC. The FERC approved the WTC Plan with the issuance of the License on September 2, 2011. Section 4.1 of the WTC Plan states,

Water temperature monitoring will be conducted at six (6) locations within Reach 3 (see WTC Plan Figure 5) with locations as equally spaced as possible, subject to access. Sites include immediately downstream of Culmback Dam (RM 16.0), near the Stringer Bridge (RM 14.3), RM 12.8, upstream of Big Four Creek (RM 11.3), and upstream of the Diversion Dam (RM 9.8) prior to the contribution of additional flow at the upstream end of Reach 2. An additional temperature monitoring location will be in Big Four Creek, the principal tributary to this reach of the Sultan River, near the confluence. Temperature readings will be collected at a minimum recording interval of 30 minutes using Onset Water Temp Pro V2 thermistors with an accuracy of 0.2 degrees C. Thermistors will be deployed in flowing water of a depth greater than 1.0 feet. Thermistors will be factory calibrated and cross checked with field reading from separate calibrated instrumentation. Data will be summarized annually and presented to the ARC for review. Monitoring at all six locations will be initiated upon issuance of a new license and upon this Plan's approval by the FERC and will continue year round for a minimum of 3 and a maximum of 5 years; the ARC will determine the number of years of monitoring within these parameters. A similar monitoring program will be conducted for Phase 2 with concurrence of the ARC and approval by the FERC. For the term of the license, monitoring for compliance with performance standards will continue at a representative station or a station where a solid correlation to representative temperatures has been developed. Both empirical data from five mainstem monitoring locations and temperature modeling (SSTEMP) will be used to inform the selection of a permanent compliance monitoring location for the duration of the license. The District will seek input from the ARC on the location of this compliance monitoring location.



WTC Plan Figure 5. Monitoring locations in Reach 3 of Sultan River for temperature, periphyton, macroinvertebrates, and fish.

Annual temperature data was collected for Water Years 2011-present, and transmitted each December to the ARC for review (Appendix A).

The introduction of anadromous salmon and steelhead into Reach 3 of the Sultan River (upstream of the Diversion Dam) is the logical outcome of the implementation of fish passage as outlined in the Diversion Dam Volitional Passage (DDVP) Plan; construction of DDVP is planned for completion by the end of October 2016. As such, data collection efforts need to be relevant for the future species utilization and flow management within Reach 3. The District has discussed with various ARC members and during the workshop held on March 14, 2016, the validity of future data collection with regard to past data collection efforts and confidence in the results of temperature modeling efforts. These discussions have narrowed the scope of future monitoring – only a subset of the temperature monitoring is still warranted for Year 5 of Phase 1 and for Phase 2.

For Year 5 of Phase 1 and For Phase 2 Monitoring:

The District is proposing to modify the program for monitoring of water temperature in Reach 3. These modifications would commence in 2016 and remain in place through 2023 coincident with the 5 year of Phase 2 of the water temperature conditioning program. This monitoring program is intended to characterize variation in temperature patterns tied to structural improvements (Table 1), operational changes, including increased minimum flows in 2020, and climatic conditions. Data will be summarized annually and presented to the ARC for review.

Table 1. Chronology of Water Temperature Conditioning improvements for Reach 3 of the Sultan River, Jackson Hydroelectric Project.

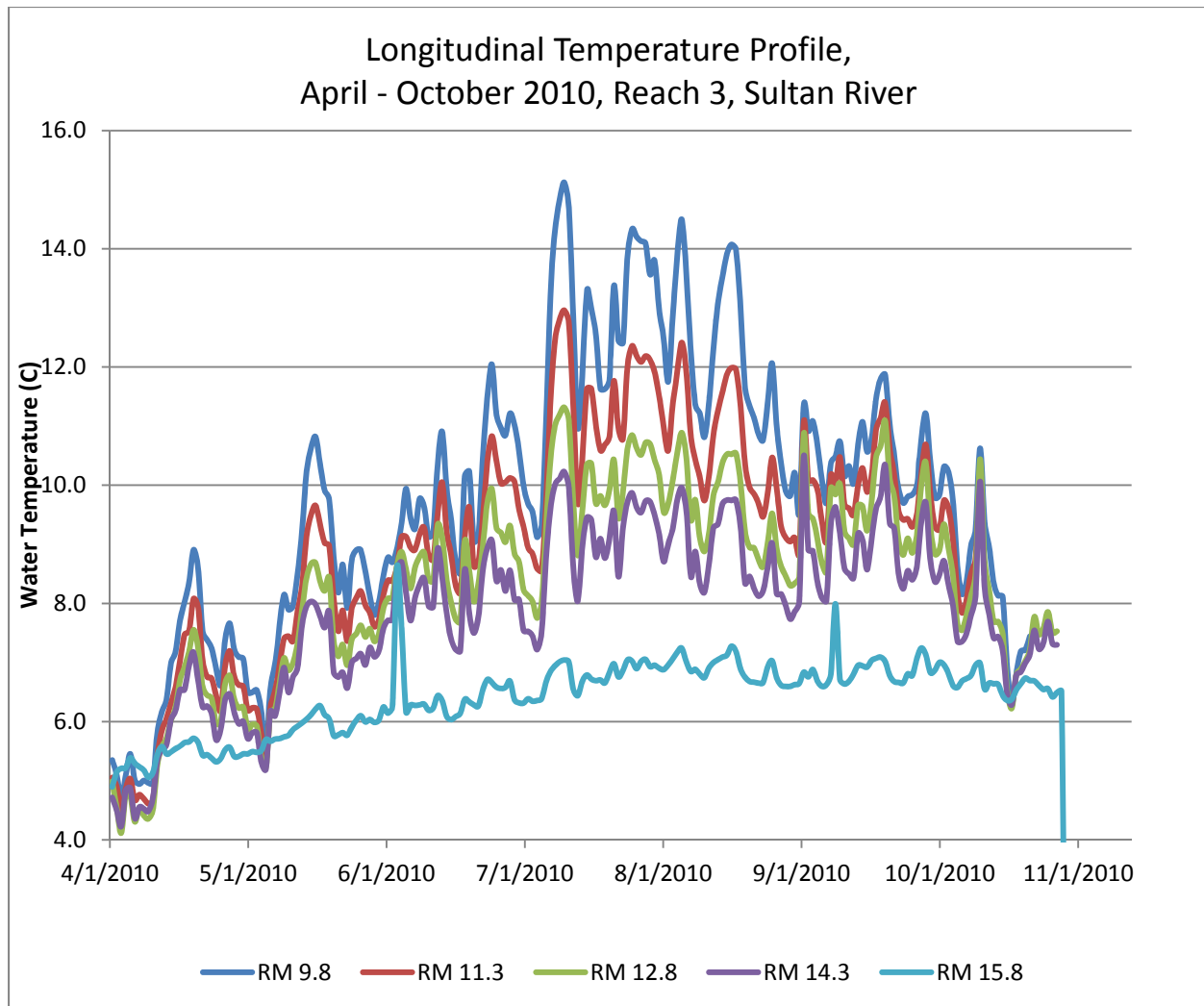
Calendar Year	WTC Phase and Year
2016	WTC Phase 1, Year 5
2017	WTC Phase 1, Year 6
2018	WTC Phase 1, Year 7
2019	WTC Phase 2, Year 1
2020	WTC Phase 2, Year 2
2021	WTC Phase 2, Year 3
2022	WTC Phase 2, Year 4
2023	WTC Phase 2, Year 5

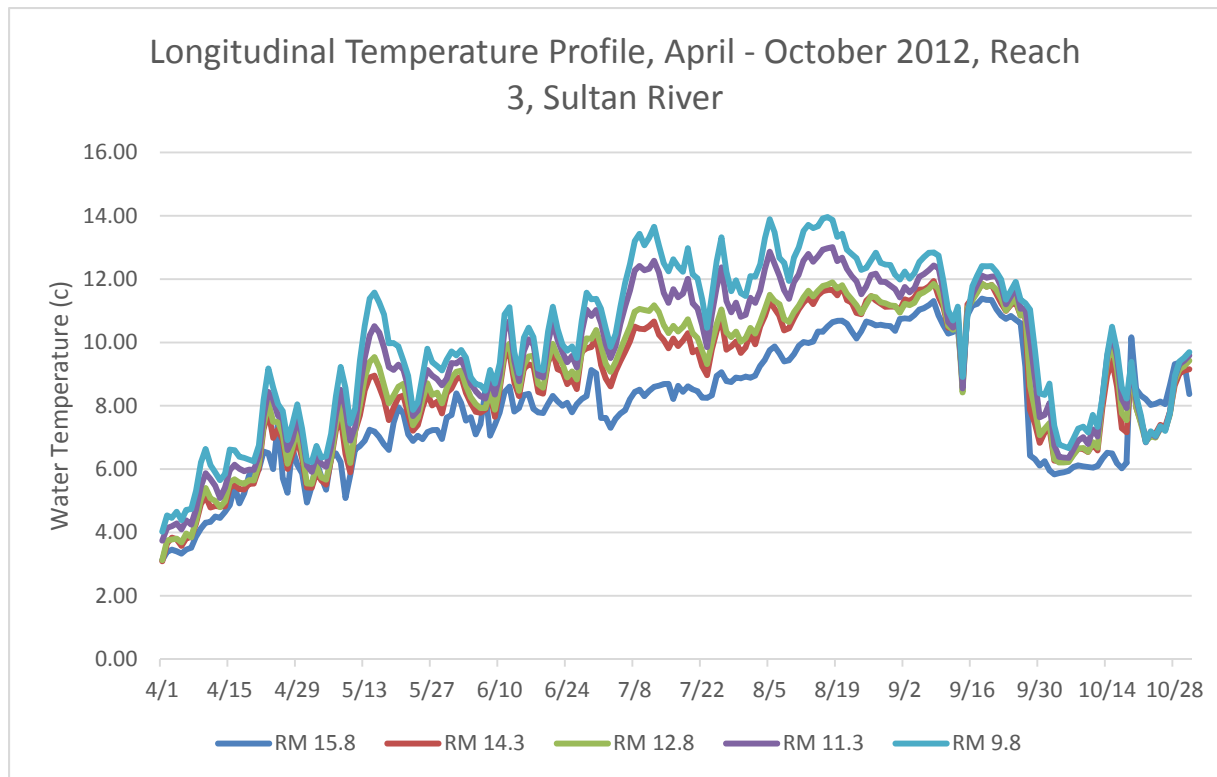
Commencing in 2016, monitoring will occur at stations listed below (Table 2). Future monitoring needs will be reassessed in 2023.

Table 2. Monitoring 2016-2023.

