COLUMBIA RIVER REGIONAL FORUM

TECHNICAL MANAGEMENT TEAM

November 2, 2005

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

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Notes: Robin Harkless

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. Most presentations were accompanied by Power Point or other electronic information. Please go to the agenda on the TMT web page to see more detailed information.

2005 TMT YEAR END REVIEW

2005 Comparison to Previous Years

- *Water and Runoff Patterns*: Cathy Hlebechuk, COE, presented information on 2005 operations for each of the projects. 2005 was generally a dry year with below average runoff. Drum gate maintenance at Grand Coulee required a draft in February. Tony Norris, BOR, noted that maintenance will happen opportunistically every year, but several low water years pushed the work back until it became a necessity this year. The COE tries to shift Dworshak and Brownlee water if possible to support this maintenance operation. Priest Rapids received a lot of spring rain this year which helped meet targeted elevations later.
    - **LESSON LEARNED**:
        - Spring rains allowed for better than expected flows this year.
        - Look for opportunities for continued exploration on operations at Libby and Grand Coulee (drum gate maintenance).
- *TDG/Temperature:* Jim Adams, COE, reported on 2005 temperatures and total dissolved gas (TDG) exceedances. The forebay stations at Lower Granite, Little Goose, Lower Monumental, Ice Harbor and McNary were moved this year. There were 69 total exceedances; TDG stayed consistent with the standard 97.7% of the time. A suggestion was made for Jim to change his graph re: 3,020 potential spill days to actual spill days.
    - **LESSON LEARNED***:* Beginning court-ordered spill posed some difficulties, but the action agencies managed to keep the system cool and minimize TDG exceedances.
- *Adult Fish Runs/Fisheries Update*: Cindy LeFleur, WDFW, reported on upriver spring chinook, upper Columbia summer chinook, Columbia River fall chinook and upriver bright fall chinook returns and fisheries. Her presentation can be found on the TMT web page. The preliminary results show that adult return numbers were generally strong this year.
    - **LESSON LEARNED**: In the past few years there have been some errors in predicting adult fish runs. The technical advisory committee (TAC) is looking into how forecasts are done; a report will be available soon, and Cindy will share it with TMT at a future meeting.

- *Fish Passage*: Jerry McCann, Fish Passage Center, reported on 2005 smolt migration: run size, timing, travel time, and survival.
    - Yearling chinook: The run at large showed similar numbers (8.4 million total) as compared to historical numbers. Jerry's timing graph showed a condensed migration of the fish – even more so this year than previous years.
    - Steelhead: Population estimates were similar to previous years, with numbers slightly up at Lower Granite. Jerry noted that the fish counted at Lower Granite were raw detections and that many fish were collected and passed over the spillway, and not counted.
    - Subyearling chinook: Subyearling preliminary data showed a later run and higher survival this year.
    - **LESSONS LEARNED**: A suggestion was made to look at the peak migration to understand how flow, temperature, run timing and other factors play into survival of the fish. Studies at this point show similar survival rates for in-river and transported fish, but the data is limited at this point. Jerry will attend a future TMT meeting when a more in-depth analysis of the 2005 smolt migration data has been completed. He will include comparisons to 1990's numbers.
- *Weather*: Kyle Dittmer, CRITFC, reported that a warm December 2004 impacted 2005 runoff. The season was warm and dry until March, at which time precipitation increased. Temperatures remained above normal, but not as extreme as the previous year. Kyle's 2006 forecast shows near normal ENSO conditions. NOAA's forecast shows near normal temperatures and above average precipitation in November, and above normal temperatures and near normal precipitation for 2006. Kyle predicted that the greatest chance for snow in the Portland area would be in January. He predicted a wet cold winter in 2006/2007.
    - **LESSONS LEARNED**: 2005 experienced some extreme weather, with an added benefit of rain in the spring. Kyle invited anyone interested to attend the 13th Annual "What will the Winter Be Like?" event, on Friday, November 4 at OMSI, at which regional forecasters made predictions about the upcoming winter.
- *Spring Chinook*: Paul Wagner, NOAA, and John Williams, NMFS Science Center, provided information on survival estimates for Snake and Columbia River juvenile salmonids. Survival of spring chinook was up from 40% in 2004 to 52% in 2005. Hatchery releases were similar to previous years. Lower Snake steelhead survival was similar to previous years, with increases seen from Lower Monumental to McNary and McNary to John Day. There is a need for additional tagging of steelhead, as they are an important fish to understand. Lower Columbia steelhead survival was similar to 2003, and higher than 2004.
    - **LESSON LEARNED**: Overall, in-river survival looked very good. Lower than expected returns of spring chinook to the Lower Columbia were not easily explained this year. There may have been increased predation combined with a change in ocean conditions.

