COLUMBIA RIVER TECHNICAL MANAGEMENT TEAM
April 05, 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 & Facilitator's Summaries
The Official meeting Minutes and Facilitator's Summaries for the March 8, 13, 15, 17, 20, and 29 TMT meetings were approved with no additional edits.

Little Goose Floating Bulkhead Operations
Ann Setter, Corps, reported that the floating bulkhead at Little Goose Dam (LGS) will be returned to storage on April 12th, which requires a full pool of 638.5 feet. As coordinated at TMT, starting on approximately April 11th, the reservoir elevation will be raised above MOP to allow the bulkhead to be stored.

Russ Kiefer, ID, reported on FPAC discussions regarding the operation and timeline for returning the LGS pool to MOP. He noted that typically, MOP operations are in part implemented to improve (speed up) smolt travel time; however, due to this year's high flows, there is not as much of a benefit. Thus, holding the water and moving it out later at the point that it could be used to extend the uniform spill pattern at Lower Monumental (LoMo) could be beneficial to fish. Russ also brought up the idea that if flows stay high and juvenile sockeye start to pass LGR, TMT may want to return LGS to MOP at that time to further aid sockeye passage.

Ann noted that Units 1, 4, and 5 are currently out of service at LoMo and Unit 1 will be the first to return to service, likely in mid-June. The trigger to switch from a uniform to bulk spill pattern is 140 kcfs outflow if all units are available. Because of the lower powerhouse capacity, this number will likely be adjusted downwards, closer to 100kcfs outflow. Russ noted that at these outflows, the bulk spill pattern tends to increase TDG. The Corps agreed to provide more information on the specific flow triggers for the switch in spill patterns for FPAC's consideration. FPAC will discuss this situation at its next meeting.

- **ACTION –** The Corps will raise the LGS pool to facilitate storage of the floating bulkhead on April 12th. They will hold full pool after the storage. TMT will discuss how and when to return to MOP at the next TMT on April 12th. If agreement is not reached at TMT on the 12th, the Corps will default to returning to MOP after the bulkhead is stored.

Turbine Operations at McNary and The Dalles
Scott Bettin, BPA, presented a proposal to manage required reserves and lower TDG at McNary and The Dalles Dams. The proposal is posted on the TMT web site. Scott explained that these projects must operate below full turbine capacity in order to hold required contingency generation reserves within the 1% operating range .

Tony Norris, BPA, explained that holding reserves within the 1% range reduce capacity through the turbines and thus increases spill. Because of the high flows at present, TDG in the river is over the State TDG standards. BPA suggested that TMT consider allowing the projects to utilize non-spinning reserves above the 1% turbine operating range until stream flows recede. FPAC was interested in more information on the duration and frequency of this type of non-spinning reserve operation. Scott noted that these reserves are needed approximately 2-4% of the time, and typically last less than two hours. The reserves are

required in case the system has a failure and the energy is needed within seconds to minutes to avoid a failure.

Salmon Managers noted that at this point, TDG levels are not concerning as fish have opportunities to move to deeper areas where TDG is not as impactful. TDG levels around 130% are more concerning. Additionally, they noted that there are concerns other than TDG, for instance hydraulic and other impacts from passing through the turbines. Erick Van Dyke, OR, noted that there may other operations to help reduce TDG in the river. Salmon Managers agreed to discuss this proposal in more detail at the next FPAC meeting. Scott will provide additional information on the flows and duration, and Tony will draw a schematic of the proposal.

- **ACTION:** BPA will provide more information to the Salmon Managers regarding the non-spinning reserve proposal. FPAC will discuss at their next meeting and circle back to TMT at the April 12th meeting, with Oregon bringing options to reduce TDG.

Chum Operation

Doug Baus, Corps, noted that the spill season in the Lower Columbia starts on April 10th. This transition to the spill season marks the end of the Chum operation. He noted that tailwater levels are sufficient to keep the chum redds covered and thus chum will not be impacted by the change.

