COLUMBIA RIVER TECHNICAL MANAGEMENT TEAM
August 28, 2019
DRAFT Facilitator's Summary
Facilitator: Emily Stranz; Notes: Colby Mills, 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.nwdwc.usace.army.mil/tmt/agendas/2019/.

Meeting Minutes & Summary
TMT members present approved the August 14, 2019 meeting minutes and summary with no additional edits.

Dworshak Operations
Jon Roberts, Corps, updated the group on operations at Dworshak Dam. Currently the project is discharging 8 kcfs, with a forebay elevation of 1,542.46 feet. TDG levels in the Dworshak tailrace are right at 100%, or slightly above, and have been for the last 10 days. Hatchery TDG has stayed from 98 – 101.5%.

The Lower Granite tailwater reached 67.89 degrees F as of 0700 hours, and will likely climb up to 68 degrees F as today is forecast to be the hottest day of the week. These conditions are expected to remain until September 1st.

Looking ahead, the RFC inflow forecast doesn't show any significant inflow. Ambient temperatures are expected to cool on Thursday and Friday then warm back up on Saturday. September 1 is the end of summer spill and Lower Granite will then draw cooler water through the powerhouse from deeper in the forebay, which is currently around 63-65 degrees F. The model shows an increase in temperature into September 4 and 5, and then most likely will reduce as cooler water is pulled from the deeper in the pool through the powerhouse. Dworshak pool elevation is projected to be 1,538.75 feet on September 1, which leaves 55 kaf of additional water (the volume difference between 1539 ft and 1535 ft on September 1). Flows will transition down from the current 8 kcfs range to the 7-7.5 kcfs range throughout the weekend and will fluctuate slightly to meet the intent from the Dworshak Board Operational Plan.

Dworshak Board Operational Plan
Jay Hesse, Nez Perce Tribe, provided an update on the Dworshak Board's operational plan. As part of the Snake River Basin Adjudication, the Nez Perce Tribe secured 200,000-acre feet of Dworshak water for release as a benefit for fish. The benefit is viewed as a transition from summer flow augmentation of Dworshak water through September until natural cooling regimes are reached at the end of September or early October. The Dworshak Board, who met on Monday, guides the release strategy for the water. The operational criteria and objectives decided upon for this year (posted on the TMT website) provide a path to ramping down flows to avoid a drastic change in water temperature and stranding fish that could be rearing in the shallow water areas:

1. Lower Granite tailwater not to exceed 68 degrees F;
2. Clearwater River at Spalding not to exceed 56 degrees F; and
3. Minimize daily temperature differentials to no more than 1 degree F in Clearwater River at Peck and Spalding.

The SOR earlier this summer to conserve water gained about 4 days of water in September before hitting 1,535 feet elevation. Given the relatively cool conditions, discharges starting in September will allow for the 200,000-acre feet of water to have influence throughout the entire month.

The planning of Dworshak's operational guide triggered a discussion at FPAC regarding the Lower Snake River (LSR) pool elevation management in September. The Water Management Plan describes MOP operations at the LSR Projects (Lower Granite, Little Goose, Lower Monumental, and Ice Harbor Dams) that occur from April 3

through August 31. On September 1 the MOP requirement ends and the Action Agencies are able to operate the LSR Projects within their normal forebay operating range unless adjusted for specific operational issues such as navigation safety. There have been concerns in the past that the Dworshak Board water would be used to fill the LSR pools and not help with flow augmentation. Salmon Managers expressed to Action Agencies an informal request to minimize filling the LSR pools with Dworshak water in September in an effort to maximize cooling effects for the benefit of fish, while recognizing the various projects for fish that will be happening simultaneously at these dams. If necessary, they suggested prioritizing filling the Ice Harbor pool and work from downstream to upstream. Doug Baus, Corps, acknowledged the fish manager's interest and noted the navigational constraints in place that prevent Lower Granite from going below 735 feet. Tony Norris, BPA, added that in the past the Action Agencies have demonstrated that the Dworshak Board water has moved through the system by temporarily returning to MOP after the Dworshak Board operation. Jon shared his expertise that based on modeling, MOP operations did not impact temperatures or travel time when flows were below 40 kcfs.