Snake River Review:

- *Fall Chinook Summer Spill Passage*: Paul Ocker, COE, provided preliminary information on passage based on radio telemetry at Lower Granite, Little Goose, Lower Monumental, Ice Harbor and McNary. Overall, he noted that the preliminary results showed high subyearling survival, high fish passage efficiency and that spill effectiveness was increased with the RSW. A comment was made that the goal of installing RSW's should be to increases

survival, not to show similar survival at less cost. Paul agreed that effectiveness could be measured in a number of ways and that the COE will be presenting a more in-depth report at AFEP in Walla Walla later this month. Anyone that is interested should contact Paul at 503-808-3726.

  - **LESSON LEARNED**: Preliminary data indicated that passage through dams in the Snake River is good, passage through turbines is effective and overall passage is up.

- *EPA Water Temperature Modeling*: Kyle Dittmer, CRITFC, reported that exceedances in temperature standards did not occur this year. EPA's tool was helpful in predicting temperatures and helping the salmon managers make recommendations on how to shape the water for cooling at Lower Granite.
  - **LESSON LEARNED**: Averaging multiple-year temperature data together was an effective tool for planning water releases to keep temperatures cool in the system.
- *Fall Chinook Survival Studies*: Billy Connor, USFWS, acknowledged all the researchers that collected data for the study, looking at the effect of hydrosystem operations on Snake River Fall chinook. Lyons Ferry hatchery fish were used as surrogates, and three groups were studied: wild, surrogates and production fish.
  - **LESSON LEARNED**: The smaller fish (wild) tend to move slower, have lower survival and are more inclined to have holdover/resident attributes.
  - **LESSON LEARNED**: Surrogates were not perfect but showed general similarities to wild fish. Releasing surrogates over a three-week period might reduce differences in attributes. SAR information is needed to better understand why life history differences occur between wild and surrogate fish.
  - **LESSON LEARNED**: Production fish, compared to wild fish, were exposed to little spill, moved quickly, and had a higher probability of migrating and surviving.
  - **LESSON LEARNED**: Many of the fish were too small to tag, which poses a logistical problem. How can we track more fish?

- *Snake River Review*: Ken Tiffan, USGS, looked at the effects of water velocity on fish travel rates. 100 fish were released for the study, and preliminary data indicates a strong relationship between velocity and travel time. He also looked at winter passage and asked the question: When do residence-type juveniles pass the dams? The tagged fish showed residence times up to 120+ days in the Lower Granite forebay, decreasing as they move downstream.
  - **LESSON LEARNED**: There was a big drop in detections from Lower Granite to Little Goose. Researchers want to look more closely at this.
  - **LESSON LEARNED**: IDFG releases fish in the fall, and caution was expressed that their arrival at Lower Granite could confound the current research.

2005 Study Information that Might Impact 2006 Operations

- *Ice Harbor Results*: Paul Ocker, COE, reported on preliminary results of smolt survival with the installation of the RSW at Ice Harbor. Note that there is still a need to look at adult returns to fully understand the impacts. Chinook survival with the RSW was at 95%, and 93% with dam and forebay. Steelhead survival was 91% with the RSW, and 93% with dam and forebay.