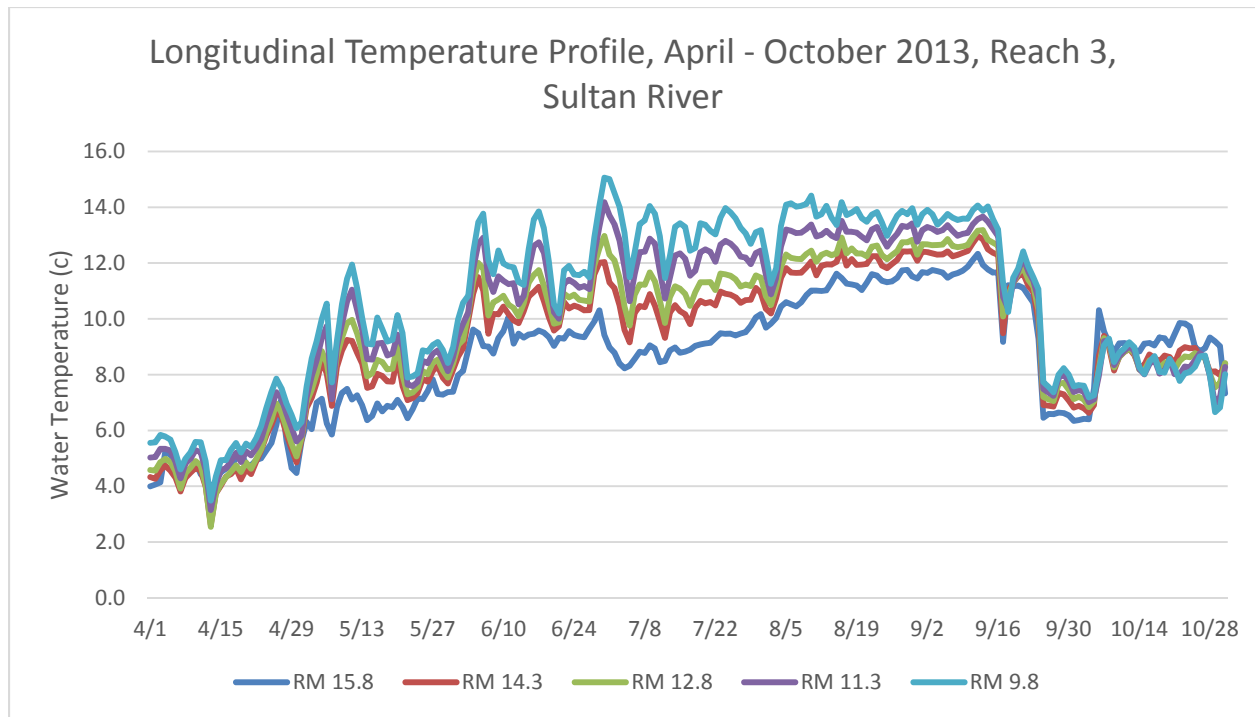
River Mile	Past Program	Future Program	Rationale for change
16.1	Year-round sampling	Year-round sampling	No change, per WQMP
15.5	Not sampled	Sampled seasonally (April through October)	New station, further downstream, to allow for full mixing
14.3	Year-round for a minimum of 3 and maximum of 5 years	Sampled seasonally (April through October)	Confidence in existing dataset and modeling results, sampling tied to WTC operation, avoid high flow season to minimize loss of equipment / data
12.8	Year-round for a minimum of 3 and maximum of 5 years	Eliminated	Confidence in existing dataset and modeling results, landslide precludes safe access
11.3	Year-round for a minimum of 3 and maximum of 5 years	Sampled seasonally (April through October)	Confidence in existing dataset and modeling results, sampling tied to WTC operation, avoid high flow season to minimize loss of equipment / data
9.8	Year-round sampling	Year-round sampling	No change, per WQMP
Big Four Creek	Year-round	Eliminated	Data of limited value

Appendix A

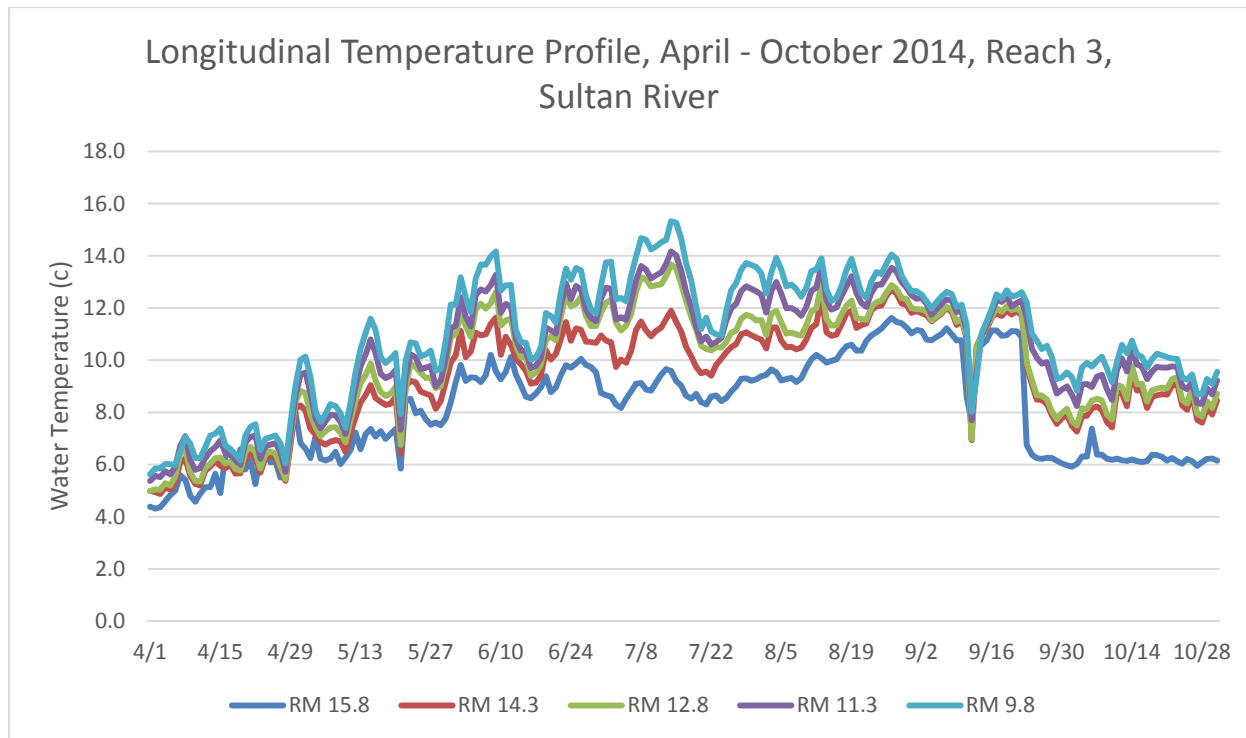




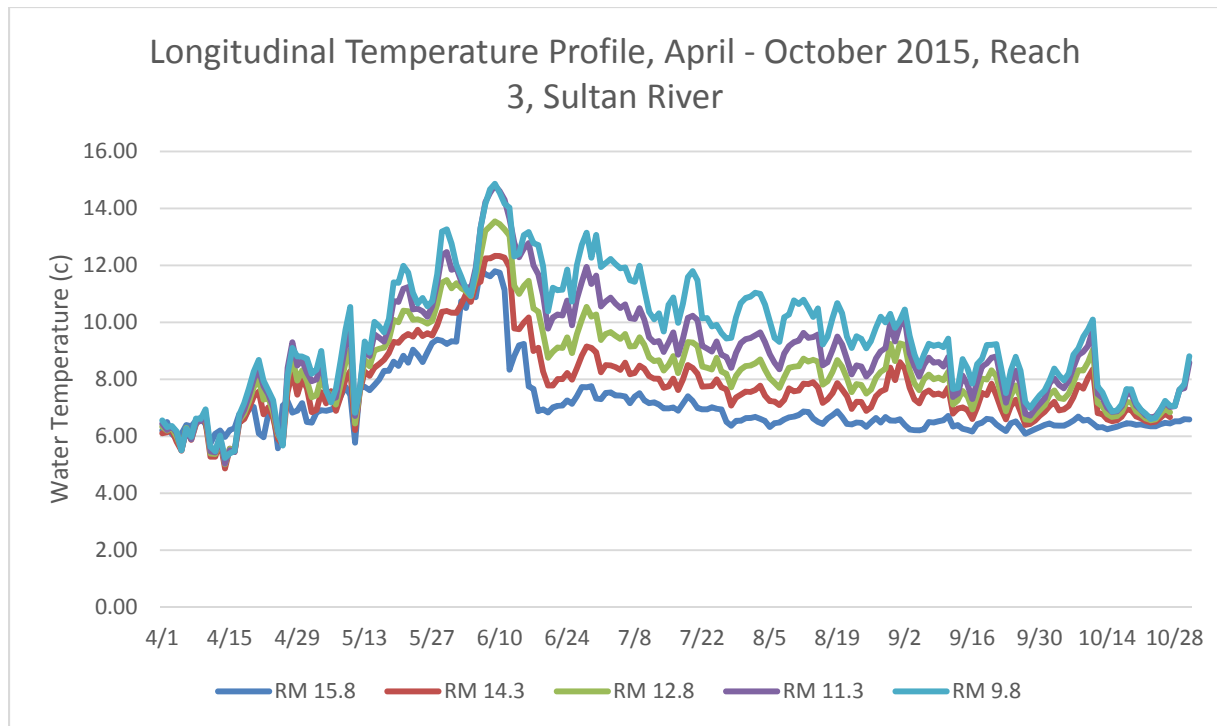
Appendix A



Appendix A



Appendix A



Attachment 3

Biological Response Monitoring Proposal to ARC

***License Article 415 Water Temperature Conditioning Plan:
Year 5 – Resident Rainbow Trout Growth Rates – Monitoring Proposal***

The development of this proposal was a cooperative effort between Public Utility District No. 1 of Snohomish County (the District) and members of the Aquatic Resource Committee (ARC) to identify monitoring and data collection needs related to documenting the growth rates of the resident rainbow trout population in Reach 3 of the Sultan River for Year 5 of Phase 1 of the Water Temperature Conditioning (WTC) Plan for the Jackson Hydroelectric Project (Project).

Background:

The WTC Plan was approved by the ARC prior to filing it with the FERC; the FERC approved the WTC Plan with the issuance of the License on September 2, 2011. Within the WTC Plan is the requirement for biological response monitoring under Section 4.2 that states,

Biological response monitoring will include sampling of periphyton (algal mats), benthic macroinvertebrates, drifting macroinvertebrates (captured in flowing water) and fish. The intent of the monitoring is to determine changes in community characteristics (abundance, composition, diversity, distribution, and growth) of relevant aquatic biota relative to the change in thermal regime.

Sampling for periphyton and benthic macroinvertebrates will be conducted at five mainstem locations (RM, 15.8, RM 14.3, RM 12.8, RM 11.3 and RM 9.8) to capture spatial / longitudinal characteristics of the community in response to thermal conditions. Sampling for drift and fish will occur at RM 14.3 and RM 11.3 to allow for sufficient spatial segregation while not sampling at the extreme thermal conditions within the reach. One year of baseline sampling will occur upon license issuance and Plan approval by the FERC, or the District may use sampling data collected prior to license issuance as baseline data if the data are available. Baseline sampling applies to all elements of monitoring. An overview of sampling program is presented below, by element:

- ***Periphyton*** – Sampling during the baseline prior to temperature conditioning and the first, third, and contingently¹ fifth year after temperature conditioning is initiated, during late August/early September, eight samples per site composited and analyzed as one sample.
- ***Benthic Macroinvertebrates*** – Kick net sampling during the baseline prior to temperature conditioning and the first, third, and contingently fifth year after temperature conditioning is initiated, late August/early September, eight samples per site composited and analyzed as one sample, suite of metrics presented.
- ***Drift Macroinvertebrates*** – Sampling during the baseline prior to temperature conditioning and the first and third years after temperature conditioning is initiated, during early summer and late summer, three samples, composited and analyzed as one sample.
- ***Fish*** – Snorkel surveys that encompass all habitat types at each location during baseline prior to temperature conditioning and the first, third and contingently fifth years after

¹ Sampling during the fifth year is contingent on no detectable evidence of change in the biological community between baseline conditions and conditions during Years 1 and 3.

temperature conditioning is implemented during late summer. Surveys will be modeled after those conducted for Revised Study Plan 2 (Normandeau and TRPA, 2008) following a Hankin and Reeves (1988) protocol or equivalent methodology suited to site conditions.

