COLUMBIA RIVER TECHNICAL MANAGEMENT TEAM
March 29, 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/

Start of FOP Spring Spill Operations
Lisa Wright, Corps, reported that at midnight on April 3rd, all Snake River projects will begin FOP spring spill operations. On April 1st, the 1% operating range constraint begins at all Snake and Lower Columbia River projects.

On March 27th, spill is between 30-70% due to high flows; thus there will not likely be a noticeable change in spill with the beginning of FOP spring spill. Vancouver is currently above flood stage, with a forecast of up to 18ft, decreasing over the next ten days, but remaining above flood stage.

Reservoirs Status Update - Mary Mellema, BOR, presented current elevations and flows for Bureau of Reclamation projects:

- Hungry Horse: 3539.3 ft. midnight elevation;11.8 kcfs discharge with 4 kcfs spill
- Grand Coulee: 1249.6 ft. midnight elevation; 209 cfs discharge, 36.9 in spill, and 123% TDG.

Lisa Wright presented current elevations and flows for Army Corps of Engineers projects:

- Libby: 2388.6 ft. midnight elevation; 9.4 kcfs inflow and 24.6 kcfs discharge
- Albeni Falls: 2056.6 ft. midnight elevation; 59.7 inflow and 57.4 discharge
- Dworshak: 1529.2 ft. elevation; 19.1 kcfs inflow and 24.8 kcfs discharge
- Lower Granite: 161.5 average inflow
- McNary: 410.2 ft. elevation average inflow
- Bonneville: 446.8 ft. elevation average inflow

Dworshak Update
Alfredo Rodriguez, Corps, provided an update on Dworshak operations. Currently the reservoir is at 1528.89ft elevation. Discharge is 25 kcfs, with 4.7 kcfs generation and 20.3 kcfs spill. TDG levels are 125% measured at the dam and 105.5% at the hatchery.

The forecast calls for 1-1.5 inches of rain over the next couple of days, then tapering off Thursday through the weekend. Temperatures will warm slightly, but remain cool. The April/July NWRFC forecast is for 2.6 MAF. The official Corps forecast will be available next week, but is expected to be approximately 2.9 MAF.

Jay Hesse, Nez Perce, reported on a March 18, 2017 memo from the hatcheries to FPAC updating fall Chinook fry emergence timing (available on the web site). It discusses redd creation, distribution and water temperatures downstream of Dworshak. Jay pointed the TMT to Figure 2, which shows 258 redds in the Lower Clearwater River (representing approximately 4% of the redds in the NF around the Ahsahka Islands reach and 2% of the total population). These figures suggest 57% Chinook emergence by mid-April, and 75% emergence by May 1st in the North Fork Ahsahka Islands reach. In the lower Clearwater, most fry are still in the gravel, with 15% expected out by May 1st. This is a delayed date from the September 2016 report, which is good news, as they will have less TDG exposure. Jay noted that they will continue to update these dates as the season progresses.

Jay and Dave Swank, USFWS, provided an update on fish on station. In the hatchery, some brood year 2016 spring Chinook will be taken off incubation water and onto North Fork Clearwater water on May 1st. Jay noted that it would be good to have the TDG closer to 100% when that happens. The fish appear to be feeding pretty well.

Dave reported on recent hatchery releases. The hatchery released Chinook on March 20th. It released some steelhead early (those that they could not switch over to reservoir water), starting on March 21st and completed March 23rd. Fish were released on and offsite. Released fish moved downstream very rapidly. Fish onsite continue to be sampled for GBT: sampled fish showed bubbles in gills and lateral line, but no deaths were seen.

Little Goose Navigation Lock Extended Maintenance Outage Update

Ann Setter, Corps, reported on maintenance operations on the Little Goose navigation lock. She reported that the contractor encountered an unexpected problem involving gate alignment. As a result, the return to service date is postponed; this puts off the ability to store the floating bulkhead. Ann explained that they plan to raise the forebay pool on April 12th in order to float the bulkhead into the forebay storage slot, she asked for TMT input as to if they should leave the pool closer to the top foot between now and April 12th, or if TMT thought it was better to drop down to MOP and then raise back up to store the bulkhead. It was noted that the MOP operation is aimed at helping push juveniles out of the system faster; however, with the current spill and high flows, they are already moving out fast. Russ Keifer, ID, suggested that there might be a potential operation that help both the fish and the Corps' maintenance needs. He offered that they could hold LGS above MOP until flows recede to the point that LOMO would shift to bulk spill pattern, at this time return LGS to MOP which would provide 5-7 kcfs for approximately 4 days and maintain the uniform spill pattern at LOMO. Russ asked Margaret Filardo, FPC, for her thoughts on water particle travel time. Margaret noted that with the high flows, there is not likely a significant difference in water particle transit time either way and flows are expected to stay high. She also noted that it is early in the sampling season, thus it is difficult to tell how fast the fish are moving.