- **LESSON LEARNED**: Improvements to survival are likely if training spill is improved. Additional studies are planned for 2006.

Other Lessons Learned/Thoughts

- It would be helpful to summarize water temperature information systemwide. This will be added to a future Water Quality Team agenda.
- Throe group would like to see other tools that might help the COE's method for looking at December water supply (there are issues with the SOI index).
- The summer operation information (e.g. Ice Harbor, holdover fish) was very interesting and TMT needs to have further discussions about these issues.
- The established criteria for when to begin transporting spring migrants was off – could have put them in-river. TMT will need to revisit the decision making process, and look for opportunities to leave more fish in-river.
- It would be helpful if we could improve ocean predictions to help make system decisions, especially transport decisions. Need a more integrated approach and a broader strategy.
- Differences between needs and operations for chinook and steelhead require a balanced approach to management.
- McNary spill results are very encouraging.

TMT Business Meeting

Chum Study

Ken Tiffan, USGS, is hoping to continue a chum study this year, beginning with the arrival of chum. He presented his study plan to FPAC prior to today's meeting, to maintain a tailwater elevation during the day and spill any excess water at night. Specifically, he requested five tests at elevation 13.5' for eight hours, five at 15.5' for eight hours on Wednesday and Saturday days, and, if flows come up in December, continuing with a few additional tests at 17.5' for eight hours.

A concern was raised about the request for a longer duration for the tests this year, and that there would be more potential for the chum to establish redds at higher elevations. Ken responded that the 8-hour duration would allow stabilization of the water and better understanding of where and for how long fish are spawning. TMT members and other participants responded:

CRITFC – Suggested using John Day or something other than Grand Coulee storage to implement the study.

ODFW – Supports the study.

WDFW – Supports the study and asked about using nighttime water to support the daytime study. (Likely, yes.)

IDFG – Supports the study and believes resident folks will support it as well.

NOAA – Not anticipating redds being placed in higher elevations, so supports the study. If redds are placed, then we should not 'own' them.

USFWS – Supports the study.

BOR – Supports the study – this is important information to gather.

COE – Supports the study.

BPA – Supports the study.

ACTION: Ken will send an electronic copy of the study proposal to the COE for posting to the TMT web page.

ACTION: Ron Boyce, Oregon, reported that one chum had been observed at this point, and that surveyors would be out again on Friday (11/4) morning. Ron agreed to call the action agencies when chum are observed, at which time the study would be implemented.

TMT Meeting Schedule

The next TMT meetings were scheduled for November 7 and 23, at the usual meeting place at the COE.

Technical Management Team Year-End Review Meeting Notes

November 2, 2005

1. Greetings and Introductions.

Today's meeting was chaired by Cathy Hlebechuk and facilitated by Donna Silverberg. The following is a summary (not a verbatim transcript) of the topics discussed and decisions made at this meeting. Anyone with questions or comments about these notes should contact Hlebechuk at 503-808-3936.

2. 2005 Water and Runoff Patterns – Comparison to Previous Years.

Hlebechuk led this presentation; she began by providing a table showing actual average outflows vs. spring and summer flow objectives for McNary, Lower Granite and Priest Rapids Dams for the years 2001-2005. Hlebechuk noted that, in 2005, the actual average outflow for the April 10-June 30 period was 196 Kcfs at McNary (compared to a seasonal objective of 220 Kcfs) and 123 Kcfs at Priest Rapids (compared to a seasonal objective of 135 Kcfs). For the April 3 – June 20 period the actual average outflow was 66 Kcfs at Lower Granite (compared to a seasonal objective of 85 Kcfs). For the July 1-August 31 period, the actual average outflow was 165 Kcfs at McNary, less than the seasonal target of 200 Kcfs. At Lower Granite, for the June 21-August 31 summer

period, the actual average outflow was 33 Kcfs, less than the summer flow objective of 50 Kcfs.

