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T. JAMES DAVIS
LYNN M. HEMINGER
RONALD E. SKAGEN

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Public Utility District No. 1 of Douglas County

1151 Valley Mall Parkway • East Wenatchee, Washington 98802-4497 • 509/884-7191 • FAX 509/884-0553 • www.douglaspud.org

Via Electronic Filing

Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 1st Street N.E.
Washington, D.C. 20426

April 28, 2014

Subject: Wells Hydroelectric Project No. 2149
2013 Water Temperature Annual Report – License Article 401(b)

Dear Secretary Bose:

Public Utility District No. 1 of Douglas County, Washington (Douglas PUD), licensee for the Wells Hydroelectric Project (Wells Project), respectfully submits the final 2013 Water Temperature Annual Report for the Wells Project (Water Temperature Report; Appendix A). The Water Temperature Report summarizes water temperature activities and milestones for calendar year 2013 including the development and approval of a Quality Assurance Project Plan, permitting and installation of remote and real time thermistors, and data collection.

This is the first water temperature annual report submitted to the Federal Energy Regulatory Commission (FERC) under Douglas PUD's new Wells Project License. The submission of this report to the FERC is a requirement of Article 401 (b) of the License as is the requirement that this report be filed with the FERC by April 30th of each year. The enclosed report was also written to be consistent with (1) the Water Quality Management Plan that is contained within the Aquatic Settlement Agreement, and (2) Condition 6.7(3)(b) of Ecology's Clean Water Act section 401 Water Quality Certification for the Wells Project.

Consistent with Article 401 (b), Douglas PUD provided a draft Water Temperature Report to the parties to the Aquatic Settlement Agreement for review and comment. Douglas PUD's responses to the comments received can be found in Appendix B of this filing and serves as a consultation record supporting the review and approval of the final Water Temperature Report. The final Water Temperature Report was approved at the April 9, 2014 Aquatic Settlement Work Group conference call.

If you have any questions or require further information regarding the enclosed report, please feel free to contact Andrew Gingerich at (509) 881-2323 or andrewg@dcpud.org.

Sincerely,

Shane Bickford
Natural Resources Supervisor

Enclosures:
(1) Appendix A – 2013 Water Temperature Annual Report – Wells Project
(2) Appendix B – Pre-filing Consultation Record for the 2013 Water Temperature Report

Cc: Aquatic Settlement Work Group
Charlie McKinney – Ecology
Pat Irle – Ecology
Chas Kyger – Douglas PUD
Andrew Gingerich – Douglas PUD

Appendix A

2013 Water Temperature Annual Report

Commissioners:
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Pat Irle
Department of Ecology
15 W. Yakima Avenue, Suite 200
Yakima, WA 98902

March 18, 2014

Subject: 2013 Wells Project Water Temperature Annual Report

Dear Ms. Irle:

Public Utility District No. 1 of Douglas County (Douglas PUD), licensee for the Wells Hydroelectric Project (Wells Project), respectfully submits the 2013 Annual Water Temperature Report for the Wells Project. This is the first annual water temperature report submitted to the Washington State Department of Ecology (Ecology) under Douglas PUD's new Federal Energy Regulatory Commission (FERC) license for the Wells Project. Submission of this report to the Ecology and the FERC by April 30, 2014, is consistent with requirements in the Clean Water Act section 401 Water Quality Certification and license Article 401(b) for the Wells Project. This report summarizes water temperature activities and milestones in 2013 including the development and approval of a Quality Assurance Project Plan, permitting and installation of remote and real time thermistors, and data collection.

If you have any questions or require further information regarding the enclosed report, please feel free to contact Andrew Gingerich at (509) 881-2323 or andrewg@dcpud.org.

Sincerely,

Shane Bickford
Natural Resources Supervisor

Copy: Charlie McKinney – Ecology, Yakima

2013 WATER TEMPERATURE ANNUAL REPORT

WELLS HYDROELECTRIC PROJECT

FERC NO. 2149

March 18, 2014

Prepared by:

Public Utility District No. 1 of Douglas County
East Wenatchee, WA

Prepared for:
Washington Department of Ecology
Yakima, WA

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1.0 INTRODUCTION

The Wells Hydroelectric Project (Wells Project or Project) is owned and operated by the Public Utility District No. 1 of Douglas County (Douglas PUD). On November 9, 2012, Douglas PUD received a new 40-year license for the Wells Project from the Federal Energy Regulatory Commission (FERC). During the FERC licensing process, Douglas PUD submitted to the Washington Department of Ecology (Ecology), an application for a 401 Water Quality Certification (401 Certification) on September 30, 2010, pursuant to the provisions of 33 USC §1341 (§401 of the Clean Water Act [CWA]). On September 12, 2011, Douglas PUD withdrew its request and reapplied. On February 27, 2012, Ecology concluded that the Wells Project, as conditioned by its 401 Certification/Order No. 8981, complied with all applicable provisions of 33 USC 1311, 1312, 1313, 1316, 1317 and appropriate requirements of Washington State law (Ecology 2012).

Pursuant to the Wells Project License Order and the 401 Certification, Douglas PUD is required to maintain compliance with the state Water Quality Standard (WQS) for water temperature through continued implementation of a monitoring program and to prepare an annual report of the monitoring results and analyses for submittal by April 30 of the following year (Ecology 2012).

This annual report summarizes water temperature activities implemented at the Wells Project in 2013. Background activities including the Project description, regulatory framework, past Wells Project temperature activities, and 401 Certification temperature requirements are presented in Section 2.0. Implementation results for 2013 are presented in Section 3.0 and include the development of an Ecology-approved Quality Assurance Project Plan (QAPP) for water temperature, permitting activities, equipment acquisition and partnering activities and temperature data collection.

2.0 BACKGROUND

2.1 Project Description

The Wells Project is located at river mile (RM) 515.6 on the Columbia River in the State of Washington. Wells Dam is located approximately 30 river miles downstream from the Chief Joseph Dam, owned and operated by the U.S. Army Corps of Engineers (USACE), and 42 miles upstream from the Rocky Reach Dam, owned and operated by Public Utility District No. 1 of Chelan County. The nearest town is Pateros, Washington, which is located approximately 8 miles upstream from the Wells Dam.

The Wells Project is the chief generating resource for Douglas PUD. It includes ten generating units with a nameplate rating of 774.3 MW and a peaking capacity of approximately 840 MW. The design of the Wells Project is unique in that the generating units, spillways, switchyard, and fish passage facilities were combined into a single structure referred to as the hydrocombine. Fish passage facilities reside on both sides of Well Dam, which is 1,130 feet long, 168 feet wide, with a crest elevation of 795 feet in height. The juvenile fish bypass (JBS) system was developed by Douglas PUD and uses a barrier system to modify the intake velocities on all even numbered spillways (2, 4, 6, 8 and 10).

The Wells Reservoir is approximately 30 miles long. The Methow and Okanogan rivers are tributaries of the Columbia River within the Wells Reservoir. The Wells Project boundary extends approximately 1.5 miles up the Methow River and approximately 15.5 miles up the Okanogan River. The normal maximum surface area of the reservoir is 9,740 acres with a gross storage capacity of 331,200 acre-feet and usable storage of 97,985 acre-feet at elevation of 781 feet above mean sea level (msl). The normal maximum water surface elevation of the reservoir is 781 feet (Figure 1).

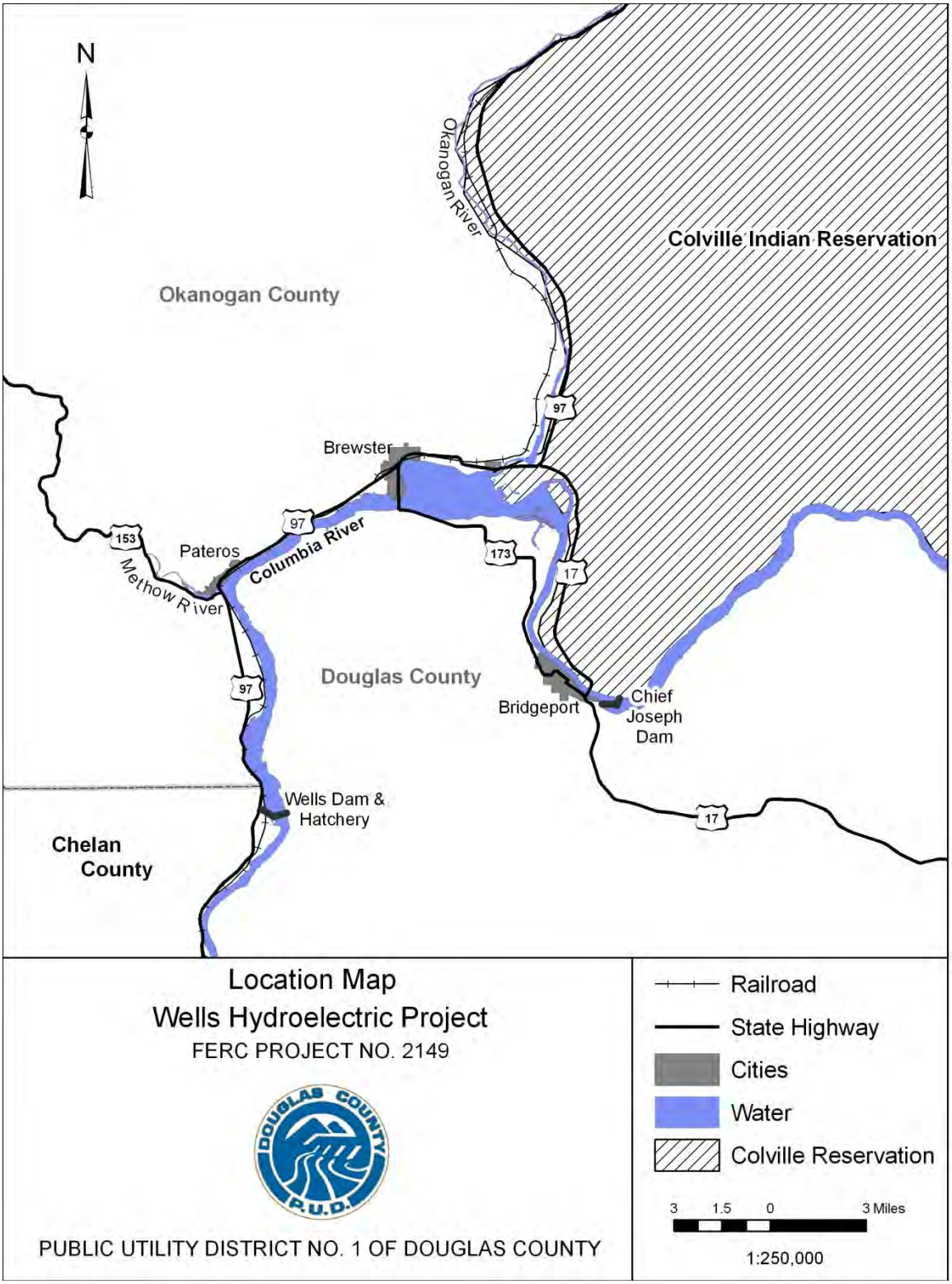


Figure 1. Location Map of the Wells Project.

2.2 Regulatory Framework

2.2.1 Temperature Water Quality Standard

Temperature is measured by the 7-day average of the daily maximum temperatures (7-DADMax). The 7-DADMax for any individual day is calculated by averaging that day's daily maximum temperature with the daily maximum temperatures of the three days prior and the three days after that date (WAC 173-201A-020).

Under the Washington State WQS, the 7-DADMax temperature within the Columbia, Methow, and Okanogan river portions of the Wells Project shall not exceed 17.5°C (63.5°F) (WAC 173-201A-602 and 173-201A-200(1)(c)). When a water body's temperature is warmer than 17.5°C (or within 0.3°C (0.54°F) of the criteria) and that condition is due to natural conditions, then human actions considered cumulatively may not cause the 7-DADMax temperature of that water body to increase more than 0.3°C (0.54°F).

In addition to the numeric criteria above, the WQS contains additional supplemental temperature requirements for the Project portion of the Methow River (i.e., Methow River Supplemental Requirements). Ecology has identified water bodies, or portions thereof, which require special protection for spawning and incubation in accordance with Ecology publication 06-10-038. This publication indicates where and when the following criteria are to be applied to protect the reproduction of native char, salmon, and trout. Water temperatures are not to exceed 13°C from October 1 to June 15 in the lower Methow River including the portion within the Project boundary (up to RM 1.5).

2.2.2 305(b) Report, 303(d) List and Total Maximum Daily Loads

Every two years, the Environmental Protection Agency (EPA), as specified in section 305(b) of the CWA, requires Ecology to compile an assessment of the State's water bodies. Data collected from the water quality assessment are used to develop a 305(b) report. The report evaluates and assigns each water body into five categories based upon the Ecology's evaluation of the water quality parameters collected from within each water body.

(1) Category 1 states that a water body is in compliance with the State WQS for the parameter of interest.
(2) Category 2 states a water body of concern.
(3) Category 3 signifies that insufficient data are available to make an assessment.
(4) Categories 4a-4c indicates an impaired water body that does not require a Total Maximum Daily Load (TMDL) for one of three reasons:

- Category 4a indicates a water body with a finalized TMDL.
- Category 4b indicates a water body with a Pollution Control Program.
- Category 4c indicates a water body impaired by a non-pollutant (e.g., low water flow, stream channelization, and dams).

(5) Category 5 represents all water bodies within the State that are considered impaired and require a Water Quality Implementation Plan (WQIP) (formerly TMDL). The 303(d) list consists of only water bodies with Category 5 listings.

For temperature, the reach of the Columbia River within the Project is on the State's 2012 303(d) list for temperature impairment. The EPA has developed a draft temperature TMDL for the mainstem Columbia River, including that portion of the Columbia River contained within the Project. It is anticipated that the EPA will issue the final temperature TMDL for the Columbia River at some future date. The TMDL will address the water temperature effects of dams and other human actions, including model analyses and load allocations for mainstem hydroelectric projects including Wells Dam.

The reach of the Methow River within the Project (RM 1.5) is not on the 2012 303(d) list for temperature.

The reach of the Okanogan River within the Project (RM 15.5) is not on the 2012 303(d) list for temperature. However, reaches of the Okanogan River upstream of the Wells Project boundary are listed on the 2012 303(d) list for temperature.

2.3 Wells Project Water Temperature Activities

2.3.1 Wells Reservoir and tributaries

Beginning in 2001, an extensive water temperature monitoring effort was initiated by Douglas PUD in order to better understand the temperature dynamics throughout the Wells Reservoir. Temperature data was collected by Douglas PUD at four locations in the Columbia River (RM 544.5, RM 535.3, RM 530.0, and RM 515.6) and at one site each on the Okanogan (RM 10.5) and Methow (RM 1.4) rivers. Data collected by Douglas PUD were collected hourly using Onset© Tidbit temperature loggers. Monitoring start and end dates varied from year to year but generally began in the early spring and ended in late fall. Quality assurance and control measures were implemented prior to deploying and upon retrieving temperature loggers to ensure that data collected were accurate. Due to sensor loss or sensor malfunction in some years, the availability of data at some of these monitoring locations is sporadic (WEST Consultants 2008).

The 7-DADMax temperature data recorded since 2001 indicate that the portion of the Columbia River upstream of and within the Project generally warms to above 17.5^{o}C (WQS numeric criteria) in mid-July and drops below the numeric criterion by early October. Temperatures in the Methow River upstream of the Project warm to above 17.5^{o}C in mid-July and drop below the numeric criterion by September, while trends in the Okanogan River upstream of the Project indicate warming above 17.5^{o}C from early June with cooling by late September.

To assess compliance with the state WQS for temperature (during the Wells Project FERC relicensing process), two 2-dimensional laterally-averaged temperature models (using CE-QUAL-W2) were developed that represented existing (or "with Project") conditions and "without Project" conditions of the Wells Project area, including the Columbia River from the Chief Joseph Dam tailrace to Wells Dam, the lowest 15.5 miles of the Okanogan River, and the

lowest 1.5 miles of the Methow River. The results were processed to develop daily values of the 7-DADMax, and then compared for the two conditions.