Spill Priority List

Dan Turner, Corps, presented the upcoming spill priority list that goes into effect September 1, as summer spill season winds down. FPAC suggested having Bonneville at top of the list, then work from the top of the system down, with non-fish passage projects at the bottom of the list. This order is intended to place any lack of load spill at upstream projects where juvenile fish are concentrated this time of year. Doug noted that the Corps will try to keep Lower Granite 2nd on the list, however, planned work may prohibit spill (spillway PIT detector installation). In this case, the Corps will touch base at TMT for more conversation.

Operations Review

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

- **Hungry Horse**: yesterday's inflows were 808 cfs, outflows were 1,976 cfs, and the midnight elevation was 3,554.27 feet. The project is still operating to meet the 10-foot draft by the end of September, and the Columbia Falls minimum flow target of 3,450 cfs, and might increase 100-200 cfs later this week or next.
- **Grand Coulee**: yesterday's inflows were 76.6 kcfs, outflows were 104 kcfs, and the midnight elevation was 1,279.4 feet. The project is operating to the end of August draft elevation down to 1,277.5 feet, the 12-foot draft and the 0.5-foot draft for the Lake Roosevelt Incremental Storage Release (LRISR).

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

- **Libby**: midnight elevation was 2,442.3 feet, with average inflows of 4.8 kcfs and outflows of 7 kcfs;
- **Albeni Falls**: midnight elevation was 2,062.2 feet, with average inflows of 8.6 kcfs and outflows of 8.6 kcfs;
- **Dworshak**: midnight elevation was 1,542.7 feet, with average inflows of 0.6 kcfs and outflows of 8.0 kcfs;
- **Lower Granite**: average outflows of 26.5 kcfs and a midnight elevation of 735.6 feet;
- **McNary**: average outflows of 129.6 kcfs; and
- **Bonneville**: average outflows of 116.0 kcfs.

Doug noted an email communication that was sent to the TMT regarding an unplanned powerhouse outage at Lower Granite on Monday. A significant nitrogen leak on the transformer, possibly resulting from sealing problems following Doble testing, lead to a short powerhouse outage. The leak has been repaired.

Water Quality: Dan reported that with the end of spill season there is a change in state water quality criteria to 110% as of September 1. TDG in the system has been low with spill rates, although there have been some gauge issues on and off due to biological issues that are common in August.

Fish: Paul Wagner, NOAA, reported general improvements in adult passage at Bonneville over last year, with about 5,000 fall Chinook per day at Bonneville, and YTD passage at 58%. Fall Chinook jacks are at 67%,

steelhead at 27%, and unclipped steelhead at 38%. YTD passages at Lower Granite include: fall Chinook adults at 54%, fall Chinook jacks at 40%, steelhead at 28% (includes fish that didn't pass last year), and unclipped steelhead at 35%.

Sockeye passage is pretty much complete, with a couple passing in the last week. Russ Kiefer, ID, reported trapping 12 sockeye in Redfish Lake Basin, including 2 hatchery fish and 10 wild and natural. Trapping is ongoing, and a low return is expected. The sockeye have looked good overall. In response to a question, Russ noted that sockeye restoration goals are defined in the Recovery Plan for the basin; part of which would be self-sustaining, healthy, natural-reproducing populations occupying at least 3 lakes in the basin. Russ informed the TMT that until his replacement is hired, Lance Hebdon will step in as the TMT representative from Idaho. This meeting marked Russ' last TMT meeting as a TMT representative, the group wished him well in retirement.

Paul continued, noting that juveniles, specifically sub-yearling Chinook, migration is nearing an end. There may however, be a rally in October, which is one reason for the updated spill priority list.

