COLUMBIA RIVER TECHNICAL MANAGEMENT TEAM
November 15, 2017
Facilitator's Summary
Facilitator: Emily Stranz; 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/2017/

Meeting Minutes and Facilitator's Summary
The group approved the official TMT minutes and meeting summaries for the October 25 and November 1 meetings without additional modification.

Dworshak Update
Steve Hall, COE, provided information on potential operations at Dworshak Dam. He discussed two slides that are posted on the TMT web site. The first compares snowpack conditions for the past several years. For the 2018 water year, there are now 5 inches of snow water equivalent in the basin, which is a little above both the normal amount and recent years. Steve stressed that it is still early in the year, so there are a lot of uncertainties around the water and snow supply forecasts. Additionally, it is hard to predict what this year will look like given the weak La Nina signal. The second slide shows refill requirements for Dworshak in the lowest 25% of the 44 water years on record. The current Corps BiOp refill operation, based on current water supply conditions, is assuming 1 unit on minimum outflow (1.6 kcfs) from now until January 1, 2018, and then increasing outflows to 2.4 kcfs through July 1, 2018. Steve noted that there is interest in the region to increase outflow and move some water out earlier; however, based off of the information available at this point, and the uncertainty of the water year, he suggested that rather than increasing outflows now, wait for the January Water Supply Forecast is out and decide the next steps once that information is available. He continued that in 2017, they didn't start moving water until the end of January.

Salmon Managers shared that due to last year's conditions and situation, they are more cautious and interested in moving water earlier in order to avoid high flows, limited turbine capacity and subsequent high TDG. Additionally, there is concern that sustained higher flows could result in limited water supply and thus dewatering fall Chinook redds downstream. Jay Hesse, Nez Perce, noted that likely flows between 1.6-5kcfs are okay, however, he suggested running one full unit until mid-December and then reassessing conditions. The Salmon Managers shared that they are interested in keeping a close eye on the conditions and adjusting operations as needed to manage TDG.

The group brainstormed ways to move forward, including:

- Pass inflow at least until mid-December; do not aggressively refill during the month of November. Check in on progress weekly.
- Provide an end-of-year pool elevation and let operators manage to that level given the capacity of two turbines.
- Run one unit unless inflow exceeded 4 kcfs, then the second unit could be added.
- Run minimum flows for two weeks and then reassess at TMT.

After much conversation, the TMT decided to continue passing minimums until they can reassess at the December 6th TMT meeting. In the meantime, FPAC will revisit the 2016 Dworshak operation priorities to see if there are any edits needed and to work towards consensus on those priorities. Steve noted that because the Corps plans to operate to the BiOp, if there is a suggested change from Salmon Managers (for instance, coming in under the April flood control elevation), the Corps will need to hear a consensus recommendation. Their interest is in making sure that the region is accepting any potential risk to refill.

Additionally, Steve will provide model runs to help inform the FPAC conversation prior to the December 6th TMT meeting. He will develop plots similar to what was developed in 2016 that show scenarios to get to a target TDG, considering low, medium and high water years.

→ ACTIONS: The Corps will continue operating Dworshak at minimum flows until the TMT can revisit operations at the December 6th meeting. Prior to that meeting, Steve will provide FPAC with their requested model scenarios. FPAC will meet to discuss desired operations, as well as their priorities for operating Dworshak over the coming season.

Unit 3 Update

Steve updated TMT on progress on the Unit 3 overhaul. The contractor has fabricated new bars in Europe, which meet specifications. They will be shipped to Canada for applying a special coating, then moved to the project the end of January 2018. The contractor will begin installing the bars in February, with a return to service expected in late May. Steve will continue to provide updates to the TMT and expects the next milestone update to be in February 2018.

Chum Operations

Paul Wagner, NOAA, and Charles Morrill, WA, reported on chum. There is now some chum spawning activity at all of the normal sites in the Ives/Perce complex. They noted that Todd Hilson, WDFW, reported observing low numbers spawning and significant predation by Stellar sea lions in the Woodward area. Doug noted that 17 chum had passed Bonneville.