The model analyses demonstrated that "with Project" temperatures in the Columbia, Okanogan and Methow rivers do not increase more than 0.3°C compared to ambient ("without Project") conditions anywhere in the reservoir, and that the Project complies with the state WQS for temperature (West Consultants Inc. 2008). However, as identified in the Wells Project 401 Certification, a full evaluation of potential temperature impacts of hydroelectric power generation on the Columbia River will most likely require analysis of hydraulic and temperature conditions on a system-wide basis. Hydraulic and temperature influences from upstream dams complicate the evaluation of Project-related impacts. The only way to properly understand these impacts is to examine the river water temperatures more comprehensively through a system-wide TMDL study such as that which is under consideration for development by EPA. Douglas PUD is participating in the Sovereign Technical Team Water Quality Workgroup and is collaborating with the USACE and other agencies that are developing a temperature model that will inform Columbia River Treaty negotiations with the Canadian Government.

2.3.2 Wells Dam Fish Ladders

According to the terms and conditions found in the Biological Opinion (BO) supporting the implementation of the Wells Anadromous Fish Agreement and Habitat Conservation Plan (HCP) all entities that use the fish ladder trapping facilities at Wells Dam are required to monitor the water temperatures within the ladders every two hours May 1 to November 15 and to discontinue trapping operations when fish ladder water temperatures exceed 68.0º F (20.0°C). In 2001, Douglas PUD added supplemental temperature recording equipment at Pool 39 near the broodstock collection facilities in the east fishway at Wells Dam to ensure compliance with requirements in the National Marine Fisheries Service (NMFS) HCP BO. In 2001, hourly data indicated that water temperatures at this location in the east fish ladder did not exceed 68.0ºF (20.0°C) at any time during the monitoring period, which ran from late July to early December. In 2003, data were recorded every two hours and exceedances of greater than 68.0ºF (20.0°C) were observed on only three hourly occasions.

2.4 401 Certification Temperature Requirements

The Wells Project 401 Certification requires that Douglas PUD maintain compliance with the state WQS for water temperature (via citation of the Wells Project Water Quality Management Plan [Douglas PUD 2008]) by monitoring water temperature at various Wells Project locations at certain times of the year and transmitting these data on a daily basis to a web-accessible database. Specific requirements include:

1. Prepare a QAPP for each water quality parameter to be monitored. QAPPs shall follow the Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies (July 2004 Ecology Publication Number 04-03-030).

2. Monitor water temperatures at three boundary locations of the Wells Project (Methow River RM 1.5, Okanogan River RM 10.5, and Columbia River RM 544.5) and in the Well Dam Forebay and Tailrace on an hourly basis, from April 1st to October 31st.

3. Continue to collect hourly fish ladder temperatures 24 hours a day during the upstream fish passage season (currently May 1 to November 15) at the Wells Dam East Fishway Pool No. 39.

4. Monitor water temperatures hourly in the auxiliary water supply system and near the east shore of the Wells Dam Forebay (bottom, middle, and surface depths) during the upstream fish passage season (May 1 to November 15).

5. Transmit hourly temperature data on a daily basis to a web-accessible database maintained by Douglas PUD and available to Ecology, regional fish management agencies, and the public.

6. Develop an annual report of the monitoring results and analyses, in a format approved by Ecology, and submit it by April 30 of the following year.

3.0 IMPLEMENTATION RESULTS

3.1 Quality Assurance Project Plan

As required by the 401 Certification section 6.7(7)(a)(i), Douglas PUD developed a Wells Project QAPP for water temperature and total dissolved gas (TDG) (Douglas PUD 2013). The QAPP describes a systematic approach for collecting high quality and reliable data that may be used to determine compliance of these parameters with the State of Washington's WQS for the Wells Project. With regard to temperature, the QAPP contains a map of sampling locations, descriptions of the purpose of the monitoring, sampling frequency, sampling procedures and equipment, analytical methods, quality control procedures, data handling and data assessment procedures and reporting protocols (Douglas PUD 2013). The QAPP was provided to Ecology for review on March 4, 2013 and subsequently approved. Douglas PUD submitted the QAPP to the FERC on June 21, 2013, which issued an order approving it on August 8, 2013.

3.2 Regulatory and Permitting

3.2.1 Joint Aquatic Resource Permit Application

The installation of temperature monitoring stations required work below the ordinary high water mark (OHWM) of waters of the U.S. and Washington State, and within designated shorelines of the state. Work in these areas requires authorization from a number of federal, state, and local resource agencies. In compliance with these authorization requirements, Douglas PUD prepared a Joint Aquatic Resource Permit Application (JARPA), which serves as the application for a number of state, federal and local authorizations. Douglas PUD submitted a JARPA to the following entities:

- The USACE, which authorizes discharges of dredged or fill material into waters of the U.S. pursuant to Section 404 of the CWA, and authorizes activities in navigable waters of the U.S. pursuant to Section 10 of the Rivers and Harbors Act, submitted in March 2013;

- The Washington Department of Fish and Wildlife (WDFW), which processes and issues Hydraulic Project Approvals (HPA) pursuant to the State Hydraulic Code, submitted in March 2013; and
- The Okanogan County Planning Department, which issues Shoreline Substantial Development Permits pursuant to the County's Shoreline Master Program, submitted in April 2013.

After review and processing of the JARPA, the following authorizations (or exemptions) were issued to Douglas PUD for instream and shoreline-related activities associated with installation of the temperature monitoring stations:

- An exemption for Shoreline Substantial Development, issued by Okanogan County (Natural Resource Senior Planner, Charlene Schumacher) on May 13, 2013. The County determined that the proposed installation of remote temperature sensors was Exempt from the County shoreline permit requirements because the activity was considered a Fish Habitat Enhancement Project as defined by RCW 77.55.181.
- An HPA, issued by WDFW (Graham Simon, Area Habitat Biologist), on May 2, 2013.
- A Nationwide Permit verification letter, issued by the USACE (Jess Jordan, Project Manager) on June 17, 2013. The verification letter confirmed that the project was compliant with state, general and regional conditions under NWP No. 5 (Scientific Measurement Devices). This verification applies to both Section 404 of the CWA and Section 10 of the Rivers and Harbors Act. In addition, the USACE conferred with Ecology, which administers water quality certifications under Section 401 of the CWA. This conference verified that the installation of the temperature monitoring stations is certified for compliance with state water quality standards.

3.2.2 State Environmental Policy Act

Douglas PUD's State Environmental Policy Act (SEPA) coordinator determined that the project was categorically exempt from SEPA threshold determinations and the environmental review process pursuant to WAC 197-11-800, which exempts some types of minor new construction from the SEPA process:

> *(2)* ***Other minor new construction…*** *(i) the installation of hydrological measuring devices, regardless of whether or not on lands covered by water.*

3.3 Temperature Monitoring Equipment

3.3.1 Equipment Acquisition

Prior to the issuance of a new Wells Project FERC License, Douglas PUD collected temperature data using Onset© Tidbit temperature loggers (see Section 2.3.1 above), which were programmed to collect hourly data year-round and required retrieval in order to download and report data. Douglas PUD retrieved and downloaded loggers two to four times a year depending upon river conditions and access.

Per the Wells Project 401 Certification section 6.7(3)(a)(iii), hourly temperature data was required to be transmitted to a web-accessible database maintained by Douglas PUD and available to Ecology, regional fish management agencies, and the public. To meet the daily data transmission requirement, Douglas PUD received permits, acquired and then installed new temperature monitoring equipment. At each temperature monitoring location, equipment consists of a Design Analysis H-377 temperature sensor, Sutron GOES radio/logger, GOES satellite antenna and cable, 20 watt solar panel, and voltage regulator. On shore housing includes a National Electrical Manufacturers Association enclosure, 12 volt sealed lead-acid battery, galvanized pipe, flex conduit, fittings, and other hardware (Figure 2). The system consists of a sensor connected to a communications box with wireless modem access. Data is collected hourly and sent wirelessly and uploaded to Douglas PUD's publically available webpage in real time. The system is powered by battery and charged using the solar panel (Douglas PUD 2013).

Figure 2. **Remote water temperature station that sends data in real time using GOES satellite link.**

3.3.2 Equipment Installation

Consistent with 401 Certification section 6.7(3)(a)(i-iii), remote water temperature sensors were installed at eight locations in the Wells Project during 2013. Locations and required durations of monitoring include:

April 1st to October 31st:

1. Methow River, RM 1.5 - Project Boundary
2. Columbia River, RM 544.5 - Chief Joseph Dam Tailrace
3. Okanogan River, RM 10.5 - Project Boundary
4. Wells Dam Forebay (data from TDG sensor)
5. Wells Dam Tailrace (data from TDG sensor)

May 1st to November 15th:

6. Wells Dam East Fishway, Pool No. 39
7. Wells Dam Auxiliary Water Supply
8. Wells Dam Forebay (three depths)

Temperature monitoring locations are illustrated in Figures 3 through 6.

Figure 3. **Temperature monitoring at and around Wells Dam (graduated green circles are intended to show surface middle and deep depths).**

Figure 4. **Methow River temperature monitoring location (RM 1.5). The location of the sensor is approximated by the green circle.**

Figure 5. **Okanogan River temperature monitoring location (RM 10.5). The location of the sensor is approximated by the green circle.**

Figure 6. **Chief Joseph Tailrace (Columbia River RM 544.5) temperature monitoring. The location of the sensor is approximated by the green circle.**

In May of 2013, Douglas PUD entered into a Joint Funding Agreement with the United States Geological Survey (USGS) to install and maintain remote water temperature equipment at four of the eight monitoring locations including the Wells Dam Forebay (three depths), the Methow River, the Okanogan River, and the Chief Joseph Dam Tailrace. The Wells Dam Forebay and Tailrace sensors are maintained by Columbia Basin Environmental (these sensors collect both temperature and TDG data year round) but data is managed by Douglas PUD. The remaining two locations (Wells Dam East Fishway and Wells Dam Auxiliary Water Supply) were installed and are maintained by Douglas PUD.

Following approval of the QAPP, securing required permits, and equipment acquisition, the USGS began installation of temperature sensors at four locations. The Chief Joseph Dam Tailrace and Okanogan River sensors were installed in July 2013 and the Methow River and Wells Forebay locations were completed in October 2013. The Wells Dam Forebay and Tailrace sensors began collecting data on April 1st 2013 after being calibrated and installed by Columbia Basin Environmental. Douglas PUD installed sensors at two locations; the Wells Dam East Fishway and Auxiliary Water Supply, these stations were upgraded and installed respectively during the month of October 2013.

In October 2013 Douglas PUD launched a new website where hourly temperature data is transmitted daily and is publically accessible. This webpage provides a link to all real-time temperature data at http://www.dcpud.org/wells-project/total-dissolved-gas-and-temperature-monitoring.

3.4 Temperature Data Results

Temperature data from new equipment was available towards the end of the compliance year 2013. Where new equipment data was unavailable, Onset© Tidbit logger data are presented since Douglas PUD collected water temperature data from this equipment at all but one (Okanogan River RM 10.5) of the required 401 Certification monitoring locations. Temperature data during the reporting period from new equipment are provided where available. Tidbit logger data will be discontinued in 2014 and the 2014 annual report filed by April 30, 2015 shall consist exclusively of data from the new temperature equipment at all six monitoring locations.

Available 2013 temperature data are presented by location (from upstream to downstream) in subsections below.

In all figures, horizontal lines at 17.5 or 13 C^{O} illustrate 7-DADMax thresholds.

3.4.1 Chief Joseph Dam Tailrace

The Chief Joseph Dam Tailrace temperature sensor location is at RM 544.5 on the left bank (looking downstream) of the Columbia River near the town of Bridgeport, WA. Water temperature data is collected at this location from April 1 to October 31. New temperature monitoring equipment was installed by USGS at this location in July 2013. As such, data from both Tidbit and new equipment is presented below (Figures 7 and 8). Tidbit temperature data indicate that temperatures during the monitoring period ranged from 5.1°C (April) to 20.9°C (early September; Figure 7).

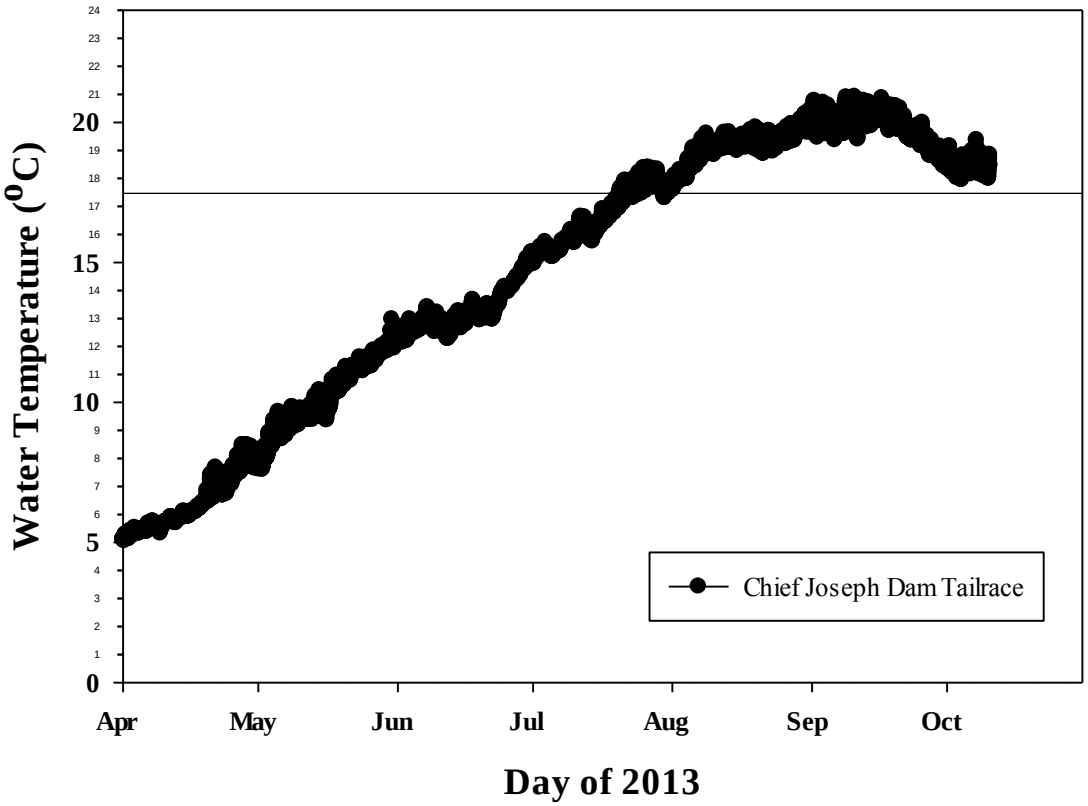


Figure 7. Water temperature data collected using Tidbits in the Chief Joseph Tailrace from April 1, 2013 to October 10, 2013.

New equipment began collecting temperature data at this location on July 23, 2013. Data ranged from 5.6 to 20.3°C during the monitoring period. 7-DADMax temperature values at this location were above the WQS numeric criteria (17.5°C) from July 26 - October 15, 2013, and may have to be above this WQS before the installation of this equipment as suggested by Tidbit data (Figure 7). In general, the data appears to be consistent between both collection sources when comparing to new remote data (Figure 8).

