

COLUMBIA RIVER TECHNICAL MANAGEMENT TEAM

April 18, 2018

Facilitator's Summary

Facilitator: Donna Silverberg; Notes: Charles Wiggins, DS Consulting

The following Facilitator's Summary is intended to capture basic discussion, decisions, and actions, as well as point out future actions or issues that may need further discussion at upcoming meetings. These notes are not intended to be the "record" of the meeting, only a reminder for TMT members. Official minutes can be found on the TMT website: <http://www.nwd-wc.usace.army.mil/tmt/agendas/2018/>

Meeting Summaries and Notes

Notes and minutes for April 4 were approved after minor edits. Erick VanDyke, ODFW, will review the longer April 11 minutes and let the Corps know if he needs any changes by end of business on April 19th.

Dworshak Operations

Steve Hall, Corps, gave a report on conditions at Dworshak. Supporting charts are available on the TMT web site. Currently the forebay elevation is 1472.9 ft. and filling, with 7.5 kcfs discharge and 16 kcfs inflow. The NWRFC water supply forecast for the North Fork Clearwater is unchanged from last week, with continuing wet weather leading to a predicted 3 maf April/July runoff. TDG levels have fluctuated between 100-102.5% at the Peck gauge, where fish are in the river. A data logger malfunction at the hatchery has affected measurement reliability for several days; a crew is now out to repair the equipment. Hatchery TDG levels should be close to 100%.

The NWRFC Dworshak inflow forecast is for inflows starting to fall off through the rest of April. The ten-day forecast predicts relatively dry and somewhat warmer conditions, with no large storms expected. The NWRFC climate forecast is for a warmer and drier 6-10 day and 8-14 day outlook; an equal chance of higher or lower temperatures and higher than normal precipitation looking out 30 days; and equal chances for both conditions for the next 90 days.

Snowtel readings show that wet conditions have built snowpack throughout the basin, estimated at 125% of normal. The regional outlook most closely tracks the 2011 water year. The next ten days should see nighttime freezing and daytime thaw at higher elevations, which should limit melting. After that, there should be round-the-clock melting.

Steve said these data make it prudent for the Corps to continue to discharge 7.5 kcfs until the end of the month, then perhaps drop to 4.8 kcfs at full powerhouse. This operation will be weather-dependent. Several fish managers thanked Dworshak personnel for a good job.

Lower Snake River MOP Operations

Aaron Marshall, Corps, presented information on planned lower Snake River operations in accordance with MOP. Lower Granite is conducting a variable MOP operation because of sedimentation in the reservoir near the confluence of the Snake and Clearwater Rivers, especially near the ports of Lewiston and Clarkston, where it affects navigation. Lower Granite is operating at MOP +1, from 734 to 735 feet, with a current elevation of 734.5 ft. Current inflows are about 110 kcfs, and are expected to drop to 95 kcfs later in the week before increasing again. The

LWSI is reading 735.5 ft., showing a one-foot elevation difference between the forebay. The Corps uses gages to inform project operations in order to manage for safe navigation.

Based on the STP extended forecast, Lower Granite is projected to operate at MOP +1 until early June with inflows from 80-120 kcfs. The inflection point will be mid-May to mid-June when inflows could vary from 100-150 kcfs. If inflows are expected to exceed 120 kcfs for several days or more, Lower Granite will transition to the MOP operating range. In late June, as flows recede, Lower Granite will transition to MOP +1.5 and later rising to MOP +2. The transition between operating ranges is based on forecasted inflow and is made in real-time one day in advance. The Corps will continue to monitor inflow and will provide updates to TMT on variable MOP operations.

