**COLUMBIA RIVER REGIONAL FORUM**

**TECHNICAL MANAGEMENT TEAM**

February 17, 2010 Meeting

FACILITATOR'S SUMMARY NOTES
Facilitator: Erin Halton
Notes: Christa Leonard

The following notes are a summary of issues that are intended to 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.

**Review Meeting Minutes for February 3, 2010**

Kyle Dittmer, CRITFC, made a correction to page 5 of the official meeting minutes explaining that the agency he cited is know as the Australian Bureau of Meteorology, and was incorrectly recorded as the Australian Board of Meteorology. Corrections will be made and posted to the web site. There were no other comments or changes to either the facilitator's notes or the official meeting minutes and both sets are considered final.

**The Dalles Spillwall Update**

Steve Barton, COE, explained to TMT that section 14 of 15 of the Dalles spillwall is currently being set, and that the project is expected to be completed in mid-March, two weeks early. He also noted that TDG modeling will be ongoing.

**2010 Operations/ Updated Weather and Flood Control Forecasts**

Steve Barton, COE, directed TMT to data posted as a link to the agenda that detailed precipitation in the region. With the exception of areas in the Olympic Mountain range, the water supply is much below normal levels, specifically 60% of normal for February. The mid-month update is due out on Friday 2/19 and is projected to verify the data currently available.

Kyle Dittmer, CRITFC, discussed the current El Nino conditions and noted that they have strengthened since his last report. He referred to graphs (not posted to the agenda) tracking various temperatures. Data reported by NOAA currently shows near normal sea surface temperatures off the Oregon/Washington coast and predictions indicate that warming should peak in May. Given this, a fair amount of precipitation is still a possibility for the spring.

Discussing flood control, Barton directed meeting participants to the flood control link on the TMT site. He explained that Duncan is the only project at flood control target and that the rest of the projects are discharging project minimums, below flood control for the season. Barton noted that the historical Initial Control Flow (ICF) value is in the mid 300's and that the current ICF is 238.

> **Action/Next Steps:** Updates on this issue will continue to be discussed at all TMT meetings in the near future.

**Water Management Plan Spring/Summer Update**

Steve Barton, COE, explained that a draft Spring/Summer update to the WMP is expected on 3/1 and that the final draft will be due 5/15. He committed to emailing TMT members when the draft is posted and ready for review and comments. Paul Wagner, NOAA, asked if the draft will be in the usual format. Barton answered yes, unless there are suggested changes. He further noted that the COE is open to all ideas to improve the document as they want it to be as useful a tool as possible.

**Action/Next Steps:** TMT will revisit this topic at the 3/3 TMT meeting.

**FOP Update**

Steve Barton explained that while changes to the Fish Operations Plan are still being made, the COE is working diligently to share a draft of the plan soon. He said he expects a draft to be available in mid-March and that he will bring it to TMT as soon as possible.

**Operations Review**

Reservoirs: Libby was at elevation 2407.09', with inflows of 1.9 kcfs (averaging 2.4 last week) and outflows of 4 kcfs. Albeni Falls was at elevation 2051.53', passing inflows of 14.7 kcfs. Dworshak was at elevation of 1516.31' with inflows of 1.7 kcfs and outflows of 1.1 kcfs. McNary average flows were 102.9 kcfs and Bonneville average flows were 120 kcfs (operating at chum minimum). Grand Coulee was at elevation 1283.4', operating to meet both the chum tail water below Bonneville Dam and the Vernita Bar protection flows, currently drafting about .5' per day. Hungry Horse was at 3527.13' with outflows of 2.7 kcfs (78% of normal water supply forecast for February).

Fish: Paul Wagner, NOAA, noted that the chum temperatures are following historic trends and that the salmon managers are hoping for early emergence. Timing will continue to be tracked and technical data will be shared with TMT at the next meeting.

Cindy LeFleur, WA, shared that, as of yet, no large fish have been observed in the system although some spring chinook have been caught in the Kalama and Woodland River fisheries.

Rick Kruger, OR, shared some findings regarding recent sturgeon kills at Bonneville. The fish appear to have sustained injury due to contact with the turbines and as a result, coordination has been done with operators to make adjustments to the B2 turbine. He explained that a protocol has been submitted for inclusion in the Fish Passage Plan, which would initiate a 'slow roll' operation when turbines are down for any length of time. Discussions will be ongoing between Oregon, Washington and BPA on how to address this issue.