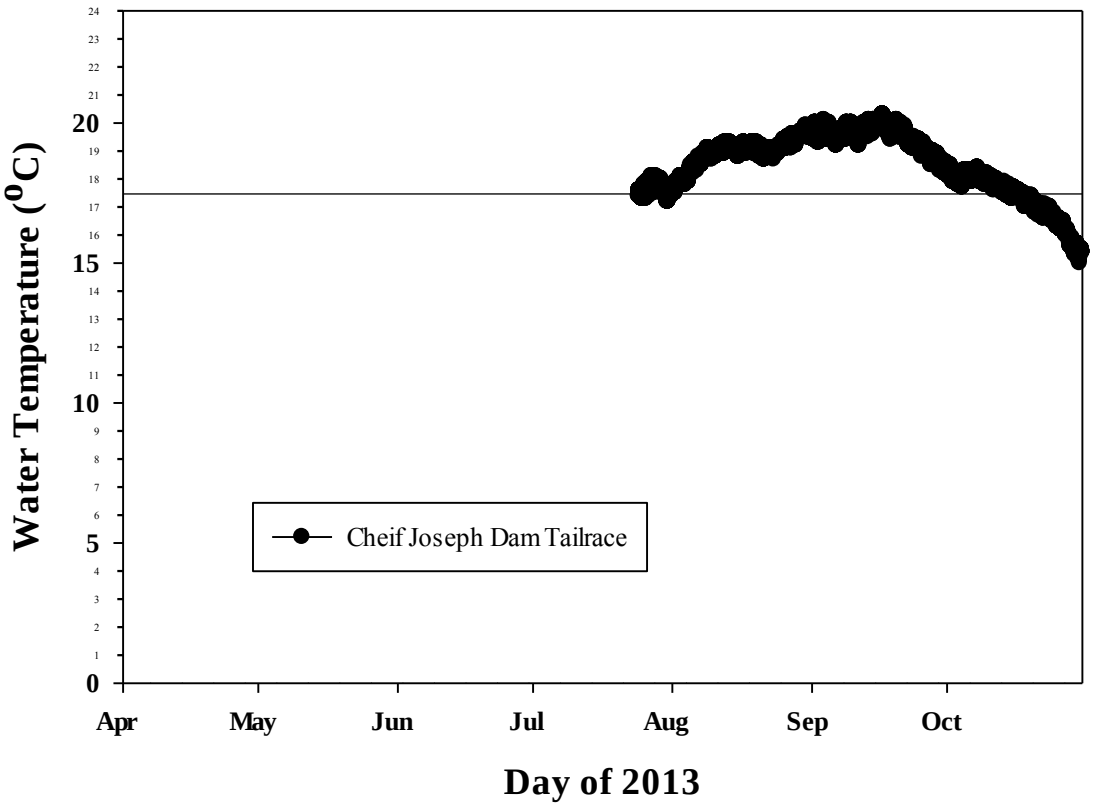


Figure 8. Water temperature data collected using new real-time thermistors in the Chief Joseph Tailrace from July 23, 2013 to October 31, 2013.

3.4.2 Okanogan River Boundary

The Okanogan River Boundary monitoring location is at RM 10.5. Water temperature data is required to be collected at this location from April 1 to October 31. However, Tidbit temperature data was collected closer to the confluence of the Columbia River (RM 0.5) in 2013 (as it had been prior to the issuance of the Wells Project License) and was only available from April 1 to April 21 since high flows destroyed the anchoring system and the sensor was lost after this download event (Figure 9). Temperature data from new equipment installed in September at the RM 10.5 location was available from September 29 to October 31 (Figure 10). Available data from both sources were collected outside of the late summer season where maximum water temperatures are generally observed. As such, 7-DADMax data reported after the installation of the station in late 2014 are well below the WQS numeric criteria (17.5°C) for this location.

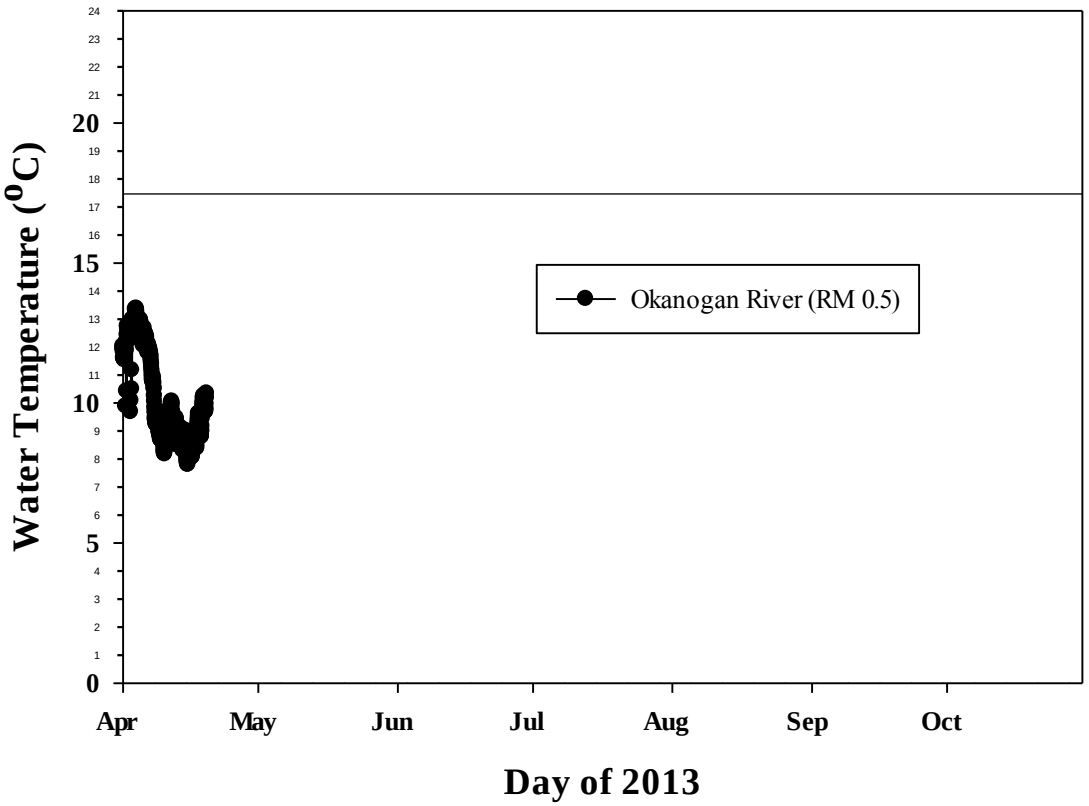


Figure 9. **Water temperature data collected using Tidbits in the Okanogan River at river mile 0.5 from April 1, 2013 to April 21, 2013 when the sensor failed.**

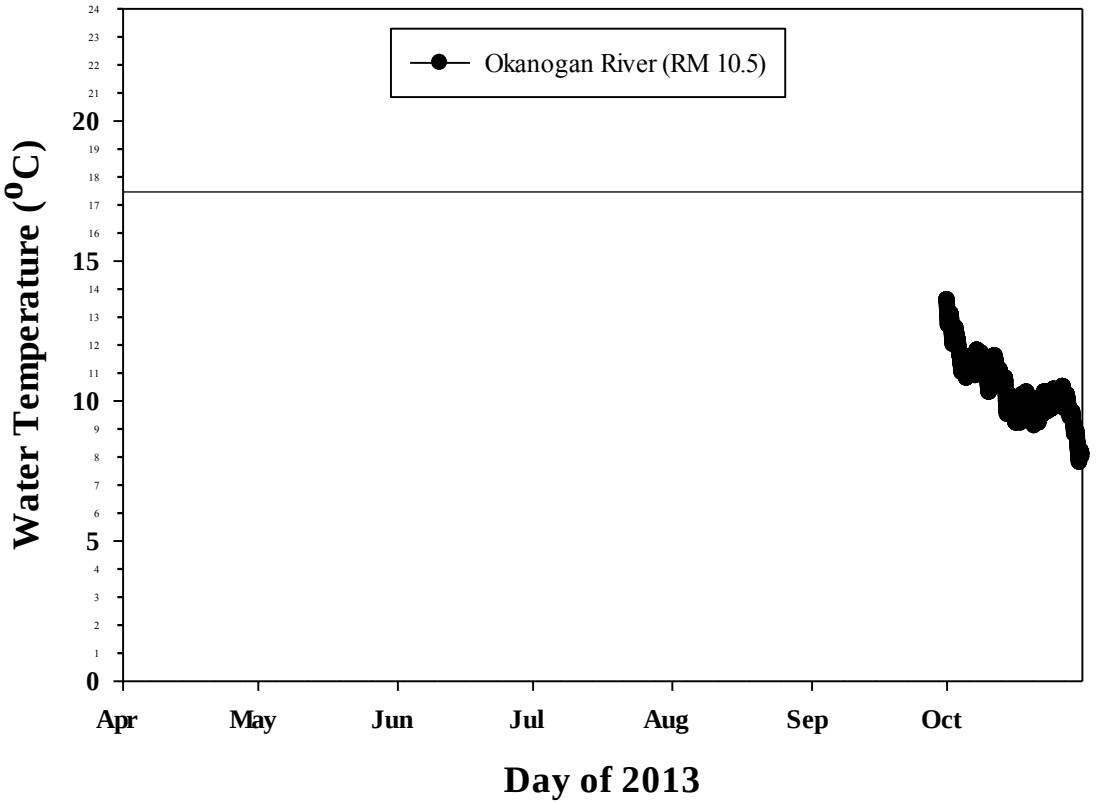


Figure 10. Water temperature data collected using new real-time thermistors in the Okanogan River at river mile 10.5 from September 29 to October 31, 2013.

3.4.3 Methow River Boundary

The Methow River Boundary monitoring location is at RM 1.5 on the right bank near Pateros, WA. Water temperature data is required to be collected at this location from April 1 to October 31. In addition to the WQS numeric criteria of 17.5°C, Ecology has identified this portion of the Methow River as requiring special protection for spawning and incubation in accordance with Ecology publication 06-10-038. This publication indicates where and when the following criteria are to be applied to protect the reproduction of native char, salmon, and trout. In the lower Methow River including the reach within the Wells Project boundary, water temperatures are not to exceed 13°C from October 1 to June 15.

Tidbit temperature data indicate that temperatures during the monitoring period ranged from 7.0°C (April) to 23.0°C (late August/early September). 7-DADMax temperature values at this location were above the WQS numeric criteria (17.5°C) from July 3, 2013 to September 16, 2013. However, data suggests that temperatures at this location remained below 13°C from April 1 to June 15 and from October 1 to October 31 (Figure 11).

New equipment began collecting temperature data at this location on October 23, 2013. Data until the end of the monitoring period (October 31) remained below 13°C (Figure 12).

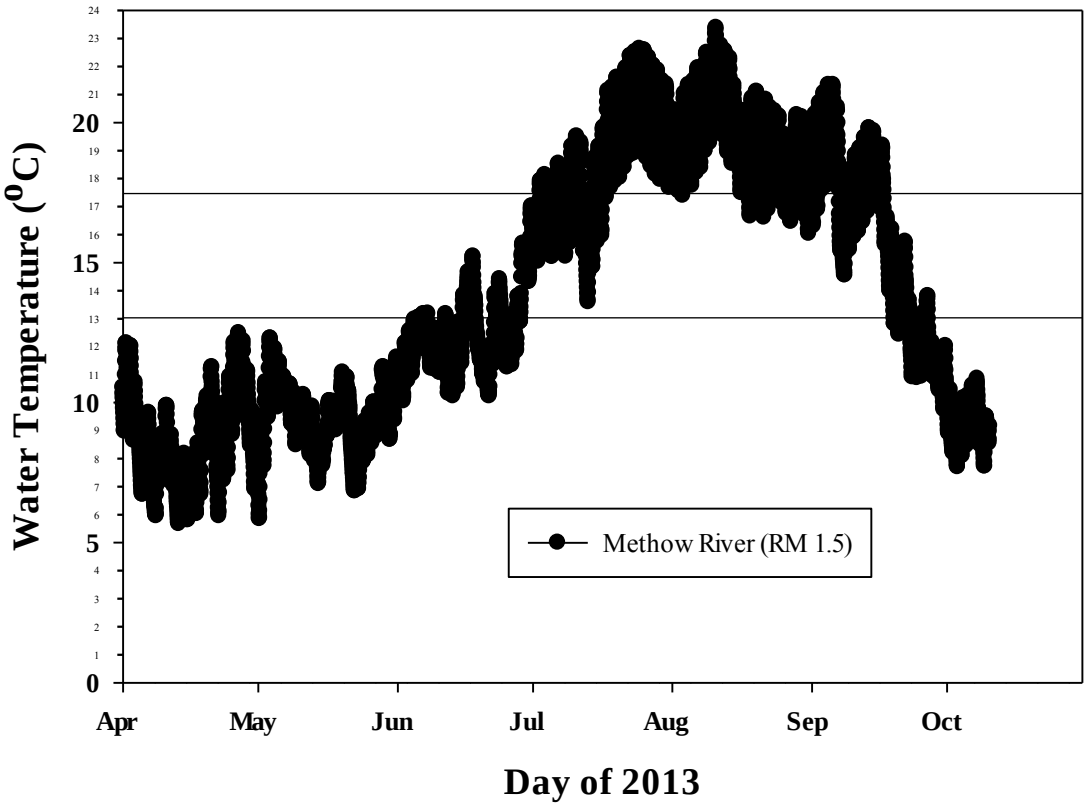


Figure 11. Water temperature data collected using Tidbits in the Methow River at river mile 1.5 from April 1, 2013 to October 10, 2013 when Tidbits were discontinued.

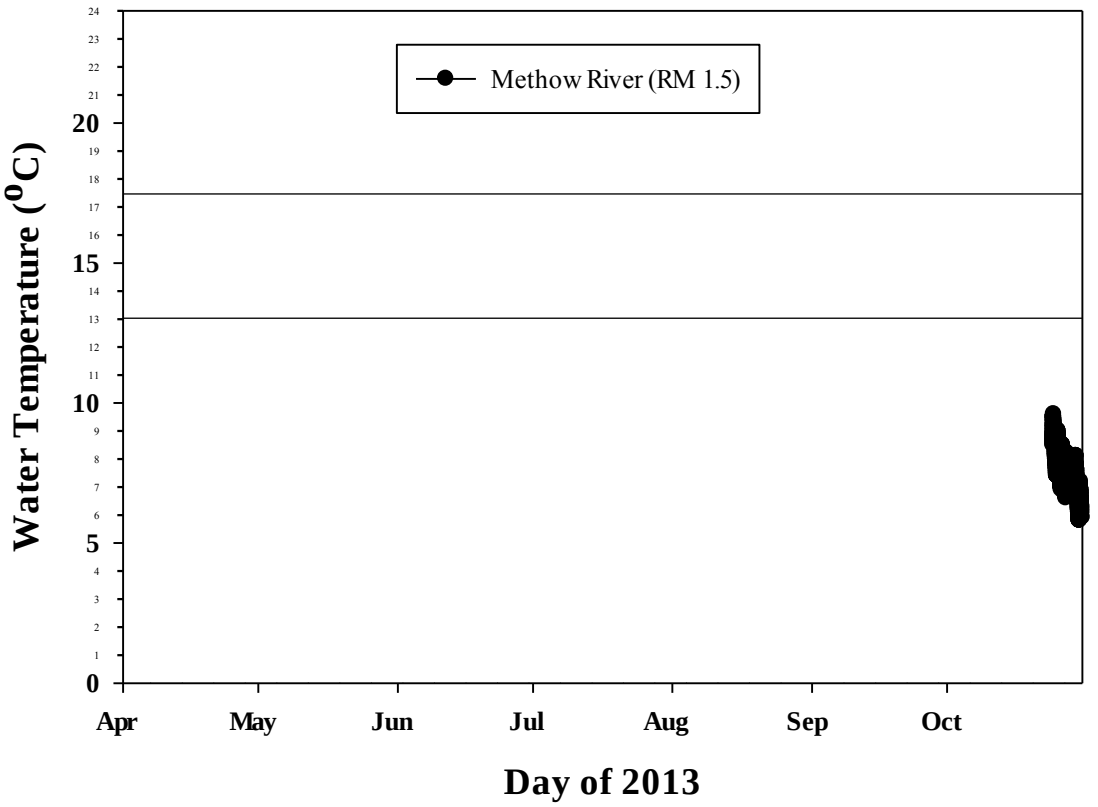


Figure 12. Water temperature data collected using new real-time thermistors in the Methow River at river mile 1.5 from October 22, 2013 to October 31, 2013.

3.4.4 Wells Dam Forebay

The Wells Dam Forebay location, where temperatures are required to be collected hourly from April 1 to October 31 of each year, is located on the face of pier nose 6 at Wells Dam. Columbia Basin Environmental maintains operations of this sensor (collects both temperature and TDG) and Douglas PUD manages the data. This sensor was installed in March of 2013 and therefore data is available over the entire monitoring period (Figure 13). 7-DADMax temperature values at this location were above the WQS numeric criteria (17.5°C) from July 19, 2013 to October 3, 2013 which is generally consistent with historic Wells Project temperature monitoring data (see section 2.3.1).

