State of Oregon
Department of Environmental Quality Memorandum

Date: April 19, 2016

To: Environmental Quality Commission

From: Joni Hammond, Acting Director

Subject: Agenda item G, Informational item: Director's report
April 20-21, 2016, EQC meeting

Annual meeting of the Environmental Council of the States

Greg Aldrich, Office of Policy and Analysis Manager, attended the annual meeting for ECOS earlier this month. During his trip, Aldrich represented Oregon in a number of discussions, roundtables and voting on resolutions. The theme of the 2016 Spring Meeting was *Pathways to Partnerships: Advancing Environmental Protection*. In response to the drinking water crisis in Flint, Michigan, several sessions and two keynote addresses focused on effective communication and the nexus between public health and environmental protection. A number of participants said that environmental protection work should reconnect to public health work. It was noted that most environmental protection programs in the country grew out of public health programs but the connections have eroded over time. Other sessions focused on updates on implementing the more stringent ozone standard, restoring urban waters, a business roundtable on sustainable material management, measuring the impact of environmental enforcement, and an update on the Clean Power Plan. EPA Administrator Gina McCarthy provided some rousing messages, reminding everyone that our core work resonates with the public. Many participants noted their concern for and how they missed former DEQ director Dick Pedersen. Pedersen was the ECOS President two years ago.

ECOS funds Oregon Materials Management film

Earlier this year, DEQ received funds from ECOS via an EPA grant for solid waste activities. The agency used the funds to create a short film highlighting the shift from waste-focused programs to a materials management approach.

The film is available online, and is the product of a number of staff across the agency. DEQ has promoted the film through its various social and traditional media outlets, and will continue to share the messaging and importance of a materials management approach.

Film link: https://vimeo.com/159406711

DEQ issues comprehensive greenhouse gas emission report for internal operations

As part of agency sustainability efforts, DEQ was able to hire a post-graduate student as an intern in 2015 to collect data related to the agency's overall greenhouse gas emissions associated

with internal operations. This data, covering fiscal year 2013, was synthesized into a comprehensive report outlining the sources of DEQ's greenhouse gas emissions, both directly and indirectly through a lifecycle analysis, and recommendations for reductions in these emissions.

DEQ presented the draft report to the Oregon Sustainability Board in May 2015, and staff have spent the last 10 months finalizing the data and ensuring that the information is accurate and complete. Stacy Ludington, the report's primary author and DEQ intern, has returned to begin implementing recommendations related to procurement guidance for more sustainable purchasing and contracting processes as part of her capstone project through AmeriCorps. Ludington worked with numerous staff at DEQ and other state agencies to gather information, provide analysis and quality-assure the results and summaries.

The final report will be posted this week, and the information promoted as part of ongoing agency sustainability efforts. DEQ will continue its work to implement recommendations and collaborate with other state agencies and project partners for better sustainability outcomes for the state.

Annual fish passage report for the lower Columbia River

The U.S. Army Corps of Engineers is required to submit an annual report to DEQ regarding its operations for fish passage and spill at the four lower dams it operates along the Columbia River. DEQ received that report from the Corps on Jan. 28, 2016, detailing aspects of the 2015 spill season from April 1 through August 31.

DEQ staff reviewed the report and prepared a summary, attached to this document. Some key elements of the summary are that:

- Malfunctioning sensors account for the 77 times during the season that the Corps reported total dissolved gas at levels above the modified standard – 71 times at the John Day Dam and six at the McNary Dam. These occurrences may not have actually been exceedances as it is the Corps' protocol to report as exceedances the inaccurate data or data gaps from malfunctioning sensors.
- The Fish Passage Center examined 4,573 juvenile salmonids and only six individuals, or 0.1 percent, had signs of gas bubble trauma with less than 25 percent of their surface area affected. This is a slight reduction from 2014 when 0.2 percent, or 11 salmonids of 6,581 examined, exhibited gas bubble trauma.
- Overall, risks to migrating salmonids were low during the 2015 fish passage season

State of Oregon
Department of Environmental Quality Memorandum

Date: April 19, 2016

To: Environmental Quality Commission

From: Oregon DEQ

Subject: Annual Report on 2015 Columbia River Total Dissolved Gas and Spill for Fish Passage

Annual report and update

This is an informational summary about the total dissolved gas levels during the 2015 fish passage spill season at the lower four Columbia River dams. The commission requires this report as part of the February 2015 total dissolved gas standard modification issued to the US Army Corps of Engineers and the 2002 total dissolved gas TMDL. The dams included in the modification and addressed as part of this report are Bonneville, The Dalles, John Day and McNary federal hydropower dams on the mainstem Columbia River. DEQ received the 2015 total dissolved gas report from the Corps on January 28, 2016.