The current Water Supply Forecast predicts 91 MAF (104% of normal) at The Dalles, and 23 MAF (117%) at Lower Granite. Doug reiterated that it is still early in the water year, so these numbers will change. The RFC forecast shows a probability of above average temperatures and precipitation for the Northwest over the next 6-10 day and 8-14 day periods. Looking out a month, the RFC forecast predicts below average temperature and above average precipitation in OR, ID, and MT. Inflows at Bonneville are currently at 115 kcfs; a spike up to 140 kcfs is expected in the next 3 days and back down to 130kcfs over the 10-day period. At 9 AM today, outflow at Bonneville was 121.5 kcfs, with a stable tailwater elevation at about 11.9 feet.

No changes were made to the current chum operation.

Operations Review

Reservoirs: Chris Runyon, BOR, reported on Bureau of Reclamation projects:

- Hungry Horse midnight elevation was 3,539.83 ft., current discharge is 2.39 kcfs, and inflows are.42 kcfs. They are operating to meet the Columbia Falls minimum flows.
- Grand Coulee midnight elevation was 1,285.5 ft. They are operating to support chum in the lower river.

Lisa Wright, Corps, reported on US Army Corps of Engineers projects:

- Libby midnight elevation was 2,439.8 ft., current inflows are 3.4 kcfs, and discharge is 5.1 kcfs.
- Albeni Falls midnight elevation was 2,051.3.4 ft.; yesterday's average inflow was 13 kcfs and outflows were 14.3 kcfs.
- Dworshak midnight elevation was 1,519 ft.; inflow yesterday was 2.1 kcfs and outflows were 1.6kcfs.
- Lower Granite average daily outflows were 18.1 kcfs.
- McNary average daily outflows were 102.9 kcfs.
- Bonneville average daily outflows were 119.2 kcfs

Doug Baus, COE, reminded TMT members that the second draft of the Water Management Plan is now available for comments. Comments are due on November 20. The document is at: http://pweb.crohms.org/tmt/documents/wmp/2018/Nov_14_Draft/20171114_WMP_Draft_NWD.pdf.

Fish: Paul Wagner, NOAA, reported on fish. Juvenile fish passage is complete for the season. At Bonneville adult fall Chinook numbers are 61% of the 10-year average; jacks are 49%. Steelhead are 35% of the 10-year average and wild steelhead are 30%. At Lower Granite fall Chinook numbers are 74% of the 10-year average; jacks are 48%. Steelhead are 45% of the 10-year average and wild steelhead are 33%. Tony asked for clarification on the zero generation steelhead passage targets. Paul noted that he will confirm, however, believed the targets to be 30 steelhead and 10 wild steelhead.

Water Quality: Dan Turner, Corps, reported that there are relatively low TDG levels throughout the system. Lower Granite has higher TDG than the rest of the projects due to current spill.

Power Supply: Tony Norris, BPA, reported there was some wind activity in the system, causing several dips down to 900MW of hydroelectric generation. He noted that they reached the reserve limit and the production dropped by 13,000 MW within an hour due to increased wind production. More information can be found at: https://transmission.bpa.gov/Business/Operations/Wind/reserves.aspx.

The next TMT meeting will be a conference call on December 6, at 9:00.

Columbia River Regional Forum
TECHNICAL MANAGEMENT TEAM OFFICIAL MINUTES

November 15, 2017
Minutes: Pat Vivian

1. Introduction

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

2. Review Meeting Minutes – October 25 and November 15

The facilitator's summary and meeting minutes for both meetings were approved as final.

3. Dworshak Operations

Steve Hall reported. Dworshak is passing minimum outflows of 1.5 kcfs through the turbines, with 100 cfs of that moving through the Dworshak National and Nez Perce fish hatcheries.

3a. NRCS Dworshak 2018 Snowpack Comparison. Current snowpack is a bit above normal compared to recent years, but little is known at this point how runoff will occur in 2018. Conditions could be either significantly wetter or drier than normal.