Power System: Tony Norris, BPA, had nothing to report on the power system, however, he did mention that the current El Nino conditions are negatively impacting wind generation.

Water Quality: Laura Hamilton, COE, had no water quality issues to report.

Other: Steve Barton, COE, advised TMT members and attendees that the COE security clearance list has expired and is being rebuilt. The list is being pared down to the current group participants. They can expect to be contacted by security to confirm their on-going participation. This exercise will be repeated annually.

**RIOG Briefing**

TMT was briefed by four members of the Regional Implementation Oversight Group (RIOG): Kate Puckett, Bureau of Reclamation; Holly Hardwood, BPA; Rock Peters, COE; and Ritchie Graves, NOAA. Rock shared a historical review of how RIOG came to be, as an outgrowth of the court-mandated Policy Work Group, and clarified that the group was convened to support and ensure implementation of the 2008 BiOp and its associated performance standards. The purpose of today's presentation was to share RIOG guidance on dispute resolution procedures for the technical teams, and how the teams intersect with RIOG. Rock clarified that RIOG's intent is not to change the important role TMT plays in day-to-day operations management, nor to usurp any decision-making authority held by a single agency. Several supporting documents were posted as links to the TMT agenda, outlining procedures for the groups' interactions and conflict resolution and included a Point of Contact spreadsheet.

Holly Hardwood referred TMT to page 3 of the '2010 Hydro Dispute Resolution Procedures' document posted as 8(a) to the TMT agenda. It detailed a flow chart showing two pathways through the decision making process designed to resolve long and short-term issues.

> **Suggestion**: A TMT member suggested that when polled on an issue, the choices for technical team members should include the option of 'no objection' as has been the protocol for TMT in the past. This would allow all parties more flexibility in providing input on any given issue.
>
> **Question**: Are non-listed salmonid species addressed by the RIOG? RIOG: RIOG members need to understand the interactions of all species with salmonids and this should play a role in decision-making. So yes, RIOG does discuss non-listed salmonid species.
>
> **Question**: How are disputes under other BiOps, e.g. the 2000 and 2006 USFWS FCRPS BiOps, addressed within the RIOG process? RIOG: As they interface with NOAA's FCRPS BiOp, they should be addressed within the RIOG process.

Kate Puckett shared that "adaptive management" as it relates to the 2008 NOAA BiOp is a formal framework described in the Adaptive Management Implementation Plan and the BiOp for how to fold new information into decision making around changes to the RPAs in the BiOp. This would happen through annual progress reports as well as the 2013 and 2016 check ins. Adaptive management, she said, is distinct from 'in-season flexibility' that TMT is concerned with.

> **Question**: What is the process for raising adaptive management issues? RIOG: These issues should be raised through RIOG members and the Senior Hydro Team. Changes to the BiOp ultimately would need to be sanctioned by NOAA.

Ritchie Graves, NOAA, will convene the Senior Hydro Team in March, and will serve as Chair for that group. It was clarified that, unlike IT, the senior technical teams will not serve a dispute resolution function, but will help identify and frame issues and will play an integral role in long range planning. Ritchie encouraged the technical teams to resolve issues at their own levels and stressed the importance of having close relationships with and open lines of "vertical" communication between themselves and RIOG members.

The RIOG members were thanked for providing feedback to TMT on the RIOG process, and they thanked TMT for the valuable work they do to support the overall regional effort of implementing the BiOp.

> **Action**: Katherine Cheney, RIOG coordinator, will send Steve Barton updates to the RIOG Point of Contact list as they are available.

**NOAA Transport Studies**

Bill Muir of the NOAA Science Center walked TMT through several graphs summarizing the Science Center's analyses of juvenile chinook salmon and steelhead transport from Lower Granite and Little Goose dams from 1998-2008. The presentation focused on background information; data including weekly mean flow and spill for the 10 most recent years; addressed dams with surface bypass, percent of fish survival given transportation, predation and travel time; and impacts of the use of PIT tagged fish and sample size. He noted that 2009 was one of the best years for travel time on the Snake River. He answered questions from TMT members regarding the gathering, calculating and plotting of study information. He concluded by saying that while recent operations have decreased the difference in SARs between in-river migrants and transported fish, transportation for most fish produces a higher SAR, especially later in the season. See Bill's summary and report for details on the analyses; both are posted as links to the agenda.