2015 results

The total dissolved gas standard is 110 percent of barometric pressure. The 2015 standard modification allows 120 percent in the tailwater, the area downstream of the spilling dam, for the purpose of endangered species fish passage. The standard modification applies to the fish passage spill period of April 1 to August 31. In 2015, Columbia River flows were 86 percent of average, compared to 104 percent in 2014. Between April and August there were no days of high flows above the 7Q10[1], when Oregon's total dissolved gas standard was not applicable due to flood flow conditions on the Columbia River as defined in the 2002 total dissolved gas TMDL.

For the 2015 spill season, the Corps reported 13 percent (77 out of 612) of the total days in the fish passage spill season exceeded the limit specified in the standard modification. In 2014, 7.2 percent of the days exceeded the limits. Malfunctioning monitoring gauges account for all of the 77 exceedances (6 exceedances at McNary dam and 71 exceedances at John Day dam). When situations arise where data is removed from the monitoring record, such as in this case where monitoring gauges malfunction, the Corps' protocol is to report these as exceedances to DEQ. The Corps believes that the higher than normal stream temperature and low flows at John Day dam contributed to conditions within the primary total dissolved gas sensor housing yielding erroneously low total dissolved gas measurements. Therefore, the 71 reported instances at John Day dam may not have actually been exceedances of the limit. Testing conducted at John Day dam near the end of the spill season used comparative data from an auxiliary total dissolved sensor in a housing location adjacent to the primary sensor housing. Test results confirmed that

[1] The average peak annual flow for 7 consecutive days that has a recurrence interval of 10 years, or a 10% probability of being equaled or exceeded in any giving year.

the primary sensor provided inaccurate data. Given the error range there is a possibility that exceedances occurred.

The Fish Passage Center conducted biological monitoring of juvenile salmon and trout for gas bubble trauma at Bonneville and McNary dams during the fish passage spill period in accordance with Corps and FPC protocols. Sampling occurred twice a week at each dam under typical conditions during the first few months of the spill period. In separate approvals, DEQ approved Corps requested reduction in sampling considering the GBT monitoring process exasperated stress experienced by sampled juveniles due to higher than normal stream temperatures. The combination of these conditions resulted in a considerable increase in mortality for juveniles that were not recovering from anesthetization required for GBT evaluation. In approving the Corps' request to reduce monitoring, DEQ considered stream temperatures approaching and exceeding 20 degrees Celsius in the dams' forebays and very low observations of GBT. For monitoring at McNary dam, DEQ gave the Corps approval to reduce monitoring from twice to once a week on June 18 and discontinue monitoring on July 16. For monitoring at Bonneville dam, DEQ gave approval to reduce monitoring from twice to once a week on July 22. Due to low numbers of juveniles passing Bonneville dam, the target sample size of 100 was not obtainable for the remainder of the spill period, and effectively prevented the ability to continue GBT monitoring at Bonneville dam.

The commission-issued total dissolved gas standard modification states that the fish passage spill program must be halted if either 15 percent of the fish examined show signs of gas bubble trauma or if five percent of the fish examined have signs of gas bubble trauma over 25 percent of their surface area. The Fish Passage Center examined 4,573 juvenile salmonids and 6 individuals, or 0.1 percent, had signs of gas bubble trauma with less than 25 percent of their surface area affected. This is a slight reduction from 2014 when 0.2 percent, or 11 salmonids of 6,581 examined, exhibited gas bubble trauma.