Hall presented scenarios based on historical water years with the 25% lowest inflows (or the 11 years with the lowest inflows out of the past 44). Running one unit at full load would move about 2.3 kcfs if the COE were to start releasing additional water. At this point, however, Hall recommended waiting to increase Dworshak outflows above the 1.5 kcfs minimum. In a very dry year, such as 1977, even sticking to minimums throughout the year would be insufficient to refill the reservoir.

Last year's analysis found that moving more water earlier would have dramatically changed the outcome. Naturally, TMT doesn't want a repeat scenario. The COE made recommendations at the time that would have kept TDG levels at around 115% had they been followed.

The 11 scenarios Hall presented today indicate that, starting at the current reservoir elevation (1519 ft) and running one unit releasing minimum project outflows (1.6 kcfs) between now and 1/1/18 and then 2.4 kcfs 1/2/18 through 7/1/18 would run a 16% risk (7 out of 44 water years) of not achieving the DWR refill target for summer flow augmentation. This would violate the BiOp criteria of

operating the project to a 95% chance of refill. The STP runs are showing 2.4 kcfs through the end of the year, while the Weather Service inflow forecast went up to 4 kcfs, so the STP data might not be reliable.

Jay Hesse, Nez Perce Tribe, said running one unit at full load through the beginning of the year could dewater fall Chinook redds. It would be better to delay ramping up flows until mid-December. If we're going to wait that long to start moving water, we might as well wait for the January 1 official water supply forecast because it will provide a clearer picture of flood control requirements, Hall replied.

Tom Lorz, CRITFC/Umatilla, questioned whether this would be soon enough to avoid a repeat of last year's deluge; Erick Van Dyke, Oregon, said this echoes the Salmon Managers' main concern. It wasn't until February 2017 that the need to move a lot of water became apparent, Hall recalled. December 2016 was so dry the Action Agencies didn't start moving water until the end of January.

Baus asked the Salmon Managers to clarify whether they want to increase DWR discharges or avoid dewatering fall Chinook redds, as the two priorities are contradictory. Hesse said he supports passing inflows and remains concerned about the effects of sustained higher flows on hatchery fish. Lorz advocated passing inflows, not aggressively refilling the reservoir.

Paul Wagner, NOAA, said the Salmon Managers discussed this as an option in the absence of today's information and will be keeping track of snowpack accumulation. Everybody is on the alert to prevent a repeat performance of last year.

Hall said the project is already passing inflows and the elevation is about 11-12 ft below where it was last year at this time. Continuing minimum discharges would probably refill the reservoir to 1520.5 ft elevation by November 25, up from its current elevation of 1519 ft. A slow fill of 0.10 of a ft/day over the last 5 days is desirable.

It was clarified that the Salmon Managers are not requesting a change in Dworshak operations today. There was general agreement to wait until the January 1 water supply forecast is released before making any operational changes.

Hall asked the Salmon Managers to think about refining their priorities for 2018 DWR operations in terms of Idaho's priorities last year, which were sanctioned at the time by the other Salmon Managers. Idaho's priorities were:

1. Operate the reservoir to the BiOp's 95% probability of refill
2. Avoid exceeding 110% TDG downstream
3. Achieve April 10 flood control elevation

Last year, the COE recommended drafting below the flood control elevation, but that option didn't get much support, Hall recalled. In order to depart from operating

to the BiOp criteria of a 95% probability of refill, the Action Agencies would need unanimous Salmon Manager support.

Lorz asked whether passing inflows would jeopardize refill. Hall said it's difficult to model passing inflows at this point because the STP projections aren't reliable, and passing any volume above minimum flows could have a negative impact on refill if it turns out to be a low water year.

Julie Ammann asked Hesse whether there's an upper limit on flows above minimums to avoid impacting fall Chinook redds. Hesse recommended matching inflows up to turbine capacity using two units, with no spill, until the end of December when spawning is over. The status quo operation at Dworshak is to release 1.6 kcfs minimum outflows.