On Friday, 13 April, the Lower Monumental operating range was extended by 0.5 ft. above MOP up to a maximum of 538.5 ft. for navigation safety. Operators will make best efforts to remain within MOP. The expanded range will allow operators to use the full 1 foot operating range and will only use the additional half foot on an as needed basis. Since implementation of the expanded operating range, Lower Monumental has remained within MOP except for a one-hour exceedance up to 538.02 ft. With 4 out of 5 available generator units currently operating with fixed blades, there are deadbands that make it challenging to keep the forebay within MOP. On Thursday, 12 April, with changes in the spill cap, inflow, and unit operations, the forebay was drafted to the minimum of 537.00 ft. The expanded operating range is needed to avoid decreasing below the minimum forebay elevation for navigation safety. The Corps has not received any concerns from navigation stakeholders. Unit 6 is expected to return to service as an adjustable blade unit on 11 May. Unit 1 is expected to return to service in early July as an adjustable blade unit.

FOP Spring Spill Update

Dan Turner, Corps, updated TMT on spill operations. The operation began at lower Snake River facilities on April 3. Dan explained that each facility registers TDG at two gauges, at the forebay and the tailwater. When expressing exceedances to the gas cap in the overview tables provided, the most restrictive reading is used. In general, there were many exceedances to the gas cap as the Corps worked to implement the new regime. After last week's difficult initial experience, fewer exceedances are expected moving forward as pressure and wind levels stabilize.

Columbia River spill cap operations began April 10. It has proven easier to adjust McNary to a spill cap of 120% than at other facilities. The Dalles is significantly influenced by upstream TDG. Ice Harbor, McNary and Bonneville are influenced most by tailwater conditions.

The Corps is doing its best to meet the strictest state's water quality standard. Barometric pressure continues to have a significant effect on TDG levels, complicating operations. In general, as pressure decreases, TDG levels increase. The main difficulty observed so far has been variability in readings at the downstream forebays. Tailrace values seem to be tracking more predictably. As a result, the Corps had inquired whether NOAA Weather could provide are making efforts to obtain more complete atmospheric pressure forecast data to help the process. One participant mentioned that, while it seems not a problem at present, it might be useful to track the results of operations on fish health and passage.

The Corps reminded TMT members that it has responsibility for managing spill cap operations as outlined in the attachment to the Court order in the document titled, "Procedure for Setting 2018 Spill Caps." The task is taking more time than they had expected and requires intensive labor to

monitor and adjust. As a result, the Corps would prefer to discuss operations weekly at TMT. If fish managers have input between meetings, they should coordinate with the FPAC co-Chair Paul Wagner, NOAA, who will share the ideas during his daily calls with the Corps. The Corps will discuss how it has been responsive to input at TMT.

Methodologies to Monitor Snake River Adult Passage

Russ Keifer, ID, reported there are no changes in this project from last week. DART has a beta product on its web site. FPC also has a beta product, which is being refined internally. This methodology should be ready for presentation to TMT soon.

Operations Review

Highlights of operations were presented. Paul Wagner reported on fish. He observed that only 3% of the 10 year average of adult Chinook have passed Bonneville, but water temperature may not yet be right to entice the fish to move. Adult Steelhead are at 73%, and adult wild steelhead are at 86% of average. Juveniles are moving downstream efficiently, especially at Lower Granite and Little Goose, with Steelhead numbers at times being higher than spring Chinook.

Joel Fenolio, BOR, reported the Hungry Horse (HGH) forebay elevation at 0900 hours today was 3481.7 feet with project outflows of 13 kcfs. Based on current conditions HGH will likely refill sometime in July. Grand Coulee elevation is 3423.0 feet. Sherri Sears, Colville tribe, noted that the Ferry is currently out of service and they will be in touch soon.

The next TMT meeting is a conference call on April 25, at 9:00 AM.

Columbia River Regional Forum
TECHNICAL MANAGEMENT TEAM OFFICIAL MINUTES

April 18, 2018
Notes: Pat Vivian

1. Introduction

Representatives of the Nez Perce Tribe, COE, Washington, NOAA, USFWS, Oregon, Idaho, BPA, Colville Tribe, Montana, BOR, CRITFC/Umatilla and others participated in today's TMT meeting chaired by Doug Baus, COE, and facilitated by Donna Silverberg, DS Consulting.

2. Review Meeting Minutes – April 4 and 11

The meeting minutes and facilitator's notes for April 11 were both finalized. The April 4 facilitator's notes were finalized with an edit of the juvenile transport discussion. Finalizing the April 4 minutes was put on hold until tomorrow morning to allow more time for review.