**TMT Schedule – NOTE:** TMT will meet weekly during the month of March.
The next TMT meeting will be: **face-to-face on 3/3 at 9:00 am at the Division COE conference room.**

Agenda items will include:

- Notes Review
- The Dalles Spillwall Update
- 2010 Operations- Updated weather and flood control forecasts
- Water Management Plan Spring/ Summer Update
- FOP Update
- Chum emergence timing
- Emergency Actions
- Operations Review

**Columbia River Regional Forum**
**Technical Management Team Meeting**
**February 17, 2010**

### *1. Introduction*

Today's TMT meeting was chaired by Steve Barton (COE) and facilitated by Erin Halton (DS Consulting) with representatives of Montana, Washington, Oregon, Idaho, USFWS, COE, BOR, BPA, NOAA, CRITFC and others participating. The following is a summary (not a verbatim transcript) of the topics discussed and decisions made at the meeting. Anyone with questions or comments about these notes should provide them to the TMT chair or bring them to the next meeting.

### *2. Review Meeting Minutes for February 3, 2010*

Kyle Dittmer (CRITFC) pointed out that "Australian Board of Meteorology" should be "Australian Bureau of Meteorology" in section 4 of the official notes. There were no other comments on meeting notes today.

### *3. The Dalles Spill Wall Update*

Little has changed since the last progress report to TMT, Barton said. Spill wall construction is still ahead of schedule, with completion expected in mid-March if all goes well. The contractor is working now on section 14 of 15.

### *4. 2010 Operations – Updated Weather and Flood Control Forecasts*

**a. Weather.** Barton showed TMT a map, linked to today's agenda, that depicts snow pack across the Columbia basin. All areas are significantly drier and warmer than normal, with the exception of the Olympic range of northern Washington and western Montana along the continental divide. Canadian sites that were previously showing normal snow levels have dropped to below normal, with the exception of one site in the far north of Canada.

The February mid-month forecast just released validates the February final forecast, which was 74% of normal for The Dalles Dam; 65% of normal in the Snake basin; and 81% of normal at Grand Coulee Dam. Water supply predictions are now 67% of normal for The Dalles; 67% of normal above Ice Harbor Dam; and 59% of normal at Grand Coulee Dam.

Dittmer then gave an update on ocean conditions, which are also indicative of a low water supply. According to the multi-variable ENSO chart, the El Nino warming trend has gotten stronger at a time of year when it should be dying off. The ENSO index tracks SOI, seas surface temperatures, sub-ocean temperatures and sky conditions. The last time El Nino strengthened like this was 1957-58. However, there's some good news on the horizon. There are pockets of

colder water and rain off the coast and no indication of temperature patterns associated with El Nino. Conditions for spring migration could still be favorable.

**b. Flood Control.** Barton showed TMT the latest flood control elevation targets for each project, based on February final water supply forecasts for Libby and Dworshak dams. (These calculations are posted on the TMT web page as item 3 under water control data.) The only project currently above its end of February flood control elevation is Duncan Dam in Canada, which is also the only project above its April flood control elevation. The Initial (flood) Control Flow (ICF) this year is 238.1 kcfs, which is very low. A typical ICF is in the mid-300s.

Dittmer asked whether it would be possible to trigger refill before April 30, given these low flow conditions. That's uncertain at present, Barton replied. Tony Norris (BPA) emphasized there's zero flood control draft available at Grand Coulee from March 30-April 30. TMT will be tracking the region's water supply forecasts and flood control targets closely at upcoming meetings.

***5. Water Management Plan – Spring/Summer 2010 Update***

The COE is working on a draft, due to be posted to the TMT website by March 1, with the final WMP spring/summer update due May 15, Barton said. The plan for 2010 spring/summer operations is very susceptible to change based on updated weather and water forecasts. The COE will notify TMT members when the draft WMP spring/summer update is available for review. Meanwhile, TMT can discuss how best to structure the review process. Norris noted that updates are generally considered living documents, open to change throughout the season. TMT will revisit this issue at its next meeting March 3.

