

Columbia River Regional Forum Technical Management Team Annual Review of Lessons Learned Wednesday, December 6, 2023

Draft Session Summary

The following Facilitator's Summary is intended to provide a brief recap of the 2023 Year End Review presentations. This summary is not intended to be the "record" of the meeting, only a reminder for TMT members. Official minutes can be found on the [TMT website](#).

Welcome

Emily Stranz, DS Consulting Facilitator, welcomed the group to the 2023 Columbia River Technical Management Team (TMT) Year End Review (YER), noting that this is the 25th annual TMT YER. Participants joined the session in-person and virtually; an attendance list is provided on page 6.

The purpose of the TMT YER is to provide an opportunity for TMT members and other interested parties to step out of the regular meeting format, review selected conditions, operations, and information from the year, and consider lessons learned that might enhance choices and decision-making moving forward. The following pages provide brief summaries of the presentations provided during the YER, more details are available in the [presentation slides on the TMT website](#) and in the meeting minutes.

WY 2023 Weather Review

Kyle Dittmer, Columbia River Inter-Tribal Fish Commission, presented a review of [2023 weather conditions](#). Observed temperatures in fall of 2022 were warm and precipitation varied throughout the basin, with some areas, such as southern Idaho, being very dry for the season. Winter 2022-2023 was dry and cold; followed by a cool start to spring and then warmer temperatures later on. Precipitation in Spring 2023 was healthy, especially in southern Idaho, which helped recover areas of the basin that were dry through the fall/winter seasons. Summer was warm and dry. Overall, the water year was good, if not a bit dry. Although 2022-2023 was a La Niña year, it was drier than would be expected, in fact, one of the driest La Niñas on record. In summary, Kyle noted that there was a lot of variability in the weather and precipitation throughout the water year and basin, with a record 26 atmospheric river events.

Winter 2023-2024 Weather Forecast

Kyle also presented an annual [forecast for the 2023-2024 winter season](#). Current model predictions are indicating a strong El Niño and then shifting into ENSO Neutral conditions. Kyle anticipates a borderline strong El Niño, with some shifting between strong and moderate conditions. Precipitation is high for this early in the El Niño season, currently the 7th atmospheric river is passing through the region. Upwelling off the coast of Oregon is increasing, which is not consistent with El Niño conditions. Kyle summarized a few different forecasts for this winter, ranging from near to above normal temperatures, and near normal to dry precipitation levels. Kyle predicted hydrological, snow, and precipitation forecasts all near normal, with a couple of moderate snow events in Portland.

Review of the Water Year and Management Actions

Alexis Mills, US Army Corps of Engineers Northwest Division, presented a review of the [2023 water year and management actions](#). She recapped the water supply, noting that the year most of subbasins were

below average, with the exception of the Snake River basin, which was very close to average for the 2023 water year. As measured at The Dalles, 2023 was the 17th driest on record. Alexis recapped flood risk management, refill, power, spill, temperature, and fish operations at Libby, Albani Falls, Dworshak and Grand Coulee, including chum operations downstream at Bonneville (see slides for details on specific operations). She touched on how the Corps Reservoir Control Center forecasts reservoir operations, including the single trace procedure (STP) and RFC forecasting models. Additionally, Alexis recapped spill operations in the Snake and Lower Columbia and provided a summary of spill reductions as a result of GBT exceedances observed below Ice Harbor in 2023.

Northwest River Forecast Center Updates and Forecast Techniques 101

Steve King, NW River Forecast Center, provided an overview of [forecasting techniques and updates](#), specifically the RFC's STP forecast. He noted a few RFC updates including a new "normal" precipitation dataset, which are used to pit seasonal and monthly observations and forecasts in perspective. Additionally, RFC is recalibrating all 400 basins that they forecast for, using gridded data instead of point data. Steve summarized the Community Hydrologic Prediction System (CHPS), which is the model that RFC uses to prepare a variety of forecasts (including the STP which NWRFC and the Corps co-produce). The CHPS model utilizes observed and forecast forcing inputs, and outputs include a variety of forecasts such as stage height, flow, volume, etc. The model can be run as deterministic or ensemble. Steve provided overviews of the ESP 0 (no deterministic weather forcing for first 10 days), ESP 10 (with deterministic weather), HEFS (uses an ensemble for the first 15 days), and STP forecasts (see slides for details). Regarding the STP, the first 10 days are deterministic, and the remaining 110 days are forecast using historical mean for the 30-year normal. Steve cautioned that the 120-day STP forecast is a reasonable assumption for volume but does not verify well for the peaks and nuances beyond the first 10 days. Steve noted that changes in the STP from week to week are due to changes in inflow forecasts or regulation operations.