3. Dworshak Operations

3a. Hourly Data. Steve Hall reported. Dworshak reservoir is at elevation 1472.9 ft and filling, with discharges of 7.5 kcfs and inflows of 16 kcfs.

3b. NWRFC Water Supply Forecast NF Clearwater – Dworshak Dam. The official water supply forecast for April-July is still approximately 3 maf.

3c. Hourly TDG (tailrace, hatchery and Peck). Total dissolved gas levels are below 110% saturation in the North Fork Clearwater. Due to data reporting problems with the hatchery probe, there was no report today on TDG saturation levels in the hatchery. Every effort is being made to restore the lost data. When repaired, the probe is expected to report TDG levels of around 100% saturation in the hatchery.

Gas levels at the confluence of the Clearwater and the mainstem Snake River (the location of the Peck gage) are around 102.5% saturation depending on temperatures. The Nez Perce Tribe has expressed concern about conditions for naturally emerging fish at this location, so the Peck gage was added to regular TMT check-ins for this agenda item.

3d. NWRFC Dworshak Dam Inflow Forecast. Inflows are 16 kcfs, expected to drop to 10-12 kcfs for the rest of April. The 10 day forecast indicates a shift to drier weather patterns because storms are no longer coming in from the Pacific Ocean. With rain as the likely source of recent

runoff, and little snowmelt occurring, DWR inflows are expected to decline over the next few weeks.

3e. NWRFC Climate Forecast. The 6-10 day forecast is warmer and drier than normal, and the 8-14 day forecast follows the same trend. The one month forecast calls for more precipitation than normal and equal chances of higher or lower temperatures than normal. The 90 day forecast calls for equal chances of higher or lower temperatures and precipitation than normal.

3f. Snowpack Comparison Graphs. Snowpack continues to build. Hall showed TMT graphs comparing SWE accumulation at five stations throughout the Clearwater basin to analog years 2008, 2011 and 2012.

- Crater Meadows, a high elevation station, is tracking the analog years with snowpack continuing to build.
- Snowpack also continues to build at Hemlock Butte, a mid-elevation station.
- Hoodoo on the northeastern edge of the basin is showing lower snowpack than the rest of the stations, tracking closest to 2012.
- Lolo Pass on the southeastern edge of the basin continues to build snowpack, tracking closest to 2011.
- Lost Lake in the northwest corner of basin is continuing to track 2011, which had the highest inflows of all the analog years.

Snowpack currently exceeds 125% of normal. It's likely that SWE accumulation will level out soon unless the weather forecast is wrong.

3g. Proposed Dworshak Operation. Hall showed TMT an operational graph based on the RFC's 10 day forecast, using analog year 2011 because it tracks closest to 2018 at key locations in the basin. Snowmelt in May is likely.

Under these conditions, the COE believes it's prudent to hold 7.5 kcfs discharges through the end of April, then drop to full powerhouse flows, which at this point is 4.8 kcfs.

Charles Morrill, Washington, asked about freezing levels and minimum temperatures over the next 10 days. Freezing is expected at high elevations, Hall replied. Freezing at night and warmer temperatures during the day are predicted in the mountains, a freeze-thaw cycle that tends to limit runoff. Toward the end of the 10 days, runoff might be elevated, and thunderstorms could impact temperatures.

Paul Wagner, NOAA, said this operation looks good. Russ Kiefer, Idaho, agreed.

4. Lower Snake River MOP Operations

4a. Lower Granite Dam Hourly Data. Aaron Marshall reported. The COE is implementing a variable MOP operation at Lower Granite this year due to sedimentation at the confluence of the Clearwater and Snake Rivers near Lewiston. Current inflows of 110 kcfs are within the range of 80-120 kcfs that defines the Granite operation as MOP+1, limiting the forebay elevation to 734-735 ft. Inflows are expected to decrease to 95 kcfs before lower elevation snowmelt starts.