Moving on to a table of observed volume runoffs, 2003-2005, Hlebechuk said that, at Hungry Horse, the 2005 volume runoff for the April-August period was 1.48 MAF, 71% of average. At Libby, the observed runoff volume was 5.56 MAF, 89% of average. At Albeni Falls, observed runoff was 9.57 MAF, 71% of average. At Grand Coulee, observed 2005 volume runoff was 48.8 MAF, 81% of average. At Dworshak, observed 2005 volume runoff was 1.7 MAF, 62% of average; at Lower Granite, 14.4 MAF, 63% of average; at The Dalles, 68.5 MAF, 74% of average.

Next, Helebchuk provided a series of graphs plotting forebay elevation, flood control rule curve elevations, outflow, inflow and spill volumes for the period September 1, 2004-October 1, 2005 for Libby, Hungry Horse, Grand Coulee, Priest Rapids, Dworshak, Lower Granite and McNary Dams. These graphs are available via hot-link from today's agenda on the TMT homepage; please refer to these documents for full details.

Hlebechuk noted that, in 2005, Libby filled much earlier than normal, and was drafted gradually through July, August and September. We will get the new flood control rule curve for that project in early December, she said; because of the amount of rain in the Libby Basin, the reservoir has actually filled slightly so far this fall. She said she expects the end of December rule curve elevation to be 2411'.

Going back to last December, there was a pretty big Libby draft in December, said Bob Heinith – what was the basis for that? The early forecast at Libby indicated a likely runoff volume of close to normal, Hlebechuk replied; that set the end of December flood control rule curve for Libby at elevation 2411'. I'm just wondering if there are other tools you can use to avoid that situation in the future, because that draft really set the reservoir back, said Heinith. That's why we've gone to the SOI-based forecast, Hlebechuk replied. The problem is that there is no magic tool that would give you any better information that early in the season, Tony Norris replied – prior to the actual arrival of the snowpack, the error bounds are simply too large. Heinith noted that the upriver tribes are concerned about impacts to cultural resources when Libby is drafted to elevation 2411 during the winter. Hlebechuk and Wellschlager noted they had not heard of any cultural resource issues in Lake Kookanusa. Wellschlager noted at the 2005 annual public meeting at Libby the tribal representative did not mention any cultural resource issues last winter.

The group also devoted a few minutes of discussion to 2005 operations at Grand Coulee, in particular, the drum gate maintenance operation that drafted Lake Roosevelt to near elevation 1253 from early April through mid-May. Much of the discussion focused on the fact with the low water years recently, drum gate maintenance had not been done. In WY 2004 BOR told TMT if drum gate maintenance wasn't done in WY 2004, it would be mandatory in WY 2005. Safety of drum gates is extremely important and scheduling it continues to be a live issue.

3. Temperature/TDG Level Variations.

Jim Adams provided an extensive briefing on the 2005 water quality monitoring season. He noted that the Corps operated 29 fixed monitoring stations in 2005; Reclamation, four FMS, the Mid-Columbia PUDs, 10. Five new stations were added in 2005; the Lower Granite, Little Goose, Lower Monumental, Ice Harbor and McNary (Washington side) FMS were relocated this year.