Although GBT monitoring halted in mid-July, less invasive condition monitoring of juveniles occurred throughout the spill season at McNary, John Day and Bonneville dams. The 2008 Federal Columbia River Power System Biological Opinion requires the Corps to conduct condition monitoring, a type of biological monitoring, to identify injuries that may indicate dam passage issues. Smolt Monitoring Program personnel did not report observable GBT during condition monitoring. For more information on GBT monitoring and condition monitoring that occurred in 2015 in addition to river conditions leading to the reduction and cessation of GBT monitoring, please refer to the attached memorandum from the Fish Passage Center.

Risks to fish

Although the Corps reported an incomplete total dissolved gas monitoring record because of malfunctioning equipment, biological monitoring indicated a low gas bubble trauma risk to out-migrating juvenile salmonids. The Corps' goal is to meet the total dissolved gas modified limit when implementing the fish passage spill program. To address total dissolved gas monitoring gauge malfunction issues at John Day dam, the Corps relocated the primary total dissolved gas sensor to an adjacent housing location with better internal flow dynamics. The Corps is also implementing additional quality assurance and quality control measures to detect potential

occurrence of erroneously low total dissolved gas measurements at John Day dam. If these errors persist, the Corps will investigate the possibility of utilizing a small submersible pump to further improve flow dynamics in the total dissolved gas sensor housing. DEQ will continue to work with the Corps to reduce the number of exceedances and improve monitoring data accuracy and completeness during the 2016 fish passage spill season.

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MEMORANDUM

TO: Paula Calvert, Oregon-DEQ
Eugene Foster, Oregon-DEQ

FROM: Margaret Filardo

DATE: November 17, 2015

SUBJECT: Sampling for GBT in 2015

In response to your request we are providing a summary of conditions encountered in 2015 and the conduct of gas bubble trauma (GBT) monitoring that took place this year. In a normal year, sampling for GBT begins with the implementation of the voluntary spill program and continues to the end of the spill program (August 31st), or until fish numbers decrease to a level such that sampling quotas cannot be met. GBT sampling requires the handling of a minimum number of fish to assure that the sample observations are representative of the population. In most years if the decrease in fish numbers occurs, it normally occurs toward the end of August when TDG levels are well below the waiver criteria.

Characterization of flow, spill and temperature in 2015

Flow

In 2015 the runoff volume at The Dalles (January–July) was 83% of average (1981–2010). If we consider a longer time period, 1929 to 2014, the runoff volume at The Dalles Dam ranked 68 out of the 87 year record. The low runoff volumes resulted in flows that were considerably less than observed in 2014, or an average of the past ten years (Figure 1).

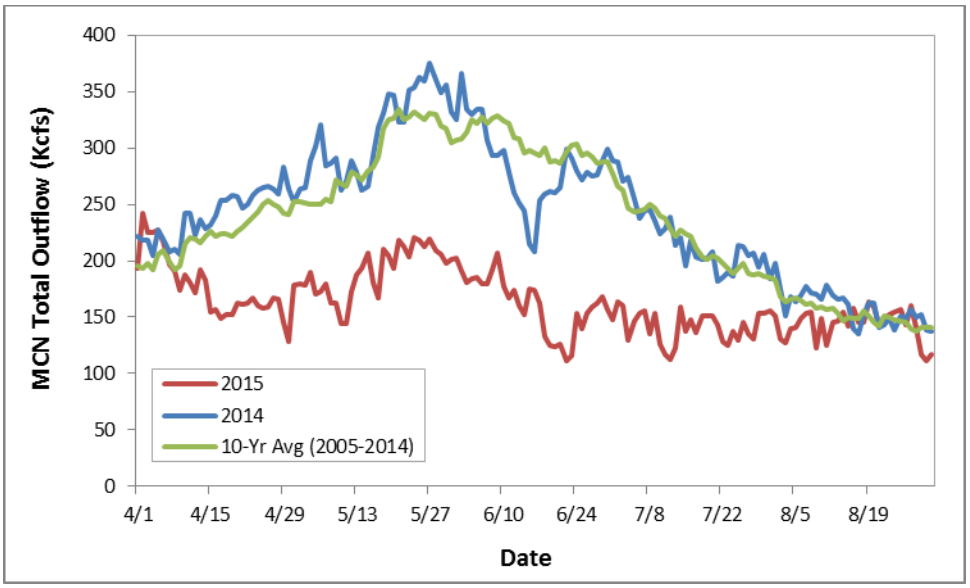

Figure 1. Average daily flows at McNary Dam during 2015 and 2014 as well as the past 10-year average.