Power System: Tony Norris, BPA, noted warm temperatures yesterday lead to an increase in load. There was not an increase in wind generation, as the east winds do not produce much wind generation.

The next scheduled TMT meeting is a conference call on September 11, 2019, at 9:00 AM.

This summary is respectfully submitted by the DS Consulting Facilitation Team. Suggested edits are welcome and can be sent to Colby at colby@dsconsult.co.

Columbia River Regional Forum
Technical Management Team OFFICIAL MINUTES
Wednesday, August 28, 2019
Minutes: Melissa Haskin, FLUX Resources

1. Introductions

Today's TMT meeting was chaired by Doug Baus, Corps, and facilitated by Emily Stranz, DS Consulting. See the end of these minutes for a list of today's attendees. Copies of documents discussed and meeting minutes are available on the TMT website.

2. Review Meeting Summaries and Minutes

Minutes and summaries from the 8/14 TMT meeting were approved with no additional edits.

3. Dworshak Operations – Jon Roberts, Corps NWW

Jon Roberts, Corps NWW, reported on operations at Dworshak Dam. The project is discharging 8 kcfs. The forebay elevation is 1,542.5 ft. TDG is ~100% currently in the Dworshak tailrace and in the range of 98–101.5% in the hatchery (Figure 1).

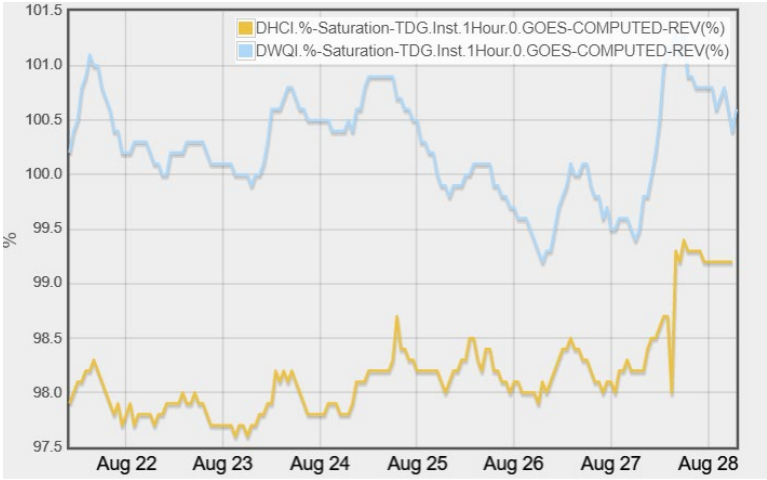


Figure 1. Total Dissolved Gas (TDG) at the Dworshak Dam tailrace (DWQI) and Dworshak Hatchery Collection (DHCI) over the last 6 days, August 22-28.

Temperatures in the Lower Granite tailwater are currently 67.89°F. Today should be the hottest day of the week, thus the tailrace should reach 68°F today and will likely remain near there until September 1.

The NWRFC 10-day inflow forecast for Dworshak shows no significant inflows (Figure 2).

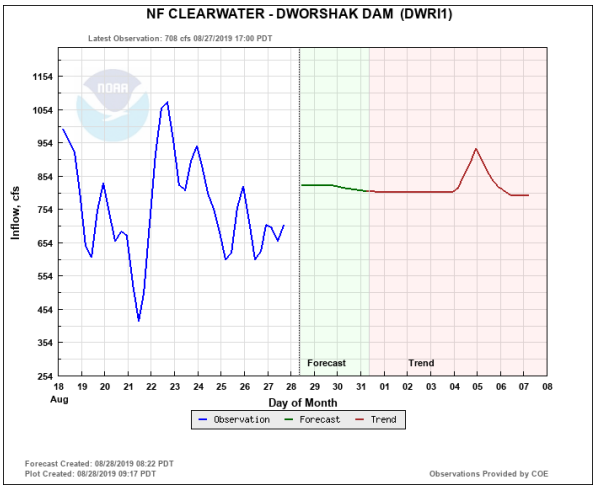


Figure 2. NWRFC observed and forecasted inflow for Dworshak Dam as of August 28.