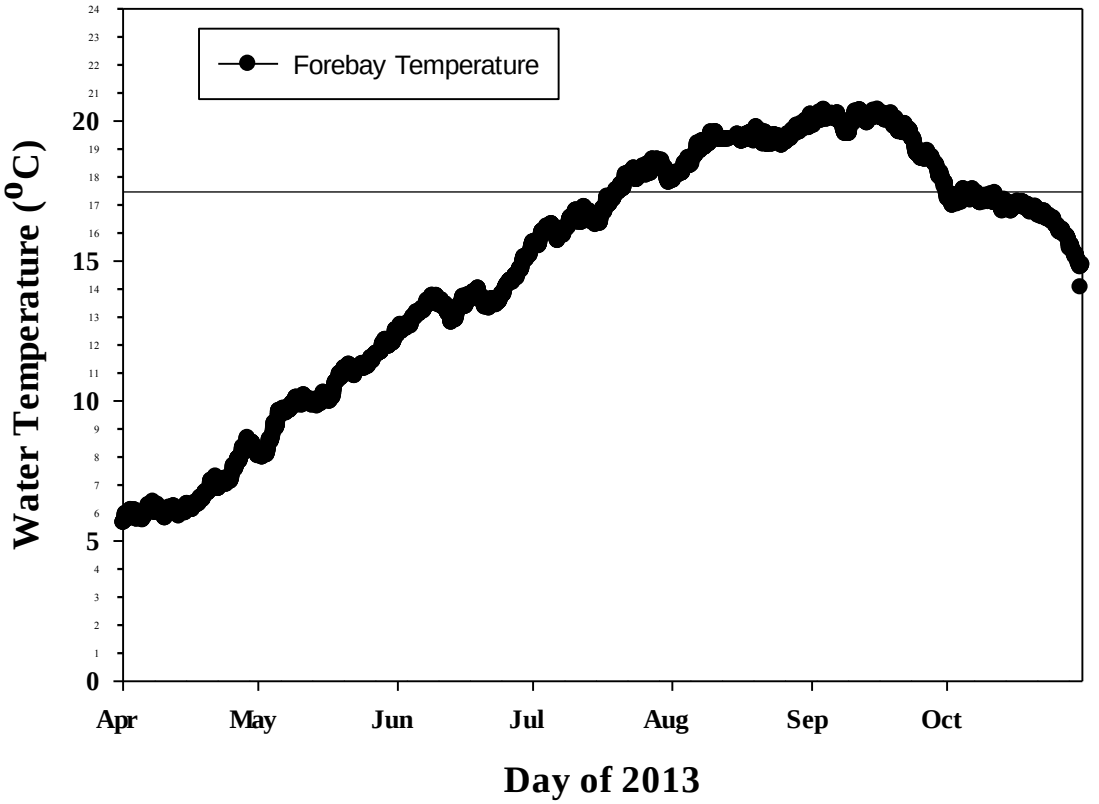


Figure 13. Water temperature data collected using new real-time thermistors in the Wells Dam Forebay at pier nose 6 from April 1, 2013 to October 31, 2013.

3.4.5 Wells Dam Tailrace

The Wells Dam Tailrace location, where temperatures are required to be collected hourly from April 1 to October 31 of each year, is located approximately 2 miles downstream of Wells Dam on river left. Columbia Basin Environmental maintains operations of this sensor (collects both temperature and TDG) and Douglas PUD manages the data. This sensor was installed in March of 2013 and therefore data is available over the entire monitoring period (Figure 14). 7-DADMax temperature values at this location were above the WQS numeric criteria (17.5°C) from July 20, 2013 to October 1, 2013 which is generally consistent with historic Wells Project temperature monitoring data (see section 2.3.1).

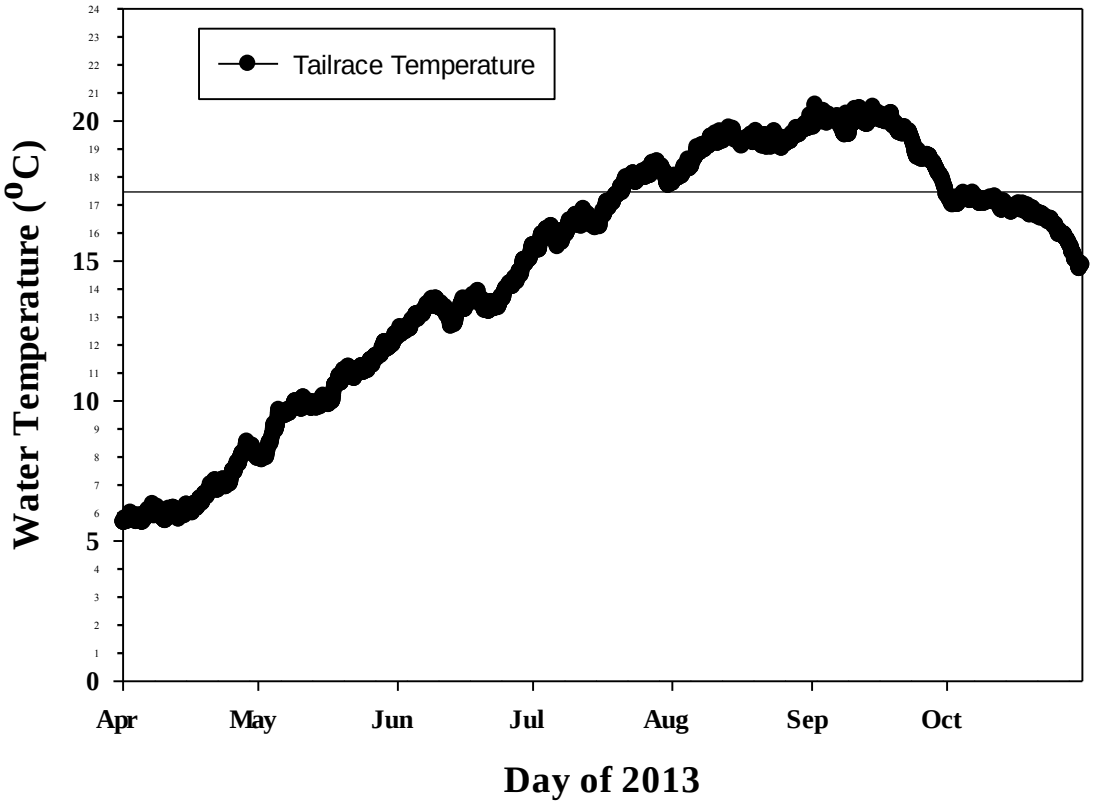


Figure 14. Water temperature data collected using new real-time thermistors in the Wells Dam tailrace from April 1, 2013 to October 31, 2013.

3.4.6 Wells Dam Forebay Multiple Depth Requirement

The Wells Dam Forebay temperature monitoring location is at RM 515.8 on the left bank (east side) of the Columbia River. Monitoring at this location is required between May 1 and November 15. Temperature data is collected at three depths to provide temperature profiles throughout the water column at this location. Sensors are located near the surface (<2m depth), mid-water column (approximately 10m), and near bottom (>30m). At this location, new temperature monitoring equipment was not installed until October 31, 2013; however, thermistors failed QA/QC calibration protocols so any available data from this location for the monitoring period are not reported. Temperature data at this location continued to be collected by Tidbit loggers and these data are presented in Figure 15. Tidbit temperature data indicate that temperatures during the monitoring period ranged from 5.7°C (April) to 21.2°C (early September). 7-DADMax temperature values at this location were above the WQS numeric criteria (17.5°C) from July 20, 2013 to October 4, 2013. Comparison of data at the three depths indicates that thermal stratification does not occur at this location (Figure 15). Measurements between three depths were similar throughout the season and never differed by more than 1.29°C between depths at anytime during the monitoring period. Only three hours, all occurring on September 1, 2013 had temperature differences between depths of more than 1°C, but not higher than 1.29°C. The average difference between the locations during the monitoring period was

0.038°C further supporting the lack of stratification in the Wells Dam Forebay. The lack of thermo-stratification in the Wells Forebay is supported by relicensing efforts conducted by Douglas PUD and West Consultants (WEST Consultants Inc., 2008). Further, tidbits used to collect water temperature data shown in Figure 15 have individual accuracy rates of 0.2 C^0 and 0.4 C^0 when compared against each other. For example, 97.4% of all data points comparing surface, middle and deep depths had differences in water temperature less than 0.4 C^0, which is apparent by the convergence of the three depths (lines) in Figure 15. Despite this instrument limitation, results from 2013 suggest a lack of thermo-stratification in the Wells Dam forebay.

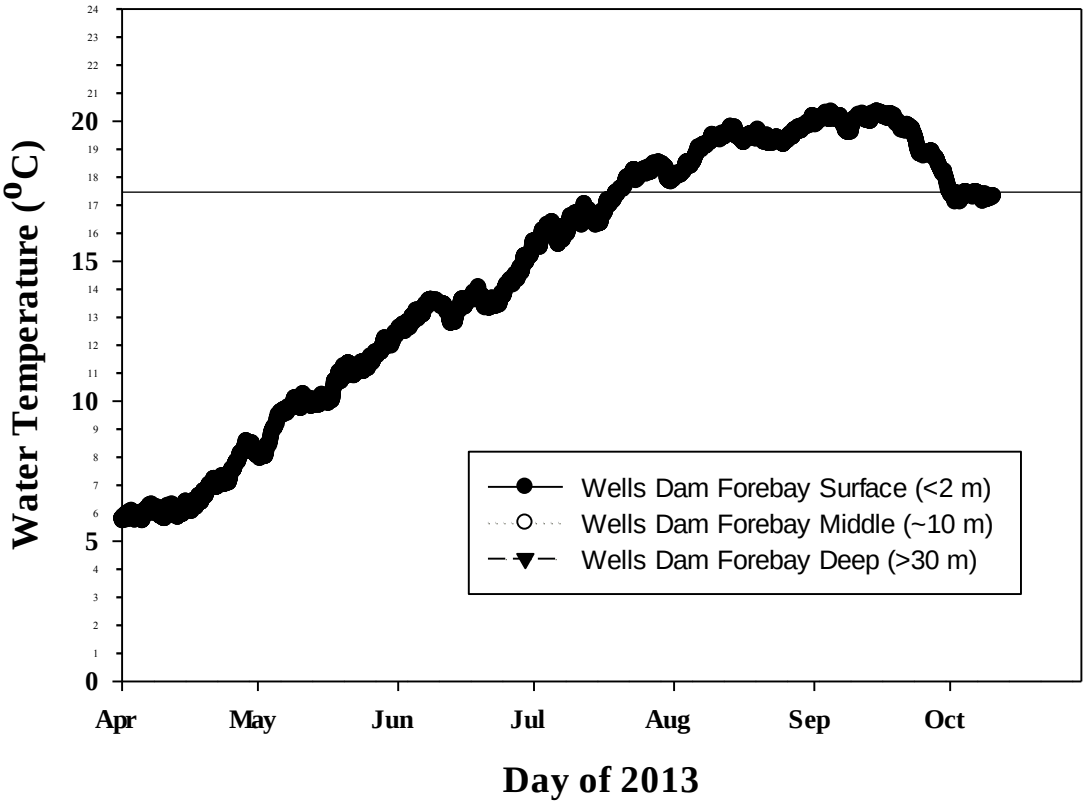


Figure 15. Water temperature data collected using Tidbits in the Wells Dam Forebay at three depths from April 1, 2013 to October 10, 2013 when Tidbits were discontinued. Temperature profiles show the lack of stratification in this location during the time period.

3.4.7 Wells Dam Auxiliary Water Supply

The Wells Dam Auxiliary Water Supply location is within the lower west fishway adjacent to the collection gallery. Water from this location originates from the tailrace and is used to provide additional water for the lower 22 pools of the fishway including the fish collection gallery (Douglas PUD 2001). Monitoring at this location is required between May 1 and November 15. Previous to the issuance of the 401 Certification, Douglas PUD was already collecting this data and as such it is available for the entire monitoring period of May 1, 2013 to November 15,

2013. Results indicate that temperatures ranged from 8.3°C in May to 20.6°C in early September (Figure 16).

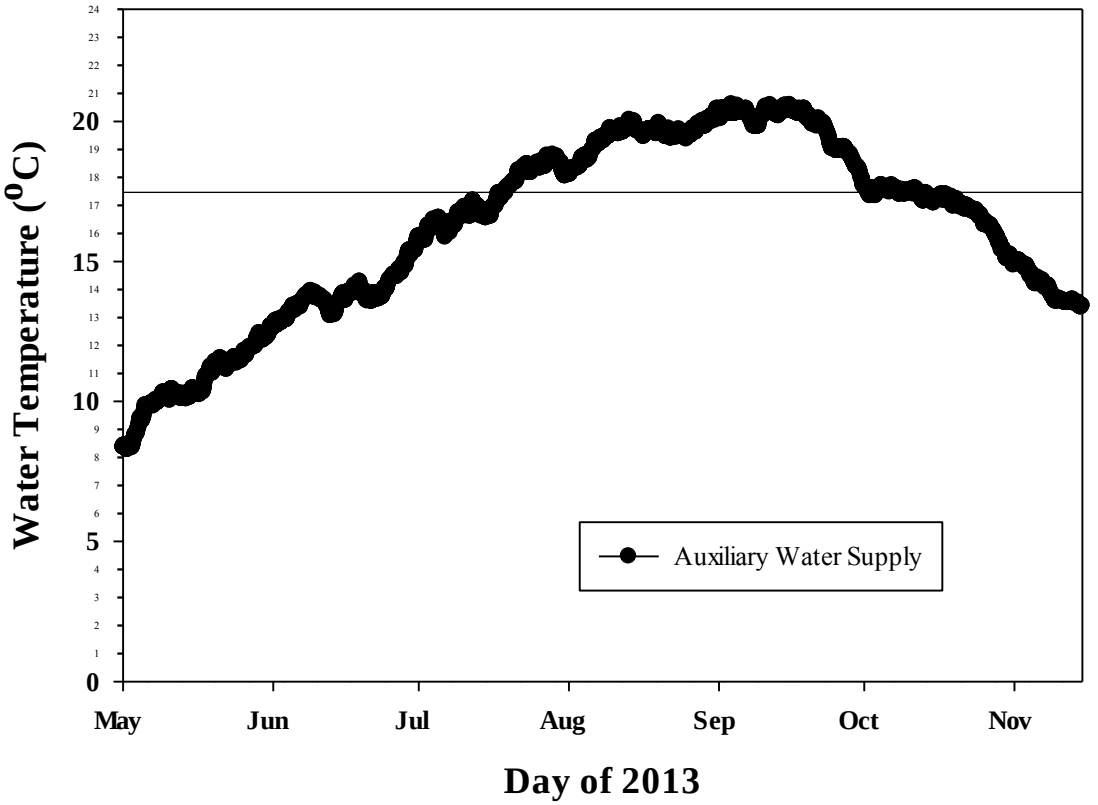


Figure 16. Water temperature data collected using real-time thermistors in the auxiliary water supply system at Wells Dam from May 1, 2013 to November 15, 2013.

3.4.8 Wells Dam East Fishway Pool No. 39

According to the HCP BO, all entities that use the fish trapping facilities at Wells Dam are required to monitor the ladders every two hours May 1 to November 15 and discontinue trapping operations when fish ladder water temperatures exceed 68.0º F (20.0°C). The Wells Project 401 Certification also adopted this requirement with the addition of hourly monitoring. At this location, new temperature monitoring equipment was not installed until October 31 and Tidbit loggers were not deployed at this location in 2013. Data from November 1-15 indicate that temperatures during this period ranged from 8.0°C to 14.9°C; well below the 20.0°C criterion that would trigger the stoppage of fish trapping activities (Figure 17).