Spill

Due to the low flow levels the volume of water spilled at the Middle Columbia projects was also low, since three of the four projects call for spill as a percentage of total flow. Flows in the Snake and Middle Columbia rivers were sufficiently low throughout the entire spring and summer seasons such that uncontrolled spill did not occur. Because of the extremely low flows in 2015, TDG levels were less than the Oregon waiver limit of 120% tailrace TDG throughout the spring and summer spill period, and considerably less during June and July when sampling was interrupted (Figure 2).

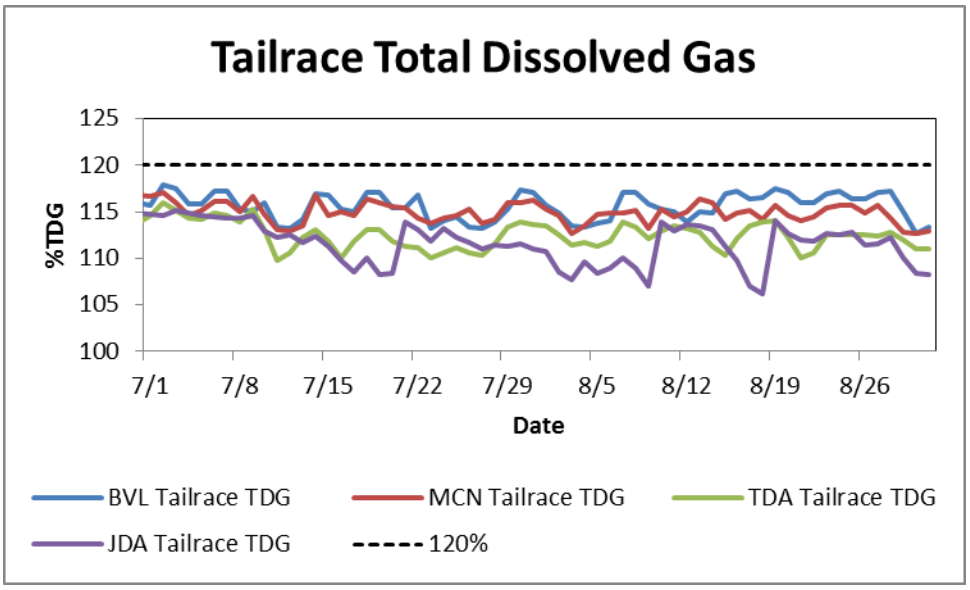

Figure 2. Total dissolved gas (TDG) levels at the tailrace monitors for the Middle Columbia River monitoring sites during July and August of 2015 compared to the 120% Oregon DEQ TDG waiver.

Temperature

The temperature data presented here are from the water quality monitors that are located both in the forebay and tailrace at each project for the passage period of April 1st through August 31st. In 2015, temperatures at Middle Columbia projects were higher earlier in the season than the previous ten years. This pattern is presented here for Bonneville Dam (Figure 3). Water temperatures began to exceed the 68°F water temperature standard during the second half of June and continued above 68°F past the end of the TDG waiver period on August 31st.