- **Fish tissue** – *Scale samples collected by electroshocking or angling during baseline, years 1 and 3, during late summer; tissue collection for stable isotope analysis during baseline and contingently Year 3, during late summer. The number of samples collected will be based on the efficiency of the capture techniques with 10 samples as a minimum per sampling session.*

...

At the completion of the sampling in Year 3, a detailed report will be prepared and submitted to the ARC for review. The report will include the results of lab analysis following DOE protocol for periphyton and benthic macroinvertebrates including an accompanying narrative. For baseline, Year 1 and Year 3, this report will summarize structural and compositional metrics based on taxonomy such as diversity and taxa richness as well as measures of abundance, age, growth, and longitudinal distribution. During fish surveys, observations of species, number, length and habitat use will be recorded. Scales will be collected from a representative sample of fish and analyzed for growth patterns. Fin clips will be collected during baseline surveys and used for stable isotope analysis. Depending on the results of the stable isotope analysis, additional sampling may occur in Year 3. For drift samples, aquatic insect taxa will be enumerated and identified to genus, where practicable. Flow measurements at the time of sampling will be used to calculate drift density. Literature values will be used to determine calorimetry.

The suspension, continuation, or modification of the monitoring program and its applicability to Phase 2 will be based on the results of sampling and input from the ARC. The Phase 2 monitoring will be initiated after construction of Phase 2 improvements and will be consistent with the Phase 1 program, as modified by the ARC.

The District has completed monitoring for the Baseline, Year 1 and Year 3; a detailed report was issued after the Year 3 sampling effort.

The introduction of anadromous salmon and steelhead into Reach 3 of the Sultan River (upstream of the Diversion Dam) is the logical outcome of the implementation of fish passage as outlined in the Diversion Dam Volitional Passage (DDVP) Plan; construction of DDVP is planned for completion by the end of October 2016. As such, data collection efforts need to be relevant for the future species utilization and flow management within Reach 3. The District has discussed with various ARC members and during the workshop held on March 14, 2016, the validity of future data collection with regard to past data collection efforts. These discussions have narrowed the scope of monitoring for Year 5 – only a subset of the initial monitoring is warranted for Year 5 of Phase 1 with the focus on data to document rainbow trout growth rates.

Existing information:

As presented in the Year 3 report, baseline data on growth rates collected during 2010 was compared with data collected during 2014, Year 3 (Figure 1).

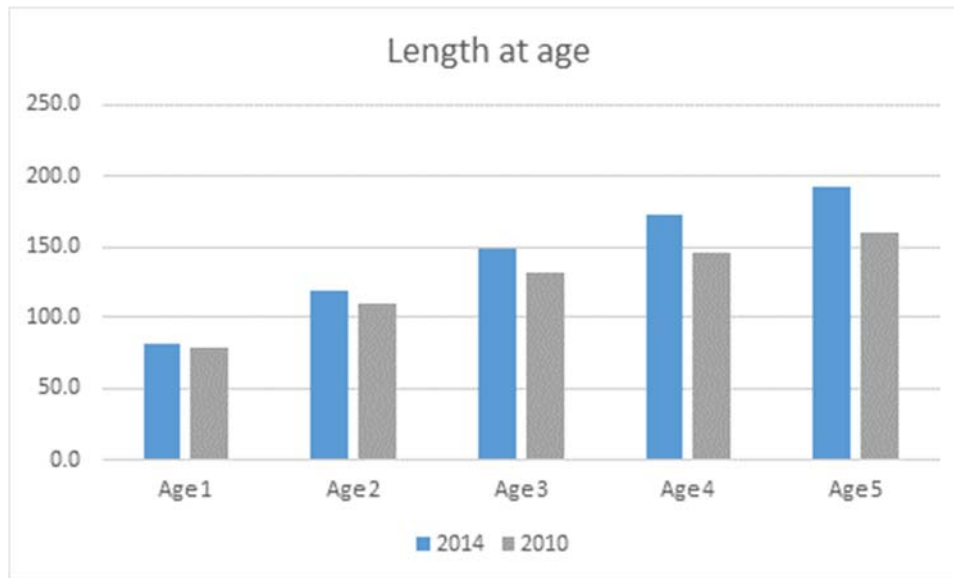


Figure 1. Length (mm) at age for rainbow trout collected in Reach 3 of the Sultan River under the baseline condition (2010) and Year 3 of Phase 1 of the Water Temperature Conditioning Program.

For Year 5 Monitoring:

To supplement the existing record, the District proposes to:

- analyze scale samples collected during 2012 (Year 1),
- collect samples from a minimum of 20 and a maximum of 40 fish during 2016 (Year 5),
- analyze scale samples collected during 2016 (Year 5), and
- prepare a brief technical report summarizing changes in growth rates between the baseline condition and Years 1, 3, and 5 of Phase 1 of the WTC Program.



Water Temperature Conditioning Plan for Reach 3

Henry M. Jackson Hydroelectric Project
(FERC No. 2157)



July 2010

TABLE OF CONTENTS

1. INTRODUCTION	4
1.1. Background	4
1.2. Purpose	4
1.3. Coordination and Integration	5
1.3.1. District's Role	5
1.3.2. Consultation	5
1.3.3. Resources	5
2. TEMPERATURE CONDITIONING REGIME TARGETS	5
2.1. Phase 1	6
2.1.1 Standards and Schedule	6
2.1.2 Method of Release	7
2.2. Phase 2 Implementation	8
2.2.1 Standards and Schedule	8
2.2.2 Method of Release	9
2.3. Limitations	9
3. PHASE 2 STRUCTURE DETAILS	9
3.1. Conceptual Plan and Drawings	9
3.1.1. Intake Equipment	9
3.1.2. Water Conduction	9
3.1.3. Flow Regulation	10
3.2. Preliminary Operating Plan	13
3.2.1. Functionality	13
3.2.2. Maintenance	13
3.2.3. Reliability and Survivability	13
3.3. Design Issues	14
3.3.1. Floating Inlet Structure	14
3.3.2. Flexible Water Conveyance	14
3.3.3. Mooring Design	14
3.3.4. Submerged Valves	14
3.3.5. Morning Glory Spillway Modifications	15
4. MONITORING	15
5. REPORTING	19
5.1. Annual Report	19
5.2. Plan Review and Updates	19
6. SCHEDULE	19
7. REFERENCES	20

APPENDICES

Appendix 1	Proposed Aquatic License Article 3: Temperature Conditioning in Reach 3
Appendix 2	Consultation Documentation

ACRONYMS

ARC	Aquatic Resource Committee
cfs	cubic feet per second
District	Public Utility District No. 1 of Snohomish County
FERC	Federal Energy Regulatory Commission
HMI	Human-Machine-Interface
msl	mean sea level
PLA	Proposed License Article
PLC	programmable logic controller
PM&E	protection, mitigation and enhancement
RM	river mile
RSP	Revised Study Plan
RT	Regime targets
SA	Settlement Agreement
SSTEMP	Stream Segment Temperature model
USGS	United States Geological Survey
WTC	Water Temperature Conditioning
7DAD Max	seven day average of the daily maximum temperature

1. INTRODUCTION

1.1. Background

The Public Utility District No. 1 of Snohomish County (District) will be the sole licensee for the Henry M. Jackson Hydroelectric Project (Project) under a new license to be issued by the Federal Energy Regulatory Commission (FERC). The Project is located on the Sultan River in Snohomish County, Washington, near the City of Sultan. The original Project license was issued in 1961 and amended in 1981. In 1964, initial construction of Culmback Dam was completed to create Spada Reservoir – the major source of Snohomish County drinking water. In 1984, hydroelectric facilities were added and Culmback Dam was raised, completing the Project as it exists today. The Project includes a 262-foot high rock-fill dam (Culmback Dam); a 1,870-acre reservoir (Spada Lake or Spada Reservoir) operated for the City of Everett’s water supply, fisheries habitat enhancement, hydroelectric power, incidental flood control and recreational opportunities; a Powerhouse and various other facilities; wildlife mitigation lands; and several developed and undeveloped recreation and river access sites.

During the relicensing process, several stakeholders requested that the District explore measures to increase water temperature in Reach 3, a 6.4 mile reach between Culmback Dam and the City of Everett’s Diversion Dam. In this reach, two operational factors work to define the rearing conditions for the resident fishery, streamflow and temperature. Streamflow is currently derived from cool water releases directly from the base of Culmback Dam (reservoir elevation 1220 feet mean sea level) and accretion, which is seasonally variable in both volume and temperature.

On October 14, 2009, the District filed with the FERC a comprehensive Settlement Agreement (SA) on behalf of itself, National Marine Fisheries Service, United States Forest Service, United States Fish and Wildlife Service, United States National Parks Service, Washington Department of Fish and Wildlife, Washington Department of Ecology, the Tulalip Tribes of Washington, the City of Everett, Snohomish County, the City of Sultan and American Whitewater (collectively referred to as “Settlement Parties”). The SA resolved among the signatories all issues associated with issuance of a new license for the Project, including reservoir operation, minimum instream flows, process flows, whitewater boating flows, ramping rates, fish passage, fish habitat improvements, wildlife habitat management, marbled murrelet protection measures, recreation, historic properties and license term.

The SA requests that the FERC adopt, without material modification, Proposed License Articles (PLAs). These PLAs will implement a complex and interrelated suite of protection, mitigation and enhancement measures (PM&Es) that will result in improved resource conditions and ecological processes in the Sultan River over the term of a new license. The PLAs mainly address flows, fish passage, fish and wildlife habitat enhancement and protection, water quality, municipal water supply, rule curves for reservoir operation, fish supplementation, recreation, historic properties, and noxious weeds.

This Water Temperature Conditioning Plan (WTC Plan, or Plan) was developed as part of the early implementation requirement of the SA and outlines measures to route warmer reservoir water into the head of Reach 3 during the period of seasonal stratification as per the proposed Aquatic License Article 3 (A-LA 3): Temperature Conditioning in Reach 3 (Appendix 1).

1.2. Purpose

This WTC Plan is based on results of Revised Study Plan (RSP) 1: Water Quality Parameter Study (CH2M Hill 2009a), RSP 2: Bypass Reach Cutthroat Trout Population Analysis (Normandeau 2008), RSP 3: Sultan River Instream Flow Study (R2 Resource Consultants 2009), and RSP 20: Fish Passage Assessment (Ruggerone 2008, CH2M Hill 2009b), subsequent development of PM&E measures during SA

negotiations, and consultation with the Aquatic Resource Committee (ARC). The purpose of the Plan is to outline the steps that the District will conduct to meet the requirements of temperature conditioning in Reach 3 as written in the Settlement Agreement and license.

Documentation of consultation with the ARC regarding this Plan is included in Appendix 2.

1.3. Coordination and Integration

1.3.1. District's Role

The District has the responsibility to implement the WTC Plan as required by a new license issued by the FERC and accepted by the District. The District will be responsible for:

- providing the funding to carry out the measures as described herein;
- consulting with appropriate stakeholders, the ARC and the FERC as needed;
- monitoring of resource effects; and
- reporting to the FERC.

1.3.2. Consultation

The District will consult with the ARC during the regularly occurring meetings on relevant topics regarding the implementation of this Plan.

1.3.3. Resources

Due to the natural setting of the Project facilities and the complicated interaction of natural resources, unintended effects may occur without consideration of resource interactions and other PM&E measures. The District will coordinate the actions of the WTC Plan with the actions of the various Project resource management and other license article requirements including:

- Minimum Flows – The District will provide an annual water budget for release from Culmbach Dam into Reach 3. The seasonal shaping of flow releases will be directed by the ARC.
- Diversion Dam Volitional Passage – The presence of anadromous fish species in Reach 3 will influence decisions regarding streamflow and temperature.
- Reservoir Operations – Seasonal reservoir elevation levels will impact the availability and use of certain infrastructure for water delivery.
- Fisheries and Habitat Monitoring Plan – for cross reference to escapement monitoring and reporting requirements.