Baus asked for clarification of the Salmon Managers' priorities. Hesse advocated passing 1.6 kcfs inflows up to turbine capacity. Tony Norris, BPA, asked whether the operation could be stated in terms of a weekly elevation target so as to avoid either filling or spilling between now and the end of December. A December 30 elevation target would be preferable. Hall said that would be feasible. At present, the reservoir has above 1500 kaf of space, so it would take in excess of a 2.8 maf year, or 130% of normal inflows, to draft above that level.

Russ Kiefer, Idaho, supported BPA's suggestion to operate to a December 31 elevation target. Another option is to continue minimum flows for two more weeks and reassess the situation. A third possibility would be to operate to FPAC's recommendation: continue running one unit unless inflows go above 4 kcfs, at which point the operation switches to two units until inflows drop below 4 kcfs. Idaho's priorities are still the same, with refill first, followed by state water quality standards and the April 30 flood control elevation. If the COE's recommendation is to continue minimum flows in order to hit 95% probability of refill, that would be Idaho's recommendation as well.

The reservoir is well positioned now, Hall said. At DWR an average water supply forecast is a little more than 2.4 maf. Tony Norris asked, what would the average forecast produce in April for a maximum flood control elevation? On an average forecast, 1100 kaf of space would be needed, and the reservoir has 1250 kaf of space now. It would take a 2.6 maf or higher forecast for reservoir space to be problematic. As it stands, the reservoir would need to fill about 100 kaf in order to meet an April 1 elevation target. Once there is snow in the mountains, there will be a more reliable source of data.

TMT agreed to touch base on DWR operations again in a conference call December 6. Dave Swank, USFWS, suggested the COE provide plots similar to last year, comparing outflows with 115% and 120% TDG targets in low, medium, and high water years.

Charles Morrill suggested TMT consider running two units in December and releasing 2.4 kcfs. Ammann said the modeling indicated that operation would result in a 15-16% chance of missing refill, which would exceed the BiOp target of 95% probability. Hall reemphasized the COE would only undertake such a risk with full Salmon Manager consensus.

In response to a question from Jay Hesse re: TDG levels produced by releasing 1.6 kcfs minimums out of Dworshak, Hall said he's looking into why running unit 2 creates more TDG than unit 1. He hasn't gotten a response from project staff but will get back to Hesse as soon as he knows more.

TMT agreed to meet next in a December 6 conference call to discuss next steps at Dworshak. In the meantime, the project will continue to release minimum outflows.

3. Dworshak Unit 3 Update

Hall gave an update on Unit 3 rehabilitation, as Erick Van Dyke, Oregon, had requested previously. The contractor has fabricated new bars in Europe which will soon be shipped to Canada for coating. The shipment is expected to arrive at Dworshak near the end of January, with installation in February, which appears likely. The contractor is wrapping up other work at the site and had to reorder some damaged supplies. This means the scheduled return to service date of May 2018 could get pushed out a few months.

4. Chum Operation

Paul Wagner and Charles Morrill led a discussion of the 2017 chum spawning operation at Bonneville Dam.

4a. Chum Salmon Spawning Ground Surveys 2017-18. The number of observed chum spawner in Ives Island area and other typical locations is low everywhere this year. Predation by Steller sea lions is hitting the chum population hard this year, Tony Norris reported.

4b. Bonneville Dam Adult Salmon Counts. To date, adult chum passage at Bonneville Dam is 17.

4c. NWRFC Water Supply Forecast. Baus gate the latest forecasts for The Dalles and Lower Granite dams, noting that it's still early in the season:

- The Dalles (April-August) – 91 maf, 104% of average
- Lower Granite (April-July) – 23 maf, 117% of average

4d. NWRFC Climate Forecast. Baus presented the River Forecast Center's 6-10 day temperature and precipitation outlook. Above average temperatures and precipitation are likely throughout the Pacific Northwest, and the same forecast is true 8-14 days out. Longer term over the next month, there's a likelihood of below average temperatures in Washington and an equal chance of below average precipitation. Oregon, Idaho, and western Montana are likely to see above average precipitation.