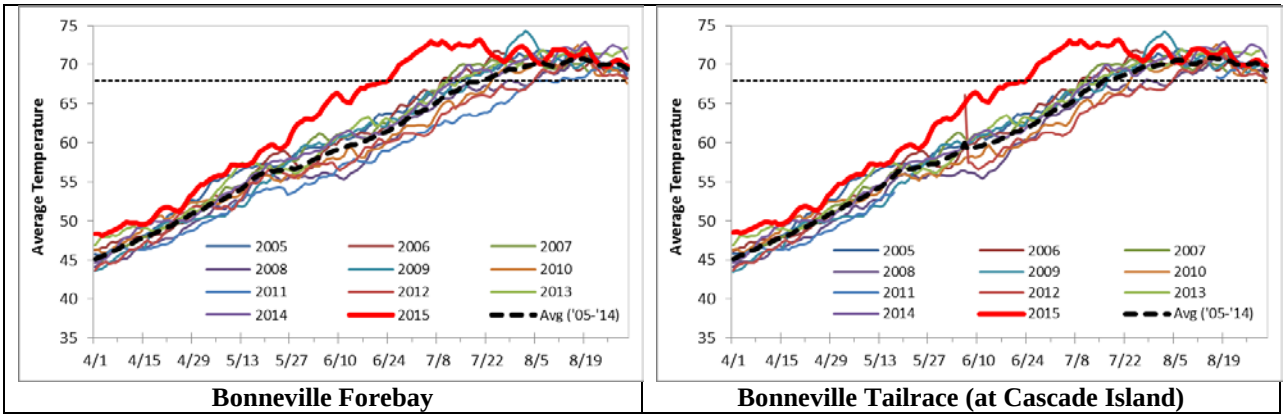

Figure 3. Daily average temperature (°F) at the Bonneville Dam water quality monitors in the forebay and tailrace (at Cascade Island), April 1-August 31, 2005-2015. Dashed line represents the 10-year average (2005-2014). Horizontal dashed line is provided at 68°F for perspective relative to the water quality standard.

Gas Bubble Trauma Monitoring

As part of the Oregon DEQ waiver requirements for the TDG waiver, monitoring for GBT is conducted twice a week at McNary and Bonneville dams' smolt monitoring facilities.

McNary Dam

In 2015 GBT sampling at McNary Dam occurred from April 15th to July 16th. On June 18th, the U.S. Army Corps of Engineers (COE) Biologist at McNary Dam requested a reduction in GBT sampling from twice-per-week to once-per-week due to an increase in the number of mortalities of recovering GBT examined fish. At the time higher than normal temperatures were observed in the river and were close to exceeding 68°F. This request was consistent with the COE's protocols to provide precautionary measures to avoid or minimize any direct or delayed mortality resulting from additional thermal stress when handling juvenile salmonid fishes at water temperatures above 68°F (20°C). The FPC advised Oregon DEQ on this matter and, given that forebay TDG levels were below the EPA 110% standard and GBT levels were minimal to-date, they agreed that once-per-week sampling was warranted. McNary Dam continued once-per-week sampling until July 16th when sampling for GBT was terminated for 2015 due to continued excessive temperatures and high mortalities in the recovery raceways. As with the reduction in sampling, FPC advised Oregon DEQ on the matter. Given that forebay TDG levels were below the EPA 110% and mortalities for recovering fish were elevated, FPC and Oregon DEQ staff agreed that GBT sampling should be terminated.

The TDG levels in the tailwater at Priest Rapids (PRD) and Ice Harbor dams (the upstream projects) never exceeded the 120% waiver level in 2015 (Figure 4). Total dissolved gas at the MCN forebay never exceeded the 115% waiver level in 2015. There were four instances when GBT was detected in a sample at McNary Dam in 2015 (Figure 4). All four of these incidents had a prevalence of 1.0% and all of the fish that showed signs of fin GBT at MCN in 2015 had Rank 1 signs (1%–5% of fin area occluded with bubbles).