Moving on, Adams touched on the following topics:

- Start of spill, end of spill and total days of spill for the eight FCRPS projects in 2005
- TDG exceedences, 1999-2005 (there were 69 exceedences systemwide in 2005, compared to a seven-year average of 247 exceedences)
- Total dissolved gas – types of exceedences (table)
- Total dissolved gas – average high 12-hour percent TDG exceedences at fixed monitoring stations, 1999-2005 (table)
- Lower Granite spill activities, 2005
- Lower Granite summer operations, during and after RSW research operations, June 19-September 2, 2005 (graphs)
- Lower Granite spill stats, 2005 (table)
- Little Goose spill activities, 2005
- Little Goose summer operations, June 19-September 2, 2005 (graphs)
- Little Goose spill stats, 2005 (table)
- Lower Monumental spill activities, 2005
- Lower Monumental summer operations, June 19-September 2, 2005 (graphs)
- Lower Monumental spill stats, 2005 (table)
- Ice Harbor spill activities, 2005
- Ice Harbor summer operations, June 19-September 2, 2005 (graphs)
- Ice Harbor spill stats, 2005 (table)
- McNary spill activities, 2005
- McNary summer operations, June 19-September 2, 2005 (graphs)
- McNary spill stats, 2005 (table)
- John Day and The Dalles spill season operations, April 1-July 31, 2005 (graphs)
- Dworshak summer operations, April 1-September 30, 2005 (graphs and table).

Please note that all of these materials are available via hot-link from today's agenda on the TMT homepage; please refer to these documents for the full details of Adams' presentation.

In response to a question, Adams said that, prior to the start of the court-ordered spill program, the Corps modeled what it felt were appropriate spill caps for each project using SYSTDG. However, on the first day of the court-ordered spill program, a number of the plaintiffs asked the Corps to raise the spill caps at several projects, so that tailwater TDG levels approached 120% more closely. The Corps was concerned that, as that water moved downstream, it would cause exceedences of the 115% forebay

standard, and that is exactly what occurred, Adams said – in other words, I think we set the gap caps properly in the first place, and they should not have been changed.

4. Adult Fish Runs/Fisheries Review: Forecasts and techniques.

Cindy LeFleur provided a presentation titled "Preliminary Review of 2005 Columbia River Fish Runs and Fisheries." LeFleur emphasized the fact that these results are still very preliminary. Among her topics:

- Upriver spring chinook returns, 1980-2005 (2005 forecast: 254,100; 2005 return: 106,400) (graph)
- Spring chinook fishery 2005: 108,000 angler trips, 10,600 spring chinook kept, commercial harvest of 5,400 chinook (ex-vessel price $4.15/lb.); SAFE commercial harvest of 2,300 chinook; treaty harvest of one fish – essentially, there was no treaty fishery on spring chinook this year
- Upper Columbia summer chinook returns, 1980-2005 (2005 forecast: 62,400; 2005 return: 60,400) (graph)
- Summer chinook fisheries, 2005: 45,000 angler trips below Bonneville, 2,300 summer chinook kept, commercial harvest of 2,800 chinook, ex-vessel price per lb. $2, SAFE commercial harvest of 1,000 chinook; treaty harvest of 3,900 chinook.
- Columbia River fall chinook returns, 1980-2005 (2005 forecast: 671,400; 2005 return: 584,800) (graph)
- Upriver bright fall chinook returns 1980-2005 (2005 forecast: 354,600; 2005 return, 293,400) (graph)
- Mid-Columbia bright fall chinook returns, 1980-2005 (2005 forecast 89,700; 2005 return 80,000 (graph)
- Bonneville Pool hatchery fall chinook returns, 1980-2005 (2005 forecast: 115,800; 2005 return: 102,500) (graph)
- Fall chinook fisheries, 2005: 75,000 angler trips, 27,800 chinook kept; commercial harvest of 27,200 chinook, ex-vessel price $2 per lb.; SAFE commercial harvest of 7,000 chinook; treaty harvest of 115,100 chinook.
- Forecast accuracy, upriver spring chinook, 1980-2005 (graph) – forecast accuracy was much lower than normal in both 2004 and 2005.
- Forecast accuracy for upriver summer chinook – (graph) generally quite accurate, except in 2001 and 2002, when returns far exceeded the pre-season predictions
- Forecast accuracy, upriver bright fall chinook, 1980-2005 (graph) – generally quite good
- Forecast accuracy, fall chinook, 1980-2005 (graph) – generally quite good

Please note that the full text of LeFleur's presentation is available via hot-link from today's agenda on the TMT homepage; please refer to this document for further details.