The District's resource specialists will be consulted as needed. Operational staff will be trained on the unique requirements of the WTC Plan.

2. TEMPERATURE CONDITIONING REGIME TARGETS

The goal of this PM&E measure is to increase temperatures in Reach 3 to better reflect seasonal and diurnal changes found in unregulated streams to benefit rearing salmonids and other aquatic resources, including fish and macroinvertebrates, during those times of the year when Spada Lake is thermally stratified (usually April through October). (During the rest of the year Spada Lake is relatively isothermal and temperature conditioning is not possible.) The goal will be accomplished in two Phases. For Phase 1, the emphasis will be placed on spawning and rearing conditions for resident salmonids. Bell (1991) states that optimal thermal conditions for rearing rainbow trout ranges between 54 and 66 degrees F

(12.2 to 18.9 degrees C), with a target of 57 degrees F (13.9 degrees C). Preferred temperatures for cutthroat trout range between 49 and 55 degrees F (9.4 and 12.8 degrees C). For Phase 2, emphasis will be placed on spawning and rearing conditions for anadromous salmonids. The temperature conditioning Regime Targets (RT) will be set to temporally and spatially maximize the amount of habitat providing optimal thermal conditions for the desired species. For Phase 1 it is understood that these are to be met as much as possible within the constraints of existing Project piping and infrastructure and without exceeding water quality standards set forth in the 401 Water Quality Certification Permit issued by the Washington Department of Ecology. The RT for Phase 2 will be developed to balance the thermal requirements of resident and anadromous fish. The Phase 2 RTs will be based on documented species presence within Reach 3 after volitional fish passage at the Diversion Dam is in place and additional Spada Lake infrastructure has been constructed as described below to meet the flow and temperature RTs.

2.1. Phase 1

2.1.1 Standards and Schedule

For Phase 1, the RT temperature performance standards are largely influenced by existing Project piping, infrastructure, and operations. Potential release volumes associated with the cone valve and hydro unit are known and predictable as they are located near the reservoir bottom and available for use at all times, excluding spillway inspections. The following physical parameters govern the effectiveness of Phase 1 operations to control Reach 3 flow temperature below Culmback Dam:

- Flow through the auxiliary release line is defined by reservoir elevation.
- Temperature at the intake elevation is defined by the season of potential blending which defines reservoir stratification

Once water is released at Culmback Dam, general climatic conditions (air temperature and precipitation) influence temperature and streamflow. During summer, significant warming of the river can occur over the 6.4-mile reach (Reach 3) largely related to the presence of bedrock in the canyon. Performance standards must ensure that State Water Quality Criteria are met, unless an approved variance is issued. This section of the Sultan River is designated as Core Salmonid Habitat. The State standard for this type of habitat is a seven day average of the daily maximum temperature (7DAD Max) not to exceed 16 degrees C. While variable accretion (springs, seeps and tributary inflows) can also influence seasonal temperatures, their effect is most pronounced in the fall and winter months when the risk of exceeding the daily maximum temperature standard is not present.

Performance standards will ultimately be defined by the ARC within the constraints of the 401 Water Quality Certificate. The seasonal shaping and monthly distribution of the annual water budget will influence temperature in Reach 3. Draft monthly performance standards, tied to the default minimum instream flow schedule, are presented in Table 1. Temperature modeling (USGS, SSTEMP) was used to incorporate the parameters outlined above and project temperatures at RM 9.8 at the downstream end of Reach 3. Longitudinal temperature monitoring will be used to verify and validate modeling results and refine the scheduling of future releases. Simplistic modeling of bioenergetics may also aid in refining performance standards.

Table 1. Draft monthly performance standards for release temperature and modeled temperatures at the downstream end of Reach 3.

Month	Release Temperature at RM 16, +/- 0.75° C	Mean / Maximum Modeled (SSTEMP) Temperature at RM 9.8
April	4.5° C	6.4° C / 7.3° C
May	5.5° C	8.3° C / 9.2° C
June	7.5° C	10.3° C / 11.4° C
July	10.0° C	12.7° C / 14.1° C
August	14.0° C	13.0° C / 14.4° C
September	14.5° C	11.0° C / 12.3° C
October	12.0° C	9.4° C / 10.2° C

2.1.2 Method of Release

The water release points for Phase 1 will include the 10-inch cone valve, the hydro unit, and the 16-inch auxiliary release line. The total combined capacity of these three release points is approximately 70 cfs at full pool (reservoir elevation 1450 ft. msl); 45 cfs from the cone valve, 5 cfs from the hydro unit, and 20 to 22 cfs from the auxiliary release line. The reservoir elevation dictates head and absolute release discharge. In addition, reservoir elevation dictates the availability of the auxiliary release line for use. The auxiliary release line is located at elevation 1408 ft. msl; however, because vortexing is to be avoided, it is not available at elevations less than 1412 ft. msl. The elevation for the cone valve and hydro unit is 1220 ft. msl and therefore, they are available for all normal variation of Spada Lake elevation. The elevation of the morning glory spillway, above which reservoir spill occurs, is 1450 ft. msl.

Meeting the RT will require blending of seasonally available warm water from the auxiliary line with cold water from the cone valve and hydro unit. The hydro unit runs constantly, releasing a fixed 5 cfs of cold water ranging between 3 and 6 degrees Celsius, to provide Culmback Dam station service. Therefore, blending hinges solely on the relative use of the cone valve and the auxiliary release line. When the reservoir is isothermal (generally November through March), the release location is irrelevant. However, when the reservoir is stratified and the elevation is greater than 1412 ft. msl, blending of water temperatures can occur. The degree of stratification and the water depth at the intake to the auxiliary release line will dictate the amount and degree of warmer water available for blending to achieve RT within the minimum instream flows.

The District proposes the following modifications to the existing auxiliary release line at Culmback Dam to condition the temperature of the released water. See Figure 1 for additional information.

1. Replace the existing auxiliary line outlet nozzle with an electrically operated 12-inch cone dispersion valve. Monitor and control the valve with the existing outlet programmable logic controller (PLC).
2. The new valve will require a three phase 480 volt power supply. Replace the existing single phase 277 volt service with a three phase 480 volt service.
3. Install a water temperature sensor at the auxiliary line outlet valve. Read the sensor with the existing outlet PLC.

4. Temporarily install a water temperature sensor in Reach 3 near Culmback Dam but beyond the location that the auxiliary line, the 10-inch cone valve, and the hydro generator water sources mix together. Connect to the existing outlet PLC or send data out via wireless communication. Remove temperature sensor after initial testing and calibration of the control PLC.
5. Utilize existing water temperature sensor at the 10-inch cone valve to determine the appropriate mix of released waters.
6. Program the existing Culmback Dam control room PLC to monitor auxiliary line water temperature, cone valve/hydro generator water temperature, and flow volumes through each source. Perform calculations within the PLC and control flows through each source to provide a blended water output of a selected or programmed temperature.
7. Utilize the existing water temperature sensor at the Diversion Dam forebay to monitor and record river temperatures for compliance.
8. Modify the existing Jackson Hydro Plant Human-Machine-Interface (HMI) to allow plant operator to monitor and control the system.
9. Modify the existing Jackson Hydro Plant Historian data collection system to record water temperatures, release volumes, etc. as necessary for historical record purposes.

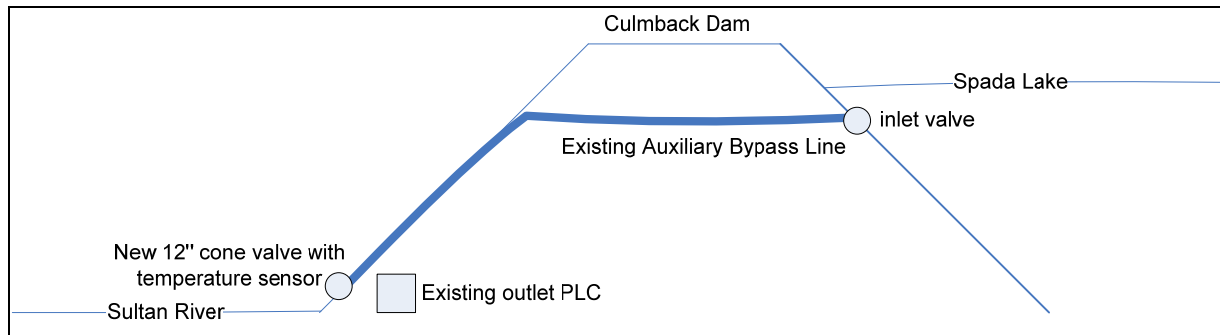


Figure 1. Proposed modifications to the existing Culmback Dam auxiliary water bypass line.

2.2. Phase 2 Implementation

2.2.1 Standards and Schedule

For Phase 2, the temperature performance standards associated with the RT are largely influenced by reservoir water surface temperature. The Phase 2 structure will provide access to the warmest water in the reservoir and eliminate the reservoir elevation restriction associated with use of the auxiliary release line. Potential release volumes associated with the cone valve and hydro unit are known and predictable as they are located near the reservoir bottom and available for use at all times, excluding spillway inspections. The release volume of the floating inlet will be sized to conduct up to 65 cfs of warm water from the reservoir surface.

Once the water is released at Culmback Dam, general climatic conditions (air temperature and precipitation) influence temperature and streamflow. During summer, significant warming of the river can occur over the 6.4-mile reach (Reach 3) largely related to the presence of bedrock in the canyon. Variable accretion (side flows) can also influence seasonal temperatures with their effect being most pronounced in the fall and winter months. Performance standards must ensure that the State Water Quality Criteria are met, unless an approved variance is issued.

Performance standards will ultimately be defined by the ARC. The seasonal shaping and monthly distribution of the annual water budget will influence temperature in Reach 3. Temperature modeling

will be used to incorporate the parameters outlined above and set draft performance standards. Longitudinal temperature monitoring will be used to verify and validate modeling results. Simplistic modeling of bioenergetics may also aid in refining performance standards.

2.2.2 Method of Release

The water release points for Phase 2 will include the 10-inch cone valve, the hydro unit, and through the existing spillway via the floating inlet. The total combined capacity of these three release points is approximately 115 cfs at full pool (reservoir elevation 1450 ft. msl); 45 cfs from the cone valve, 5 cfs for the hydro unit, and 65 cfs from the floating inlet.

Meeting the RT will require blending of seasonally available warm water from the floating inlet with cold water from the cone valve and hydro unit. The hydro unit runs constantly, releasing a fixed 5 cfs of cold water ranging between 3 and 6 degrees Celsius to provide Culmback Dam station service. Therefore, blending hinges solely on the relative use of the cone valve and the floating inlet. When the reservoir is isothermal, the release location is irrelevant. However, when the reservoir is stratified blending of water temperatures can occur.

2.3 Limitations

The Phase 1 design limitations are the fixed location (reservoir elevation) and capacity of the auxiliary release line. The Phase 2 floating intake design significantly improves the reservoir operational range of use and increases the capacity to 65 cfs.

3. PHASE 2 STRUCTURE DETAILS

The original Phase 2 concept presented to the FERC in the Additional Information Request (dated December 17, 2009) was developed in response to stakeholder requests for a structure that operated in a similar manner to the selective withdrawal structure at the intake to the power tunnel. As envisioned at the time, this concept called for a series of six fixed inlets spanning the operational range of reservoir elevations. This concept allowed for custom blending of water from multiple inlets as well as the 48-inch Howell Bunger valve, near the reservoir bottom. However, after further engineering review, the District developed an improved and more reliable design for the Phase 2 structure which is discussed below.