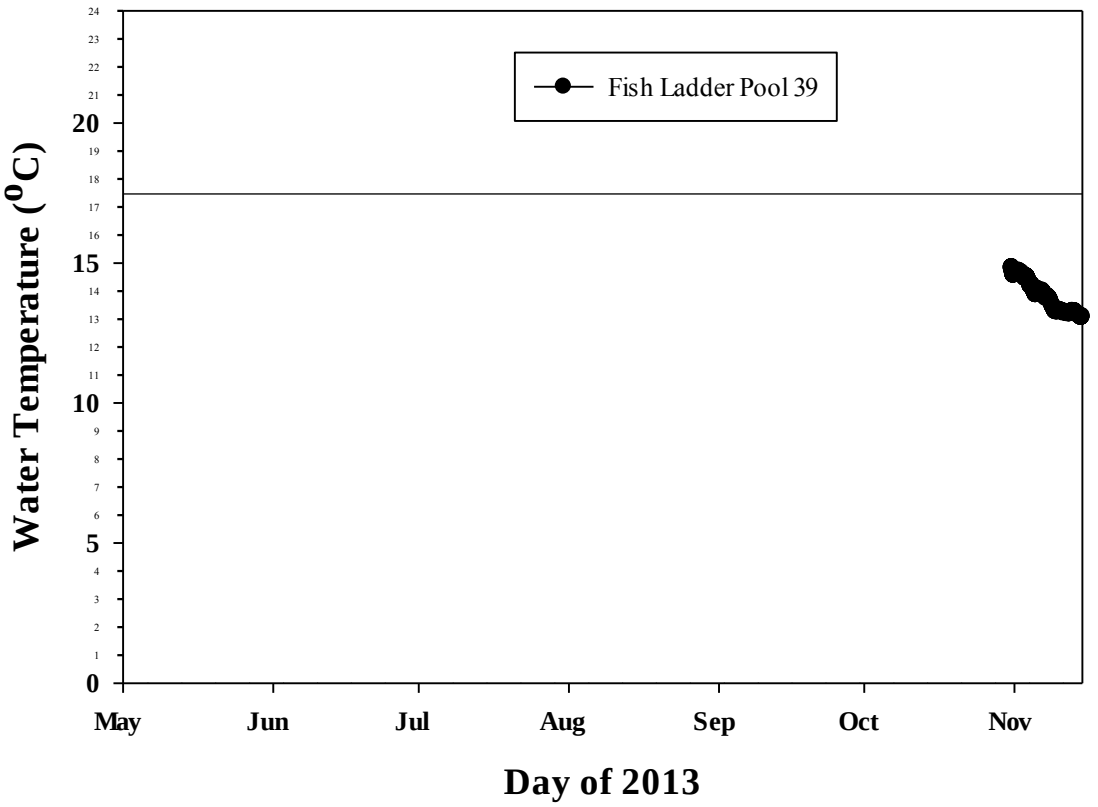


Figure 17. Water temperature data collected using new real-time thermistors in Pool 39 of the east fish ladder at Wells Dam from October 31, 2013 to November 15, 2013.

Although data from new temperature monitoring equipment was generally unavailable for much of the 2013 monitoring period (April to November depending upon location), information from the existing temperature arrays used during the Wells Project relicensing process were still available. Available data for all locations and sources are summarized in Table 1 and indicate that during the late summer to early fall of the monitoring period, water temperatures (i.e., 7-DADMax values) at multiple locations within the Wells Project were above the state WQS of 17.5°C. However, as discussed in more detail in the conclusions, the thermal regime observed was consistent with historic temperature data collected and evaluated using the CE-QUAL-W2 model which found that the Wells Project remains in compliance with the state WQS.

Table 1. 7-DADMax by location as determined by remote real time temperature sensor.

Location	*Number of Required Monitoring Days*	*Actual Number of Days Monitoring **	*Number of days exceeding 7-DADMax*	*Days exceeding 7-DADMax (17.5°C)*
Chief Joseph Tailrace	April 1 - October 31 (n = 214)	98	82	July 26 - October 15
Okanogan RM 10.5	April 1 - October 31 (n = 214)	27	0	
Methow RM 1.5	April 1 - October 31 (n = 214)	6	0	
Wells Forebay Pier Nose 6	April 1 - October 31 (n = 214)	214	77	July 19 - October 3
Wells Tailrace	April 1 - October 31 (n = 214)	214	74	July 20 - October 1
Wells Forebay Surface	May 1 - November 15 (n = 199)			
Wells Forebay Mid	May 1 - November 15 (n = 199)	Data not available		
Wells Forebay Deep	May 1 - November 15 (n = 199)			
Auxiliary Water Supply	May 1 - November 15 (n = 199)	199	85	July 19 - October 11
Pool 39 East Fish Ladder	May 1 - November 15 (n = 199)	55	0	

*Actual number of days monitoring differs from required monitoring days since equipment was being installed during the first license year and was not prior to the completion of the installation process.

4.0 CONCLUSIONS

After receipt of a new FERC license in November 2012, Douglas PUD dedicated a majority of 2013 engaged in planning, consultation, permitting, and development activities to comply with the Wells Project water temperature requirements. In the spring of 2013 tidbit temperature monitors were deployed, consistent with monitoring that Douglas PUD conducted prior to receiving a new license for the Wells Project. In addition, as required by the Wells Project License and 401 Certification, Douglas PUD developed a QAPP for water temperature and TDG which was approved by both Ecology and the FERC. In order to install new water temperature equipment throughout the Project area, Douglas PUD completed required permitting activities including a JARPA. Once permitting and approvals were completed, Douglas PUD entered into a Joint Funding Agreement with the USGS to install, collect and maintain four new temperature monitoring locations. Equipment for these locations was installed in July and October of 2013. Douglas PUD installed the remaining equipment at the two locations at Wells Dam (i.e., auxiliary water supply and pool 39) in October of 2013. At all locations, temperature data is collected hourly and transmitted daily to Douglas PUD to be made available on a publically accessible website.

Although data from new real-time temperature monitoring equipment was generally unavailable for much of the 2013 monitoring period (April to November depending upon location), information from the existing temperature loggers used during relicensing were still available. Data presented in this annual report are comprised of a combination of both sources. In general, data indicates that the thermal regime observed during the Wells Project relicensing process is still reflective of current observations. Temperatures warmed to above the WQS in late August and early September but remain below the numeric criteria during all other times of the year.

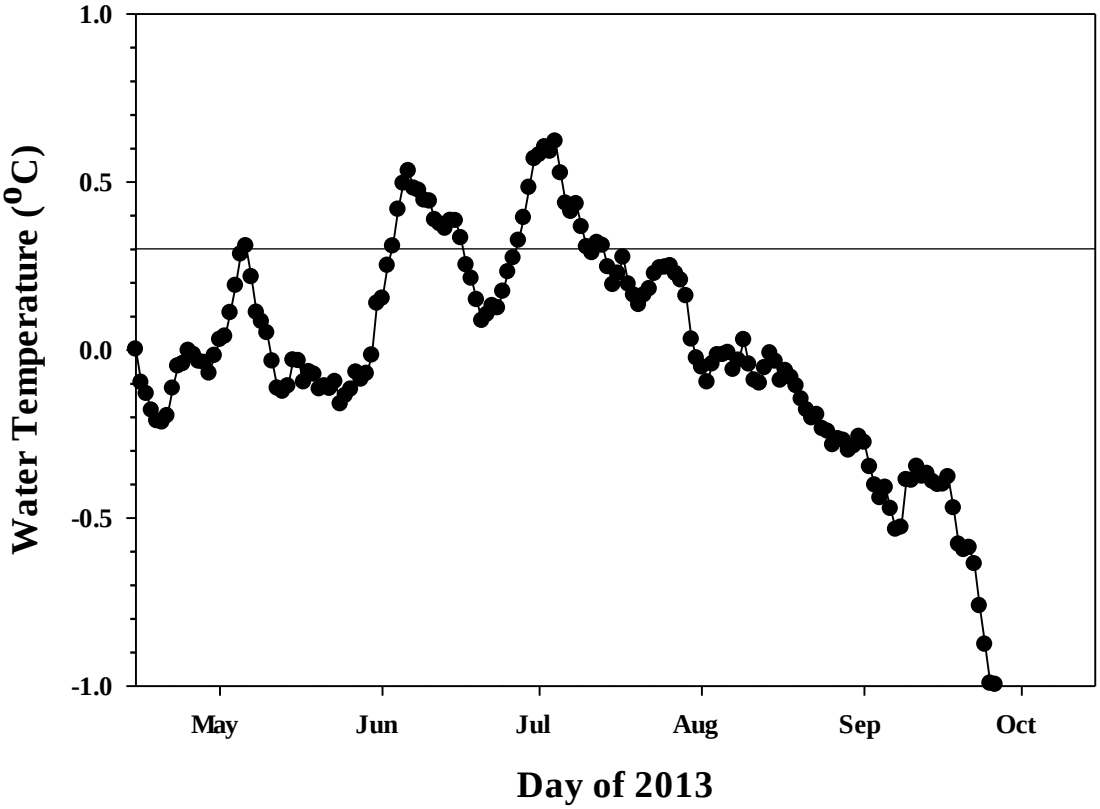


Figure 18. Change in water temperature from the Chief Joseph Tailrace to the Wells Forebay during the same time as measured in both locations during 2013.

CE-QUAL-W2 model analyses conducted during relicensing demonstrated that although 7-DADMax values above the state WQS were observed, the "with Project" temperatures in the Columbia, Okanogan and Methow rivers do not increase more than 0.3°C compared to ambient ("without Project") conditions anywhere in the reservoir, and that the Project complies with the state WQS for temperature (WEST Consultants Inc. 2008). Figure 18 compares the change in water temperature between the Chief Joseph Dam tailrace and the Wells Dam forebay in 2013. The change in temperatures during 2013 is provided for general interest, but cannot be used for determining compliance with the water quality standards due to several complicating factors. Okanogan flows and temperature need to be factored into an analysis that examines Wells Project effects on water temperature. Wells Project forebay water temperatures (calculated as 7-DADmax) were higher than 0.3 C^0 when subtracted from to Chief Joseph tailrace temperatures during three spring/summer events in 2013. In all cases, increases of more than 0.3 C^0 can be attributed to early season flows from the Okanogan above 10,000 cfs (data not show; Columbia River Dart). During these high tributary events in spring and summer, warmer Okanogan River originating outside of the Wells project has a measureable effect on water temperatures in the Wells Project. In June and July Okanogan water temperature can be above 25 C^0, at the same

time that Columbia River temperatures are 15-17 C^0. This effect is most notable in early July when Okanogan River temperatures are most severe. The opposite effect occurs later in the season in early fall when Okanogan and Methow river temperature drop much faster than mainsteam Columbia flows from Chief Joseph (Figure 18). Finally water temperatures in figure 18 are compared during the same hour at each location. Real project effects can only calculated by including the residence time of water in the Chief Joseph tailrace and its subsequent arrival at the Wells Dam forebay. These considerations were modeled during relicensing of the Wells Project prior to 2012 and showed that the Well Project remained in compliance with temperature standards. Given that the new Wells Project FERC license maintains operations similar to that of the previous license, water temperatures observed in 2013 remain in compliance with the state WQS.

In 2014, the temperature array used during relicensing (i.e., Tidbit loggers) will be discontinued and temperature data for the entire 2014 reporting period will be available from the new real-time temperature monitoring equipment.

5.0 REFERENCES

Douglas PUD (Public Utility District No. 1 of Douglas County). 2001. Wells Dam Fish Passage System Overview – Preliminary. Public Utility District No. 1 of Douglas County, Washington.

Douglas PUD (Public Utility District No. 1 of Douglas County). 2008. Water Quality Management Plan *in* the Aquatic Settlement Agreement. Public Utility District No. 1 of Douglas County, Washington.

Douglas PUD 2013. (Public Utility District No. 1 of Douglas County). Quality Assurance Project Plan for Water Temperature and Total Dissolved Gas. Wells Hydroelectric Project. FERC No. 2149. February 2013. Prepared for Washington Department of Ecology, Yakima, WA.

Ecology. 2012. 401 Certification Wells Hydroelectric Project. Order No. 8981 February 27, 2012.

WEST Consultants Inc. 2008. Development of a Water Temperature Model Relating Project Operations to Compliance with the Washington State and EPA Water Quality Standards (Water Temperature Study). Prepared for Public Utility District No. 1 of Douglas County. East Wenatchee, WA

Appendix B

Pre-filing Consultation Record Supporting the Approval of the 2013 Water Temperature Annual Report

Notice to Review the 2013 Water Temperature Report

From: Kristi Geris <kgeris@anchorqea.com>
Sent: Tuesday, March 18, 2014 5:39 PM
To: Bob Rose; 'Bryan Nordlund (bryan.nordlund@noaa.gov)'; Jason McLellan; Pat Irle (pirl461@ecy.wa.gov); Patrick Verhey (Patrick.Verhey@dfw.wa.gov); 'Steve Lewis'
Cc: Bao Le; Kristi Geris; Andrew Gingerich; Chas Kyger; Mike Schiewe
Subject: FW: 2013 DCPUD Water Temp Report

Hi Aquatic SWG: please see the email below from Andrew regarding the draft Douglas PUD 2013 Water Temperature Report for review. Due to the large file size, I was unable to attach the report to this email. However, the draft report is available for download from the Aquatic SWG Extranet site under: Documents > Reports (instructions below). Thanks! – kristi ☺

< 2014_03_18 Douglas - 2013 DCPUD Water Temp Report- Draft for ASWG and Ecology's review>

Instructions:

To gain access to the Aquatic SWG Extranet Homepage, please use the following procedure:

* Visit: https://extranet.dcpud.net/sites/nr/aswg/
* Login using "Forms Authentication" (for non-Douglas PUD employees)

You should now be at the Aquatic SWG homepage.

If you encounter problems, or need a login username and password to access the site:
Please feel free to contact me, Andrew Gingerich, or Julene McGregor [jmcgregor@dcpud.org; (509) 881-2236] and we will gladly assist you with questions or issues.

Kristi Geris

ANCHOR QEA, LLC
kgeris@anchorqea.com
T 509.491.3151 x104
C 360.220.3988

From: Andrew Gingerich
Sent: Tuesday, March 18, 2014 4:27 PM
To: Pat Irle (pirl461@ecy.wa.gov) (pirl461@ecy.wa.gov); Kristi Geris (kgeris@anchorqea.com)
Cc: Le, Bao
Subject: 2013 DCPUD Water Temp Report

Pat and other ASWG members,

Please find attached Douglas PUD's 2013 Temperature Report. The Report is a new requirement associated with Douglas PUD's Clean Water Act required 401 Certification and a requirement found in Douglas' License Order for the Wells Project (Article 401(b)).

Douglas is asking for a slightly exhibited review of this report so that we can approve the Document at the April 9th ASWG meeting. The report is due to the FERC by April 30th. Having any comments from your or other Aquatic SWG members by April 4th would be ideal so that we can revise the document accordingly prior to the meeting and discuss the changes, if necessary, during that call.

Briefly, in addition to summarizing data, the report discusses the milestones in 2013 associated with water temperature monitoring, including but not limited to:

1. Developing Quality Assurance Project Plan for Water Temperature Monitoring (QAPP) in collaboration with Ecology and the ASWG
2. Having the QAPP approved by Ecology, ASWG and the FERC
3. Permitting new remote and real time water temp stations with federal, state and county authorities
4. Procuring equipment and contracts to support the activity
5. Installing and calibrating equipment
6. Developing a webpage for this data to make available to the public
7. Summarizing existing temperature monitoring data and data collected with new temperature monitoring equipment

As always if you have questions please feel free to contact me.

Thanks
Andrew

Andrew Gingerich
Sr. Aquatic Resource Biologist
Douglas County Public Utility District
1151 Valley Mall Parkway, East Wenatchee, WA 98802
Office Phone: (509) 881-2323
Email: andrewg@dcpud.org

Comments Received from the Washington Department of Ecology on the 2013 Water Temperature Report

From: Irle, Pat (ECY) <PIRL461@ECY.WA.GOV>
Sent: Thursday, April 03, 2014 12:21 PM
To: Andrew Gingerich
Cc: Shane Bickford; McKinney, Charlie (ECY); Coffin, Chris (ECY)
Subject: 2013 Wells Water Temperature Annual Report

Follow Up Flag: Follow up
Flag Status: Completed

Hi, Andrew and Shane –

Again, another well written, comprehensive report, with very helpful maps. It's good to hear that you're working with agencies that are developing a temperature model that will be used in the Columbia River Treaty negotiations.

On the more mundane side of things:

Primary Additions

1) Could you prepare a graph showing the difference (delta) in the 7DADMax temperature between the tailrace of Chief Joe and the forebay of Wells [on the y-axis, with dates on the x-axis]? It is probably appropriate to use the measurements in the Wells forebay that are closest in depth to the measurement depths used at Chief Joe. And please use a scale such that we can see when the delta exceeds 0.3oC.
2) In Section 3.4.6, you state that "Only three hours, all occurring on September 1, 2013 had temperature differences between depths of more than 1oC…" Could you do a similar analysis, but just use the daily maximum temperature at each depth and count the number of deltas that exceed 0.3oC?