***6. Fish Operations Plan Update***

The FOP should be available for review by mid-March, Barton said. On the TMT page, a link under Reservoirs gives passage numbers for all projects.

***7. Operations Review***

**a. Reservoirs.** Grand Coulee is at 1283.4 feet which is pretty close to–near the April 10 flood control elevation – drafting about half a foot per day to meet the minimum chum tailwater elevation of 11.5 feet. Bonneville tailwater has been kept within half a foot of the target elevation almost every hour, Norris noted, and it is forcing draft from Grand Coulee to meet that requirement. Passing only inflows at this time would dewater the chum redds. The current situation is an example of how the chum requirement drives the entire river operation. Inflows at Grand Coulee have been averaging 60 kcfs for the past 15 days, which is about what's needed to provide flows at Vernita Bar. At this point there is little remedy to save water for other fish requirements in April, May and June without dewatering chum. Furthermore, if Brownlee Dam is required to fill to its flood control elevation at some point, that water would result in lower Snake and Columbia River flows.

Based on the latest STP projections, Grand Coulee reservoir will barely hit 1,283 feet while providing water for chum and Vernita Bar, John Roache (BOR) said. Water temperatures at Bonneville have been tracking close to the historical temperatures for chum incubation, which means emergence at the end of March, or half a foot of water per day from Grand Coulee for the next 45 days, Paul Wagner (NOAA) said. The system is well below the threshold where TMT needs to consider tradeoffs in Grand Coulee operations, Norris said. TMT will address this at its next meeting March 3.

Hungry Horse is at elevation 3,527.13 feet, with discharges of 2.7 kcfs to meet the Columbia Falls minimum flow of 3,411 cfs based on the final February forecast. If the March forecast drops, the Columbia Falls minimum flow will drop even further, with the lowest possible flow at 3,200 cfs. Libby is at elevation 2,407.09 feet with average inflows of 2.4 kcfs, discharging minimum flows of 4.0 kcfs as it has all year. Albeni Falls is at elevation 2,051.53 feet, passing inflows of 14.7 kcfs. Dworshak is at elevation 1,516.31 feet, with inflows of 2.7 kcfs, mainly from precipitation, and discharges of 1.2 kcfs.

Seven-day average inflows are 24.4 kcfs at Lower Granite; 102.9 kcfs at McNary; and 120 kcfs at Bonneville to maintain the 11.5-foot tailwater for chum.

**b. Fish.** Chum temperature accrual is following historic trends, Wagner said, although early emergence is still possible. Battelle placed temperature arrays in the chum spawning area and has been following this closely. Wagner offered to provide the Battelle reports at the next TMT meeting to aid in discussion of the tradeoffs involved in maintaining the chum operation.

The Washington sturgeon fishery ended yesterday, and a few early spring Chinook have been caught, Cindy LeFleur reported. Rick Kruger (Oregon) showed TMT photos of sturgeon found dead in the boating restricted zone at Bonneville Dam. This week 12 fish were killed, with injuries characteristic of turbine blades. Two weeks ago, FPOM discussed the recurrent phenomenon, and project staff offered to modify turbine start-up protocols. As of February 16, any turbine down for 12 hours or more will be started up gradually in a procedure called a “slow roll.” Apparently, sturgeon have been getting inside the turbines and resting on the blades. Project staff also instituted protocols to close the wicket gates so fish can’t enter turbines from upstream. The COE has made this change permanent by adding it to the Fish Passage Plan, but it won’t stop sturgeon from entering a turbine from downstream. Fish agencies and FPOM plan to collaborate on other measures to block downstream access. Kruger said the situation is being handled well and the COE has been very responsive. He asked TMT members to tell their field crews to notify project staff of any sturgeon kills as soon as possible so they can be investigated.

**c. Power System.** The El Nino effect has caused a drop in wind generation, Norris reported.

**d. Water Quality.** There was nothing to report today.

### *8. RIOG Briefing*

Rock Peters (COE), Holly Harwood (BPA), Kate Puckett (BOR), and Ritchie Graves (NOAA) gave TMT a presentation on RIOG's role and the dispute resolution process RIOG is developing. The process is open to input from the technical teams, and the best way to communicate with RIOG is via a RIOG representative. RIOG meets next on March 11.