3.1 Conceptual Plan and Drawings

The revised Phase 2 structure presented here relies on a single floating inlet collector combined with a flexible conveyance system that allows it to freely move with reservoir elevation (see Figures 2 and 3). Schemes of this type have been used in the offshore oil industry and have proven reliable over many years. This concept makes it possible to continually access the warmest water in the reservoir for the longest duration possible. This near surface water can be combined with bottom releases from the Howell Bunger valve to achieve the desired temperatures in Reach 3, downstream of Culmback Dam. This revised concept is superior to the original concept because it gives broader flexibility towards achieving the temperature targets for both resident and anadromous salmonids.

3.1.1 Intake Equipment

A floating inlet will be compliantly moored with a three-point catenary mooring using concrete block anchors and chain mooring lines.

3.1.2 Water Conduction

A flexible water conveyance system similar to systems used in the offshore oil industry or other systems installed for water temperature control at hydroelectric reservoirs will be used.

3.1.3 Flow Regulation

The structure will use a hydraulic or pneumatically actuated regulating valve and a manually operated guard valve in series with a regulating valve.

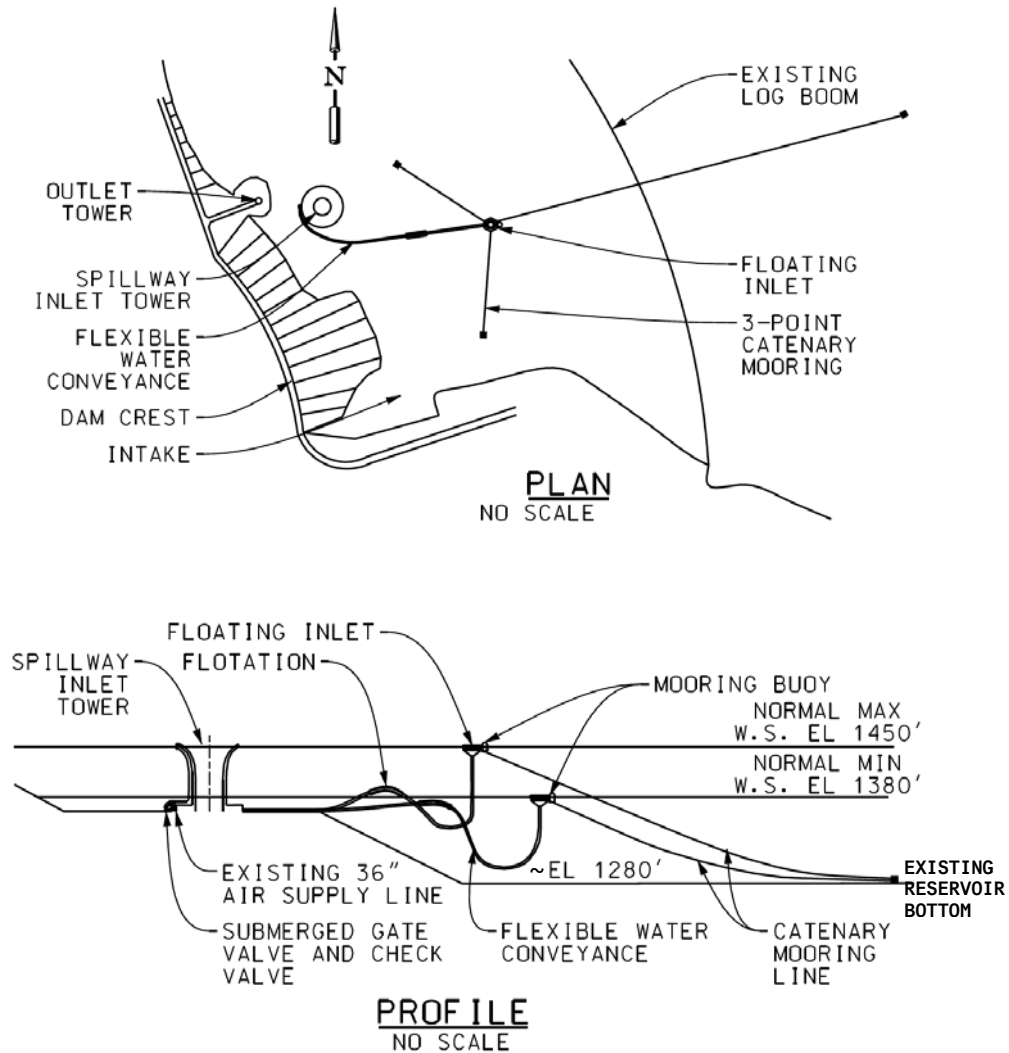


Figure 2. Profile and Plan Sketch for Phase 2 Concept

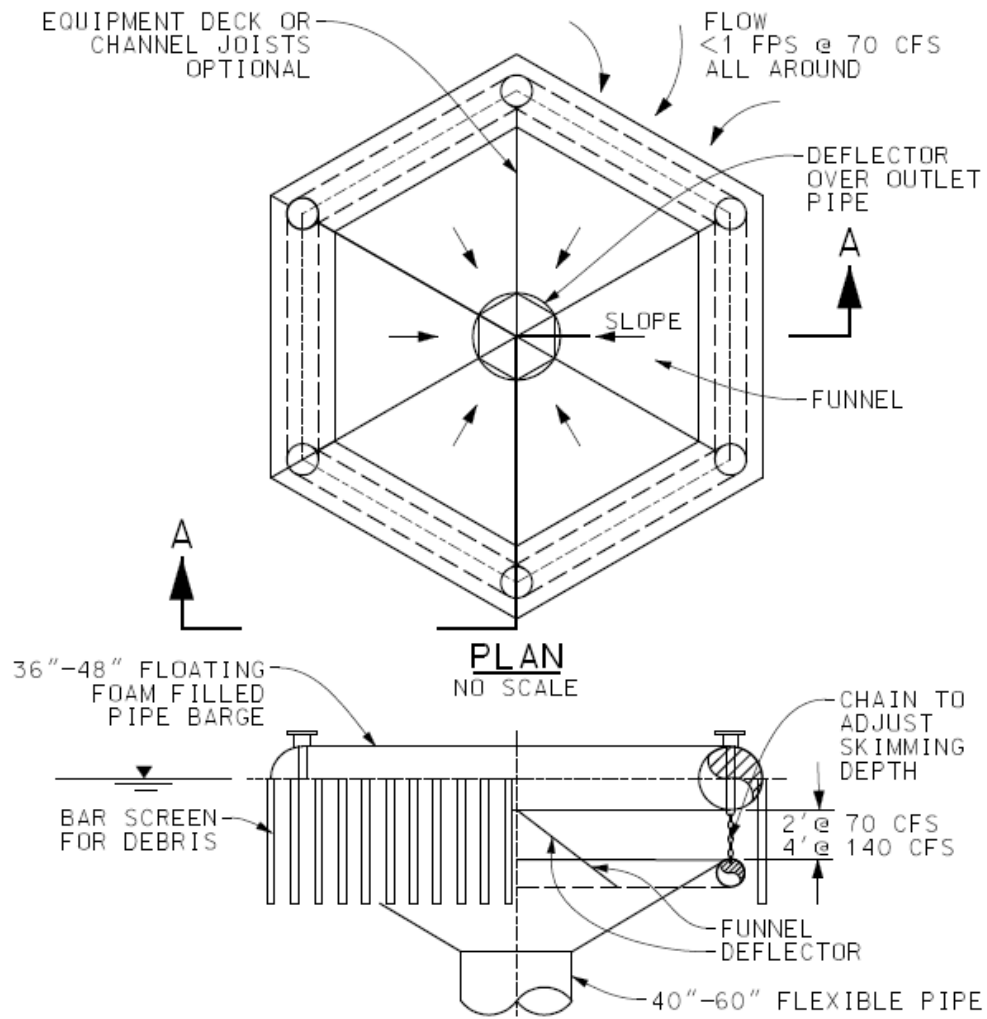
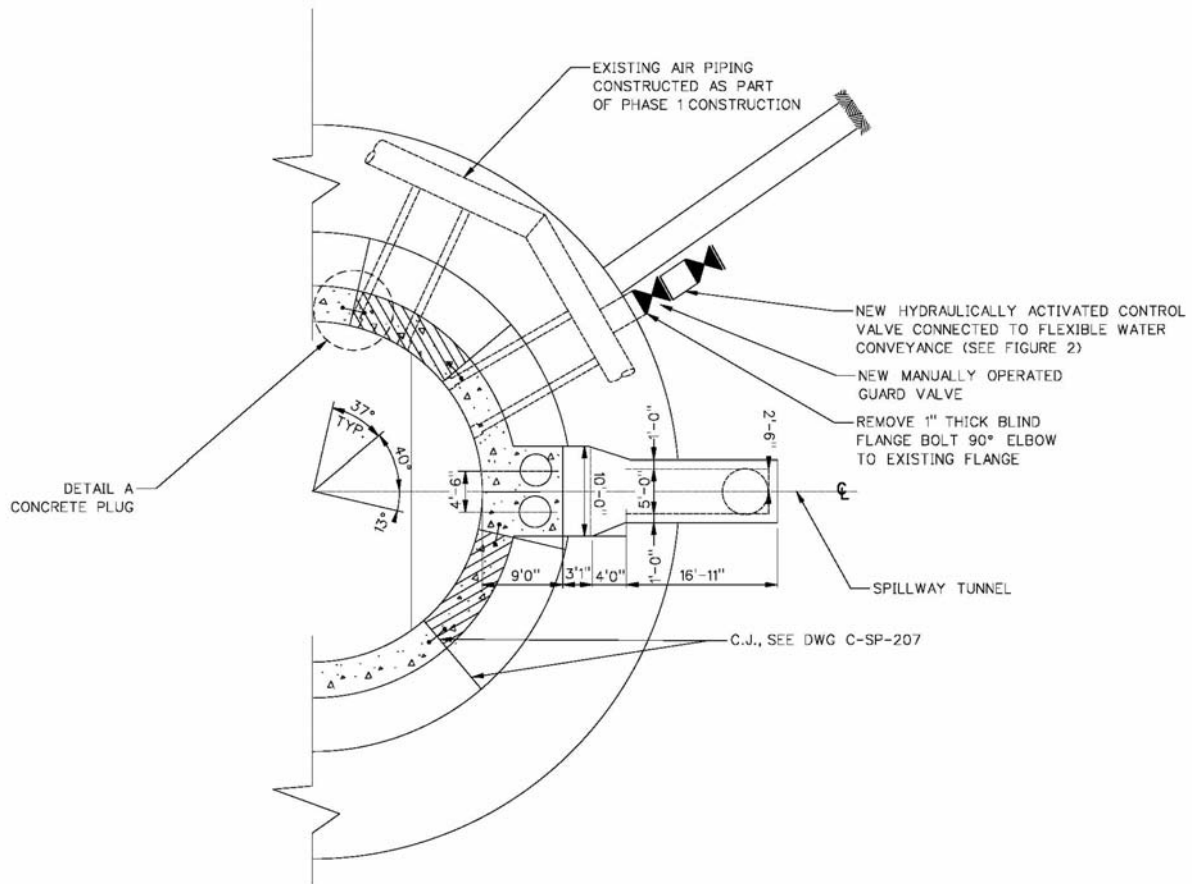