It was noted that LGS is currently already at MOP; with that information, Salmon Managers suggested that the Corps leave it at MOP until they need to raise it in order to store the bulkhead. Scott Bettin, Corps, noted that there may be some change in pool elevation, however, MOP will be maintained as of April 3rd.

- **ACTION**: The Corps will operate to be in the MOP range at Little Goose by April 3rd. They will raise the pool to store the bulkhead on the morning of April 12th. Salmon Managers will discuss potential operations for after bulkhead storage at their next FPAC meeting and offer recommendations at the April 5th TMT meeting.

Little Goose Spillbay Extended Maintenance Outage

Ann continued that spillbay 5 was still out of service potentially until April 20th. The delay is due to the need to refabricate parts. The project is proposing to implement the temporary spill patterns for bay 5 out of service that were developed and implemented last year. Those present noted that the pattern looked like the best pattern possible given the spillbays available.

1% Operating Range at TDA and MCN

Scott Bettin, BPA, suggested that the Salmon Managers consider carrying reserves at TDA and MCN instead of spilling even more water when the 1% constraints officially start on April 1. He pointed to the current high levels of spill and corresponding TDG, and noted that operating within the 1% operating range will increase spill at those two projects by 30-60kcfs. Laura Hamilton, Corps, thought that this would increase TDG by 1-3%; TDG is currently above 120%. Jay Hesse asked if there were lessons to learn with this shift; Laura thought that it is a tool that can be used to manage system wide TDG.

- **ACTION:** Scott will provide, in writing, a description of the operation to FPAC prior to their meeting on 4/4. FPAC will discuss and bring input back to TMT on 4/5.

The next TMT meeting will be in-person at 9:00 AM on Wednesday, April 5, 2017.

Columbia River Regional Forum
TECHNICAL MANAGEMENT TEAM OFFICIAL MINUTES

March 29, 2017
Minutes: Pat Vivian

1. Introduction

Representatives of Washington, NOAA, USFWS, Nez Perce Tribe, CRITFC, BOR, COE, BPA, Idaho and others participated in today's TMT call chaired by Lisa Wright, COE, and facilitated by Emily Plummer, DS Consulting.

2. Start of FOP Spring Spill Operations

Lisa Wright led a discussion of spring FOP spill under current high water conditions. At midnight on April 3, the lower Snake River projects typically start spilling to levels defined in the 2017 Fish Operations Plan. This means going to Minimum Operating Pool at all Snake projects.

Furthermore, on April 1, all projects on the lower Columbia and Snake rivers begin the constraints of 1% turbine operations for fish passage season.

With all projects on the system spilling involuntarily above their gas caps, and Vancouver gauge exceeding flood stage for the foreseeable future, there shouldn't be much of a difference in spill. Wright and Mary Mellema, BOR, gave a system update reservoir by reservoir:

- Libby – Forebay elevation is 2388.6 ft with inflows of 9.4 kcfs, discharging 24.6 kcfs.
- Albeni Falls – Forebay elevation is 2056.6 ft with inflows of 59.7 kcfs, discharging 57.4 kcfs.
- Dworshak – Forebay elevation is 1529.2 with inflows of 19.1 kcfs, discharging 24.8 kcfs.
- Lower Granite – Outflows are 161.5 kcfs.
- McNary – Outflows are 410.2 kcfs.
- Bonneville – Outflows are 446.8 kcfs.
- Grand Coulee – Forebay elevation is 1249.6 ft and outflows are 209 kcfs, with 36.7 kcfs of that as spill. TDG levels downstream are around 123% saturation.
- Hungry Horse – Forebay elevation is 3539.3 ft and discharges are 11.8 kcfs, with 4 kcfs of that as spill.

As of March 27, spill at the Snake River projects was between 30-70% of river flows, which is well above FOP requirements. This will continue for some time. The entire system is being operated for flood control, with a forecast of nearly 18 ft elevation at the Vancouver gauge, decreasing over the next 10 days but still above flood stage of 17 ft. The hydro system will be in flood control mode for the foreseeable future.

3. Dworshak Update

3a. Current Operations Data. Alfredo Gonzales, COE Walla Walla, reported that current DWR forebay elevation is 1528.89 ft. Total outflows are 25 kcfs with 4.7 kcfs of that as generation and 20.3 kcfs as spill. This operation will continue for the foreseeable future.

3b. TDG Data for DWR Tailrace. Total dissolved gas in the tailrace of Dworshak Dam is 125-128% saturation.

3c. TDG Data for Dworshak National Fish Hatchery Collection Channel (DHCI). The latest reading from the new gauge is 105.5% total dissolved gas at the hatchery. TDG levels have remained steady at 105% saturation over the past few days.