Dworshak Summer Operations

Willow Walker, US Army Corps of Engineers Walla Walla District, presented on [Dworshak summer operations and modeling improvements](#), with a brief overview of the Snake River Basin projects and tributaries. Willow noted that the Snake River above Anatone is 85,000 square miles of drainage, the Clearwater is 10,000 square miles, and Dworshak regulates 2,000 square miles, or 2% of the flow that makes its way to Lower Granite. Dworshak is operated to provide cooling water to Lower Granite, much of which comes from snowpack, and some of which originates from carryover, precipitation, and baseflow/soil conditions. Willow provided a summary of the last few years of regional conditions, water supply, and the impacts on short and longer term Dworshak augmentation operations. She also touched on the operational and physical constraints and flexibilities, including ramping rates, water quality requirements, reservoir space, modeling accuracy, and regional coordination on operations. The Walla Walla District has worked over the last few years to increase efficiency and coordination to best utilize Dworshak's cool water (see slides for details).

Small Group Conversations

Following the morning presentations, participants broke into small groups to share thoughts on in-season management given the variability in conditions, as well as additional opportunities to consider.

The following take-aways were noted by individual small groups and will be discussed collectively by TMT in the future as needed.

1. How has TMT adapted in-season management to be responsive to variabilities in climate, precipitation, flow timing and volume?

- Pre-planning responses and improving regular communication.
- Prescribed operations for high and low flows, e.g., spill tables in the FOP.
- Codifying regular/repeated operations, e.g., DWR summer operations for water temperatures.
- Adapting to drought conditions, e.g., DWR summer operations and chum operation.
- Improved team building, not as reactive (better process).
- Increased/improved collaboration and communication.
- Better understanding of reservoir operations, FRM shifts, treaty operations, flow augmentation flexibility.
- Use of observed and forecasted weather data has improved: higher resolution data and improved computing power.

2. What additional opportunities or flexibility should the TMT consider moving forward?

- Data availability and transparency of data.
- Tailoring operation for specific fish populations.
- Potential new operations under a “no-CRT” world, e.g., real time FRM.
- Consider trade-offs/optimal conditions for fish under high flows, e.g., MOP vs. travel time vs. spill levels.
- Maintain network of co-op weather stations in basin.
- Recognize tails of the distribution.
- Balance/recognize things we’d like to know vs. data we have.
- Support data and forecasting improvements, more SNOTEL sites needed.

Estuary PIT Monitoring

Gabriel Brooks, National Oceanic and Atmospheric Administration, provided an overview of [PIT improvements from the Columbia River estuary to McNary Dam](#). He started by pointing out that although the number of PIT tags in the system is decreasing, the number of detections is increasing. There has been a recent decrease in detections at mainstem dams due to more fish passing via spill, however, increased detection instream and at the Lower Granite Spillway Detector have supported overall increases in detection rates. Gabriel focused on recent advancements in the estuary detections using antennas on pile dikes located in the Columbia River Estuary. The pile dike PIT detection sites are capturing adult and juvenile migration. Over the last few years, NOAA has been designing, testing, and adapting their equipment to increase detections and in 2022 two pile dikes detected about a third of the trawl detections. In 2023, results were even better, more detections were captured by the pile dikes than the trawl and flexible arrays. Gabriel provided information on the species composition of the detections, along with the origin of the fish detected (see slides for details). Moving forward, NOAA is increasing the number of pile dike PIT detection antennas, will expand two sites, and evaluate a new site as a test site. Additionally, they are working on installing detectors in the ice and trash sluiceway at

Bonneville and are exploring options for installing additional PIT detection at McNary (spillbay fin antenna, spillbay floating antenna, PIT detection barge, flexible array system, antennas on outfall pipe, etc.).