Operations Review

Reservoirs – The BOR and Corps reported on reservoir conditions. Mary Mellema, BOR, presented on Bureau of Reclamation projects:

- Hungry Horse: 3,535.15 ft. elevation, with 11.6 kcfs discharge
- Grand Coulee: 1,243.3 ft. elevation, with 36kcfs spill and 120% TDG

Lisa Wright, Corps, presented on Corps projects:

- Libby: 2,381.7 ft. elevation, with 9.6 kcfs inflow, 24.1 kcfs discharge
- Albeni Falls: 2,056.4 ft. elevation, with 51kcfs inflow, 56kcfs discharge
- Dworshak: 1,522.2 ft. elevation, with 14.2kcfs inflow, and 24.8kcfs discharge
- Lower Granite: average discharge is 150.1kcfs
- McNary: average discharge is 407.5kcfs
- Bonneville: average discharge is 439.7kcfs

Julie Ammann, Corps, shared that the Corps is evaluating where they are in regards to declaring refill and seasonal runoff. For now, the Corps continues to operate to flood control drafts. Steve Hall, Corps, noted that DWR experienced 330% of normal inflows for March. This was from rainfall and low elevation snowmelt. High elevation snow pack is still increasing. The current water supply forecast is for 2.984 MAF, which is 122% of normal. Dworshak will continue to discharge 25 kcfs for the next week or so, and the Corps is considering whether deviating from the refill curve calculations is necessary at this time. The Corps will provide an update at the April 12th TMT meeting. Erick requested an updated Unit 3 maintenance schedule at the next TMT meeting; Steve said they will provide it if available. He also noted that the project is on track to adjust flows for the hatchery intake cleaning efforts.

Fish –Paul Wagner, NOAA, reported on fish. He noted that adult Spring Chinook counts at Bonneville are low, at 22, which is 4% of the ten-year average of 604. The winter run Steelhead are at 1,802, 70% of the 10-year average, wild steelhead are at 65% of the 10-year average.

At Lower Granite, overwintering steelhead counts are at 102% of ten-year average, and wild over wintering steelhead are at 118% of average.

Paul continued that juvenile monitoring has begun; however the Lewiston trap was removed because of debris and high flows. Juvenile spring Chinook are well underway from Lower Granite through to McNary, with around 10,000/day. Sub-yearling Chinook numbers are low; however, steelhead numbers are also well underway, with 117,000 at Lower Granite. Lamprey numbers at Bonneville and John Day are looking reasonable for this time of year. The group looked at the FPC and DART websites, noting the timing of fish passage between DWR and Lower Granite.

Water Quality - Dan Turner, Corps, reported on water quality. He noted that the lower Snake River projects currently are operating with involuntary spill for flood control, and TDG levels range from 105-125%. The official water supply forecast will be posted today on the TMT web site.

Power Supply – Tony Noris, BPA, reported that there is nothing to report on the power supply.

Columbia River Regional Forum
TECHNICAL MANAGEMENT TEAM OFFICIAL MINUTES

April 5, 2017
Minutes: Pat Vivian

1. Introduction and Review Meeting Minutes

Representatives of the COE, BPA, NOAA, USFWS, Washington, Idaho, Warm Springs Tribe, Yakama Nation, Oregon, CRITFC/Umatilla Tribe and others participated in today's TMT meeting. Doug Baus, COE, served as chair and Emily Stranz, DS Consulting, facilitated the conversation. Meeting summaries and minutes for March 8, 13, 15, 17, 20 and 29 were approved as final.

2. Little Goose High Pool for Floating Navigation Lock Bulkhead

Last week TMT discussed the need for going above MOP to float the bulkhead into storage at Little Goose on April 12. Typically the bulkhead is stored before April 3 when spill season begins on the Snake and forebay constraints of 633-634 ft MOP go into effect at LGS. However, this year it has been in use for an extended outage of the navigation lock.

FPAC is being asked for a recommendation on whether to hold the higher forebay elevation or return to MOP operations once the bulkhead is stored a week from today. The LGS forebay must attain 638.5 ft elevation by 8 am April 12 to float the bulkhead, Ann Setter, COE Walla Walla, reported. The summary attached to today's agenda says the target elevation is 637.5-638.5 ft.