What is the geographic area you're referring to when you talk about Mid-Columbia fish? one participant asked. Bonneville to McNary, LeFleur replied. She added

that further analysis of the reasons for the discrepancy between the pre-season forecast and actual returns of 2005 spring chinook is ongoing; she will provide further TMT updates as more information becomes available.

5. 2005 Fish Passage.

Jerry McCann briefed the TMT on the 2005 smolt migration. Working from a series of PowerPoint slides, he touched on the following topics:

- Yearling chinook population index at Lower Granite and hatchery releases, 1998-2005 (graph)
- Survival of wild yearling chinook from traps to Lower Granite, 2001-2005 (graph)
- Yearling chinook timing at Lower Granite, March 30-June 30 (graph)
- Yearling chinook timing at Little Goose, April 9-June 30 (graph)
- Yearling chinook timing at Lower Monumental, April 17-June 30 (graph)
- Water transit time, Lower Granite to tailwater Ice Harbor Dam vs. average flow at Little Goose, Lower Monumental and Ice Harbor Dams (graph)
- Travel time,Lower Granite to McNary for hatchery and wild yearling chinook, 1998-2005 (graph)
- Survival, Lower Granite to McNary for hatchery and wild yearling chinook, 1998-2005 (graph)
- Combined hatchery and wild steelhead population at Lower Granite and hatchery releases, 1998-2005 (graph)
- Survival of wild steelhead from traps to Lower Granite, 2001-2005 (graph)
- Steelhead timing at Lower Granite (graph)
- Steelhead timing at Little Goose (draft)
- Steelhead timing at Lower Monumental (graph)
- Travel time, Lower Granite to McNary for steelhead, 1998-2005 (graph)
- Survival from Lower Granite to McNary for steelhead, 1998-2005 (graph)
- Hatchery/supplementation releases of subyearling chinook above Lower Granite, 1995-2005 (graph)
- Subyearling chinook timing at Lower Granite (graph)
- Survival, Lower Granite to McNary, for subyearling chinook before and during summer spill in 2005, with 90% Cis (graph)
- Survival for subyearling chinook, Lower Granite to McNary, 2001-2005, with 90% CIs (graph)
- Subyearling chinook survival vs. average total flow, Little Goose, Lower Monumental, Ice Harbor, McNary (graph)
- Subyearling chinook survival vs. average spill percentage, Little Goose, Lower Monumental, Ice Harbor, McNary (graph).

Please note that the full text of the Fish Passage Center presentation is available via hot-link from the TMT homepage; please refer to this document for further details.

McCann said that, overall, system survival appeared to be in the 60% range for in-river fish in 2005. There seems to be a real correlation, in terms of the flatness of the total survival data, said John Wellschlager – have you looked at other years to see if

similar correlations exist? Quite often there are, within a given year, McCann replied; often what you see is lower survival early in the year, higher survival through the middle part of the migration season, and then it sort of tails off toward the end of the spring migration. The highest survivals tend to be seen when flows are highest and water particle travel times are lowest, he explained.

Is there a graph that shows how total survival in 2005, including the survival of transported fish, compared to previous years? Wellschlager asked. I don't have that today, said McCann – what I've presented today shows only in-river survival. In 2005, about 80% of the total run originating above Lower Granite was transported; that compares to a more typical average of about 90%. The TMT asked that McCann return at a future meeting to provide a further update once the 2005 data has been more fully analyzed.

6. 2005 Weather.