Juvenile Fish Survival Estimates

Steve Smith, NOAA Fisheries, Northwest Science Center, presented on yearling chinook and steelhead [smolt survival](#) through the hydropower system (see slides for details). NOAA is in the process of incorporating estuary avian PIT recoveries and results presented at the 2023 YER are preliminary. Steve provided detection probabilities in terms of estimated proportion of passing PIT-tagged smolts detected at each dam, noting that higher spill levels have reduced detection rates, as a lower proportion of fish use juvenile bypass systems and other passage routes lack detection capabilities. Exceptions are Bonneville (corner collector) and Lower Granite (spillway detector). 2023 saw an uptick in percentages through the JBS at most dams, although not at McNary (less than 2% of tagged fish detected), especially for steelhead. Steve summarized river conditions, including daily flow, temperatures, spill, percentage spill, and dissolved gas saturation using historical record and 2023 data. In 2023, estimated passage distributions at Lower Granite Dam were close to the historic norms, although Chinook (hatchery especially) showed a more concentrated migration.

Steve presented preliminary annual estimates of survival for various stocks and reaches. The 2023 survival estimate for yearling Chinook from Snake River hatcheries to Lower Granite Dam (LGR) averaged 67%, slightly higher than the long-term average but lower than recent years. Survival for yearling chinook from upper Columbia River hatcheries to McNary Dam averaged 43%, which is the lowest estimate within all years of data. Hatchery steelhead survival from upper Columbia hatcheries to McNary was below average at 34.5%. Estimated survival from the Snake River trap to Lower Granite dam was 87% for yearling Chinook (below average, low confidence) and 94.% for steelhead (near average). Lower Granite to McNary was 63% for Chinook, 71% for steelhead; McNary to Bonneville (fish from Snake) was 75% for Chinook, 89% for steelhead; McNary to Bonneville (fish from upper Columbia) was 78% for Chinook, 100% for steelhead; and Snake River Trap to Bonneville was 42% for Chinook, 58% for steelhead.

Juvenile Fish Transport

Steve also presented on [juvenile transportation](#) through the hydropower system (see slides for details). Yearling Chinook and steelhead data were presented from migration years 2017-2020. Steve summarized that smolt-to-adult-returns (SARs) (LGR-to-LGR) generally remain higher for transported than for bypassed fish. For those that migrated in 2020, SARs were generally higher than for 2017-2019 migrants, with some transported groups exceeded 2% return. SARs for transported fish were higher than for bypassed fish for all stocks in 2020.

Migration year 2020 was the first in which detectors were operational in a spillway at Lower Granite Dam. For all stocks, SARs were greater for spillway-passed fish than for bypassed fish. SARs for spillway-passed wild steelhead also exceeded SARs for transported counterparts. These spillway vs. bypass results are consistent with circumstantial evidence from previous years. They do not resolve whether the cause is a reduction in mortality for spillway-passed fish, either direct or latent, or inherent

differences among fish, such as size or condition, that correlate with both passage-route selection and survival.

Lower Columbia River Chum Salmon: Status, IPM Development, and Habitat Restoration

Todd Hillson, WA Department of Fish and Wildlife, presented on the [Lower Columbia River chum salmon stocks](#), providing an initial historic overview of chum, its decline in the 1940s, and its listing as a threatened species under the Endangered Species Act in 1999. WDFW's approach to chum recovery includes habitat restoration and creation, supplementation and re-introduction, and monitoring. Todd reviewed the status and trends for Grays, Washougal, and upper/lower Columbia River Gorge populations, with only the Grays population reaching above the minimum viability goal 100% over the last 22 years.

WDFW developed an Integrated Population Model (IMP) for lower Columbia chum as part of a three-tiered recovery approach that will help: assess stage and location-specific bottlenecks limiting viability at the population and ESU level, evaluate the role and usefulness of supplementation, and prioritize habitat restorations. Habitat restoration and creation is focused on creating/restoring high-quality off-channel chum spawning habitat with a goal of achieving egg-to-outmigrant survival in the range of 25-50% in spawning channels. See Todd's slides for more information on completed and planned habitat restoration efforts.