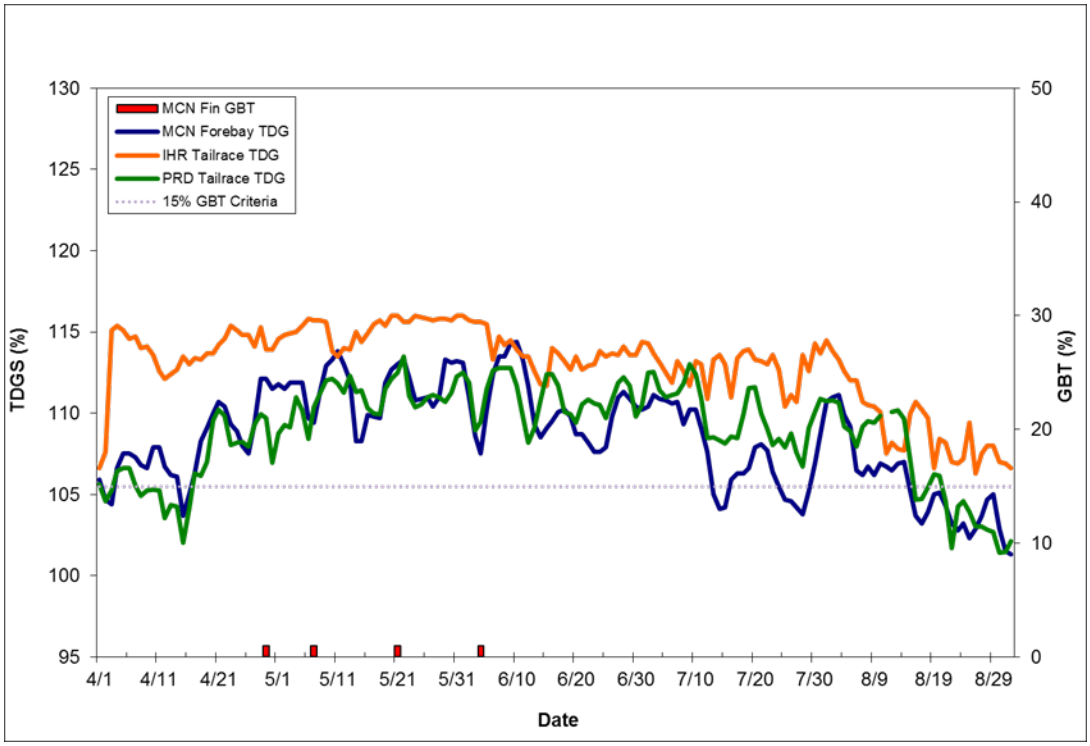

Figure 4. Percent GBT observed in the sample of fish at McNary Dam over the 2015 sampling period.

Bonneville Dam

GBT sampling at BON occurred from April 22nd to July 20th. After the July 20th GBT sample the Fish Passage Center, after advising Oregon DEQ staff, reduced sampling at BON from twice-per-week to once-per-week. Similar to MCN, the decision to reduce the sampling frequency was due to the combination of increased moralities of recovering GBT examined fish, elevated temperatures at the facility, and TDG levels in the forebay that were generally below the EPA 110% standard. At the same time, collection of the 100 fish target was becoming difficult. On July 20th, FPC staff informed personnel at BON to proceed with GBT sampling once-per-week but only to examine fish for GBT if the target of 100 fish was obtainable. Due to continued low passage numbers, this target sample size was never obtainable, and thus, the July 20th GBT sample was the last for the 2015 season. At Bonneville Dam, there were two occasions in 2015 when signs of fin GBT in fish were recorded (May 6th and May 27th) (Figure 5). On both of these occasions the GBT prevalence was 1.0%. Both of the fish that exhibited signs of GBT at BON in 2015 had signs that were Rank 1 (1%–5% of fin area occluded with bubbles).

The Dalles Dam

Total dissolved gas in The Dalles Dam tailwater was managed under both the Oregon and Washington methodologies of estimating a 12-hour average TDG. Under the Oregon methodology, the 12-hour average is based on the 12 highest hourly TDG measurements in a single calendar day, regardless of whether they are consecutive or not. Under the Washington methodology, the 12-hour average is based on rolling 12-hour averages with the highest of the rolling averages reported as the 12-hour average for a given day. The COE managed to the gas level based on the higher of the two methodologies. The 12-hour averages under both of these methodologies are provided in Figure 5 below. Total dissolved gas in The Dalles tailwater never exceeded the 120% waiver level in 2015. Total dissolved gas in the BON forebay exceeded the Washington DOE 115% waiver level for a total of seven days in 2015. The longest continuous period where the BON forebay exceeded 115% was only three days, from May 9th to May 11th.

