COLUMBIA RIVER TECHNICAL MANAGEMENT TEAM

March 1, 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/

Dworshak Update

Steve Hall, Corps, provided an update on Dworshak operations. He noted that the forebay is currently at 1,523.4ft, compared to 1,524.4ft last week. The project is releasing around 10kcfs, with 4.7kcfs generation and 5.2kcfs spill through the RO's. There is now more water in the system, with inflow currently 13kcfs. TDG below the project has been at 114%, however, is now at 113% because the project accidently did not bump it up overnight. The current plan is to increase flows carefully to reach 114% and avoid spikes. Steve recommends that because of the structure of the spill mechanism, in the future the Corps be permitted to set a specific flow target, which could let TDG levels vary a bit (as opposed to setting a TDG target).

Snotel Verification

Steve presented two graphs, available on the TMT web site, from the NRCS verification flights of February 13 & 14, 2017. They show data from the two Snotel pillows that are side-by-side at each site in the basin. There is some variability between the two pillows due to natural conditions and the ability to accurately measure the snow.

The snowpack in the Dworshak Basin is overall at 98% of normal. Lower elevations are above, mid-elevations are at, and upper elevations are below normal, mainly because of a warm November.

Operations Scenarios

Steve presented seven graphs, available on the TMT web site, that show the results of modeling scenarios for potential operations at Dworshak. Water supply in the basin has been climbing and according to NWRFC, has gained 600Kaf since the beginning of February.

Steve explained that the scenarios he presented were based on a forecast of 2.8 MAF, though the actual water supply forecast will probably be higher. The Corps is now looking at 2.87 MAF. After February inflows that were 200% of normal, the 10-day forecast is very wet, with significant increases in low-level snowpack.

The Corps recommends the first scenario in the series as "the prudent plan." This plan calls for flow at 16 kcfs for March, except for a two-day drop on March 27-28 to 8 kcfs to accommodate the Clearwater hatcheries' release. On April 1st, flow would then increase to 17 kcfs until April 15th to meet the flood control rule curve. After April 15th, flows should be held at 8 kcfs until the end of April for Spring augmentation, then drop to 5-6 kcfs through mid-June during refill. Steve predicted that at 15 kcfs, TDG levels would be 125%. Jay Hesse, Nez Perce, noted that 125% TDG is not manageable by the degassers at the Nez Perce hatchery. After degassing, this would probably produce 109% at the hatchery, and thus gas bubble trauma for the fish on station.

In answer to a question from Jay, Steve said that at 2.8 MAF, the rule would require an elevation of 1,501 on April 15th. If the wetter forecast proves accurate, and 2.87 MAF results, the end of March target would be 1,493ft, and the April 15th rule elevation would be 1,471ft.

FPAC Dworshak Scenarios

Dave Benner, FPC, presented three scenarios showing forecasts of operations based on flood control data from 2008 and 1984 as comparable years, assuming a 2.8 MAF water supply forecast. The April 15th flood control elevation was 1,481.9ft for the first two scenarios (2008), and 1,507ft for the third (1984).

Steve Hall raised a concern with using 1984 as a comparable year, as runoff was late that year so it was easier to reach the April 15th flood control target. He did not think it was comparable to the current runoff forecast.

Margaret Filardo, FPC, noted that there would be lower TDG levels if operations were to target April 30th rather than April 15th. This is represented in Trace 3. Julie Ammann, Corps, responded that it is too far out to assess the risk of deviation from the April 15th FC target, especially with 150-60% normal snowpack in the Snake River basin.

Hatchery managers reported that they have identified some changes in operation that they can make to alleviate some of the TDG concerns, however, not all. They will continue to explore options and report back to TMT.

General Discussion
There was a general conversation about potential alternatives, including:

- Taking a system view to include flood control contributions from Grand Coulee, Libby, or other Columbia River reservoirs, to help relieve the pressure on DWR. Modifications to hatchery operations to include moving fish, changing rearing densities, testing existing degassers at higher levels, pulling water from the reservoir for the DWR hatchery, and using temporary degassers.
- Lowering the volume of spill through March and then increasing it to meet the April 15th target.
- Modify the flood control targets/scenarios during this critical time for fish.