The weather forecast is for a cool down Thursday and Friday, then warmer over the weekend. Starting Sunday, September 1, summer spill ends and Lower Granite will begin passing cooler water (63-65°F) through the powerhouse from deeper in the forebay, which will cool temperatures in the tailrace by several degrees.

Today's temperature model results (Figure 3) show the Lower Granite tailrace remaining around 68°F and increasing around September 4; however, Roberts noted that the September estimations are most likely high since Lower Granite will be passing cooler, deeper water through the powerhouse starting September 1.

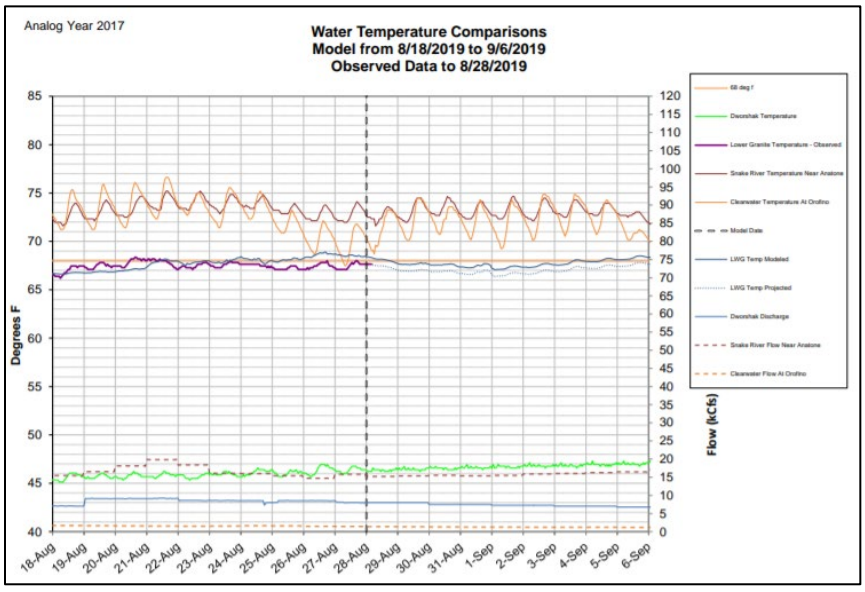


Figure 3. Water Temperature Model Results for August 18-September 6.

As shown in the proposed operation graphic (Figure 4), the projected forebay elevation on August 31 is 1,538.75 feet, which is 3.75 feet above 1,535 feet and translates to about 55,000 acre-feet (55 KAF) of additional water for use in September. Dworshak outflow is currently 8 kcfs and the plan is to reduce to 7–7.5 kcfs over the weekend, then transition on September 1 to the gradual step-down per the Dworshak Board plan (see next agenda item).