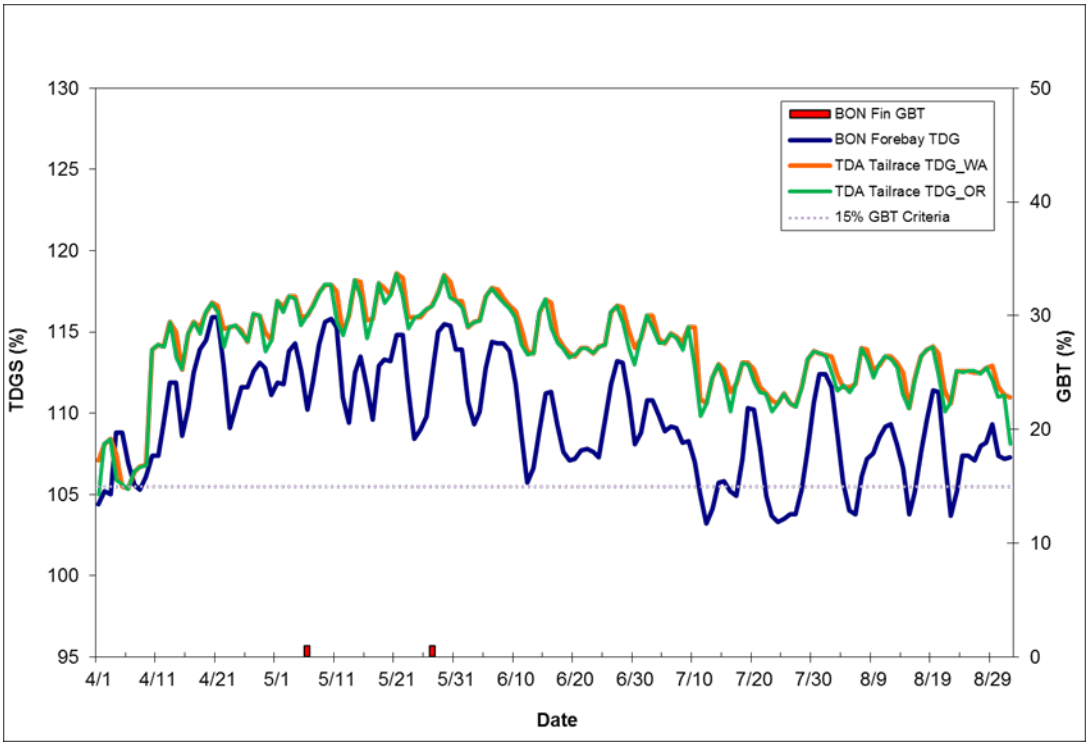

Figure 5. Percent GBT observed in the sample of fish at Bonneville Dam over the 2015 sampling season.

Condition Monitoring

Under Reasonable and Prudent Alternative 53 in the 2008 Biological Opinion the COE is directed to "Monitor and document the condition (e.g., descaling and injury) of smolts at all dams with Juvenile Bypass Systems (JBS), identify potential problems, and evaluate implemented solutions." Consequently, condition monitoring is conducted at McNary, John Day and Bonneville dams in the Middle Columbia River. The primary role of the condition monitoring is to identify the proportion of each species of migrant juvenile salmonid and larval and juvenile lamprey (where applicable) that are descaled (salmonids only) or have significant

injuries indicative of problems in fish passage at dams, such as debris in fish bypass apparatus. Secondarily, the data collected on disease, predation, and other injuries will provide a relative indication of the health of fish passing at the dams.

The dams in the Middle Columbia River equipped with JBS (McNary, John Day and Bonneville) all have high temperature sampling protocols designed to minimize stress and mortality associated with handling under these circumstances. At John Day, routine sampling under the Smolt Monitoring Program ceases and "condition only" sampling occurs twice per week. At MCN, sampling remains every other day, but target sample sizes are reduced. At BON, sampling frequency is reduced from every day to every other day. While GBT monitoring is not conducted as part of the condition sampling because the sampling protocol is different (fish are not sampled immediately as they enter the project for condition monitoring), the personnel conducting condition monitoring have also been trained to conduct GBT monitoring. SMP personnel are encouraged to report any pertinent information or observations made during the fish condition procedure. Consequently, the staff would notify the FPC Smolt Monitoring Program Coordinator of this occurrence.

Please feel free to contact me if you need any additional information.