Figure 3. Plan and Section of Floating Inlet



Detail A

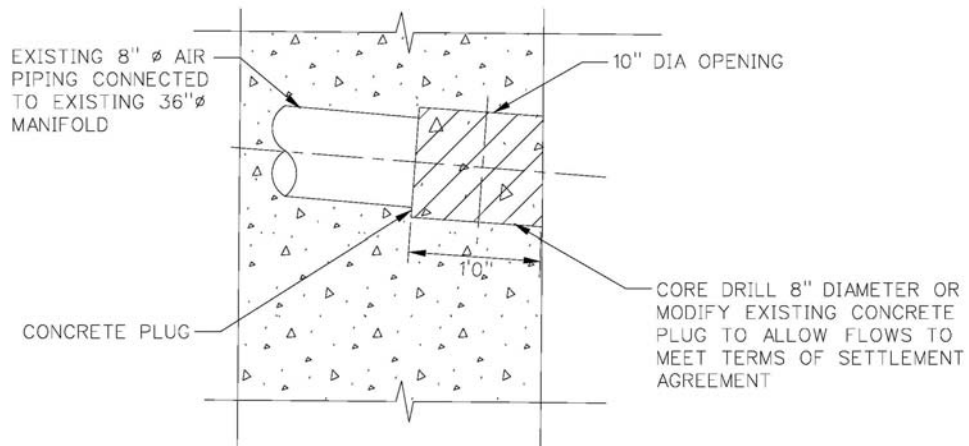


Figure 4. Plan and Detail of Concrete Plugs in Spillway

3.2 Preliminary Operating Plan

3.2.1 Functionality

The floating inlet will allow for water to be drawn from the uppermost layer of the reservoir (top five feet) over the entire operating range from reservoir elevation 1,380 ft. msl to reservoir elevation 1,450 ft. msl. This will ensure that only warm water from the lake surface is collected by the intake. The area of the intake structure would be sized to allow for a flow of up to 65 cfs of warm water. The flow of warm water will be regulated by a valve at the base of the spillway tower as the water passes from the flexible water conveyance system into the existing spillway aeration piping. A regulating valve control will allow the volume of warm water passing through the spillway to be adjusted to conform to licensing requirements for water temperature in the reach of the Sultan River between the Culmback Dam and the City of Everett's diversion dam for Lake Chaplain. Simultaneous control of the existing bypass valves will maintain the minimum instream flow release volume, mixing cold water with warm surface water to meet the stream flow temperature target.

3.2.2 Maintenance

Maintenance activities associated with use of the floating inlet will include regular cleaning of the intake trash screen, periodic maintenance and painting of the float, inspection and potential replacement of the flexible water conveyance system, and inspection and replacement of the mooring system. It is anticipated that the trash screen will need to be cleaned every season and will require on-the-water maintenance. Depending on the corrosion protection system selected, it is anticipated that the float will require painting every five-to-ten years and that it may need to be removed from the lake for maintenance. The flexible water conveyance system will require periodic inspection to ensure the integrity of the pipe wall and structural reinforcement. The frequency of these inspections will depend on the type of conveyance system selected, but inspections will likely be required at intervals no more than every five-to-ten years. The inspection of the water conveyance system and the painting of the float could be scheduled concurrently to minimize the amount of on the water work required to disconnect the float and pipe and tow the system to shore. The design life of the flexible water conveyance system will depend on the type of pipe selected, but it is anticipated that it will have a useful life of no less than twenty years. In-water inspection of the mooring system may be required to assess the structural integrity of the mooring lines and connection points. These inspections will likely require the use of a remotely-operated vehicle and will likely be required every five to ten years. The mooring system will be designed to have a useful life of not less than forty years.

3.2.3 Reliability and Survivability

The location of the inlet structure would be in an open area of Spada Lake with a maximum fetch of up to four miles. This location would expose the floating inlet, flexible water conveyance, and mooring to environmental loads due to wind, waves, and ice. Preliminary analysis indicates that the worst loads on the floating inlet and mooring system would occur during severe icing events; such events are expected to occur periodically on Spada Lake. The floating inlet will be located such that the distance between the new inlet structure and the existing spillway inlet tower will be large, and the floating inlet and flow line would likely not experience large hydrodynamic loads during spilling events. If the intake becomes clogged with trash or debris, and the regulating valve remains open, there is the potential for the external water pressure to collapse the flexible water conveyance system. The potential for collapse would be mitigated by measuring the water level inside the intake structure and providing a mechanism to close the regulating valve or bypass the trash screens if the water level drops excessively in the intake.

3.3 Design Issues

3.3.1 Floating Inlet Structure

The floating inlet structure would be subjected to environmental loads due to wind, waves, current due to spilling events, and ice loads. Adequate freeboard will be included in the design of the inlet structure to prevent wave overtopping in the design wind and wave condition. The lateral and vertical motions of the floating inlet in waves will be assessed to ensure that the loads on the flexible water conveyance system are minimized. The inlet structure will be designed to minimize ice loading on the structure or conversely, provisions could be constructed to be removable from the lake during periods when substantial icing might occur. Connectors between the floating inlet and the flexible water conveyance system will be designed to minimize the loads imparted to the conveyance system while maximizing the design life of the connectors.

Vandalism, primarily in the form of shooting towards the moored intake, raises concerns regarding possible leakage of the floats due to bullets. To offset this concern, the floats could be compartmentalized to reduce the risk of sinking due to leakage and active buoyancy would be provided with polystyrene foam inserts to mitigate loss of floatation in case of a puncture.

3.3.2 Flexible Water Conveyance

The design team will work with manufacturers of flexible water conveyance systems to specify the most appropriate material and construction method to maximize the life of the system. The shape of the conveyance would be designed to minimize the loads on the connection points to the floating inlet and the submerged control valve. Depending on the bottom type and the amount of debris on the lake between the floating inlet and the spillway tower, a portion of the system may be armored to limit damage due to abrasion. The flexible conveyance system will be designed in conjunction with the mooring system to minimize the potential for extreme loads on the connection points, interference between the mooring lines and the conveyance system, and to avoid buckling of the conveyance system.

3.3.3 Mooring Design

The collector mooring system will be designed to withstand the extremes of static and dynamic loads imposed on the floating inlet structure and flow line. Preliminary analysis of the horizontal load on the floating inlet indicate that the mooring will need to resist a horizontal force in excess of 20 kips during a combined icing and spilling event. The intake float structure can potentially be designed to apply bending loads to a thin surface ice layer that would break the ice, and in turn apply only moderate stress on the mooring lines. The details of the mooring system and anchors will depend on the bathymetry and site specific bottom conditions of Spada Lake which will be investigated as part of the final design. A conceptual mooring design has been developed assuming 1-inch anchor chain for the mooring lines and large concrete block anchors. It is anticipated that the dry weight of the anchors for this type of mooring would be approximately 50 kips, allowing for a factor of safety of 1.5 for anchor uplift in the survival condition.

3.3.4 Submerged Valves

The submerged valves would be designed to operate at water depths of up to 120 feet. The working fluid for the valve actuator will be potable, since a portion of the water in Spada Lake is used as drinking water for the City of Everett and most of Snohomish County. The valves and attachment points to the existing aeration manifold and the flexible flow line would be designed to minimize the amount of installation time required under water. Valves used in this application will also be specified and selected

assuming long maintenance intervals to limit the amount of dive work required if, and when that is ever necessary.

3.3.5 Morning Glory Spillway Modifications

The Phase 2 structure incorporates existing spillway modifications. By way of background, as part of Stage 2 construction of Culmbach Dam in the early 1980s, the morning glory spillway was raised 90 feet over a two-year construction period. The first-year construction involved reshaping the existing spillway crest from a curved surface to a flat surface with a sharp edge. The possibility of this sharp edge leading to negative pressures and cavitation damage to the spillway was evident. To prevent cavitation, a temporary air inlet system was cast into the lip of the spillway at approximate elevation 1364 ft. msl. The temporary air inlet system included twenty steel pipes, 8 inches in diameter, equally spaced around the spillway edge. The 8-inch pipes were connected to a 36-inch diameter steel manifold. The manifold was connected by a flanged fitting to an air inlet pipe that extended above the high water mark. This temporary air inlet system functioned, as designed, from the fall of 1982 until spring of 1983. When the raised spillway was completed, the ends of the 8-inch diameter pipes were sealed with concrete, the temporary air inlet pipe was removed, and a solid plate was bolted to the inlet flange. Re-opening these pipes will allow the warm water to be discharged to the spillway tunnel, where it will mix with cold water from the existing bypass valve and turbine.

To provide the required flow under the New License and to maintain a balanced loading on the spillway, the Phase 2 structure will require the coring of all 20 of the 8-inch air inlet pipes which were plugged as part of Stage 2 raising of the spillway. Modification of the ports will be made to prevent cavitation during spills and ensure smooth operation during the range of flows indicated in the SA (see Figure 4).

4. MONITORING

The goal of the monitoring component, as determined by the ARC at a March 11, 2010 meeting, is to assess the changes in biological productivity and composition in Reach 3 as a result of changes in releases and temperature. The role of the ARC is to review data collected on thermal changes and resultant biological effects of the temperature regime change in Reach 3.

4.1. Temperature Monitoring

As stated in section 2 above, the goal of temperature conditioning in Reach 3 is to reflect seasonal and diurnal changes found in unregulated streams to the extent that it is operational feasible. During Phase 1, this will be achieved by adding up to 20 cfs of water from the 16-inch auxiliary release line during the period of reservoir stratification (typically April to October). At certain times of the year, the volume of water available for temperature conditioning is low relative to the negotiated instream flows for Reach 3. A balance between appropriate stream temperatures and instream flows will be negotiated by the ARC for Phase 1; if the ARC is unable to reach consensus on the instream flows, the default flow schedule as identified for minimum instream flows for Phase 1 will be used.

Water temperature monitoring will be conducted at six (6) locations within Reach 3 (see Figure 5) with locations as equally spaced as possible, subject to access. Sites include immediately downstream of Culmbach Dam (RM 16.0), near the Stringer Bridge (RM 14.3), RM 12.8, upstream of Big Four Creek (RM 11.3), and upstream of the Diversion Dam (RM 9.8) prior to the contribution of additional flow at the upstream end of Reach 2. An additional temperature monitoring location will be in Big Four Creek, the principal tributary to this reach of the Sultan River, near the confluence. Temperature readings will be collected at a minimum recording interval of 30 minutes using Onset Water Temp Pro V2 thermistors

with an accuracy of 0.2 degrees C. Thermistors will be deployed in flowing water of a depth greater than 1.0 feet. Thermistors will be factory calibrated and cross checked with field reading from separate calibrated instrumentation. Data will be summarized annually and presented to the ARC for review. Monitoring at all six locations will be initiated upon issuance of a new license and upon this Plan's approval by the FERC and will continue year round for a minimum of 3 and a maximum of 5 years; the ARC will determine the number of years of monitoring within these parameters. A similar monitoring program will be conducted for Phase 2 with concurrence of the ARC and approval by the FERC. For the term of the license, monitoring for compliance with performance standards will continue at a representative station or a station where a solid correlation to representative temperatures has been developed. Both empirical data from five mainstem monitoring locations and temperature modeling (SSTEMP) will be used to inform the selection of a permanent compliance monitoring location for the duration of the license. The District will seek input from the ARC on the location of this compliance monitoring location.