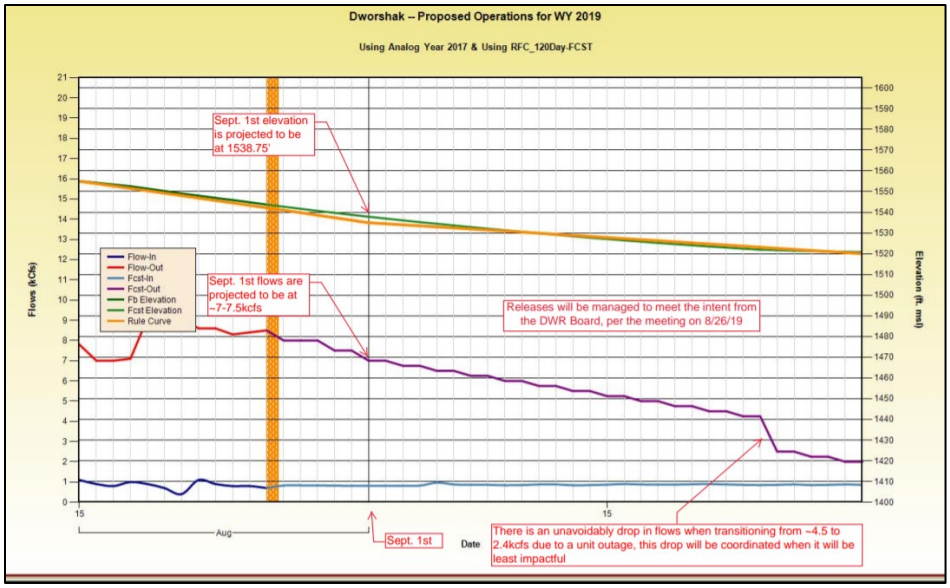


Figure 4. Dworshak Dam proposed operation as of August 28, 2019.

Tony Norris, BPA, asked if once spill is stopped whether the observed temperatures at the Lower Granite tailwater gauge will be representative of actual temperatures. Roberts said there are a few nuances. The temperature gauge is at a fixed elevation. As the tailwater elevation fluctuates, the depth over the gauge also fluctuates. This is why the spill rate and pattern can be exactly the same and result in different temperature readings. The physical location of the gauge at a fixed elevation results in the reported temperature being more or less influenced by solar radiation or wind, depending on the depth of the sensor. Charles Morrill, WA, asked for the elevation of the gauge. Roberts replied that it's tracked by depth. Right now, it is about 8-9 feet deep. *[NOTE: hourly data for the Lower Granite tailwater gauge (LGNW), including depth and temperature, are available at: http://pweb.crohms.org/report/total.html]*

4. Dworshak Board Operational Plan – Jay Hesse, Nez Perce Tribe

Jay Hesse, Nez Perce, presented on the Dworshak Board Operational Plan attached to today's agenda. As part of the Snake River Basin Adjudication, the Nez Perce Tribe secured 200,000 acre-feet (200 KAF) of Dworshak water for release to benefit fish, with the intention to provide a transition for Dworshak summer flow augmentation through September until the natural cooling that typically happens late September or early October.

As part of the agreement, the release strategy of that water is determined by the Dworshak Board. Hesse reviewed this year's Dworshak Board plan, highlighting sections D, E, and F as the primary operational criteria that guide the release strategy:

> **D**. Target LWG Tailwater temperatures not to exceed 68°F. The discharge water temperature is expected to be in the range of 46 to 48°F.
>
> **E**. Target Clearwater River at Spalding daily average water temperature not to exceed 56°F. The discharge water temperature is expected to be in the range of 46 to 48°F.

F Target Clearwater River at Peck and Spalding daily average water temperature change of no more than 1°F. The discharge water temperature is expected to be in the range of 46 to 48°F.

The goal is to gradually ramp down Dworshak outflow to avoid drastic flow reductions that could increase temperatures or strand fish, particularly lamprey that rear in shallow water.

Dworshak Dam releases have kept the lower Clearwater in the upper 40s and low 50s throughout the summer. Hesse stressed the importance of keeping this below 56°F.

Earlier this summer, the salmon managers submitted an SOR to manage Dworshak summer releases for Lower Granite tailwater temperature rather than targeting a forebay elevation. *[NOTE: see SOR 2019-1 at: http://pweb.crohms.org/tmt/sor/2019/]* The Corps and BPA implemented this operation, which added about 4 days of water that can be used in September. Given the relatively cool conditions, this additional water could mean that the 200 KAF will provide a benefit for the rest of September. In the past, water has run out as early as the second week of September.