**a. RIOG's role in the region.** Peters began with a description of how RIOG was formed. The Regional Oversight Implementation Group is an outgrowth of the Policy Work Group (PWG) that dealt with issues over a 3-year period during the 2008 BiOp remand process. PWG members wanted to continue working together on BiOp issues in collaboration with sovereign parties as the region moves toward full BiOp implementation. RIOG's main function is to implement the 2008 BiOp while addressing issues and concerns raised by the sovereign parties.

A top priority is meeting BiOp performance standards for hydro and habitat. To accomplish that, RIOG's process is linked to that of other groups such as the Council, but RIOG's role is not to disseminate information. The central role of RIOG is BiOp implementation.

The role of the senior technical teams – such as the Senior Hydro Team chaired by Ritchie Graves (NOAA) – is to respond to RIOG's requests for information and prepare briefing materials for RIOG. Senior technical teams for hydro, habitat, hatcheries and harvest are forming now. RIOG intends to maintain TMT and SCT, as well as the other technical teams and committees such as AFEP, FFDRWG and SRWG, as integral to BiOp implementation. There's also a continued need for O&M committees to ensure that the federal projects are operated as intended for fish.

RIOG will serve as an advisory policy forum for the region, not a decision-making body. All final decisions rest with the agency that has statutory authority. RIOG's procedures and guidelines – including the dispute resolution process outlined in the 5 attachments linked to today's agenda – are open to refinement.

To monitor progress toward full BiOp implementation, federal action agencies will develop annual progress reports on actions taken in the previous year. These reports will highlight actions that worked well or didn't work, and the applied to the adaptive management process. With its focus on resolution of long-term issues, RIOG isn't oriented toward the type of short-term, in-season management decisions TMT makes. RIOG anticipates the technical teams will participate in development of new processes and procedures to improve system performance. RIOG also anticipates that the technical teams will be actively involved in the comprehensive checklists of 2013 and 2016 to measure how well the various ESU's are doing. Questions and answers on RIOG's role followed:

- *How is RIOG pronounced?* REE-og.

- *Will the public have access to RIOG meeting information via a website?* There are no plans for a public forum at this time. The best access to RIOG is through a RIOG member. The Senior Hydro Team and other H-teams will have public websites and TMT's site will continue to be public.

**b. Dispute Resolution Process.** Holly Harwood (BPA) described the procedures for dealing with short- and long-term disputes (shown in the chart on page 3 of the dispute resolution procedures attached to today's agenda). In general, RIOG expects the hydro technical teams such as TMT and SCT to try to resolve issues at the working level. To resolve a dispute, the chair polls the sovereigns to get their views and clarify areas of disagreement. If the technical team is not able to resolve an issue, there are two potential ways to elevate it:

(1) Short term issues – These issues require a decision within 2 weeks. The federal agency with statutory authority will make the decision based on input from the technical team and notify the team and RIOG of the decision and its rationale in a timely manner. If a technical team member disagrees with the decision, they should confer with their RIOG representative. If the two agree there's a problem, they should ask the Senior Hydro Team to address it.

Questions and answers on short-term issues followed:

- *When TMT representatives are polled on an issue, one option has routinely been to vote "no objection" instead of simply abstaining. Will this continue to be a choice?* That's useful feedback, and RIOG will consider it (as of now, the choices are "yes," "no" and "abstain"). Future questions like this can be referred to RIOG via a RIOG representative.

- *Do the RIOG dispute resolution procedures pertain strictly to listed salmonid species?* The first step is to ensure that one's RIOG representative understands the interactions between species. *Is it within the purview of the dispute resolution process to consider issues that affect both listed and nonlisted species?* Yes, it's appropriate to raise operational issues that affect multiple species.

- *In the past, TMT worked as a group to frame the terms of a dispute as part of the resolution process. Now that's up to the individual TMT member, right?* Yes, if it's a short-term issue. A TMT member who is dissatisfied with an agency decision can go to their RIOG representative, who will refer the issue to the Senior Hydro Team Chair if also unsatisfied, Harwood said. There is no defined role for RIOG or the Senior Hydro Team in short-term decisions, but the process is flexible enough to allow discussion at the senior technical team level if necessary, Graves added.