Russ Kiefer, Idaho, described FPAC's reasoning regarding MOP at LGS after April 12. With higher flows, MOP operations don't have much positive impact on smolt travel times. No one objected to a proposal to hold the water for now and return Little Goose forebay to MOP operations at a later time when the extra flows could be used to extend the uniform spill pattern at Lower Monumental. FPAC members saw this as benefiting the smolt population. Little Goose should return to MOP when the extra releases will maintain a uniform spill pattern for 3-4 more days at LMN, which would suppress TDG levels in the river when large numbers of fish are passing.

However, if flows remain high and sockeye are passing LGS in significant numbers, FPAC would request the LGS return to MOP operations for juvenile sockeye passage. Kiefer estimated that juvenile sockeye passage on the lower Snake will begin in earnest around May 1.

There was discussion of what flow rate would trigger the switch from uniform to bulk spill at LMN. The current FOP says 140 kcfs with full powerhouse capacity, but with powerhouse limitations would it be lower? Baus said the trigger is based on total LMN outflows, not just generation. When total flows at LMN exceed 140 kcfs under normal circumstances, the uniform spill pattern goes into effect, which produces lower TDG levels than bulk spill. Lisa

Wright, COE, said the 140 kcfs threshold might be affected by powerhouse capacity. The COE will report back to TMT on exact flow rates for the spill pattern change.

Kiefer asked when the Lower Monumental turbines (Unit 1 and Unit 5) are likely to be back in service. Unit 1 will probably be the first to come back in mid-June, Setter replied. Next week exploratory work will help define the problem with unit 4 but this will not take unit 4 out of service so at this time Lower Monumental will have 2 units out of service. Unit 5 can't be worked on and returned to service until work on unit 1 is complete.

Scott Bettin, BPA, proposed that, for now, the Action Agencies hold the water at LGS and refine the numbers with regard to MOP. On April 12, TMT will meet at the same time the floating bulkhead operation is taking place to consider new information and decide at what point to return the project to its MOP elevation. There was general agreement on this.

Erick Van Dyke, Oregon, voiced concern that other alternatives were not being considered. He said he wasn't fully comfortable with the current proposal, but wouldn't object. The operation is still a work in progress. He recalled problems three years ago when the floating bulkhead operation interfered with fish passage.

Next week the COE will provide more precise information on flows. For now, the COE will maintain full pool after the bulkhead is stored on April 12. TMT will meet that morning and made a recommendation. The default operation is to draft LGS pool down to MOP in the 3-4 days after bulkhead placement unless TMT reaches consensus on another operation.

3. Turbine Operations at McNary and The Dalles

As follow-up to an idea that BPA introduced to TMT last week, a proposal to carry non-spinning reserves above 1% of turbine capacity at McNary and The Dalles is linked to today's agenda. The purpose of the proposal is to reduce high TDG levels in the river. If TMT approves, the proposal would be deployed from April 5-20 at McNary and The Dalles only.

Paul Wagner, NOAA, reported that FPAC discussed the proposal and raised many questions regarding frequency and duration. With TDG levels above 120% in several locations – 124% at MCN and 123% at TDA – there are diverging views of whether the effects of increased turbine passage would be positive or negative.

NOAA's view is that the effect of turbine passage on fish at The Dalles is unknown. Others view the effects of putting more water through turbines negatively because turbine-passed fish generally have lower survival rates. There might be more support if TDG levels were approaching 130%, but minimal effects are associated with the current levels exceeding 120%. If TDG levels rise, FPAC would reconsider. For now, Wagner said, the consensus was no.

Tony Norris, BPA, asked why fish are sensitive to TDG levels of 105% in the North Fork Clearwater, yet levels in excess of 120% in the lower river don't call for action. The difference is the hatchery, Wagner explained. With no depth compensation in the raceways, fish are exposed continuously to high TDG, while in the river they experience a range of exposures. On the

surface the river may have 120% TDG saturation, but at 3 meters down, exposure drops to less than 105%.