In view of the uncertainty about alternatives, TMT agreed to meet again on Friday, March 3, 2017 for further discussion.

- **ACTION:**

  The Corps will increase DWR discharge to 12.5 kcfs immediately. March water supply forecast information will be posted immediately when available, which will hopefully be later this afternoon, and at least by end of Thursday. All parties commit to out-of-the-box exploration of alternatives to best manage flood control risk and minimize impact on fish. They will bring ideas back to TMT on Friday.

TMT will reconvene at 0900 Friday March 3, 2017 to consider next steps.

Columbia River Regional Forum
TECHNICAL MANAGEMENT TEAM OFFICIAL MINUTES

March 1, 2017
Minutes: Pat Vivian

1. Introduction

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

2. Dworshak Update

Steve Hall, COE Walla Walla, led a conversation on Dworshak water management in light of the increasing volume forecast and generation limitations due to the Dworshak unit 3 outage. Last week, TMT coordinated an operation allowing spill up to 115% TDG downstream of the dam.

2a. Current Operations Data. Dworshak is currently releasing 10 kcfs with 4.7 kcfs of that as generation and 5.2 kcfs spilling through the RO's. The reservoir is at elevation 1523.4 ft.

2b. Total Dissolved Gas Report. Gas levels have been around 114% saturation, with an unintentional dip to 113% last night because project operators have encountered technical difficulties in adjusting flows to a specific TDG level. For that reason, Hall recommended that TMT consider setting a specific flow target and allowing TDG saturation levels to vary.

2c. SNOTEL Verification. Hall presented the results from a SNOTEL site verification flight conducted on February 13-14, linked to today's agenda. The purpose of snow flights is to confirm all equipment is working as intended. This one found the Elk Butte station is not transmitting data; the COE has been working on getting the equipment repaired. The Shanghi Summit site was compromised because the landowner clear-cut up to the equipment, which has apparently been damaged by a snowmobile.

The graph attached to this item depicts snow water equivalent (SWE) readings from 6 sites in the Snake basin that broadcast readings every 5 or 15 minutes via telemetry. Each site has two pillows reporting data with slight variations between them. There's approximately 20-30 inches of water content in the basin according to the latest SWE readings.

Tom Lorz, CRITFC/Umatilla, asked how the SWE readings compare to historical averages. Low elevation stations are generally above average, Hall said, while the mid elevation stations are average and higher elevation stations are below average. The basin as a whole is at 98% of normal. Jay Hesse, Nez Perce Tribe, asked how the data are verified; Hall said the NRCS does data correction using a statistical process.

2d. Operational Scenarios. According to the COE's early bird water supply forecast, the April-July runoff volume at Dworshak will be 2.87 maf, which coincides with the RFC's 10-day volume forecast of 2.8 maf. Hall noted the RFC forecast has been climbing significantly since mid-February, with an increase of about 600 kaf since February 1. The COE suspects the official April-July runoff forecast will be 2.87 maf. The RFC's 10 day forecast is 2.8 maf and the 5 day forecast is 2.7 maf.

The series of scenarios Hall showed TMT assume a 2.8 maf inflow volume forecast, which is likely to increase.

- The first scenario based on STP inflows shows Dworshak releasing 16-17 kcfs through March and the first half of April. What differentiates it from the rest is a two-day drop to 8 kcfs in mid-March to accommodate a combined Nez Perce/Dworshak hatchery release at the request of the Salmon Managers. This scenario is the COE's preferred approach.

- This shows the difference in outflows required to reach the April 15 flood control elevation without a two-day drop in DWR discharges to accommodate hatchery releases. Discharges average 16.3 kcfs based on a 2.8 maf runoff volume. If the official March water supply forecast turns out to be 2.87 maf as expected, the April 15 flood control elevation would drop another 10 ft.