The RFC forecast has current Bonneville Dam inflows of 120 kcfs increasing up to 140 kcfs in 3 days and then decreasing down to 130 kcfs by the end of the 10 day period.

4e. Bonneville Dam Current Hourly Data. On November 15 at 0900 hours, BON total outflows were 121.5 kcfs, with a tailwater elevation of 11.9 ft. On November 14, the average project tailwater elevation was 11.74 ft with a maximum of 12 ft and a minimum of 11.6 ft. Charles Morrill thanked the Action Agencies for consistently holding the tailwater elevation at BON while still holding GCL at 1285 ft.

4f. TMT Coordinated Chum Operation, November 1, 2017. The details of the current chum operation are posted to today's agenda. It is the same operation discussed at several previous TMT meetings. NOAA and Washington both said the operation is a good one and should continue.

Baus asked about removal of the Duncan trap this year. Morrill replied the process will be the same as in previous years. The trap is easier to remove at higher tailwater elevations. BPA will follow up with Washington on this. Morrill will give TMT updates on an annual basis.

5. Operations Review

5a. Reservoirs. Lisa Wright, COE, and Chris Runyan, BOR, reported.

Libby is at elevation 2439.8 ft with average inflows of 3.4 kcfs and outflows of 5.1 kcfs. Albeni Falls is at elevation 2051.3 ft with inflows of 13.0 kcfs and outflows of 14.3 kcfs. Dworshak elevation is 1519.0 ft with inflows of 2.1 kcfs, discharging 1.6 kcfs minimums. Lower Granite outflows are 18.1 kcfs, McNary outflows are 102.9 kcfs, and Bonneville outflows are 119.2 kcfs. Hungry Horse is at elevation 3539.83 ft, operating to Columbia Falls minimums of 3500 cfs. Inflows are 0.42 kcfs, with a 2 day average of 0.76 kcfs, and outflows are 2.39 kcfs. Grand Coulee is at elevation 1285.5 ft, operating to provide augmentation flows for chum spawning.

5b. Fish. Paul Wagner reported.

Juveniles are done for the season. Adults: At Bonneville, fall Chinook passage is winding down, with an average of 150 fish per day over the past week which is 61% of the 10 year average. Fall Chinook jack counts are 37,627 which is 49% of the 10

year average. Steelhead counts are 117,354 which is 35% of the 10 year average, and the numbers are increasing. Wild steelhead are 34,215 which is 30% of the 10 year average.

At Lower Granite, 26,330 fall Chinook adults have arrived, which is 74% of the 10 year average. Fall chinook jacks are arriving at the rate of 10 per day for a total of 6,652 to date, which is 48% of the 10 year average. Adult steelhead counts are 74,783, which is 45% of the 10 year average. Wild steelhead are 14,379, which is 33% of the 10 year average.

Tony Norris, BPA, asked for a report from NOAA on zero generation steelhead passage targets this year. Paul Wagner estimated 30 steelhead per day and will give a more precise update at the next TMT meeting.

5c. Water Quality. Dan Turner, COE, reported. TDG numbers have been fairly low throughout the hydro system.

5d. Power System. Tony Norris reported. Wind generation has had wide swings of 1400 MW in an hour, more than the 1100 MW CGS generates. There have been times when wind reached the limit of reserves. This is common especially in spring, when it's most difficult to forecast wind accurately. BPA has to carry enough reserves to be able to manage these swings. During spill season, BPA operates to a different set of rules to keep wind reserves from impacting fish and wildlife operations.

5e. Water Management Plan. The second draft of the 2018 WMP has been posted to the TMT website, with comments due November 20.

6. Next TMT Meeting

TMT will meet next in a December 6 conference call to discuss next steps at Dworshak.

Name	***Affiliation***
Paul Wagner	NOAA
Aaron Marshall	COE
Tony Norris	BPA
Chris Runyan	BOR
Laura Hamilton	COE
Dan Turner	COE
Charles Wiggins	DSC
Doug Baus	COE
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Ann Setter	COE
Jen Graham	Warm Springs
Russ Kiefer	Idaho
Laura Berg	Clearing Up