Bettin and Norris explained non-spinning reserves and why exceeding 1% of turbine capacity for non-spin could reduce TDG levels in the river. BPA is required to carry contingency reserves on the power system in the event that a unit or some other component fails. The longest these reserves can be deployed is two hours and usually for less than an hour. In an electrical failure, spinning reserves must be exhausted before non-spinning reserves are called upon. Non-spinning reserves are only deployed 2-4% of the time in May and June. Increasing the non-spin portion of reserves would allow the turbines to pass more water within 1% of peak efficiency and reduce spill, which would reduce TDG exposures for fish.

Non-spinning reserves only come into play when flows and TDG levels are high and turbine capacity is in short supply. When flows and TDG levels are low, there's more flexibility in how turbine capacity is used. At MCN and TDA, holding reserves within the 1% efficiency range restricts how much water can pass through the turbines starting April 1. Other projects don't have the same constraint.

The effects of TDG exposure on in-river fish will be evaluated when monitoring begins at the Snake this week. However, the only site where fish are monitored for GBT symptoms is Lower Granite, which is currently producing 126% TDG, one of the highest levels in the system.

Dave Swank, **USFWS**, asked during what hours non-spinning reserves might be deployed. Any time they are needed, but for no more than 2 hours at a time, Norris replied. USFWS is still trying to understand the concept, particularly in terms of frequency and duration with associated impacts, i.e., GBT symptoms in fish.

NOAA's concern is that typically passage through turbines has lower fish survival Conditions for turbine-passed fish at TDA are highly uncertain, and turbulence in the gate wells at MCN is an ongoing problem.

Erick Van Dyke, **Oregon**, wanted more consideration of alternatives for staying below the gas cap. He also wanted definition of the "small increments" described in the proposal.

Charles Morrill, **Washington**, asked about the likely range of TDG increases if the proposal is not adopted. It depends on the flow rate Norris said. TDG levels of over 120% in the MCN tailrace under the current operation would go down to 120% if the proposal were implemented. Information collected to date suggests that GBT isn't an issue until levels in the river approach 130% TDG, Morrill replied.

Now is a good time to research the proposal, Bettin said. It could become an important tool for managing TDG in future if flows go up depending on snowmelt. It's a tool for managing system wide TDG exceedances and doesn't necessarily provide a power benefit, Norris noted. Implementing the proposal would decrease spill slightly and lower TDG levels during all hours, but flows above 1% through the units would occur in only 2-4% of the hours in a month. At times of oversupply, some entities must be paid not to generate power. Although that costs

money, **BPA** made the proposal as part of an effort to manage system wide TDG to state water quality standards as required under the BiOp.

Julie Ammann, **COE**, characterized the proposal as expanding turbine operations to the full range of 1% and lowering TDG accordingly, in exchange for the fact that 2-4% of the time, the turbines could pass water above the 1% range. Most of the time the turbines would operate at the upper end of 1%, passing a bit more water than they are now, but still within the 1% range.

There was discussion of flow rates through the turbines and MW generated if the proposal were implemented. FPAC members wanted to consider the implications of the proposal, balancing the aid it could offer fish with its potential adverse impacts.

On April 12, the Action Agencies will provide a visual presentation and more details on flow rates for the TMT conference call. It was noted the proposal would only be relevant when inflows are exceeding turbine capacity and discharges in the TDA and MCN tailraces are exceeding state water quality standards.

4. Chum Operation

The COE will instruct Bonneville project staff to end chum incubation protection levels in the tailwater as of midnight on April 9, Baus reported, with the beginning of spring spill season. Given the system wide flood control situation and continued high BON tailwater well above the minimum established for chum, there were no concerns about ending the minimum tailwater elevation requirement for chum.

5. Operations Review

5a. Reservoirs. Mary Mellema and Lisa Wright reported.