- *Will RIOG and the technical teams working on BiOp implementation follow the 2006 USFWS BiOp and other BiOps, or just the 2008 FCRPS BiOp?* RIOG will review all operations and the BiOps that pertain to them together. For the most part, the FCRPS BiOp recognizes other BiOps and incorporates key ingredients of the other BiOps. All the BiOps are intended to be implemented together, Harwood said.

- *Will these dispute resolution procedures apply to disputes over other BiOps, and will other BiOps be subject to this implementation process?* There's no requirement to use a different methodology for other BiOps. However, if there's an interaction between the FCRPS BiOp and another BiOp, it's good business to notify the Senior Hydro Team, Graves said.

(2) Long-term issues – These issues are more typical of SCT's role in planning system configuration improvements years in advance. If the technical team (i.e. SCT) can't resolve a long-term issue, the chair will simultaneously refer it to the Senior Hydro Team chair, the RIOG chair and the RIOG coordinator for review. The senior technical team will discuss the issue and prepare a briefing paper for RIOG. Before referring an issue to a senior technical team, the technical team working on the issue should define it in writing. A template for preparing RIOG briefing materials is attached to this agenda item.

Harwood pointed out that the Senior Hydro Team is not intended to be a dispute resolution forum, as IT was. Its primary role is refinement of issues for RIOG to consider in making a recommendation to the agency with statutory responsibility. There were no questions today on the procedures for resolving long-term issues.

**c. Adaptive Management.** Kate Puckett (BOR) discussed the meaning of adaptive management. The term is being used in a number of ways, but in relation to the FCRPS 2008 BiOp it has a specific definition. Adaptive management allows for formal changes to a Reasonable and Prudent Alternative, a rigid structure that isn't open to change by any individual team or agency. Literally, adaptive management means the process by which an RPA may be altered if it becomes reasonable to do so. Such alterations would arise from the annual agency progress reports and be referred to RIOG. If RIOG and NOAA agree the new information warrants changing an RPA, the change will be formally clarified.

By contrast, in-season management operates within the RPA structure. In-season flexibility is based on annual variations in runoff, weather and fish runs, which is not the same as adaptive management. Questions and answers on adaptive management followed:

- *Who takes on the task of resolving adaptive management issues, the technical team as a whole or an individual member? Will adaptive management issues be referred to RIOG?* Adaptive management issues will come from many different sources, notably annual progress reports. Some of this information will reach RIOG. If a technical team identifies a desired operational change to an RPA, they can work through their RIOG representatives to get the request on RIOG's agenda. Any substantive changes to RPAs must be sanctioned by both RIOG and NOAA.

- *Does the FCRPS point of contact list attached to today's agenda contain up-to-date information?* It's up to date but not complete, as some sovereigns haven't designated their representatives yet. The updated contacts list will be posted to the TMT web page.

- *What will be the timing of RPA-based changes in the hydro management cycle? Will agency progress reports recommend changes to be implemented the following year?* Production of agency progress reports is frequently delayed for inclusion of the latest scientific findings. Often the COE must wait until September to gather all pertinent information for its annual report. There's no clear answer to this dilemma beyond a conscious effort to keep reporting cycles as current as possible.

When the sovereigns have all identified their Senior Hydro Team members, Graves will convene a kickoff meeting, probably in March 2010. Graves encouraged TMT to keep up its good work in service to the region, to do its best to resolve disputes at the TMT level, and to write up any unresolved issues for the Senior Hydro Team to consider. Good communication between technical team members and their RIOG representatives is essential.

***9. NOAA Transport Studies***

Bill Muir (NOAA Science Center) gave a presentation on conditions for transported vs. in-river fish in recent years. The analysis, attached to today's agenda and posted on the NOAA web site, is 100 pages of mostly graphs. The transport studies looked at how operational changes have affected juvenile survival and travel time in terms of smolt to adult return rates, and how those rates compare with SARs for juveniles bypassed and returned to the river.

The studies don't identify an optimal date for the start of transportation. ISRP's recommendations on this issue are to continue current operations until adults have returned and data are available, which is beginning to happen.

Study Variables: Flow conditions for migration have varied widely in recent years. The year 2008 was one of high flows, and in 2007 low flows resembled 2001, the lowest year on record in the region's water supply. Spill levels were high in 2006, a year of average flows, and in 2007 and 2008. The opposite was true in 2001 (zero spill) and 2005 (no spill until the end of the season). Another variable has been the staggered start of transport in recent years, based on

temporal information from the ongoing transport studies. Seven of 8 projects now have surface collectors, which affect travel time and possibly survival rates. The combination of spill conditions and delaying the start of transport meant a smaller percentage of fish were transported in recent years.