Hesse reported that the planning of the 200 KAF operation triggered an FPAC discussion on how the lower Snake pools are operated during the month of September. Per the Water Management Plan, MOP operations end on August 31. Starting September 1, the lower Snake projects may be operated within their normal forebay operating range, as adjusted for navigation safety. There is concern from some salmon managers that this Dworshak water will be used to fill the lower Snake pools instead of helping with flow augmentation through the reservoirs. FPAC discussed the need to consider seeking an extension of MOP for the full duration of the Dworshak flows in September, but the group decided not to seek an extension of MOP. However, he wanted to share their concerns with BPA and the Corps and stress FPAC's desire to minimize filling the pools to the extent possible. If there were a need to do so, the preference would be to fill Ice Harbor and work upstream if possible.

Dave Swank, USFWS, said that his understanding of the FPAC conversation was that it was more focused on trying to maximize the cooling effect of the Dworshak water. Water can slow down at these reservoirs, especially at higher elevations, and cause them to warm up faster than they would otherwise.

Jon Roberts, Corps, commented that Corps studies show that in low flow conditions, as the basin is experiencing now, lower pool elevations do not result in higher water velocity or increased water travel time. These results are specific to low flows, below about 40 kcfs, when there is no measurable difference in water velocity or travel time at different pool elevations. As flows increase above 40 kcfs, there is a small increase in water velocity at lower pools, and the relationship becomes more significant when flows are above 80 kcfs.

Paul Wagner, NOAA, asked if there was a change in the wetted perimeter as a result of MOP. In other words, does the water spread out as the pool is raised, which would increase the surface area of the pool that is exposed to solar radiation and warming? Roberts replied that, no, not under the current low flow conditions because the Snake River is more of a canyon with vertical sides rather than a trapezoidal shape. This geology means the river is about 1/4 mile wide in most places and there is not a measurable increase in the surface area as the pools are raised.

Steve Hall, Corps, added there are areas of river flow that are referred to as "ineffective" and "effective" in terms of river modelling. At these low flows, there are many areas of ineffective flow along the banks of the Snake River that are stagnant or ponded and do not affect temperature or velocity in the river. Additionally, any solar radiation entering an ineffective part of the pool would not contribute to temperature in the rest of the channel. Solar radiation hitting effective flow areas has the greatest impact on temperature. A change in pool elevation is not going to change the temperature of the pool.

Norris asked if the Lower Granite pool was higher, would that provide additional insulation from solar radiation for the deeper Dworshak water to get to Lower Granite. Hall said no.

Norris also asked if the pools were higher, would the diffuser outlets and fish ladder exits and entrances be cooler due to greater submergence. Hall replied that the higher the pool, the deeper the water at the entrance and exit of the fish ladders, as well as over the turbines and spillway. So if the thermal stratification in the forebay is relatively the same, there would be cooler water at these areas due to greater submergence. Hall added that solar radiation probably only affects about the top 10 feet of the water column. Wind mixing can increase the effect slightly. During windy conditions at Lower Granite last week, the data indicated wind mixing down to a depth of about 20 feet. It would take a prolonged wind event to extend that mixing even deeper.

Charles Morrill, WA, asked if there is a temperature difference between effective versus ineffective flow. Hall responded that ineffective flow areas are usually warmer than effective flow areas.

In regards to the salmon managers' request to minimize filling the lower Snake pools in September to the extent possible, Hesse shared that there was no formal FPAC poll but that no members on the FPAC call expressed objections.

Doug Baus, Corps, said that the Corps hears the desire to minimize filling above MOP in September. He reminded TMT that there are still navigation constraints in place that already restrict some of the forebay operating ranges. For example, the Lower Granite forebay is currently constrained to a smaller range due to the raised minimum of 735 feet. There are also other activities related to fish research that will require a balancing act in the month of September. The Lower Granite spillway PIT installation is scheduled to begin in September, which will require special operations. Ice Harbor operations will be impacted by a spill test at McNary and an upcoming Ice Harbor unit 2 test. Baus stressed that the Corps hears the request but there are other restrictions and activities scheduled in September that must be implemented.