- This scenario shows DWR operating to an end of March flood control elevation of 1500 ft with 14-15 kcfs discharges increasing to 20 kcfs, depending on the shape of runoff.

- The next several scenarios show what shape does to the forecast. Instead of using STP inflow traces, they are based on water year 1989, which had a 2.8 maf volume forecast but more normal timing with peak runoff in April. The first of these scenarios has 14 kcfs flat flows coming out of DWR.

- A similar scenario based on water year 1990 doesn't peak in early April and has lower flows in mid-March, with flat flows of 14.7 kcfs which could be low. Operating to the end of the month flood control target puts releases at 12 kcfs rising to 20-21 kcfs.

Hall emphasized the COE's concern that the current forecast doesn't actually represent what could be coming in terms of inflows.

The COE prefers the first scenario, 16-17 kcfs Dworshak discharges in March/early April. The 10 day forecast calls for wet conditions in Dworshak basin, which could mean a half-inch increase in precipitation every day over the next 10 days and a steadily increasing snowpack. Other conditions, including two spikes in inflows, point to a high incidence of snowmelt at lower elevations that aren't yet recorded at the SNOTEL sites. For this reason the COE foresees a steady increase in snowpack and believes the water supply forecast is underestimating actual runoff.

Jay Hesse, Nez Perce Tribe, asked whether the target elevation for the end of March is 1510 ft or lower. Hall said the end of March flood control elevation shown on the scenarios is

1501 ft, but if the 2.87 maf water supply forecast is approved, the end of March elevation will be 1493 ft and the April 15 elevation will be 1471 ft.

Dave Statler, Nez Perce, asked whether the COE would manage to the end of March target as well as the April 15 target of 1471 ft. It's more prudent to operate to the April 15 target than the March 31 target, Hall replied.

Dave Swank, USFWS, asked whether the difference between the first and last scenarios involves releasing the same amount of water. Hall said STP inflows just show averages and don't capture normal variability caused by rainstorms moving through the area. In 1989 and 1990 inflows varied from 4 to 18 kcfs and went up to 20 kcfs in 1989.

Tom Lorz, Umatilla, asked whether flows are expected to drop after April 15. Hall said 8 kcfs might be possible through end April to provide the rest of spring augmentation flows, then it might be necessary to back off for the sake of TDG management.

Dave Statler, Nez Perce, said a potential 1471 ft flood control target for April 15 seems low, given minimum Dworshak pool elevation at 1445 ft.

Jay Hesse, Nez Perce, asked what levels of TDG 16-17 kcfs discharges would produce; Hall said it would be in the vicinity of 125% TDG.

Mark Drobish, Dworshak National Fish Hatchery, clarified that Dworshak and Clearwater hatcheries have coordinated their releases for March 27-28.

2e. FPC Summary. Dave Benner, FPC, provided three graphs for discussion.

1. The first scenario uses water year 2008, which had a 2.8 April-July maf inflow volume. The April 15 flood control elevation was 1481.9 ft. To reach that elevation, outflows were 14.5 kcfs through April 15, then dropped to 4.5 kcfs for most of the two-week refill period in June.

2. The next scenario also uses 2008 STP inflows through end March with the March forecast as a flood control target. The April 15 target is 1481.9 ft, same as in the first scenario. To reach that elevation, outflows were 15.8 kcfs through April 15, then dropped to 4.5 kcfs through the end of refill.

3. The last scenario is an alternative operation discussed at FPAC yesterday, with a deviation from the April 15 flood control target. It uses the same April-July inflows as the first scenario, but the April 15 flood control target is 1507 ft instead of 1481 ft. This was the April 30 flood control point in 2008 based on STP inflows through end March. April-July inflows are the same as in 1984, a 2.8-2.9 runoff.

Hall said the COE looked at 1984 as well, but the shape was not considered comparable because runoff was relatively late and inflows didn't rise until mid-May. In the first half of April 1984 inflows were 7 kcfs, while this year inflows for the same period are likely to be 12-13 kcfs.