There's currently a 1 ft difference between the Lewiston gage (elevation 735.35 ft at the confluence of the Snake and Clearwater rivers) and the Lower Granite forebay gage. Lower Granite is operating to maintain a minimum elevation of 735 ft at the Lewiston gage. This operation provides the additional 2 ft of depth needed for navigation safety.

Erick Van Dyke, Oregon, asked which gage is most critical. Marshall said both are important, but the operation follows the forebay gage. The modified MOP operation serves to keep the pool high enough for safe navigation when inflows are low. When inflows exceed 120 kcfs, Lower Granite will transition to MOP.

4b. Lower Granite Dam Extended Forecast. This graph represents the latest STP extended forecast the COE sends out each Monday in spreadsheet form.

4c. Lower Granite Dam Variable MOP. This presentation superimposes MOP operation ranges over the extended inflow forecast for Lower Granite. Inflows will probably continue in the MOP+1 range of 80-120 kcfs until early June based on this forecast. The current forecast indicates inflows will be 100-120 kcfs from mid to late May until mid-June (i.e. MOP+1 ft), with chances of snowmelt starting in mid-May. When flows decline in late June, the project will transition to MOP+1.5, then to MOP+2 ft in July when flows go below 50 kcfs.

Wagner asked whether the shift to MOP will be instantaneous or based on a forecast of flows over 120 kcfs. Marshall said the COE will make the call one day ahead. This advance notice should allow for a smooth transition to MOP.

Because MOP is a fish protection measure, Oregon wants to see it maintained, Erick Van Dyke commented.

4d. Lower Monumental Dam Hourly Data. On April 13, the COE notified TMT via email that the upper MOP operating range of 537-538 ft at Lower Monumental was extended by ½ ft. With inflows of 110 kcfs and spill of 40 kcfs, the pool elevation is currently in the middle of that range.

The operating range needed to be increased because unit 1 is out of service until the end of July. Of the 4 units operating, only unit 5 has an adjustable blade; the others are fixed-blade until they are upgraded. These conditions at Lower Monumental are making spill operations downstream at Ice Harbor more challenging.

One way to adjust the lake level is through changing generation, Marshall explained. On April 12, the LMN spill cap was changed from 42 kcfs to 40 kcfs. At the same time, inflows were increasing, and the forebay elevation was rising. Generation was adjusted to continue to meet the spill target and keep the project in its MOP range.

Increasing generation by adding another turbine unit meant discharges rose from 63 kcfs to 81 kcfs, rapidly drafting the forebay. By 1:00 am on April 13, the pool hit 537 ft elevation, the minimum depth required for navigation safety. The ½ ft MOP adjustment was made as a buffer to allow LMN to operate closer to its upper elevation range. Lack of ability to adjust the fixed-blade units increases the need for a buffer, Julie Ammann, COE, noted. Yesterday the forebay elevation rose to 538.02 ft, Marshall said. The added flexibility at the top end helps keep the pool elevation from getting too close to the bottom.

Van Dyke asked whether the navigation community had input on this decision. While there have been calls from stakeholders in the past, Marshall said, there has been no feedback to date on the Lower Monumental MOP operation. Marshall also noted that although it was close, the project had not gone below the minimum level for navigation, so tow boaters did not experience an impact. This expanded MOP operation would help ensure navigation requirements were met.

Dave Swank asked about the status of the unit rebuilds. In early July when unit 1 returns to service, it will have adjustable Kaplan blades, Ann Setter, COE Walla Walla, said. Unit 6 is expected to return to service on May 11, also with adjustable blades.

Russ Kiefer asked whether there are power production concerns with MOP in addition to navigation concerns. BPA follows the rules of power generation and adjusted the boundary to meet all requirements, Tony Norris replied. The fish ladder has a minimum pool elevation which could be impacted with an elevation below MOP Setter added.

5. FOP Spring Spill Update

5a. Snake River TDG Overview Table. Dan Turner, COE, presented spill cap overview tables that show TDG readings by date in the project tailwater and the next downstream forebay, highlighting gas cap exceedances. The tables also identify spill caps, minimum generation operations and actual daily average spill at the four lower Snake River dams.