3d. DWR 10-Day Inflow Forecast. The RFC is forecasting another surge of 26-27 kcfs inflows over the next few days. After that, Dworshak inflows are expected to recede.

3e. NWRFC Water Supply Forecast. The current RFC April-July runoff volume forecast for Dworshak is expected to be about 2.6 maf.

3f. 10-Day Meteorological Forecast. Today the RFC forecasts 1-1.5 inches of rain for the Clearwater Basin, tapering off on March 31 and April 1. Precipitation on March 29-30 will cause increased inflows over the next few days. Daytime temperatures will be slightly warmer through April 1, with cooler temperatures in the evening. The Corps anticipates an April water supply forecast for April-July of around 2.9 maf. The COE will release its official April water supply forecast next week.

3g. Clearwater Chinook Fry Emergence and Steelhead Passage. Jay Hesse, Nez Perce Tribe, presented a memo written by Nez Perce, USFWS and IDFG staff documenting the timing of emergence at fall Chinook redds established in fall 2016. The memo provides an update on fall Chinook redd distribution, water temperatures, and estimated emergence timing. The goal was to estimate fry emergence in terms of their potential exposure to high TDG levels in the river.

The most vulnerable reach is in the north fork Clearwater, with 258 redds that represent about 4% of redds in the lower Clearwater and about 2% of the redds in the 2016 fall Chinook population. Emergence for 57% of those eggs and fry is estimated to occur in mid-April, with nearly 75% of them emerging by May 1. This means less than 15% of those fish will be out of the gravel by May 1, which bodes well. Cooler water and delayed emergence are giving in-river fish a better chance of surviving the high TDG levels associated with involuntary spill.

The memo will be updated on a monthly basis. The modeling is based on actual temperatures through March 6 and temperatures from past years after that.

Starting May 1, 2016 spring Chinook will be transitioned from incubation water to the north fork Clearwater. If gas levels in the hatchery are down to 100% by May 1, it would help these fish enormously, Hesse said. The hatchery is chilling the fish to delay emergence until May 1; it cannot be delayed further.

Dave Swank, USFWS, gave an update on the March 21-23 early release from Dworshak National Hatchery of all but 1.1 million steelhead that could be kept on System 1 water, which is a blend of reservoir and river water with lower TDG levels. TDG readings of blended water in System 1 have been at 102% TDG saturation with up to 46% reservoir water needed to keep TDG that low. So conditions are better than they were, but not ideal. Hatchery workers are still seeing bubbles in fish, but there have been no mortalities.

Russ Kiefer, Idaho, asked if the fish are feeding well; the answer was yes for those that have been in system 1 water the entire time. Fish that were in system 2 water have more bubbles, as well as low levels of food in 4 of 10 fish.

To date, over 2,000 of approximately 18,000 PIT tagged steelhead released from Dworshak on March 21-23 have been detected at Lower Granite Dam. This indicates a large portion of the release made it downstream much faster than usual for steelhead released early. Similarly, of the 50,000 PIT-tagged Chinook released on March 20, 500 have already been detected at Lower Granite Dam, which is a much faster travel time than previously observed.

4. Little Goose Navigation Lock Extended Maintenance Outage

Ann Setter, COE Walla Walla, reported that problems with gate alignment at the Little Goose navigation lock are delaying its return to service. Crews are working 7 days a week under intense pressure to finish. With the nav lock work in progress, the floating bulkhead is in use and can't be stored by April 3 as it usually is when MOP operations begin. Floating the bulkhead requires a high pool elevation at the top of normal operating range; it can't be stored at MOP. The project needs to float the bulkhead on April 12 from 0800-1200 hours, and it will take a couple days on either end for the pool to fill, then draft back down to MOP.

The COE posted a proposal to today's agenda to raise the Little Goose forebay elevation to normal or slightly above 0.5 ft of the top pool elevation from 8 am to noon on April 12 to store the floating bulkhead. The default operation is to go to MOP on April 3, then start filling sometime on April 11 to get to the target elevation for the work to occur on April 12, then start drafting back down to MOP over the next couple days. Another option for TMT to consider is delaying MOP operations until the bulkhead is stored, then drafting the water out at a time when it could benefit fish as determined by TMT. Little Goose, Lower Monumental and Lower Granite are currently at MOP, while Ice Harbor pool elevation is toward the top of its range. Setter asked TMT to consider whether Little Goose should operate within the normal pool elevation range until the bulkhead is stored on April 12 since with the high river flows travel time is not likely a concern.