Swank asked whether the April 15 flood control elevation is set based on a potentially late runoff. April system flood control elevation is based on computations of total runoff in April-July, Hall said. So far this season, future inflows have been discounted and not enough water has been moved. All indications are that inflows will be above average in March and early April due to abundant low-elevation snowpack.

Margaret Filardo, FPC, asked whether TDG levels might be better controlled by operating Dworshak to the April 30 rule curve instead of April 15. This would protect fish released in late March. Julie Ammann, COE, said it's too early to decide whether a deviation of the April 15 flood control elevation is even an option in light of system flood control requirements, with snowpack in the Snake basin at 150-160% of normal and growing. Hall said the operation will be based on the real-time shape of runoff and when it intersects the flood control refill curve (FCRC).

At this point, the Salmon Managers aired their thoughts on biological objectives in light of the current situation.

Jay Hesse, **Nez Perce Tribe**, said the hatchery won't be able to handle 125% TDG and fish will be exposed to conditions that are known to cause gas bubble trauma (GBT). What's needed is ways of managing TDG levels in relation to release timing. Discharging high TDG levels now will gas the Clearwater River during a low flow period when the buffering effect of convergence with the Snake River is substantially reduced. The rearing area for juvenile fall chinook in the North Fork of the Clearwater is at a different elevation than the gas meter, meaning they will be exposed to higher TDG levels than what's on record. In light of the serious risks to fish, Hesse asked the Action Agencies to look at alternative scenarios for reducing gas levels in the hatchery and river at critical times. He asked how flexible the downstream flood control targets are, given that inflows at The Dalles are about 100% of normal.

Dave Statler, Nez Perce, wondered whether there's a way to spread the risk more evenly between flood control operations and fish survival in light of these concerns. Scott Bettin, BPA, asked, would it be beneficial to spike flows or back them off if higher discharges are needed? Chronic exposure to levels above 100% are risky, Hesse replied. Becky Johnson, Nez Perce, said last year's hatchery tests showed the vacuum degassers could handle 115% or even 120% TDG, but 125% or 130% TDG levels have never been tested.

Mark Drobish, **Dworshak National Fish Hatchery**, agreed it's unknown how the degassers would function at 125% or 130% TDG. Last year when the river was at 120% TDG, saturation levels were 104% in the hatchery. At 125% TDG below Dworshak, TDG levels at the hatchery might be 109%. And there's a complicating factor: the April 15 Clearwater hatchery release will also discharge some reservoir water.

Paul Wagner, **NOAA**, recalled that a contingency plan for moving fish to acclimation ponds in other hatcheries was considered at one point; has it been developed? Kiefer said no. Becky Johnson, Nez Perce, said Dworshak hatchery is most at risk because its 2 million spring chinook smolts can't be moved.

Howard Schaller, **USFWS**, asked what level of spill would keep TDG levels in the river at 120% TDG or under. Probably 12-13 kcfs, Hall replied. In response to a question earlier about the historic depth to which DWR has been drafted, Hall reported the reservoir has been deeply drafted in the past. In 2014 it was at 1485 ft elevation, in 2011 it was at 1450 ft, in 2008 it was at 1475 ft, in 1975 it was at 1445 ft, and in 1982 it was at 1455 ft. Schaller asked about scenarios with a lower volume of spill through March 30 and increasing spill from then on. Hall said operating to a higher elevation at the end of March can make it difficult to catch up on flood control releases in April.

Margaret Filardo, FPC, noted that local flood control elevations are higher than system flood control elevations. Doesn't this indicate there's room in the reservoir to capture early runoff and continue 11.5 kcfs discharges into early April? The reservoir operation is intended to pivot either direction if conditions get wetter or drier, Ammann replied. With February inflows at 200% of normal, similar inflows in March would make it difficult to get down to the required flood control elevations. STP traces don't reflect 200% of normal inflows; Dworshak releases could need to go as high as 25 kcfs to achieve the required elevations. The COE will monitor whether a flood control deviation might be possible in April, but it's too soon to tell.