After a week of gas cap spill, with all the variables in TDG management, the result is more exceedances on the Snake than readings under the gas cap, Turner reported. Meeting but not exceeding the gas cap is proving extremely difficult.

For example, in the past 5 days at the Little Goose gauges: 2 days exceeded, 2 days were under and 1 day actually met the gas cap, despite many hours of staff time involved. Goose is especially challenging because the tailwater gage reacts to upstream forebay readings.

TDG levels meeting but not exceeding the gas cap, may be an unrealistic expectation most of the time, Turner noted. Few of the downstream forebays actually had 115% TDG. Since spill season started, today is the only day Lower Granite hit the gas cap with 115% in the downstream forebay. Lower Monumental downstream forebay is 113%, while Ice Harbor has 120% TDG saturation in the tailwater.

In response to questions, Turner said the tailwater and downstream forebay TDG readings are linked on the chart because the projects are required to operate to both tailwater and forebay limits. So both readings are highlighted if TDG levels at either gage exceeded the state water quality standards of 120% in the tailrace and 115% in the next downstream forebay.

Russ Kiefer suggested listing the forebay and tailwater exceedances separately to flag exceedances that are the result of uncontrolled spill. Dave Swank wondered whether the readings on the chart are hourly values, and Turner said that might be captured in later iterations. An asterisk will denote when a project had involuntary spill.

5b. Columbia River TDG Overview Table. Spill on the Columbia River started on April 10, a week after spill started on the Snake. Generally the Columbia projects have lower travel times than the Snake. For example, travel time from TDA tailwater to BON forebay is only 1.2 days.

McNary has been the most successful at spilling to the gas cap while meeting both tailwater and downstream forebay requirements. Spill started at 190 kcfs and the cap was raised to 195 kcfs, then 198 kcfs in an effort to target 120% TDG in the tailrace.

However, it has proven more difficult to achieve TDG at the gas cap at projects downstream of MCN because the next forebay tends to be the most restrictive gage.

At The Dalles, spill caps have been lowered in an effort to reduce downstream forebay TDG readings. The Dalles appears to be significantly influenced by upstream concentrations. The gas cap will probably go lower to maintain 115% saturation in the downstream forebay.

Russ Kiefer asked whether the bathymetry in the tailrace or “flip lip” spillway deflectors are making TDG management easier at MCN and IHR than at other projects. Spill operations at IHR, MCN and BON are driven by tailwater readings as opposed to downstream forebays thus easier to target, Turner replied. In addition, IHR tailwater benefits from mixing with the Columbia where TDG levels are lower, generally making MCN forebay readings less of a concern. Between MCN and JDA, there’s plenty of time for degassing with the long reservoir.

5c. Project Graphs. Turner presented graphs showing variability in TDG readings on the Columbia similar to those on the Snake, with wide swings of 6-7% saturation especially in downstream forebays. Saturation levels can change quickly in response to barometric pressure, even if TDG is unaltered by travel time. As barometric pressure goes up, TDG saturation goes down. Julie Ammann has contacted the National Weather Service for more reliable barometric pressure forecast data.

Jay Hesse, Nez Perce, commented on the gas cap spill operations to date:

1. Pre-season predictions of flow ranges to meet water quality standards were good.
2. It’s preferable to see more exceedances than spill too low to meet the gas cap. The tribe had initial concerns that the operation would be too conservative.

Managing to the differences in the Oregon and Washington water quality waivers adds to the challenge, Julie Ammann said. She also pointed out that the Corps was not operating projects to try to exceed, they were really trying to meet, but not exceed. The Washington standard is

usually more restrictive. There was discussion of the nuances in calculating TDG exceedances in Washington and Oregon.

5d. Communication. Julie Ammann outlined the preferred communication protocol with COE RCC during spill to the gas cap operations under the court order. Every day, RCC staff will review TDG data, run models, and adjust spill caps to meet both Washington and Oregon water quality standards. Project staff and BPA will be notified of the spill caps, and they will be posted to the TMT website.

The preferred mode of communication re: spill caps is TMT meetings. Calls to individual staff might not be returned promptly due to heavy workload, and emailed requests for information may not reach all TMT members, whereas discussions at TMT benefit all parties.