Kyle Dittmer briefed the TMT on the monthly weather events that impacted basin flows and fish migration during water year 2005 (October 2004-September 2005). He noted that water year 2005 was noteworthy for extreme variability in precipitation and temperature patterns. Overall, said Dittmer, the autumn period started out wet, then turned very warm and dry; winter was also dry and warm, with below-normal snow-packs throughout the region. The spring period was also extreme, with near-normal conditions in April followed by a very warm, very wet May and June. The summer period was also extreme, warm and dry, with several record-breaking daily high temperatures recorded in July and August. Strong storms broke the dry spell in late September.

Dittmer said the cumulative precipitation totals, by basin, for water year 2005 were as follows:

- The Dalles: 90% of average
- Southeast Washington: 66% of average
- Hood/Lower Deschutes: 70%
- East slope Washington Cascades: 71%
- Owyhee: 117%
- Snake River Plain: 114%
- Flathead/Columbia above Castlegar: 103%.

One thing to note is that, for the May-June period, precipitation in all portions of the Snake River Basin was well above average in 2005, Dittmer said. From a temperature standpoint, average monthly temperatures across the Columbia basin were about 1.5 degrees C warmer than average in 2005, very similar to what we saw in 2004. If anyone is looking for evidence of global warming and climate change, he said, there's a piece of it right there.

With respect to his predictions for weather year 2006, Dittmer described the methodology and indices he uses in developing his long-term forecasts, including the 11-year sunspot cycle and the Southern Oscillation Index. Dittmer said current sunspot

data suggests a near-normal weather pattern in 2006; however, based on this data, he is already predicting that the winter of 2006-2007 is going to be extremely cold and snowy – it is shaping up as a strong La Niña year.

The multivarible ENSO index is near the zero line, currently, which means near-neutral ENSO conditions between now and next spring, which is good news, Dittmer said. Moving on, he said the Pacific Daily Oscillation index, which has been fairly strongly positive in the last two years – bad news for Pacific salmonids – has, just in the last month or so, slipped back into the negative range, which is good, if it stays negative. In addition, NOAA's National Center for Environmental Prediction sea surface temperature departure forecast is now showing near-normal Pacific surface temperatures over the next several months, which is also good news, Dittmer said.

Dittmer noted that, according to NOAA's forecast modelers, the Northwest will see normal temperatures and above-normal precipitation over the next month. NOAA's long-term forecast shows above-normal temperatures and near-normal precipitation for the rest of the winter period, he added.

Dittmer said that, for his long-range analysis, he had chosen 26 surrogate historic water years, all with near-neutral ENSO signals. He said he had averaged Columbia River runoff at The Dalles during these 26 water years; what this analysis shows is slightly below-normal runoff during the winter period, followed by a slightly above-normal peak during the spring. I looked at the weather patterns for each of those 26 years, and averaged them together to produce a forecast, he explained.

So what is the long-term forecast, based on this analysis? Dittmer asked. What this shows is temperatures across the region will be near-normal, but slightly on the coolish side, with temperature departures on the order of -0.1 to -0.8 degrees C. With respect to precipitation, he said, my analysis is predicting near-normal precipitation except the months of November and January, which look to be slightly below-normal. With respect to the chances for snow on the valley floor, Dittmer said that, anytime there are ENSO-neutral conditions, that is when there is the greatest potential for snow in the Portland area, the Willamette Valley and the Gorge, because there is no strong force directing the jet stream elsewhere, and you're more likely to see the alignment of conditions conducive to snow. Snow is most likely to occur during the December 15-February 15 period. Dittmer said he would go out on a limb and predict two moderate-sized – 3"-5" accumulation – snow events this year, most likely in January.

Finally, in terms of what kind of a water year to expect in 2006, my analysis shows about a 99 MAF runoff year at The Dalles, or about 92 percent of normal, Dittmer said. The University of Washingon's Climate Impacts Group, which runs a couple of different models, is in pretty close agreement – they're predicting a water year on the 106-107 MAF scale at The Dalles, or 99-100% of normal. The most recent STP forecast from NOAA's River Forecast Center shows about 97 MAF at The Dalles in 2006, or about 90% of average, Dittmer said. In other words, he said, all of the forecasts that have been produced so far this year are pretty tightly clustered.