Wagner asked about exploring options that shift system flood control, given that Grand Coulee has drafted well below its flood control elevation in preparation for drum gate maintenance. There are maximum elevations during drum gate maintenance that limit Coulee storage, Ammann replied. And forecasted inflows at The Dalles are increasing, Tony Norris, BPA, added. The April-August forecast for TDA was 95 maf, so the March forecast can be expected to exceed the current 10 day forecast. This will produce additional draft at GCL below what is needed for drum gate maintenance. Hall recalled previous discussions in which the COE explained there will be no shift of flood control space this year because it would be impossible to shift the volume back out with Dworshak unit 3 out of service.

Dave Swank, **USFWS**, asked whether it would be possible to do a stepped increase over a day or two instead of going to 15-16 kcfs discharge suddenly. This would give the hatchery time to evaluate how well the vacuum degassers work at levels above those previously tested. Hall said that's an option, but any delay only increases the volume of water to be released later. He asked the Salmon Managers whether they had considered portable raceway degassing as well as rearing density and other hatchery-related options. It was clarified that anything above 120% TDG in the river would be questionable in terms of hatchery management.

Margaret Filardo, FPC, asked why not operate DWR to the April 30 rule curve instead of April 15? Would that meet flood control requirements? She asked for a more precise definition of risk from a biological perspective. Is it better to have high TDG levels in the river now or later, after fish have been released from Dworshak Hatchery?

Hall told TMT the Columbia River system has relatively minimal storage volume, which means flood control releases need to be managed closely. If inflows aren't drafted out of the Snake basin now, flood stage flows could affect Portland, the Tri-Cities and other population centers on the Columbia.

The COE gave the Salmon Managers two options to consider:

- Dworshak releases go to 14.4 kcfs and slowly rise to 20 kcfs in a stepped approach.
- Dworshak releases increase to 16-17 kcfs immediately.

Hall noted this analysis is based on drafting to 1482-3 ft by mid-April, but it's likely the April 15 flood control elevation will drop 10 ft to 1471 ft based on the current water supply forecast. Worst-case scenario, the project might need to discharge 25 kcfs to get to 1445 ft by April 1. Tony Norris asked the Salmon Managers to specify the most desirable timeframe for releasing excess volume.

In light of the situation, Russ Kiefer at first requested a Salmon Manager caucus, then suggested shifting the operation to 120% maximum TDG discharges until Friday and schedule another TMT meeting then. This would give the Salmon Managers a few days to confer with hatchery personnel. Hall said 120% TDG is probably equivalent to 12-13 kcfs out. Schaller said higher TDG releases in the next few weeks would probably have the least impact on hatchery fish. Ammann said flat flows of 13 kcfs would be easier to implement rather than maintaining a specific TDG level. Kiefer said Idaho wouldn't object to 12.5 kcfs.

The COE will increase Dworshak discharges to 12.5 kcfs immediately until Friday, March 3, when TMT will have another conference call to discuss a longer term operation. The final March forecast will be available on Friday to aid in the decision.

Name	***Affiliation***
Russ Kiefer	Idaho
Dave Swank	USFWS
Jim Litchfield	Montana
Jay Hesse	Nez Perce
Dave Statler	Nez Perce
Tom Lorz	CRITFC/Umatilla
Jen Graham	Warm Springs
Trevor Conder	NOAA
Paul Wagner	NOAA
Tony Norris	BPA
Aaron Marshall	COE
Julie Ammann	COE
Doug Baus	COE
Pete Lyman	PGE
Sheri Sears	Colville Tribe
Steve Hall	COE
Mary Mellema	BOR
Wayne Jousma	COE
Steve Earl	COE
Charles Wiggins	DSC
Dave Benner	FPC

Margaret Filardo	FPC
Michael Bryant	CBB
Laura Berg	Clearing Up
Erick Van Dyke	Oregon
Mark Drobish	DWR Fish Hatchery
Becky Johnson	Nez Perce
Scott Bettin	BPA
Howard Schaller	USFWS