Grand Coulee is at elevation 1243.7 ft, spilling 36 kcfs with TDG levels of 120%. Hungry Horse is at elevation 3535.15 with discharges of 11.6 kcfs. Libby is at elevation 2381.7 ft with inflows of 9.6 kcfs and discharges of 24.1 kcfs. Albeni Falls is at elevation 2056.4 ft with inflows of 51 kcfs and discharges of 56 kcfs. Dworshak is at elevation 1522.2 ft with inflows of 14.2 kcfs and discharges of 24.8 kcfs. Lower Granite average outflows are 150.1 kcfs. McNary average outflows are 407.5 kcfs. Bonneville average outflows are 439.7 kcfs.

Wagner asked whether the COE is planning to decrease Dworshak discharges. Ammann said the COE is evaluating refill to distinguish runoff from spring peak flows for the sake of flood risk management. Steve Hall, COE, said the official final April water supply forecast for Dworshak is 2.984 maf, 122% of normal. The Dworshak operation will probably intersect the FCRC in mid-April. Flows out of Dworshak will be at least 25 kcfs for the next week or so. March inflows were 330% of normal, the highest on record. Similar high levels have been reported at other locations – and snowpack continues to increase at high elevations. Steve Hall said the COE is planning another snow flight at the end of May or the beginning of June.

Erick Van Dyke asked for an update on Dworshak unit 3 repairs at the next TMT meeting, which Hall said he will provide if the information is available.

5b. Fish. Paul Wagner reported.

Adults: Bonneville has recorded 22 spring chinook to date, which is only about 4% of the 10 year average for this date. Steelhead are doing better with 1,802 arrivals, of which 598 were wild. That's 70% of the 10 year average for steelhead overall and 55% of the 10 year average for wild steelhead. Overwintering steelhead at Lower Granite are now migrating upriver, with a count of 5,905, which is 102% of the 10 year average. The wild count at Granite is 118% of the 10 year average.

Juveniles: Monitoring of juvenile passage has begun. Yearling spring Chinook migration is well underway at Lower Granite with 10,000 fish per day. Little Goose, Lower Monumental and McNary are reporting similarly high numbers. Steelhead numbers were high at 100,000 per day as soon as sampling began, all the way to John Day. Lamprey are passing Bonneville and John Day in reasonable numbers.

Charles Morrill asked for more details on migration at Lower Granite. The DART page did not have a listing for PIT tagged steelhead from Lower Granite, but the FPC page reported a significant number of PIT tagged steelhead from Dworshak, which is consistent with the peak in juvenile steelhead migration last week, Margaret Filardo said. It was noted that spring Chinook passage is progressing slowly, which is typical Chinook behavior.

5c. Water Quality. Dan Turner, COE, reported. Spill season started April 3 on the lower Snake, although it was indistinguishable from involuntary spill with TDG levels ranging from 120-127% in the tailraces. Lower Granite and Ice Harbor transitioned to FOP spill starting yesterday. Problems with receiving data from Coulee are probably due to a decoding issue, which should be resolved soon. The COE will post its official April water supply forecasts tomorrow to the TMT website.

5d. Power. There was nothing to report today.

6. Next TMT Meeting

TMT will meet next in a conference call April 12, with updates on the Little Goose bulkhead operation, Dworshak operations, TDG management at The Dalles and McNary, and Dworshak unit 3 milestones on the agenda.

Name	***Affiliation***
Doug Baus	COE
Lisa Wright	COE
Aaron Marshall	COE
Kevin McAllister	COE
Dan Turner	COE
Tony Norris	BPA

Julie Ammann	COE
Paul Wagner	NOAA
Dave Swank	USFWS
Charles Wiggins	DSC
Scott Bettin	BPA

Phone:

Charles Morrill	Washington
Russ Kiefer	Idaho
Jen Graham	Warm Springs Tribe
Mary Mellema	BOR
Tom Iverson	Yakama Nation
Steve Hall	COE Walla Walla
Ann Setter	COE
Michael Bryant	CBB
Margaret Filardo	FPC
Dave Benner	FPC
Erick Van Dyke	Oregon
Tom Lorz	CRITFC/Umatilla Tribe