Norris responded for BPA, saying that there are many operations intentionally scheduled for September, as it is a period when there are fewer restrictions on the system and lower flows, which opens the window for critical work. In the past, BPA implemented the "no net fill" operation and returned the lower Snake projects to MOP (as adjusted for navigation) after the release of the 200 KAF from Dworshak to demonstrate that the Dworshak water passed through the lower Snake projects. BPA will take a look at what is possible and take the recommendation into consideration but will have to remain flexible to accommodate the navigation constraints and other work. It is notable that there is not a lot of water in the system and so it is unlikely that BPA would be moving the pools around too much on any given day.

5. Spill Priority List - Dan Turner, Corps NWD

Dan Turner, Corps, reported on the fall/winter spill priority list that goes into effect September 1. The list reflects the change in state water quality standards and adjusts the project priority order for lack of load spill. This year, the salmon managers requested Bonneville as first priority, then going to Lower Granite and working downstream, with non-fish passage projects at the bottom.

Russ Kiefer, ID, asked if having Lower Granite as second priority will conflict with the spillway PIT detector installation. Baus said the Corps and BPA's approach is to define the default order, then any constraints or restrictions that are in effect at a project will take precedence and they will skip to the next project in the order.

Erick Van Dyke, OR, said that in the past, they would move projects down in the order if there was work scheduled that conflicted with spill. He asked why that isn't the case with Lower Granite. Baus replied that the intent is to keep Lower Granite as second priority to the extent possible, then if work conflicted with spill, they would skip to Little Goose. The other option would be to move Lower Granite lower in the order as the default, which would mean a lower chance of spill regardless of whether there was a work conflict. If the salmon managers' preference is to move it lower as the default, the Corps can make that change. In the meantime, if there is lack of load spill at Lower Granite, the Corps will report back at TMT.

Lisa Wright, Corps, noted that the fall/winter order in previous years has been to start at Bonneville and work upstream. She asked why the Snake projects had been moved up. Wagner replied that this year, that is where more of the subyearlings are as of now. The list is a "living document" and may change as the year goes on.

6. Operations Review

6a. Reservoirs – Chris Runyan, Reclamation, and Lisa Wright, Corps

Hungry Horse – Yesterday's inflows were 808 cfs and outflows were 1,976 cfs. Midnight elevation was 3,554.27 feet. The project is on target to meet the 10-foot draft by the end of September. Columbia Falls is currently at 3,971 cfs, which is above the minimum flow target of 3,450 cfs, but flows may drop over the next week. In response, Reclamation plans to increase Hungry Horse discharge by 100-200 cfs later this week or next week if needed to maintain Columbia Falls.

Grand Coulee – Yesterday's inflows were 76.6 kcfs and outflows were 104 kcfs. Midnight elevation was 1,279.4 feet. Reclamation is operating to target 1277.5 feet by the end of August, which is the 12-foot draft as well as the 0.5-foot draft for the Lake Roosevelt incremental storage release.

Libby Dam – Midnight elevation 2,442.3 feet. Yesterday's average inflows were 4.8 kcfs and outflows were 7 kcfs (bull trout minimum).

Albeni Falls – Midnight elevation 2,062.2 feet. Yesterday's average inflows were 8.6 kcfs and outflows were 8.6 kcfs.

Dworshak Dam – Midnight elevation 1,542.7 feet. Yesterday's average inflows were 0.6 kcfs and outflows were 8.0 kcfs.

Lower Granite – Yesterday's average outflows were 26.5 kcfs. There was an unplanned powerhouse outage Monday to repair a nitrogen leak.

McNary Dam – Yesterday's average outflows were 129.6 kcfs.

Bonneville – Yesterday's average outflows were 116.0 kcfs.