Minor Additions

1) Could you include a horizontal line on each of the figures showing water temperature data showing the 17.5oC standard? This will help us better see when temperatures start to exceed 17.5 and again when they fall below that value. On the figure for the Methow, it would be helpful to include the 13oC standard, as well.

Thanks. If you have any questions or concerns, please let me know.

Pat Irle
Hydropower Projects Manager
Department of Ecology
(509) 454-7864

Douglas PUD's Response to Comments Specific to the 2013 Water Temperature Report

From: Andrew Gingerich
Sent: Wednesday, April 09, 2014 9:06 AM
To: Kristi Geris (kgeris@anchorqea.com)
Subject: FW: 2013 Wells Water Temperature Annual Report
Attachments: 20140404162426420.pdf

Kristi, please distribute the below to the technical leads to the ASWG. Doulgas received comments from Ecology on the 2013 Wells Project Water Temperature Report. I am hoping to incorporate most if not all of Ecology's comments. In an effort to be thorough and vet this document with the ASWG, I will summarize the below on the call this morning. Looking forward to feedback from the group, towards incorporating Ecology's comments and finalizing this document.

Thanks in advance.

Andrew

From: Andrew Gingerich
Sent: Friday, April 04, 2014 4:37 PM
To: 'Irle, Pat (ECY)'
Subject: RE: 2013 Wells Water Temperature Annual Report

Pat, thanks for the timely reply. I have only received comments on this report from Ecology (yourself) so far. Because I am tied up most of early next week I started reviewing your comments yesterday and today. Below in red text is my suggested path to address your comments.

Please let me know what you think and for number two. It might help me to chat a bit further on it.

Thanks
Andrew

From: Irle, Pat (ECY) [mailto:PIRL461@ECY.WA.GOV]
Sent: Thursday, April 03, 2014 12:21 PM
To: Andrew Gingerich
Cc: Shane Bickford; McKinney, Charlie (ECY); Coffin, Chris (ECY)
Subject: 2013 Wells Water Temperature Annual Report

Hi, Andrew and Shane –

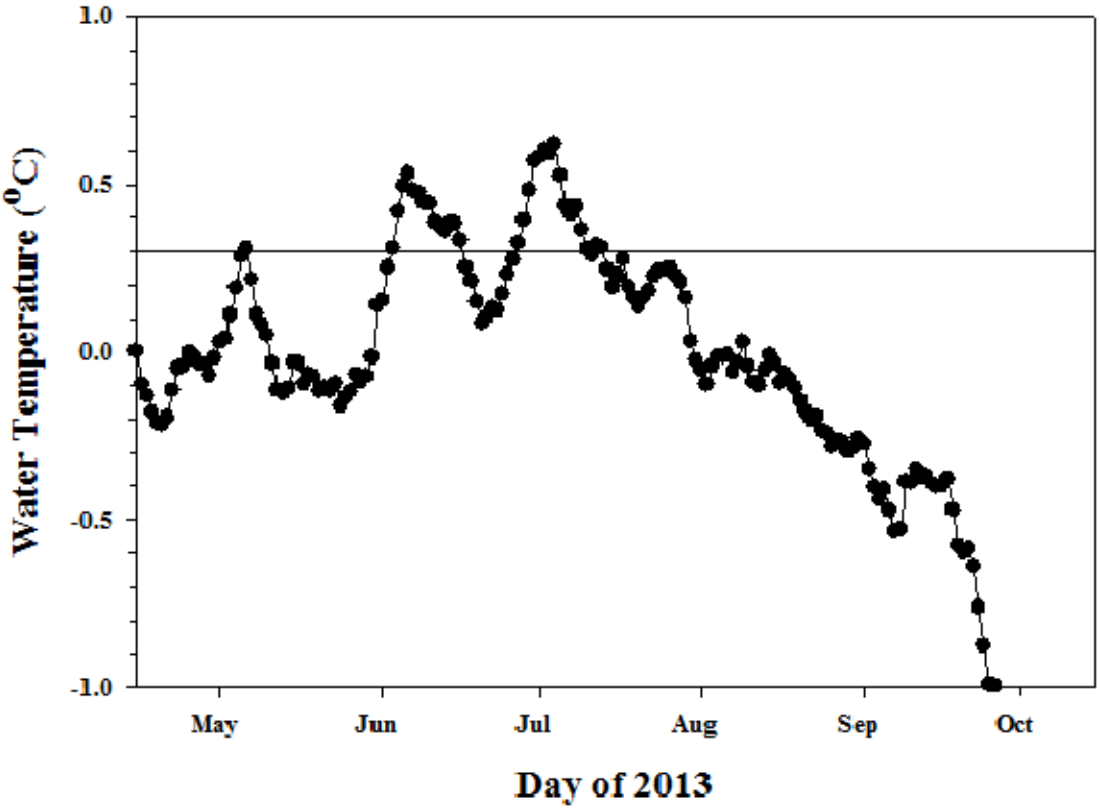
Again, another well written, comprehensive report, with very helpful maps. It's good to hear that you're working with agencies that are developing a temperature model that will be used in the Columbia River Treaty negotiations.

On the more mundane side of things:

Primary Additions

1) Could you prepare a graph showing the difference (delta) in the 7DADMax temperature between the tailrace of Chief Joe and the forebay of Wells [on the y-axis, with dates on the x-axis]? It is probably appropriate to use the measurements in the Wells forebay that are closest in depth to the measurement depths used at Chief Joe. And please use a scale such that we can see when the delta exceeds 0.3oC.

Good question. However, comparing these two project boundaries alone is imperfect. Okanogan flows and temperature need to be factored in to the analysis you are thinking of. I suggest we insert the following Figure X and add the following text the results section: "Wells Project forebay water temperatures (calculated as 7-DADmax) were higher than 0.3 C when subtracted from to Chief Joseph tailrace temperatures during three spring/summer events in 2013. In all cases, increases of more than 0.3 C can be attributed to early season flows from the Okanogan above 10,000 cfs (data not show; Columbia River Dart). During these high tributary events in spring and summer, warmer Okanogan River originating outside of the Wells project has a measureable effect on water temperatures in the Wells Project. In June and July Okanogan water temperature can be above 25 C, at the same time that Columbia river temperatures are 15-17 C. This effect is most notable in early July when Okanogan River temperature are most severe. The opposite effect is occurs later in the season in early fall when Okanogan and Methow river temperature drop much faster than mainsteam Columbia flows from Chief Joseph (Figure x)."



"Figure x. Change in 7DADmax temperatures between Chief Joseph Tailrace and the Wells Forebay. Peaks in early May, June and July that exceed the 0.3 C WQS are most likely associated with the influence of Okanogan tributary flows that occurred during these periods and exceeded 10,000 cfs. In May June and July the Okanogan River is much higher temperatures than the mainstem Columbia."

I will also add the following reference: "Columbia River DART, Columbia Basin Research, University of Washington. (2014). Available from http://www.cbr.washington.edu/dart/query/streamflow_graph_text"

2) In Section 3.4.6, you state that "Only three hours, all occurring on September 1, 2013 had temperature differences between depths of more than 1oC…" Could you do a similar analysis, but just use the daily maximum temperature at each depth and count the number of deltas that exceed 0.3oC?

This one has me a bit stumped: I have 499 data points (daily max values) to compare between depths for the period of April 1 or May 10 to Oct 10ish. Of them, 90% are below that 0.3 C threshold. If I use 0.4 C it goes to only 97.4% of all data

points are inside the threshold (using 0.5C goes to 99% within standard and so on). What's more worrisome is that I have to use tidbit data for this analysis since it's all we had for complete data in 2013 at this location. As you know, we were installing our more robust, remote, and real time temperature data collection system during the monitoring period. Unfortunately, the tidbit data has an accuracy of 0.2 C (See the spec sheet I attached in this email) for each tidbit. As such, comparing two tidbits data gives us an accuracy of 0.4 C, since they both have 0.2 C potential error from true values. So 0.3 is not within our standard and therefore I can't say with any confidence that 90% is a valid statistic to report. Sorry that is so convoluted. We should discuss this one on the phone maybe, but I am afraid that we don't have a good answer for this one. Next year this should be much easier to report, if deemed appropriate for the 2014 report, since the accuracy on our new temp system is much better. I can't find what the WA state standard is for "thermoclines or "metalimnion" but that might help us determine how we should analyze this comparison in the future. Again, a chat might help me.

Maybe I should just delete the original sentence "Only three hours, all occurring on September 1, 2013 had temperature differences between depths of more than 1oC…" ? Since it might not get the point across that there is lack of stratification? I am not sure if it's relevant to the report.

Minor Additions

1) Could you include a horizontal line on each of the figures showing water temperature data showing the 17.5oC standard? This will help us better see when temperatures start to exceed 17.5 and again when they fall below that value. On the figure for the Methow, it would be helpful to include the 13oC standard, as well.

Yep. Easy Fix. The final or next version will have graphs with this threshold identified as requested.

Thanks. If you have any questions or concerns, please let me know.

Pat Irle
Hydropower Projects Manager
Department of Ecology
(509) 454-7864

Draft Meeting Minutes of the April 9th, 2014 Aquatic Settlement Work Group Conference Call Approving Changes to the 2014 Water Temperature Report

Draft Conference Call Minutes

Aquatic Settlement Work Group

To: Aquatic SWG Parties **Date**: April 23, 2014

From: Michael Schiewe, Chair (Anchor QEA, LLC)

Re: Draft Minutes of the April 9, 2014 Aquatic SWG Conference Call

The Aquatic Settlement Work Group (SWG) met by conference call on Wednesday, April 9, 2014, from 10:00 a.m. to 11:30 a.m. Attendees are listed in Attachment A of these meeting minutes.

I. Summary of Action Items

1. Douglas PUD will develop a list of considerations for the future of sturgeon stocking activities, including future sources, prioritization, and genetics (Item VI-1).
2. Aquatic SWG members will submit comments on the draft Douglas PUD 2014 White Sturgeon Outreach Plan to Douglas PUD no later than Monday, May 12, 2014 (Item VI-1).
3. Aquatic SWG members will submit comments on Washington Department of Fish and Wildlife's (WDFW's) draft standardized White Sturgeon Fish Health Protocol, to WDFW (with a copy to Kristi Geris) by May 7, 2014 (Item VI-1).
4. The 2013 White Sturgeon Statement of Agreement (SOA) will be discussed during the Aquatic SWG meeting on May 14, 2014 (Item VI-4).
5. Aquatic SWG members will submit comments on the draft 2013 Aquatic Resource Management Plan Annual Reports (5 total) to Douglas PUD no later than Wednesday, May 7, 2014 (Item VI-6).
6. The Yakama Nation (YN) and Douglas PUD will coordinate to continue regional lamprey discussions (Item VI-8).
7. The YN will provide regional lamprey materials to Kristi Geris for distribution to the Aquatic SWG (Item VI-8).

II. Summary of Decisions

1. The Aquatic SWG members present approved the Wells 2013 Water Temperature Report, contingent on incorporating comments discussed (Item VI-2).

2. The Aquatic SWG members present approved the Methow Basin Bull Trout Passive Integrated Transponder (PIT) Tag Behavioral Analysis (Steve Lewis provided USFWS' approval of the document via email on April 10, 2014, as distributed to the Aquatic SWFG by Geris that same day; Item VI-3).

III. Agreements

1. No agreements were discussed during today's conference call.

IV. Review Items

1. Kristi Geris sent an email to the Aquatic SWG on April 7, 2014, notifying them that the draft 2013 Aquatic Resource Management Plan Annual Reports (5 total) are available for review, with comments due to Douglas PUD no later than Wednesday, May 7, 2014 (Item VI-6).
2. Kristi Geris sent an email to the Aquatic SWG on April 10, 2014, notifying them that the draft Aquatic SWG 2013 Annual Report is out for a 30-day review period, with comments due to her by no later than Thursday, May 8, 2014 (Item VI-7).
3. Kristi Geris sent an email to the Aquatic SWG on April 11, 2014, notifying them that the draft Douglas PUD 2014 White Sturgeon Outreach Plan is out for a 30-day review period, with comments due to Douglas PUD no later than Monday, May 12, 2014 (Item VI-1).

V. Documents Finalized

1. No documents have recently been finalized.

VI. Summary of Discussions

1. **Welcome, Agenda Review, and Meeting Minutes Review** (Mike Schiewe): Mike Schiewe welcomed the Aquatic SWG members (attendees are listed in Attachment A) and opened the meeting. Schiewe reviewed the agenda and asked for additions or other changes to the agenda. Bob Rose requested a brief update on Pacific lamprey, and Pat Irle requested that Rose briefly introduce a White Sturgeon Technical Workgroup.

   The revised draft March 12, 2014 meeting minutes were reviewed. Kristi Geris said that there were comments remaining regarding the discussion of WDFW's draft Standardized White Sturgeon Fish Health Protocol, as follows:

   - John Kerwin (WDFW) indicated that authority to euthanize fish rests with the "director." Patrick Verhey clarified that Kerwin was referring to WDFW Director, Phil Anderson.
   - Kerwin explained that a key step in taking action on fish health issues is to obtain concurrence from the "Co-Managers (federally recognized treaty tribes)."

Verhey clarified that, in this context, WDFW would coordinate with the YN and the Colville Confederated Tribes (CCT), and recommended revising the parenthetical statement to indicate "pertinent tribes."

Geris said that she will incorporate these revisions, and that all other comments and revisions received from members of the Aquatic SWG were incorporated into the revised minutes.

Action items from the last Aquatic SWG meeting on March 12, 2014, and follow-up discussions were as follows: *(Note: italicized item numbers below correspond to agenda items from the March 12, 2014 meeting.)*

- *Douglas PUD will coordinate with U.S. Fish and Wildlife Service (USFWS) to finalize the draft 2013 Methow Basin Bull Trout PIT Tag Summary (Item VI-1).*
  Andrew Gingerich said that he contacted Steve Lewis, and Lewis had no additional comments on the draft bull trout summary. Gingerich indicated that Douglas PUD will be seeking approval of the draft summary during today's conference call.
- *Douglas PUD will discuss with USFWS the Wells White Sturgeon Stocking Plan for implementation in 2014 that was approved by Aquatic SWG members present (Item VI-3).*
  Steve Lewis provided USFWS's approval of the Wells White Sturgeon Stocking Plan for implementation in 2014 via email on March 19, 2014.
- *Douglas PUD will develop a list of considerations for the future of sturgeon stocking activities, including future sources, prioritization, and genetics (Item VI-3).*
  Andrew Gingerich indicated that this list is still under development. This action item will be carried forward.
- *Douglas PUD will develop a summary outlining the objectives of their white sturgeon public outreach efforts (Item VI-4).*
  Andrew Gingerich said that Douglas PUD will distribute this summary to the Aquatic SWG for review by the end of the day today. *(Note: Douglas PUD provided the draft Douglas PUD 2014 White Sturgeon Outreach Plan to Kristi Geris on April 11, 2014, which she distributed to the Aquatic SWG that same day.)*
- *Aquatic SWG members will submit comments to Douglas PUD regarding ideas for Douglas PUD's white sturgeon public outreach efforts (Item VI-4).*
  This action item will be carried forward.
- *Aquatic SWG members will submit comments on WDFW's draft standardized White Sturgeon Fish Health Protocol, to WDFW (with a copy to Kristi Geris) prior to the next Aquatic SWG meeting on April 9, 2014 (Item VI-7).*

Chad Jackson said that WDFW has not yet received comments on the draft protocol. He added, however, that Douglas PUD has indicated that they plan to provide comments soon. Jackson said that the draft protocol was also presented to the Priest Rapids Fish Forum (PRFF) and Rocky Reach Fish Forum (RRFF). He requested that comments be submitted to WDFW by Wednesday, May 7, 2014, which also aligns with the PRFF and RRFF comment periods. He said the draft protocol will then be discussed at the Aquatic SWG meeting on May 14, 2014.

Aquatic SWG members present approved the March 12, 2014 meeting minutes, as revised.