Graphs of survival rates from Lower Monumental to McNary dams and of travel times from Lower Granite to Bonneville dams show big differences in travel times between 2007, a low-flow year, and 2001, when spill was turned off completely. As a result of the staggered start of transportation, juvenile Chinook salmon survival is over 50%, the highest rate seen in recent years. The same is true for steelhead, particularly in 2009 when steelhead survival rates were around 70%. Steelhead have fared well in recent years, with improved travel times in 2007 compared to the low-flow years of 2001 and 2004.

Lower Granite Dam Study: For the past 4 years, the Science Center has been focusing its efforts on the effects of transport at Lower Granite Dam. Once a week before passage season begins, researchers PIT tag all the wild steelhead and wild Chinook they can collect on a barge, then return them to the river. Although sample sizes were often small, the study provides useful information on fish tagged above the dam. The study didn't include never-detected fish because researchers won't be able to track them adequately until more projects have detectors installed in the spill bays. Nor did the study include effects of increased straying rates that may result from transport. Bypassed fish that were detected and returned to the river are the core of this analysis. In some years, findings were based on small numbers of adult returns. Adult returns for 2007-08 are not complete, and there's no data yet for 2009.

The study provided daily estimates of SARs for four groups of smolts, including fish tagged above Lower Granite and at the dam itself. Counts of PIT-tagged smolts in each group in relation to the number of adults that came back yielded the SARs estimates. The study used a regression model for each species in each migration year to identify daily SAR rates for transported and non-transported fish. (Weekly SARS are presented in the charts for the sake of clarity.) From the SARs ratio came a TM ratio that compares survival rates of transported vs. in-river fish. Estimates with a ratio greater than TM1 indicate that transported fish returned as adults at a higher rate. Estimates with a ratio less than TM1 indicate that in-river migrants had higher adult return rates than transported fish.

Dave Statler (Nez Perce) asked if the reason non-detected fish weren't included was so researchers could focus on daily returns; Muir said yes. To account for that variable, researchers devised an alternative standard that measures differences in SARs for detected fish vs. those put back in the river. If a TM ratio exceeds the alternative standard, the findings apply to the run at large, not just in-river migrants. The study also includes confidence intervals.

A graph comparing historic findings showed that, in most cases, the TM ratio has been brought down by improving survival rates and travel time for in-

river migrants. Graphs of SARS for hatchery Chinook, wild Chinook, hatchery steelhead (no data available for early season migrants), and wild steelhead are combined on one page for each species.

Study Findings and Conclusions: The transport analysis section of the NOAA report presents findings for each ESU for each year for fish transported vs. those tagged and released above Lower Granite Dam. Quite often the SARs were lower for fish released at Lower Granite than transported fish, but in some years they are similar. Conclusions of the transport analysis were:

- Transported fish generally didn't do as well as in-river fish early in the season, but their survival rates improved as the season went on.
- Conditions were poor for fish left in the river in 2001, a very low flow year with a high TM ratio. Conditions in 2007 were better, with spill provided at surface collectors. Improvements in survival rates over 2001 were observed for hatchery Chinook and wild and hatchery steelhead.
- Sample sizes for the wild tagged fish were small.
- The analysis was intended to describe patterns in available data, not identify a date for the start of transport.
- For all the years studied, TM ratios either remained constant or increased through the season.
- Pre-2006 SARs were greater for fish transported after May 1.
- For 2006-08, TM survival rates first exceeded the alternative standard in late May, a reflection of better in-river travel times.
- The average TM ratio was lower in 2006-08 than in 1998-2005, but SARs for transported fish were still higher than for in-river fish in most cases.
- SARs for transported wild steelhead were significantly higher than SARs for in-river wild steelhead.
- Recent operations have improved the performance of in-river migrants and lessened the disparities in SARs, with the benefits of transport occurring later in the season. However, transport still returns more adults for most stocks, especially late in the migration. Transporting fewer smolts in recent years has led to substantially fewer adults returning.