6b. Water Quality – Dan Turner, Corps

As the end of spill season approaches, there will be a change in water quality state standards to 110% at all projects starting September 1. TDG is low as are spill rates. There have been some gauge issues due to sedimentation and torn membranes.

6c. Fish – Paul Wagner, NOAA

Adults: At Bonneville, fall Chinook adults counts are about 5,000 per day with a total YTD of 32,136 (58% of the 10-year average) and jacks are 6,236 (67% of average). This is an improvement from earlier this year. Steelhead YTD are 53,703 (27% of average), of which 29,280 were unclipped (38% of average).

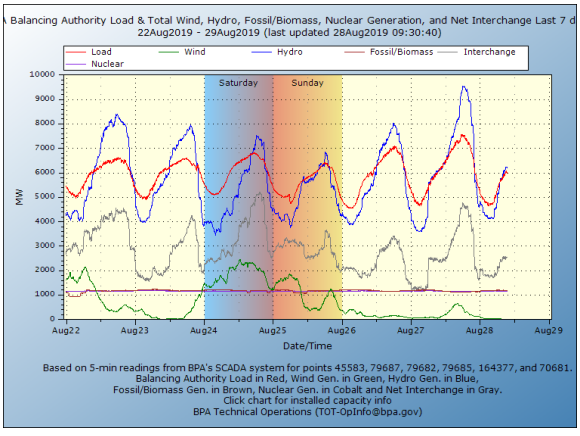
At Lower Granite, summer Chinook adults are at 536 thus far (54% of average) and jacks are 70 (40% of average). Steelhead counts include fish that didn't pass last year, overwintered in the reservoir, and then passed in the spring – total YTD is 4,794 (28% of average), of which 2,497 were unclipped (35% of average). Sockeye are pretty much done at only 81.

Russ Kiefer, ID, said that to date, 12 sockeye have been caught in the basin. Two were hatchery fish and 10 were wild/naturals. Trapping is ongoing and the forecast is for a low return. However, the fish that have been caught look good. Kiefer noted that the goal of the Recovery Plan is to achieve a self-sustaining, naturally reproducing population in at least 3 of the basin lakes (Redfish, Alturas, and Petit). He also provided an update that Lance Hebdon will serve as the temporary Idaho representative for TMT until a replacement is hired.

Juveniles: Fall Chinook subyearlings are wrapping up for the season. There can be a rally in October, which is why the spill priority list is the way it is.

6d. Power – Tony Norris, BPA

It has been warm. This has caused increased loads and with offshore flow days there is not a lot of wind generation. Moving into fall, the days are becoming shorter.



7. Next TMT

The next meeting is a conference call on September 11, 2019.

Today's Attendees:

Agency	TMT Representative
Army Corps of Engineers	Doug Baus (Chair), Julie Ammann, Lisa Wright
Bonneville Power Administration	Tony Norris, Scott Bettin
Bureau of Reclamation	Chris Runyan
NOAA Fisheries	Paul Wagner, Claire McGrath
US Fish & Wildlife Service	Dave Swank
Washington	Charles Morrill
Oregon	Erick Van Dyke
Idaho	Russ Kiefer
Montana	Jim Litchfield
Nez Perce Tribe	Jay Hesse
Umatilla Tribe/CRITFC	Tom Lorz
Colville Tribe	Sheri Sears
Warm Springs Tribe	N/A
Kootenai Tribe	N/A
Spokane Tribe	N/A

Other Attendees (non-TMT members):

Corps – Jon Roberts, Steve Hall, Dan Turner, Alexis Mills, Aaron Marshall
BPA – Kim Johnson
DS Consulting – Emily Stranz (Facilitator), Colby Mills
FLUX Resources – Melissa Haskin (Note taker)
Idaho Department of Fish & Game – Matt Belnap
Columbia Basin Bulletin – Mike O'Bryant
Yakama Nation Fisheries – Tom Iverson
Snohomish PUD – Mike Shapley
Member of the public – Charles Pace