2. **DECISION: Wells 2013 Water Temperature Report** (Andrew Gingerich): Andrew Gingerich said that Kristi Geris sent an email to the Aquatic SWG on March 18, 2014, notifying them that the draft Wells 2013 Water Temperature Report was out for review. He said that the report, which is due to the Federal Energy Regulatory Commission (FERC) by April 30, 2014, is a new requirement under the Wells Hydroelectric Project Clean Water Act Section 401 Certification and FERC relicensing.

   Gingerich said that comments on the draft report were received from the Washington State Department of Ecology (Ecology; Attachment B), which were distributed to the Aquatic SWG by Geris on April 9, 2014, prior to the conference call. Gingerich said that he hoped to review Ecology's comments during the call and then obtain Aquatic SWG approval of the report contingent on incorporating revisions per the comments discussed, as described below.

   Comment 1

   This comment is a request to show the difference (delta) in temperature between the Chief Joe tailrace and the Wells forebay. Gingerich explained that the request is intended to show if the Wells Project adds temperature loading during the monitoring period. He said that Douglas PUD proposed adding a figure that shows the delta between the Chief Joe tailrace and the Wells forebay, and text explaining that water temperature is a function of tributary inflows and the Chief Joe tailrace. He further explained that during high tributary events in the spring and summer, warmer Okanogan River flows originating from outside of the Wells Project have a measureable effect on water temperatures in the Wells Project.

   Comment 2

   This comment is a request to stratify temperature data at three depths in the Wells forebay. Gingerich explained that limited data are available to address this request with statistical confidence. Pat Irle suggested including text explaining these limitations, which she said was adequate to address this request.

Comment 3

This comment is a request to add the temperature threshold of 17.5 degrees Celsius, and also the temperature threshold of 13.0 degrees Celsius for the Methow, to water temperature figures. Gingerich said that Douglas PUD will include these thresholds in the final version.

The Aquatic SWG members present approved the Wells 2013 Water Temperature Report, contingent on incorporating revisions per the comments, as discussed.

3. **DECISION: Methow Basin Bull Trout PIT Tag Behavioral Analysis** (Andrew Gingerich): Andrew Gingerich said that the 60-day review period has ended for the draft 2013 Methow Basin Bull Trout PIT Tag Behavioral Analysis, which was distributed to the Aquatic SWG for review by Kristi Geris on January 23, 2014. Gingerich reminded the Aquatic SWG that this document is not required by FERC; rather, it is an analysis that Douglas PUD agreed to complete with USFWS. He said that USFWS has not provided any additional comments after an earlier review of the document.

   The Aquatic SWG members present approved the Methow Basin Bull Trout PIT Tag Behavioral Analysis. Steve Lewis provided USFWS' approval of the document via email on April 10, 2014, as distributed to the Aquatic SWG by Geris that same day.

4. **White Sturgeon**:

   White Sturgeon Tagging/Stocking Recap (Andrew Gingerich)

   Andrew Gingerich said that last week at the Wells Sturgeon facility, tagging of Marion Drain direct gamete-source fish went well. He said the average fish length was about 265 millimeters (mm), or 10.5 inches (in), which he noted was good considering that the target fish length was 256 to 280 mm (fork length). He said that the range of fish lengths was greater than he hoped for; the 10th to 90th percentiles were 235 and 295 mm, respectively. He said that in terms of weight, the average size was 143 grams (g), which was towards the high end of the target weight, but still within the target range of 111 to 146 g. He noted that the condition factors of the fish were quite high and will be among the highest of fish released in the Mid-Columbia to date. He also noted that there was a single post-tagging death. He said that yesterday, April 8, 2014, a total of 129 fish were released at Washburn Island, which is the same location where the larval-source fish captured below Rock Island Dam were released a few weeks ago.

   Gingerich said that next Monday, April 14, 2014, the larval-source fish on station at Wells will be tagged and then held an additional 1 to 1.5 months for additional growth. He said that currently, the range of larval-source fish sizes is also quite wide, and that hatchery staff will adjust water temperatures to increase growth rate and bring the smaller fish up to size. He said that, overall, the fish are doing well, and he added that

releasing the Marion Drain fish opened up additional tank space, which will help with growing the larval-source fish to the target release sizes.

White Sturgeon Public Outreach (Andrew Gingerich)
Andrew Gingerich said that tomorrow, April 12, 2014, advanced biology students from Bridgeport High School will participate in releasing 30 Marion Drain direct gamete-source fish as part of Douglas PUD's White Sturgeon Outreach Program. Gingerich said that these are the same students that toured the Wells Hatchery Sturgeon Facility in early March 2014. He said that Douglas PUD is coordinating with WDFW to obtain necessary coverage for the planned activities. Chad Jackson indicated that considering the limited amount of time before the planned activities, Douglas PUD can move forward as planned and that WDFW will coordinate internally, as necessary.

White Sturgeon Technical Workgroup (Pat Irle and Bob Rose)
Bob Rose said that the purpose of this workgroup is to convene a small group with the expertise to coordinate white sturgeon stocking activities, instead of moving forward in three different groups (i.e., Aquatic SWG, RRFF, and PRFF). He said that Jason McLellan, Chad Jackson, and Donella Miller will be key participants in this group; however, he also encouraged participation by the PUDs and other regional entities. Pat Irle added that the workgroup, which may also include outside experts and consultants, will focus solely on science and technology, and will develop a decision pathway that may be used by each workgroup or forum. Jackson also added that the workgroup may focus on developing a plan for sturgeon stocking in future years. Andrew Gingerich said that Douglas PUD plans to participate in the technical workgroup, unless it conflicts with other higher priority activities.

White Sturgeon 2014 Collection Efforts (All)
Andrew Gingerich noted that Douglas PUD is still in early implementation of their supplementation program for white sturgeon. He recalled that last year, a lot of time was spent discussing where to obtain fish, and noted that the effort was extremely successful. He said that Douglas PUD would like to build on the success of last year, and would also like to make sure that the Aquatic SWG is comfortable with moving forward with collecting fish in 2014.

Jason McLellan said that this year, the CCT plan to collect larvae in Lake Roosevelt. He said they do not intend to collect below Rock Island Dam again because the area is not productive, and also there is not enough funding available to collect in two locations. He said that with two entities collecting for the program, the decision-making will come after collection is complete when it is known what is on hand, and how to prioritize the releases.

Donella Miller said that the YN plans to continue the program in the same manner as last year, including brood collection in the Dalles and Bonneville pools, and coordinating with Grant PUD and Chelan PUD for brood collection at their respective facilities. She added that there will be two spawning events to accomplish two three-by-three crosses. Pat Irle asked if the YN plans to consider other options besides broodstock collection. Bob Rose said that the YN is also starting larval collection efforts, but noted that there are safety concerns that they will need to address first.

Rose said that he thought the Aquatic SWG had come to agreement to continue to fish within the Mid-Columbia, and not just focus in Lake Roosevelt. McLellan said that he did not believe that was the case. He said the original proposal was to attempt to collect in three locations: 1) Hanford Reach; 2) below Rock Island Dam; and 3) Lake Roosevelt. He said that the CCT have not been able to obtain agreement to fish in the upper end of the McNary Pool, and they cannot safely fish above Vernita Bridge, so the Hanford Reach is not an option. He said that Rock Island may be the most productive location in the Mid-Columbia; however, it is not productive enough. This leaves Lake Roosevelt. He reiterated that the CCT's budget is insufficient to sample for larval fish in two locations.

Irle asked if this will be further discussed by the Mid-Columbia White Sturgeon Technical Workgroup, and added that she would like to know when these discussions will take place. Gingerich said that he recalls that the 2013 White Sturgeon SOA addressed only the first year. He acknowledged the recent technical research such as Andrea Drauch-Schreier's work, and said that he understands the interest in moving genes upstream in the project, which Gingerich said he believes has been accomplished, at least to some extent. He said that from Douglas PUD's perspective, there is no technical reason to exclude Lake Roosevelt, and that the CCT need to sample in more productive areas to be successful; hence, Douglas PUD supports larval collection in Lake Roosevelt. He added that, contractually, there are no limitations on where fishing occurs, so it is only contingent on Aquatic SWG agreement. He also noted that time can become a constraint.

Mike Schiewe asked if an additional meeting is needed to discuss plans for 2014. Rose said that he believes there is still value in continuing to fish in the lower areas, and that the YN and the CCT can discuss, as needed. He added that he does not view this as being a significant problem. Schiewe asked when the CCT need to begin larval collection, and McLellan said it should begin in late June to early July. Gingerich noted that if the CCT plan to fish in the lower river, then collection may have to start sooner. McLellan agreed that if the Aquatic SWG reaches agreement for the CCT to fish in other places, then collection efforts could start one month earlier. He said that the CCT are willing to sample as requested and noted that it would need to be a pilot program

because of the way contracts and funding are set up. He also added that fishing in other places will limit their ability to collect as many larvae in Lake Roosevelt.

Gingerich asked the Aquatic SWG if there are issues with the CCT focusing their collection effort in Lake Roosevelt. He also asked what the interest is in the lower Mid-Columbia, and he added that he wants to confirm the interest is for the stocking program, and not something else (e.g., investigating spawning behavior in the Mid-Columbia). Rose said that the YN is interested in obtaining a mix of fish in the reservoirs. He said that success is measured in both the short and long term. He said that he does not think it is a good approach to disregard a section of the Mid-Columbia based on one year of poor collection. In addition, he stated that he believes the CCT will gain a greater efficiency over the course of a few years; and he added that it may take that long to figure out patterns of movement and where to find fish. He summarized that the YN's interest is in determining whether fish can be collected in the Mid-Columbia, and with what efficiency. He added that if collection efforts do not take place, this information will remain unknown.

McLellan expressed confidence in the thoroughness of the CCT's collection efforts in the lower Mid-Columbia. He said that they collected in the correct places and everything went as planned—the numbers of larvae were just low. He agreed with Rose that obtaining long-term data is valuable, but in the interest of collecting for the program, it is not feasible under the current contract. Irle asked McLellan if he was implying that it would be inefficient for the YN to collect below Rock Island, as well, and McLellan confirmed that he thought so. He added that the production levels in the Dalles and Bonneville pools are high. He also added that there are existing data from Bonneville Power Administration (BPA) work that provides them with a good starting point.

Irle recommended that the YN and the CCT discuss this matter further, and then bring that discussion to the White Sturgeon Technical Workgroup, which she noted Ecology would like to participate in. She said those discussions should then be raised at the next Aquatic SWG meeting on May 14, 2104. McLellan said that the CCT plan to participate in the technical group; however, he said he is unclear on what the CCT and the YN need to further discuss. He said it seems that everyone is in agreement that some collection will come from Lake Roosevelt. He said the pending discussion seems to be whether the CCT should collect in another location. He said that the CCT just need to know where that is, and then they can provide feedback on feasibility.

Schiewe encouraged the Aquatic SWG to participate in the White Sturgeon Technical Forum, but reminded the Aquatic SWG that the focus of this discussion is on the Wells Project White Sturgeon Management Plan and CCT and YN collection efforts this year. He said if those efforts are different from last year, any proposed changes need to be discussed and an agreement needs to be reached in May 2014. Gingerich noted that

Douglas PUD is in a different stage of implementation than Grant PUD or Chelan PUD. Irle requested that Kristi Geris redistribute the 2013 White Sturgeon SOA, which Geris did on April 9, 2014. The Aquatic SWG agreed to further discuss the 2013 SOA during the Aquatic SWG meeting on May 14, 2014.

5. **REMINDER: 2014 Spill/Bypass Season** (Andrew Gingerich): Andrew Gingerich said that spring spill at Wells Dam started today at 12:01 a.m. He said that 10,000 cubic feet per second is spilling through the spill bypass bays. He said with regards to Wanapum Dam spillway repair, Wells Dam staff are switching load and spill as requested; however, these changes should not affect bypass operations at Wells Dam.

6. **REVIEW ITEM: 2013 Aquatic Resource Management Plan Reports** (Chas Kyger): Chas Kyger said that Kristi Geris sent an email to the Aquatic SWG on April 7, 2014, notifying them that the draft 2013 Aquatic Resource Management Plan Annual Reports (5 total) are available for review, with comments due to Douglas PUD no later than Wednesday, May 7, 2014. Kyger reminded the Aquatic SWG that the Aquatic Nuisance Species (ANS) Aquatic Resource Management Plan Annual Report was already approved by the Aquatic SWG and submitted to FERC. He said that Douglas PUD would like to obtain approval of the remaining Aquatic Resource Management Plan Annual Reports at the Aquatic SWG meeting on May 5, 2014, in order to submit the approved reports to FERC by the May 31, 2014 deadline. Andrew Gingerich added that consistent with the ANS Aquatic Resource Management Plan Annual Report, the remaining five reports use the same template from last year where each objective is listed and actions completed throughout the year to fulfill those objectives follow in italicized font. Gingerich said that although the template text can be revised, the intent of this review is to focus on the actions completed to achieve the objectives (italicized font).

   Aquatic SWG members will submit comments on the draft 2013 Aquatic Resource Management Plan Annual Reports to Douglas PUD by the May 7, 2014 deadline.

7. **REVIEW ITEM: Aquatic SWG 2013 Annual Report** (Chas Kyger): Chas Kyger said that the Aquatic SWG 2013 Annual Report compiles the separate Aquatic Resource Management Plan Annual Reports, as well as agreements, plans, and other documentation completed throughout the year. Mike Schiewe added that the Aquatic SWG 2013 Annual Report also compiles all of the meeting minutes and associated attachments from the previous year.

   Kristi Geris sent an email to the Aquatic SWG on April 10, 2014, notifying them that the draft Aquatic SWG 2013 Annual Report is out for a 30-day review period, with comments due to her by no later than Thursday, May 8, 2014.

8. **Pacific Lamprey Update:**

2013 Adult Lamprey Passage and Enumeration Study Report (Bob Rose and Chas Kyger)
Bob Rose requested an update from Douglas PUD about Pacific lamprey. Chas Kyger said that the 2013 Adult Lamprey Passage and Enumeration Study Report has undergone several stages of review both internally and with LGL Unlimited, LLC (LGL). He noted that the report is a very data-rich document and with each review, more revisions have been made. He said he hopes to have the report ready for review prior to the next Aquatic SWG meeting. He said that, overall, conclusions were limited because of small sample sizes. Andrew Gingerich added that data were still being collected in November 2013, and also that LGL's initial analyses did not include the PIT-tag data, which Douglas PUD suggested adding to supplement the radio-tag data—this change involved a lot of rewriting.

Rose requested that the results be presented soon so that 2014 planning for lamprey can move forward. He asked if Douglas PUD knows what is planned for lamprey in 2014, and Kyger said that those decisions will be based on the Aquatic SWG's review of the 2013 study. Kyger added that if Douglas PUD expects the report to be further delayed, they will present these data regardless, in order to get discussions started. Rose said that he expects that a similar lamprey study will be conducted in 2014 to add to sample size or validation. He said that the YN needs to submit a lamprey collection schedule to the Columbia River Inter-Tribal Fish Commission (CRITFC), as they typically do in March or April, and ideally they would like to know how many fish to request for Douglas PUD.

Regional Coordination (Bob Rose)
Bob Rose said that coordination with the other PUDs of a regional Lamprey No-Net-Impact (NNI) Strategy is moving along well, and that he would like to get this process back on track with Douglas PUD. He said that the other PUDs are on a timeline for developing a draft framework from March through May 2014, and having a final draft complete by July 2014. He said by August or September 2014, a Statement of Agreement or other appropriate vehicle will be developed to wrap up these efforts and adopt a regional strategy. Rose asked that Douglas PUD convey this timeline to the appropriate managers in order to move this forward in the near future. Andrew Gingerich said that he would convey this message, and asked for Rose to provide some dates for possible meetings with Douglas PUD managers. Rose said that he will coordinate with Douglas PUD to continue regional lamprey discussions, and that he will provide regional lamprey materials to Kristi Geris for distribution to the Aquatic SWG.