Russ Kiefer, Idaho, said the goal of MOP operations is to increase fish travel time and improve survival rates, but MOP may be unnecessary at high flows because travel times are already significantly increased and there wouldn't be a noticeable difference at MOP. With two of the Salmon Managers on spring break (OR, Umatilla), FPAC had not yet discussed the COE proposal to delay MOP at Little Goose, but Kiefer thought it would benefit fish while also facilitating the high pool to float the bulkhead. He suggested TMT work out an agreement to draft Goose to MOP at a time when it would be possible to extend the high flows necessary to maintain a uniform spill pattern at Lower Monumental to aid fish outmigration and suppress TDG levels in the Lower Monumental tailrace. Scott Bettin, BPA, said

drafting Little Goose from the top of the pool to MOP would mean approximately 5-7 kcfs increased flow for four days. He agreed the proposal to delay MOP at Goose sounds like a good idea.

Since Little Goose is already in the MOP range, the discussion turned to how and when to fill/draft for the floating bulkhead stow on April 12. After discussing the process for reaching consensus on the proposal, TMT settled on a proposal by Margaret Filardo, FPC: Next week, the Salmon Managers will come to TMT with a recommendation for how long to keep Goose within the top foot of operations (i.e., MOP+4) before drafting to MOP, which will take 3-4 days at current flows.

Wright summarized the current operation. Little Goose will be in MOP when spring spill starts April 3. Starting sometime on April 11, the Goose pool will start filling to attain a full pool or 0.5 ft above on April 12 from 0800-1200 hrs. Once the bulkhead is stored, it will take approximately 48 hours to draft the pool back down to MOP (or longer if flows stay high), unless otherwise recommended by TMT to hold onto the pool longer.

Jay Hesse, Nez Perce, asked how water particle travel times would be affected. When flows are this high, fish travel times would not change, Filardo and Bettin agreed. With TDG levels nearing 130% in the Snake, Dworshak discharging 25 kcfs until April 15, and Brownlee discharging 80 kcfs, flows will stay high for a while.

Wright clarified that at elevation 633.6 ft, LGS pool is currently within MOP. The top of the pool is 638 ft. Filardo proposed keeping the project at MOP until TMT meets again on April 5. **NOAA, Washington** and **Idaho** expressed support of this proposal.

The Salmon Managers will provide their recommendation at the next TMT meeting April 5.

On March 30, WDFW surveyors will look at gas bubbles in fish at Lower Granite, Morrill noted. Bettin clarified that all the Snake projects except Little Goose are currently on schedule to attain their MOP elevations by April 3, with variations due to high flows.

5. Little Goose Spill Bay 5 Extended Maintenance Outage

Ann Setter reported that unexpected problems with procuring components for spill bay 5 will delay the return to service until mid-April, missing the start of spill on April 3. Until the spill bay is back in service, the COE proposes using the same spill patterns that were used in 2016 when it was taken out of service.

The operation linked to this item on today's agenda would be a continuation of the operation that was implemented last year. As it stands, spill on the lower Snake will start at midnight April 3 using the temporary pattern with Bay 5 out of service. Setter invited TMT members to express their views on spill patterns.

Idaho, NOAA, Washington, USFWS and the **Nez Perce Tribe** expressed approval of the spill pattern attached to today's agenda as the best option with spillway 5 out of service. TMT will revisit Little Goose operations at its next meeting.

6. Start of 1% Turbine Operations

Bettin reminded TMT that April 1 is the beginning of limiting turbines to the 1% of peak efficiency operating range for the sake of fish passage. This year, with such high flows, constraining turbine operations to the 1% range will mean increased spill of around 40 kcfs at McNary and 30-60 kcfs at The Dalles, with associated increased TDG impacts.

Bettin asked the Salmon Managers to consider whether BPA should carry reserves above the 1% operating range, which would avoid additional spill at those two projects that would otherwise begin April 1st. Laura Hamilton, COE, said this would be equivalent to a avoiding a 1-3% increase in TDG saturation levels depending on spill caps, existing TDG levels and spill priorities. She characterized the proposal as an effective tool for managing TDG system wide.

Charles Morrill, Washington, will add this topic to FPAC's next agenda for discussion. Filardo requested that BPA write up the details of the proposal, which Bettin will do later this week. TMT will revisit the proposal at its next meeting.

7. Next TMT Meeting

TMT will meet next in person on April 5.

Name	***Affiliation***
Charles Morrill	Washington
Trevor Conder	NOAA
Dave Swank	USFWS
Jay Hesse	Nez Perce
Kyle Dittmer	CRITFC
Mary Mellema	BOR
Lisa Wright	COE
Scott Bettin	BPA
Russ Kiefer	Idaho
Charles Wiggins	DSC
Michael Bryant	CBB
Margaret Filardo	FPP
Scott Richardson	Snohomish PUD
Makary Hutson	BPA
Alfredo Rodriguez	COE Walla Walla
Wayne Jousma	COE Walla Walla
Ann Setter	COE Walla Walla
Laura Hamilton	COE