Paul Wagner agreed to serve as the point of contact for Salmon Manager concerns that arise in between TMT meetings. Other key contacts are listed on the memo posted to today's agenda.

The regularly updated fish passage spill cap reports for the Snake and Columbia (attachments 5a and 5b on today's agenda) are the first place to look for updated spill information, Turner said. These numbers are updated as soon as 24 hours of data are available. The goal is to post spill caps by 2 pm daily.

Russ Kiefer said he was concerned last Friday when he saw LGS was only spilling 28.7 kcfs with inflows of 112 kcfs, which is only 25% of river flow. The tailwater TDG reading was 113% so from his perspective there was room to spill more. Spilling less than 30% of river volume at Goose will always trigger fish concerns. Kiefer asked how the Salmon Managers should communicate issues that come up late in the day on a Friday, when conditions for fish over the weekend are at stake. For urgent issues, Ammann said, give the COE a call. But people need to recognize the ability of staff to respond is very constrained.

6. Methodologies to Monitor Snake River Adult Passage

There has been no significant change in methodology development since last week, Russ Kiefer reported. The FPC and DART versions were not ready today for TMT review as planned. TMT will discuss this more in the process meeting.

7. Operations Review

7a. Reservoirs. Due to a thorough discussion of spill caps and project conditions earlier, there was no need to review project operations.

Joel Fenolio gave an update on BOR projects. Grand Coulee is at elevation 1233 ft, drafting 1 ft a day toward a 1222.7 ft target. The Inchelium Ferry is currently out of service at 1233 ft. The roads have not been fully restored after being washed out by high flows last year, Sheri Sears reported. Fenolio said the Colville Tribe has been notified there's a flood risk again this year.

Hungry Horse is at elevation 3481.7 ft, discharging 13 kcfs, soon to increase to 15 kcfs. The water supply forecast is 150-160% of average due to a healthy snow pack. This is probably going to be a big water year like 2011, with HGH spilling into July depending on snowpack.

7b. Fish. Adults: Paul Wagner reported the latest counts. Only 289 spring chinook adults have arrived at BON, which is just 3% of the 10 year average. Kiefer suggested temperatures on the lower Columbia could be playing a role in these low numbers. Fish may be present but not moving until the water gets warmer.

Wagner reported adult steelhead returns are 2,278 to date, which is 73% of the 10 year average. These are winter fish that don't typically pass McNary. The wild steelhead count is 979 adults, which is 86% of the 10 year average.

Juveniles: Juvenile passage is well underway. Large numbers of yearling Chinook are passing. Index counts in the past week exceeded 100,000 at Granite and 68,000 at Goose. This is why Russ Kiefer wanted a response last Friday re: the LGS spill cap, Wagner said.

Actual adult returns from these juvenile numbers could be higher, Kiefer said. Index counts don't reflect the improved passage efficiency of surface spillway weirs. When spilling a lower proportion of river flows through the LGS weir, the actual population will be much higher than index counts indicate.

PIT tag data from DART and FPC indicate that spring Chinook hatchery counts are well ahead of their expected numbers at this time, Charles Morrill reported. Juvenile steelhead are following the same trend, Wagner said. The index count of 186,000 steelhead at Lower Granite is higher than that for spring Chinook. The steelhead index count is 264,000 to date at Little Goose.

8. Next TMT Meeting

TMT will meet next in a conference call April 25.

<i>Name</i>	<i>Affiliation</i>
Jay Hesse	Nez Perce
Lisa Wright	COE
Charles Morrill	Washington
Paul Wagner	NOAA
Doug Baus	COE
Dave Swank	USFWS
Julie Ammann	COE
Erick Van Dyke	Oregon
Russ Kiefer	Idaho
Tony Norris	BPA
Aaron Marshall	COE
Charles Wiggins	DSC
Michelle Yuen	COE
Dan Turner	COE
Lance Hebdon	IDFG
Amit Karki	COE
John Annasis	BPA
Pat Vivian	note taker

Phone:

Sheri Sears	Colville Tribe
Jim Litchfield	Montana
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