VII. Next Meetings

1. **Upcoming meetings** (Mike Schiewe): Upcoming meetings are as follows: ***May 14, 2014 (conference call); June 11, 2014 (conference call); July 9, 2014 (conference call).***

List of Attachments

Attachment A – List of Attendees

Attachment B – Ecology's comments on the draft Wells 2013 Water Temperature Report

Attachment A
List of Attendees

Name	Role	Organization
Mike Schiewe	SWG Chair	Anchor QEA, LLC
Kristi Geris	Administration/Technical Support	Anchor QEA, LLC
Andrew Gingerich	SWG Technical Representative	Douglas PUD
Chas Kyger	Technical Support	Douglas PUD
Patrick Verhey	SWG Technical Representative	Washington Department of Fish and Wildlife
Chad Jackson	Technical Support	Washington Department of Fish and Wildlife
Pat Irle	SWG Technical Representative	Washington State Department of Ecology
Jason McLellan	SWG Technical Representative	Colville Confederated Tribes
Bob Rose	SWG Technical Representative	Yakama Nation
Donella Miller	Technical Support	Yakama Nation

Final Approval from the Washington Department of Ecology

From: Andrew Gingerich
Sent: Thursday, April 24, 2014 8:05 AM
To: 'Irle, Pat (ECY)'
Subject: RE: 2013 Wells Water Temperature Annual Report

Good suggestions. I made these final modifications.
Thanks Pat.

Andrew

From: Irle, Pat (ECY) [mailto:PIRL461@ECY.WA.GOV]
Sent: Wednesday, April 23, 2014 10:36 AM
To: Andrew Gingerich
Subject: RE: 2013 Wells Water Temperature Annual Report

Looks good.

If you want, with regard to the first topic, you may want to start with stating that the CE-QUAL analyses showed the project was in compliance, then follow with the stuff in red, maybe rephrasing the second sentence to say something like, "the change in temperatures is provided for general interest, but cannot be used for determining compliance with the water quality standards due to several complicating factors."

From: Andrew Gingerich [mailto:andrewg@dcpud.org]
Sent: Wednesday, April 23, 2014 8:01 AM
To: Irle, Pat (ECY)
Subject: FW: 2013 Wells Water Temperature Annual Report

Morning Pat.

Any concerns with the below? I'm going to file this report this week.
Andrew

From: Andrew Gingerich
Sent: Friday, April 18, 2014 8:23 AM
To: Pat Irle (pirl461@ecy.wa.gov) (pirl461@ecy.wa.gov)
Cc: Le, Bao
Subject: RE: 2013 Wells Water Temperature Annual Report

Good morning, Pat

As the meeting minutes and Action items from last week's Aquatic SWG conference call (April 9th, 2014) indicated, the Aquatic SWG, including Ecology, approved Douglas PUD's 2013 water temperature report provided we addressed Ecology's April 3rd, 2014 comments. During our April 9th, 2013 call we covered Ecology's comments and Douglas PUD's responses. We agreed that Douglas would add similar text to the report as provided to Ecology in an email dated April 4th. Please find below a more polished version of those suggested revisions. Please let me know if you have additional concerns. Douglas PUD will file this report next week to make sure we meet the FERC imposed deadline of April 30th for this report.

As always, thanks for your ongoing coordination! Have a great weekend.
Andrew
509-881-2323

For Comment #1 I added the following figure and red text to the conclusion section. The black text was already there:

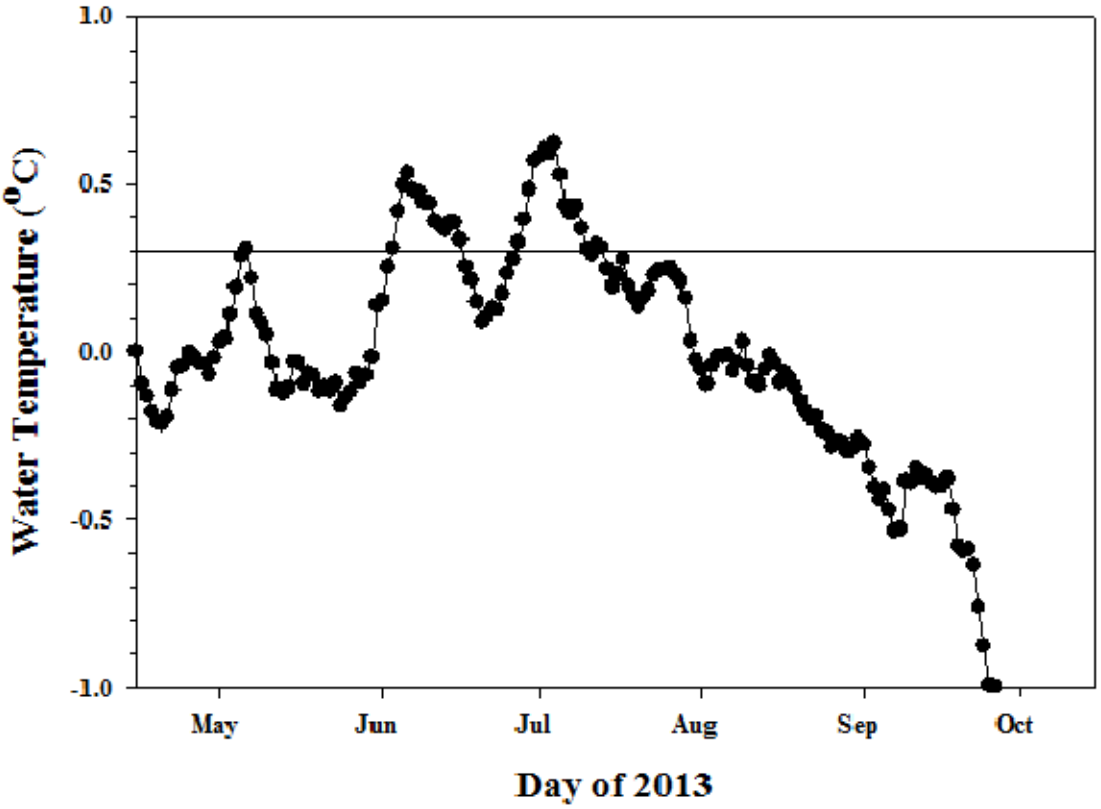


Figure 18. Change in water temperature from the Chief Joseph Tailrace to the Wells Forebay during the same time as measured in both locations during 2013.

Figure 18 compares the change in water temperature between the Chief Joseph Dam tailrace and the Wells Dam forebay in 2013. Comparing these two project boundaries alone is imperfect, but data is nevertheless provided. Okanogan flows and temperature need to be factored into an analysis that examines Wells Project effects on water temperature. Wells Project forebay water temperatures (calculated as 7-DADmax) were higher than 0.3 C^0 when subtracted from to Chief Joseph tailrace temperatures during three spring/summer events in 2013. In all cases, increases of more than 0.3 C^0 can be attributed to early season flows from the Okanogan above 10,000 cfs (data not show; Columbia River Dart). During these high tributary events in spring and summer, warmer Okanogan River originating outside of the Wells project has a measureable effect on water temperatures in the Wells Project. In June and July Okanogan water temperature can be above 25 C^0, at the same time that Columbia River temperatures are 15-17 C^0. This effect is most notable in early July when Okanogan River temperatures are most severe. The opposite effect is occurs later in the season in early fall when Okanogan and Methow river temperature drop much faster than mainsteam Columbia flows from Chief Joseph (Figure 18). Finally water temperatures in figure 18 are compared during the same hour at each location. Real project effects can only calculated by including the residence time of water in the Chief

Joseph tailrace and its subsequent arrival at the Wells Dam forebay. These considerations were modeled during relicensing of the Wells Project prior to 2012. CE-QUAL-W2 model analyses conducted during relicensing demonstrated that although 7-DADMax values above the state WQS were observed, the "with Project" temperatures in the Columbia, Okanogan and Methow rivers do not increase more than 0.3°C compared to ambient ("without Project") conditions anywhere in the reservoir, and that the Project complies with the state WQS for temperature (WEST Consultants Inc. 2008). Given that the new Wells Project FERC license maintains operations similar to that of the previous license, water temperatures observed in 2013 remain in compliance with the state WQS.

For Comment #2 Added the following to 3.4.6:

The lack of thermo-stratification in the Wells Forebay is supported by relicensing efforts conducted by Douglas PUD and West Consultants (WEST Consultants Inc., 2008). Further, tidbits used to collect
water temperature data shown in Figure 15 have individual accuracy rates of 0.2 C^0 and 0.4 C^0 when compared against each other. For example, 97.4% of all data points comparing surface, middle and deep depths had differences in water temperature less than 0.4 C^0, which is apparent by the convergence of the three depths (lines) in Figure 15. Despite this instrument limitation, results from 2013 suggest a lack of thermo-stratification in the Wells Dam forebay.

For Comment #3 I added lines to each figure to indicate DAD Max temps. Also I added… to (results): In all figures, horizontal lines at 17.5 or 13 C^O illustrate 7-DADMax thresholds.

From: Andrew Gingerich
Sent: Friday, April 04, 2014 4:37 PM
To: 'Irle, Pat (ECY)'
Subject: RE: 2013 Wells Water Temperature Annual Report

Pat, thanks for the timely reply. I have only received comments on this report from Ecology (yourself) so far. Because I am tied up most of early next week I started reviewing your comments yesterday and today. Below in red text is my suggested path to address your comments.

Please let me know what you think and for number two. It might help me to chat a bit further on it.

Thanks
Andrew

From: Irle, Pat (ECY) [mailto:PIRL461@ECY.WA.GOV]
Sent: Thursday, April 03, 2014 12:21 PM
To: Andrew Gingerich
Cc: Shane Bickford; McKinney, Charlie (ECY); Coffin, Chris (ECY)
Subject: 2013 Wells Water Temperature Annual Report

Hi, Andrew and Shane –

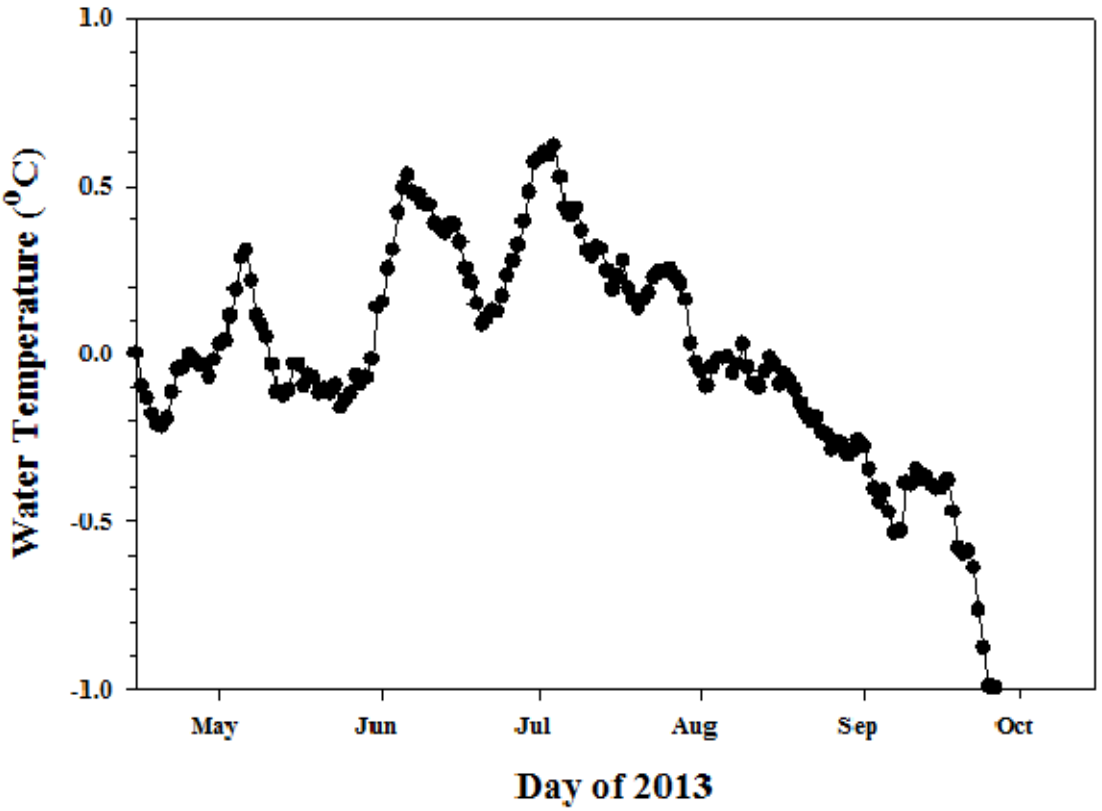
Again, another well written, comprehensive report, with very helpful maps. It's good to hear that you're working with agencies that are developing a temperature model that will be used in the Columbia River Treaty negotiations.

On the more mundane side of things:

Primary Additions

1) Could you prepare a graph showing the difference (delta) in the 7DADMax temperature between the tailrace of Chief Joe and the forebay of Wells [on the y-axis, with dates on the x-axis]? It is probably appropriate to use the measurements in the Wells forebay that are closest in depth to the measurement depths used at Chief Joe. And please use a scale such that we can see when the delta exceeds 0.3oC.

Good question. However, comparing these two project boundaries alone is imperfect. Okanogan flows and temperature need to be factored in to the analysis you are thinking of. I suggest we insert the following Figure X and add the following text the results section: "Wells Project forebay water temperatures (calculated as 7-DADmax) were higher than 0.3 C when subtracted from to Chief Joseph tailrace temperatures during three spring/summer events in 2013. In all cases, increases of more than 0.3 C can be attributed to early season flows from the Okanogan above 10,000 cfs (data not show; Columbia River Dart). During these high tributary events in spring and summer, warmer Okanogan River originating outside of the Wells project has a measureable effect on water temperatures in the Wells Project. In June and July Okanogan water temperature can be above 25 C, at the same time that Columbia river temperatures are 15-17 C. This effect is most notable in early July when Okanogan River temperature are most severe. The opposite effect is occurs later in the season in early fall when Okanogan and Methow river temperature drop much faster than mainsteam Columbia flows from Chief Joseph (Figure x)."



"Figure x. Change in 7DADmax temperatures between Chief Joseph Tailrace and the Wells Forebay. Peaks in early May, June and July that exceed the 0.3 C WQS are most likely associated with the influence of Okanogan tributary flows that occurred during these periods and exceeded 10,000 cfs. In May June and July the Okanogan River is much higher temperatures than the mainstem Columbia."

I will also add the following reference: "Columbia River DART, Columbia Basin Research, University of Washington. (2014). Available from http://www.cbr.washington.edu/dart/query/streamflow_graph_text"

2) In Section 3.4.6, you state that "Only three hours, all occurring on September 1, 2013 had temperature differences between depths of more than 1oC…" Could you do a similar analysis, but just use the daily maximum temperature at each depth and count the number of deltas that exceed 0.3oC?

This one has me a bit stumped: I have 499 data points (daily max values) to compare between depths for the period of April 1 or May 10 to Oct 10ish. Of them, 90% are below that 0.3 C threshold. If I use 0.4 C it goes to only 97.4% of all data points are inside the threshold (using 0.5C goes to 99% within standard and so on). What's more worrisome is that I have to use tidbit data for this analysis since it's all we had for complete data in 2013 at this location. As you know, we were installing our more robust, remote, and real time temperature data collection system during the monitoring period. Unfortunately, the tidbit data has an accuracy of 0.2 C (See the spec sheet I attached in this email) for each tidbit. As such, comparing two tidbits data gives us an accuracy of 0.4 C, since they both have 0.2 C potential error from true values. So 0.3 is not within our standard and therefore I can't say with any confidence that 90% is a valid statistic to report. Sorry that is so convoluted. We should discuss this one on the phone maybe, but I am afraid that we don't have a good answer for this one. Next year this should be much easier to report, if deemed appropriate for the 2014 report, since the accuracy on our new temp system is much better. I can't find what the WA state standard is for "thermoclines or "metalimnion" but that might help us determine how we should analyze this comparison in the future. Again, a chat might help me.

Maybe I should just delete the original sentence "Only three hours, all occurring on September 1, 2013 had temperature differences between depths of more than 1oC…" ? Since it might not get the point across that there is lack of stratification? I am not sure if it's relevant to the report.

Minor Additions

1) Could you include a horizontal line on each of the figures showing water temperature data showing the 17.5oC standard? This will help us better see when temperatures start to exceed 17.5 and again when they fall below that value. On the figure for the Methow, it would be helpful to include the 13oC standard, as well.

Yep. Easy Fix. The final or next version will have graphs with this threshold identified as requested.

Thanks. If you have any questions or concerns, please let me know.

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