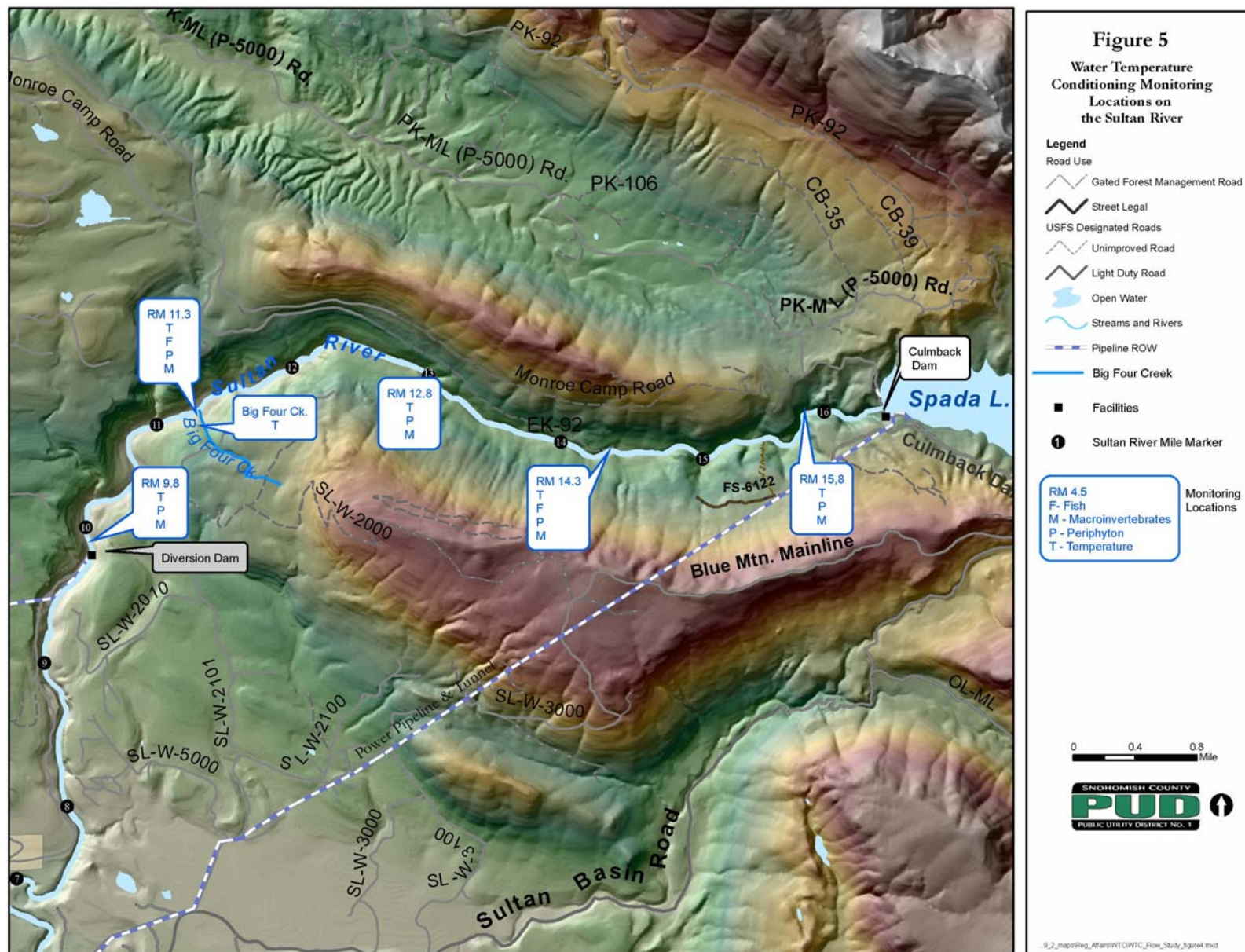


Figure 5. Monitoring locations in Reach 3 of Sultan River for temperature, periphyton, macroinvertebrates, and fish.

4.2 Biological Response Monitoring

Biological response monitoring will include sampling of periphyton (algal mats), benthic macroinvertebrates, drifting macroinvertebrates (captured in flowing water) and fish. The intent of the monitoring is to determine changes in community characteristics (abundance, composition, diversity, distribution, and growth) of relevant aquatic biota relative to the change in thermal regime.

Sampling for periphyton and benthic macroinvertebrates will be conducted at five mainstem locations (RM, 15.8, RM 14.3, RM 12.8, RM 11.3 and RM 9.8) to capture spatial / longitudinal characteristics of the community in response to thermal conditions. Sampling for drift and fish will occur at RM 14.3 and RM 11.3 to allow for sufficient spatial segregation while not sampling at the extreme thermal conditions within the reach. One year of baseline sampling will occur upon license issuance and Plan approval by the FERC, or the District may use sampling data collected prior to license issuance as baseline data if the data are available. Baseline sampling applies to all elements of monitoring. An overview of sampling program is presented below, by element:

- **Periphyton** – Sampling during the baseline prior to temperature conditioning and the first, third, and contingently¹ fifth year after temperature conditioning is initiated, during late August/early September, eight samples per site composited and analyzed as one sample.
- **Benthic Macroinvertebrates** – Kick net sampling during the baseline prior to temperature conditioning and the first, third, and contingently fifth year after temperature conditioning is initiated, late August/early September, eight samples per site composited and analyzed as one sample, suite of metrics presented.
- **Drift Macroinvertebrates** – Sampling during the baseline prior to temperature conditioning and the first and third years after temperature conditioning is initiated, during early summer and late summer, three samples, composited and analyzed as one sample.
- **Fish** – Snorkel surveys that encompass all habitat types at each location during baseline prior to temperature conditioning and the first, third and contingently fifth years after temperature conditioning is implemented during late summer. Surveys will be modeled after those conducted for Revised Study Plan 2 (Normandeau and TRPA, 2008) following a Hankin and Reeves (1988) protocol or equivalent methodology suited to site conditions.
- **Fish tissue** – Scale samples collected by electroshocking or angling during baseline, years 1 and 3, during late summer; tissue collection for stable isotope analysis during baseline and contingently Year 3, during late summer. The number of samples collected will be based on the efficiency of the capture techniques with 10 samples as a minimum per sampling session.

Table 2. Sampling Program for Years 0-5

ELEMENT	
Periphyton	Baseline, Years 1, 3, and contingently 5 ¹ during late summer, eight samples per site, composited per DOE protocol
Macroinvertebrates – benthic	Baseline, Years 1, 3, and contingently 5 ¹ , during late summer, 8 one square foot samples per site, composited per DOE protocol
Macroinvertebrates – drift	Baseline, Years 1 and 3, during early and late summer, three samples, composited
Fish – snorkeling	Baseline, Years 1, 3, and contingently 5 ¹ during late summer

¹ Sampling during the fifth year is contingent on no detectable evidence of change in the biological community between baseline conditions and conditions during Years 1 and 3.

At the completion of the sampling in Year 3, a detailed report will be prepared and submitted to the ARC for review. The report will include the results of lab analysis following DOE protocol for periphyton and benthic macroinvertebrates including an accompanying narrative. For baseline, Year 1 and Year 3, this report will summarize structural and compositional metrics based on taxonomy such as diversity and taxa richness as well as measures of abundance, age, growth, and longitudinal distribution. During fish surveys, observations of species, number, length and habitat use will be recorded. Scales will be collected from a representative sample of fish and analyzed for growth patterns. Fin clips will be collected during baseline surveys and used for stable isotope analysis. Depending on the results of the stable isotope analysis, additional sampling may occur in Year 3. For drift samples, aquatic insect taxa will be enumerated and identified to genus, where practicable. Flow measurements at the time of sampling will be used to calculate drift density. Literature values will be used to determine calorimetry.

The suspension, continuation, or modification of the monitoring program and its applicability to Phase 2 will be based on the results of sampling and input from the ARC. The Phase 2 monitoring will be initiated after construction of Phase 2 improvements and will be consistent with the Phase 1 program, as modified by the ARC.

5. REPORTING

5.1. Annual Report

No separate annual report will be developed for this management plan. Relevant data (temperature and instream flows) will be reported based on the District's water year in reports for other aquatic and fishery management plans, such as the Operations Annual Report.

5.2. Plan Review and Updates

The District will review, and update as needed, this WTC Plan after completion of the comprehensive report identified in Section 4 above to address continued monitoring under Phase 1. The Plan will also be reviewed, and updated as needed, after the Phase 2 structure is installed to address temperature RT for the anadromous fishery and monitoring. The District will allow a minimum of 30 days for members of the ARC to comment and make recommendations before filing the updated WTC Plan to the Commission. When filing the WTC Plan with the Commission, the District will include documentation of consultation; copies of comments and recommendations; and specific descriptions of how comments and recommendations from the ARC are accommodated by the District's Plan. If the District does not adopt a recommendation, the filing shall include the District's reasons based upon Project-specific information. The District will implement the updated WTC Plan upon FERC approval.

6. SCHEDULE

The District will begin implementation of this Plan within six months after the WTC Plan is approved by the FERC and the New License is issued.

For Phase 2, the District will install and operate the Phase 2 structure prior to the earlier of (a) two (2) years after the date that the District completes the volitional passage modifications at the Diversion Dam or (b) January 1, 2020. To allow the District to meet these timeframes, the District will endeavor to meet the following interim deadlines: (a) design the Phase 2 structure to a point that will include design criteria and technical memorandum available to the ARC by December 2012 for review; (b) conduct underwater dives and/or bathymetric surveys of the reservoir bottom to verify existing conditions for

connection into the spillway by December 2012; (c) provide the final design to the FERC no later than December 2017 for review and approval; and (d) undertake procurement and installation in 2018/2019. These interim deadlines may be modified if volitional passage modifications at the Diversion Dam should occur earlier than 2017 or if other circumstances require.

7. REFERENCES

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- CH2M Hill. 2009a. Water Quality Final Technical Report. Prepared for Snohomish County PUD.
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- Ruggerone, Greg. Natural Resource Consultants. 2008. Phase 1: Fish Passage Assessment Evaluation of Salmon and Steelhead Migration after a Landslide on the Sultan River. Prepared for Snohomish County PUD.
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- R2 Resource Consultants. 2009. Determination and Evaluation of Habitat – Flow Relationships in the Sultan River, Washington Sultan River Instream Flow Study RSP 3. Prepared for Snohomish County PUD.
<http://www.snopud.com/Site/Content/Documents/relicensing/Study%20Reports/SP3/RSP3TechRpt31909.pdf>

Appendix 1

Proposed Aquatic License Article 3: Temperature Conditioning in Reach 3

A-LA 3: Temperature Conditioning in Reach 3

The Licensee shall implement the following program to condition the temperature of the water released at Culmback Dam pursuant to the A-LA 9 Reach 3 instantaneous minimum flow requirements. The program's objective is to provide a seasonally appropriate water temperature regime to improve conditions for salmonids and other aquatic resources (including fish and macroinvertebrates) in Reach 3 (RM 9.7 to 16.1) of the Sultan River.

1. Temperature Conditioning Performance Standards

In consultation with the Aquatic Resource Committee (ARC), the Licensee shall develop temperature conditioning performance standards for April through October for (1) the water release points and (2) the downstream end of Reach 3. These temperature conditioning performance standards shall be the suitable temperature bands (ranges) for the benefit of salmonids and other aquatic resources (including fish and macroinvertebrates). These temperature conditioning performance standards shall comply with applicable state water quality standards.

2. Temperature Conditioning Monitoring

The Licensee shall monitor water temperature within Reach 3 for the term of the License. The Licensee shall also monitor the biological response of salmonids and other aquatic resources (including fish and macroinvertebrates) to the temperature conditioning in at least two (2) separate index areas within Reach 3 for the term of the License. The temperature conditioning monitoring shall be done in consultation with the ARC.

3. Temperature Conditioning Program Development**3.1. Phase One**

Until the earlier of (a) two (2) years after the date that the Licensee completes the Diversion Dam's volitional fish passage modifications, as described in A-LA 13, or (b) January 1, 2020, the Licensee shall implement the temperature condition program within the constraints of the Project's existing piping infrastructure. During Phase One, the Licensee shall make temperature sensor and control valve modifications, as necessary.

The water release points shall be the 10-inch cone valve, the hydro unit, and the 16-inch auxiliary release line. Blending ratios associated with this temperature conditioning program shall be determined by temperature monitoring at the water release points, the downstream end of Reach 3, Spada Lake, and/or other suitable locations.