Comments and Discussion: Russ Kiefer (Idaho) preferred the term "transport/bypass ratio" to "in-river migrants" to avoid confusing these fish with migrants that pass through turbines and surface weirs. In 2001, when there was no spill and maximum transport, there were virtually no undetected fish going through the system, Muir said. By contrast, in 2007 when spill aided passage despite low flows, an estimated 60% undetected fish passed the collector dams (excluding Lower Granite, Little Goose or Lower Monumental). The adjusted standard for wild Chinook passage at Lower Granite showed a 2-3% difference in transported vs. non-transported spring Chinook, but up to a 30% difference for transported vs. non-transported steelhead.

Kiefer asked why the modeling indicates a 95% confidence that transported fish did better in late April, yet the data don't show transported fish

did better until May. Others made that observation, so the study author is using a different model now, Muir replied.

Tables showing SARs for individual years would be helpful, Jim Litchfield (Montana) commented. They would make it easier to estimate adult returns under different scenarios. There are other tradeoffs the study didn't consider, such as increased steelhead survival, potential effects on lamprey, effects in the John Day and Deschutes rivers, and a lack of data for sockeye, Muir said.

A total annual summary would be informative in future years when sample sizes get bigger, Cindy LeFleur (Washington) commented. Also, it would help to have separate graphs for April and May. LeFleur found the weekly data informative, but the sample sizes were too small.

Litchfield asked whether the study accounts for tagging bias. Muir said no, but tagging bias is assumed to be equal for the transported and bypassed fish.

Dave Statler (Nez Perce) asked whether it would be possible to compare SARs for bypassed and in-river migrants. Annual SARs are misleading for comparing the two groups, Muir replied. Statler wants to see a direct comparison of survival ratios for non-bypassed in-river fish and transported fish.

Wagner wondered how the study findings could be applied to adaptive management. How will the findings influence recommendations for change? When the improvements we've made in river operations raise the in-river survival rates, the relative benefits of transportation will decline by comparison, Kiefer said. According to IDFG research, predators consume a smaller proportion of in-river migrations, and these are more likely to be injured or sick fish that won't return as adults. When more fish are transported, those left in-river are more vulnerable to predation, and predators are more likely to consume fish that could have returned as adults.

TMT wrestles most with the question of whether to put bypassed fish back in the river, rather than whether to transport all fish, Litchfield observed. Another question TMT wrestles with is whether to do the best thing for steelhead or gather more information on sockeye, Kiefer observed. Sockeye migration occurs when transport most benefits steelhead.

***9. Next Meeting***

The next regularly scheduled TMT meeting will be on March 3. The agenda will probably resemble today's, with an update on The Dalles spill wall construction; planning for spring 2010 operations; a WMP spring/summer update; a status report on the Fish Operations Plan spring/summer update; chum emergence; Grand Coulee operations; and the emergency actions list. This summary prepared by technical writer Pat Vivian.

***Name*** ***Affiliation***

| | |
|---|---|
| Steve Barton | COE |
| Jim Litchfield | Montana |
| Cindy LeFleur | Washington |
| Dave Wills | USFWS |
| Rick Kruger | Oregon |
| Doug Baus | COE |
| John Roache | BOR |
| Tony Norris | BPA |
| Paul Wagner | NOAA |
| Russ Kiefer | Idaho |
| Kyle Dittmer | CRITFC |
| Scott English | COE |
| Dan Spear | BPA |
| Russ George | WMC |
| Karl Kanbergs | COE |
| Tim Heizenrader | Centaurus |
| Steve Hall | COE Walla Walla |
| Don Faulkner | COE |
| Laura Hamilton | COE |
| Holly Harwood | BPA |
| Kate Puckett | BOR |
| Ritchie Graves | NOAA |
| Rock Peters | COE |
| Mark Bagdovitz | USFWS |
| Scott Bettin | BPA |
| Bill Muir | NOAA Science Center |
| Katherine Cheney | NOAA |

*Phone:*

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|---|---|
| Dave Statler | Nez Perce |
| Sherry XXX | Puget Sound Energy |
| Barry Espenson | CBB |
| Greg Lawson | Pt. Carver |
| Rob Allerman | Deutsch Bank |
| Tom Le | Puget Sound Energy |
| Richelle Beck | DRA |
| Rob Diaz | Integral Renewables |