Snake River Stocks Status Versus Management Goals

Jay Hesse, Nez Perce Tribe Fisheries, presented on [Snake River salmon stocks status and management goals](#). Historically there have been 7 anadromous fish stocks in the Snake River Basin, with over 2 million fish returning annually, providing a stronghold habitat of spring Chinook and B-run steelhead. Jay emphasized the cultural significance of salmon to the Niimípuu (Nez Perce People) and their way of life, and that their current right to harvest under the 1855 Treaty includes a responsibility to manage their populations. He demonstrated the significant decline of Snake River fish stocks and pointed to the management goals for healthy and abundant populations set via the Columbia River Basin Partnership. For Snake River Basin stocks, Jay noted the following status: spring/summer Chinook, steelhead, and lamprey have a high risk of extinction; sockeye are functionally extinct and are being supported by hatchery production; coho are extinct, have been reintroduced and are now supported by hatchery production; fall Chinook are viable, but the population is not healthy and is hatchery supported; sturgeon are degraded. Jay noted that none of the extant populations are at healthy or harvestable management levels. He highlighted specific stock specific population status for Snake River wild spring/summer Chinook, steelhead, sockeye, fall Chinook, and coho, as well as the Snake Basin salmon and steelhead status relative to historical abundance and CBC management goals. Between 2018-2021, 43% of the Snake River spring/summer Chinook populations were below the Quasi-Extinction Threshold (see slides for details).

Jay described achieving healthy and harvestable goals will require an increase in overall life cycle survival. He showed results from McCann et al 2022 which examined what smolt to adult survival rates would be necessary to achieve adult return goals under four scenarios of freshwater habitat conditions and hatchery influence. That analysis showed populations in the best habitat and without hatchery influence need SARS in 1.6 to 5.0% range, which is consistent with PATH 2 to 6% SAR conclusions. Most of Snake Basin populations will require higher SARs.

Closing

In closing, participants were asked to share something that they will take away from this year's TMT YER and carry forward into the 2024 TMT season. Multiple TMT representatives reflected on the value of having time together in-person to connect and support relationships. There was recognition of the complexity of conditions, operations, and coordination over the last year, and appreciation for the TMT partner's continued engagement in challenging discussions and coordinated decision making. Some participants highlighted that there is still a lot of work to do to support species, and new opportunities for coming in 2024.

With that, Emily thanked everyone for their engagement and the meeting was adjourned.

Participants for all or part of the session (listed in alphabetical order)

Julie Ammann (USACE), Carolina Andes (BPA), Andrea Ausmus (CorSource), Doug Baus (USACE), Grant Bell (?), Scott Bettin (BPA), Gabriel Brooks (NOAA), Chad Brown (WA DOE), Mike Buchko (?), Noah Campbell (?), Trevor Conder (NOAA), Erin Cooper (FPC), Kenneth Curtis (?), Kyle Dittmer (CRITFC), Catherine Dudgeon (USACE), Jonathan Ebel (ID), Karl Eid (?), Matthew Eppard (?), Mike Fee (?), Joel Fenolio (BOR), Shea Frantz (?), Peter Graf (?), George Gardener (?), Ragan Garner (?), Andrew Gingerich (Douglas PUD), David Gruen (?), Ben Hausmann (BPA), Jay Hesse (Nez Perce), Todd Hillson (WDFW), Stacy Horton (?), Steve King (NOAA RFC), Mark Kruzel (West Power Trading), Jody Lando (BPA), Melissa Lesser (?), Tom Lorz (UT/CRITFC), Brian Marotz (MT), Aaron Marshall (USACE), Brandon McCanless (?), K.C. Mehaffey (Clearing Up), Alexis Mills (USACE), Colby Mills (DSC), Dennis Moore (Colville Tribes), Charles Morrill (WA), Keely Murdoch (Yakama Nation), P. Nichols (?), Tony Norris (BPA), Mike O'Bryant (CBB), Christine Petersen (BPA), Shawn Rapp (?), Joshua Rasmussen (EGPS), David Reis (USACE), Jon Roberts (Corps) Chris Runyon (BOR), Jared S. (?), Kate Self (NPCC), Mike Shapley (Snohomish PUD), Donna Silverberg (DSC), Steve Smith (NOAA), Thomas Starkey-Owens (WA DOE), Scott St. John (USACE), Emily Stranz (DSC), Cynthia Studebaker (Corps), Leah Sullivan (BPA), Dave Swank (USFWS), Kelsey Swieca (NOAA), Ashlynn Tate (?), Ian Tattam (?), Brandon Taylor (?), Dan Turner (Corps), Erick Van Dyke (OR), Willow Walker (Corps), John Wasniewski (?), Charles Wiggins (DSC), Lisa Wright (USACE).