Phase One of the temperature conditioning program shall be implemented only when (1) reservoir elevations are greater than 1410 feet mean sea level (msl) and (2) the reservoir is stratified (typically April through October).

3.2. Phase Two

Prior to the earlier of (a) two (2) years after the date that the Licensee completes the Diversion Dam's volitional fish passage modifications, as described in A-LA 13, or (b) January 1, 2020, and subject to the Commission's approval and obtaining any necessary regulatory approval, the Licensee shall install and operate a temperature conditioning structure (Phase Two Structure). All of the flow components for this structure, except for the valves, shall have a hydraulic capacity to allow the Licensee to provide no less than 165 cfs (at Spada Lake elevation of 1430 feet msl) of temperature conditioned water immediately below Culmback Dam.

When the reservoir is above 1380 feet msl, this structure shall allow the Licensee to temperature condition the flows released from Culmback Dam.

Blending ratios associated with this temperature conditioning program shall be determined by temperature monitoring at the water release points, the downstream end of Reach 3, Spada Lake, and/or other suitable locations.

Phase Two of the temperature conditioning program shall be implemented only when (a) reservoir elevations are greater than 1380 feet msl and (b) the reservoir is stratified (typically April through October).

4. Water Temperature Conditioning Plan

Within 180 days of issuance of the License, the Licensee shall file with the Commission, for approval, a Water Temperature Conditioning Plan (WTC Plan). This WTC Plan shall document how the Licensee shall implement a program to condition the temperature of waters released at Culmback Dam. The WTC Plan shall include: (1) the preliminary operation plan for the conditioning of water released from Culmback Dam pursuant to the A-LA 9 minimum flow schedule to achieve temperature conditioning performance standards in Reach 3 during both Phase One and Phase Two; (2) the method and schedule for, and limitations upon, temperature conditioning of water releases; (3) the method, locations, and schedule for monitoring water temperature within Reach 3 and the response of aquatic resources (including fish and macroinvertebrates) to water temperature conditioning; (4) the method and schedule for adjusting the water temperature release schedule based upon temperature monitoring and response of the aquatic resources; (5) the conceptual design drawings of the Licensee's proposed alternatives for the Phase Two Structure; (6) a preliminary operation and maintenance plan for the proposed alternatives for the Phase Two Structure; (7) a schedule for selection, design and construction of the Phase Two Structure; and (8) the temperature conditioning program annual reporting and ARC consultation requirements.

The Licensee shall develop the WTC Plan in consultation with the ARC. The Licensee shall allow a minimum of thirty (30) days for members of the ARC to comment and make recommendations before submitting the WTC Plan to the Commission. When filing the WTC Plan with the Commission, the Licensee shall include documentation of consultation; copies of comments and recommendations; and specific descriptions of how comments and recommendations from the ARC are accommodated by the Licensee's plan. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons based upon Project-specific information.

Upon Commission approval, the Licensee shall implement the WTC Plan.

Appendix 2

Consultation Documentation

Presler, Dawn

From: Presler, Dawn
Sent: Wednesday, January 20, 2010 12:54 PM
To: 'Tim_Romanski@fws.gov'; 'steven.m.fransen@noaa.gov'; 'Andy.Haas@co.snohomish.wa.us'; 'Applegate, Brock A (DFW)'; 'Jim Miller'; 'Maynard, Chris (ECY)'; 'Abby Hook'
Cc: Binkley, Keith; Moore, Kim; 'Barry Gall'; 'deborah.knight@ci.sultan.wa.us'; 'Thomas O'Keefe'
Subject: Jackson ARC - Water Temp Conditioning info
Attachments: Spada Reservoir Stratification History - Temperature Conditioning.xlsx; Temperature Conditioning - Temp Targets_011910.pdf; Phase 1 design criteria Culmback_Aux_Water_Bypass_Modifications_111609.pdf; Phase 2 Design Criteria.pdf; 20091217 Response to AIR.pdf; Monitoring component of Water Temp Cond Plan.pdf

Dear ARC Members (Temp Conditioning Quorum Members):

Per our meeting last week, here are some relevant documents regarding the Water Temp Conditioning Plan for your review:

- 1) Phase 1 Design Criteria – previously provided at the ARC Meeting #1. Let Kim/Keith know of any concerns by end of January as PUD prepared to purchase valves and line up electrical workers.
- 2) Phase 2 Design Criteria – distributed at the ARC meeting last week. Let Kim/Keith know of any comments/questions by 2/20 for review, consideration and inclusion, if appropriate, by next ARC meeting.
- 3) Response to FERC's Additional Information Request – provides an initial conceptual drawing of Phase 2; however, as indicated at the ARC meeting last week, with HDR/DTA on board, there likely will be a new and improved conceptual drawing.
- 4) Establishing Phase 1 temperature targets spreadsheet and explanatory PDF document – please review and contact Keith with your thoughts on flow versus temperature to meet targets by 2/20 for review, consideration and inclusion, if appropriate, by next ARC meeting.
- 5) Biological monitoring component from Water Temperature Conditioning Plan – please review by 2/20 and contact Keith with your thoughts on monitoring components for review, consideration and inclusion, if appropriate, by the next ARC meeting.

As mentioned, we'd like to be able to provide you with a more complete Water Temperature Conditioning Plan by the end of March, so comments (if any) would be appreciated as soon as possible on the attached. Thanks!

Please forward to appropriate ARC back-ups if needed.

Dawn Presler
Relicensing Specialist
Jackson Hydro Project

Snohomish County PUD No. 1
PO Box 1107 Everett, WA 98206-1107
Phone: 425-783-1709

Presler, Dawn

From: Binkley, Keith
Sent: Monday, February 08, 2010 4:17 PM
To: Presler, Dawn; 'Tim_Romanski@fws.gov'; 'steven.m.fransen@noaa.gov'; 'Andy.Haas@co.snohomish.wa.us'; 'Applegate, Brock A (DFW)'; 'Jim Miller'; 'Maynard, Chris (ECY)'; 'Abby Hook'
Cc: Moore, Kim; 'Barry Gall'; 'deborah.knight@ci.sultan.wa.us'; 'Thomas O'Keefe'
Subject: RE: Jackson ARC - Water Temp Conditioning info

ARC – Re-sending this as a reminder. Also, we plan to send out some Phase 2 concept materials early next week.

Keith

From: Presler, Dawn
Sent: Wednesday, January 20, 2010 12:54 PM
To: 'Tim_Romanski@fws.gov'; 'steven.m.fransen@noaa.gov'; 'Andy.Haas@co.snohomish.wa.us'; 'Applegate, Brock A (DFW)'; 'Jim Miller'; 'Maynard, Chris (ECY)'; 'Abby Hook'
Cc: Binkley, Keith; Moore, Kim; 'Barry Gall'; 'deborah.knight@ci.sultan.wa.us'; 'Thomas O'Keefe'
Subject: Jackson ARC - Water Temp Conditioning info

Dear ARC Members (Temp Conditioning Quorum Members):

Per our meeting last week, here are some relevant documents regarding the Water Temp Conditioning Plan for your review:

- 1) Phase 1 Design Criteria – previously provided at the ARC Meeting #1. Let Kim/Keith know of any concerns by end of January as PUD prepared to purchase valves and line up electrical workers.
- 2) Phase 2 Design Criteria – distributed at the ARC meeting last week. Let Kim/Keith know of any comments/questions by 2/20 for review, consideration and inclusion, if appropriate, by next ARC meeting.
- 3) Response to FERC's Additional Information Request – provides an initial conceptual drawing of Phase 2; however, as indicated at the ARC meeting last week, with HDR/DTA on board, there likely will be a new and improved conceptual drawing.
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- 5) Biological monitoring component from Water Temperature Conditioning Plan – please review by 2/20 and contact Keith with your thoughts on monitoring components for review, consideration and inclusion, if appropriate, by the next ARC meeting.

As mentioned, we'd like to be able to provide you with a more complete Water Temperature Conditioning Plan by the end of March, so comments (if any) would be appreciated as soon as possible on the attached. Thanks!

Please forward to appropriate ARC back-ups if needed.

Dawn Presler
Relicensing Specialist
Jackson Hydro Project

Snohomish County PUD No. 1
PO Box 1107 Everett, WA 98206-1107
Phone: 425-783-1709

Presler, Dawn

From: Presler, Dawn
Sent: Thursday, March 25, 2010 11:10 AM
To: 'Abby Hook'; 'Steve Fransen'; 'Tim_Romanski@fws.gov'; 'Applegate, Brock A (DFW)'; 'Maynard, Chris (ECY)'; 'Andy.Haas@co.snohomish.wa.us'; 'Jim Miller'
Cc: 'Barry Gall'; 'deborah.knight@ci.sultan.wa.us'; 'Thomas O'Keefe'; Binkley, Keith; Moore, Kim
Subject: ARC - Water Temp Cond Plan for your review
Attachments: DRAFT_WTCPlan_March2010.docx

Dear Water Temp Conditioning Quorum Members:

Attached is the full WTC Plan for your 30-day review and comment. Please provide any comments back to me by Monday April 26, 2010. If you have any questions on the Plan, please contact Keith.

Dawn Presler

Relicensing Specialist
Jackson Hydro Project

Snohomish County PUD No. 1
PO Box 1107 Everett, WA 98206-1107
Phone: 425-783-1709

Presler, Dawn

From: Presler, Dawn
Sent: Tuesday, May 18, 2010 10:18 AM
To: 'Steven.M.Fransen@noaa.gov'; 'Tim_Romanski@fws.gov'; 'Applegate, Brock A (DFW)'; Maynard, Chris (ECY); 'ahook@tulaliptribes-nsn.gov'; 'Andy.Haas@co.snohomish.wa.us'; 'Jim Miller'
Cc: 'bgall@fs.fed.us'; Moore, Kim; Binkley, Keith; 'deborah.knight@ci.sultan.wa.us'; 'Thomas O'Keefe'
Subject: ARC - updated draft WTC Plan for review - by June 17
Attachments: Draft_WTC_Plan_May2010.DOC

Dear ARC Members (WTC Quorum Members):

Attached is the updated draft WTC Plan for your 30-day review per the ARC meeting on May 13. Please send me/Keith comments, if any, by June 17 COB. Thanks!

Dawn Presler

Relicensing Specialist
Jackson Hydro Project

Snohomish County PUD No. 1
PO Box 1107 Everett, WA 98206-1107
Phone: 425-783-1709

Presler, Dawn

From: Presler, Dawn
Sent: Thursday, July 01, 2010 1:53 PM
To: Steven.M.Fransen@noaa.gov; 'Tim_Romanski@fws.gov'; 'Applegate, Brock A (DFW)'; 'Maynard, Chris (ECY)'; 'Abby Hook'; Andy' 'Haas'; 'Jim Miller'
Cc: 'Deborah Knight'; 'Thomas O'Keefe'; 'Barry Gall'; Moore, Kim; Binkley, Keith
Subject: ARC - Water Temp Conditioning Plan - ready for filing with FERC?
Attachments: DRAFT_WTC_Plan_July2010.DOC

Dear ARC (Water Temp Conditioning Quorum Members):

Attached is the updated WTC Plan based on USFS comments. Please take until July 12 to review and let us know if you have any final concerns/questions/comments. We will be discussing the readiness of filing this Plan with FERC at the ARC meeting on July 13. If ready for filing, I'll file the Plan asap after updating the consultation appendix and Keith will begin summer monitoring components for baseline data collection.

Happy crabbing season!

Dawn Presler
Relicensing Specialist
Jackson Hydro Project

Snohomish County PUD No. 1
PO Box 1107 Everett, WA 98206-1107
Phone: 425-783-1709