Dittmer added that his pre-season prediction before the 2005 runoff season was for a slightly warmer and drier than average winter period; as it turns out, it was warmer and drier than I expected, he said. In reviewing these results, it appears that, while the overall methodology was sound, the El Niño impacts were simply stronger than expected. At The Dalles, my pre-season prediction was for a 94 MAF runoff year; the Universiy of Washington's Climate Impacts Group predicted 97-98 MAF, while the RFC predicted 106 MAF using ESP. My prediction was more than 10 MAF on the high side, Dittmer said; hopefully we'll see a little tighter convergence in 2006. Dittmer noted that the annual winter weather meeting, hosted by the Oregon Chapter of the American Meteorological Society, at which various meteorological gurus give their opinions on this topic, will be held this Friday, and everyone is welcome to attend.

7. 2005 Spring Chinook.

Paul Wagner briefed the TMT on the results of NOAA Fisheries investigation into the reasons for the low returns from the 2003 outmigration, and the reasons why 2005 spring chinook adult returns didn't meet the pre-season forecast. He provided copies of two NOAA Fisheries memos – one titled "Preliminary Survival Estimates for Passage During the Spring Migration of Juvenile Salmonids Through Snake and Columbia River Reservoirs and Dams, 2005;" the other titled "Low Returns of Spring Chinook Salmon to the Columbia River in 2005."

The first memo is based in PIT-tagged spring outmigrants from throughout the Snake and Columbia River basins, Wagner explained. Wild vs. hatchery survival is not broken out. The bottom line is that, in 2005, spring chinook survival was fairly high – 52%, on average, which, given the flows we experienced, which were on the low end of the scale, and the total absence of spill at the Snake projects, was better than expected, Wagner said.

Wagner provided the following results:

- 2005 survival results for hatchery fish (summarized in Table 1 of the first memo)
- Yearling chinook survival by reach from Lower Granite to Bonneville, 2001-2005 (summarized in Table 2 of the first memo)
- Snake River steelhead survival by reach from Lower Granite to Bonneville, 2001-2005 (Table 3 of the first memo)
- Upper Columbia yearling chinook survival by reach from their release point to Bonneville, 2002-2005 (Table 4 of the first memo)
- Upper Columbia steelhead survival by reach from their release point to Bonneville, 2002-2005 (Table 5 of the first memo)
- Estimated survival probability for PIT-tagged yearling chinook and steelhead, by reach, 2005 (graphs)
- Snake River flow at Little Goose Dam, April 1-May 31, 2001-2005 (graph)
- Survival, flow, passage index – the estimated survival probability for yearling chinook from Lower Granite to McNary, plotted against flow volume at Little Goose Dam and the passage index at Lower Granite Dam (graph)

Moving on to the second memo, the analysis of the possible reasons for the low returns of spring chinook to the Columbia in 2005, Wagner touched on the various questions surrounding this conundrum, including what is known about the in-river survival of the various outmigrant groups that would have contributed to 2005 adult spring chinook returns, the historical accuracy of the jack counts used to inform previous adult return forecasts, the validity of the methodology used to extrapolate from jack counts to a predicted run size, the potential effects of ocean conditions, potential correlations with the low 2005 returns of some northern Alaska runs, the role that the especially high rate of salmon bycatch in the 2005 pollack fishery may have played, and what further research may be warranted into the impacts of ocean conditions on adult spring chinook returns.

The memo concludes that no single variable or factor NOAA Fisheries examined appears responsible for the low 2005 adult spring chinook return, and that it is likely that a combination of factors played a role:

- Poor ocean conditions may have resulted in a higher-than-normal percentage of 3-ocean fish remaining in the ocean and waiting to return to spawn as four-ocean fish due to poor growth rate
- Marine mammals in the Lower Columbia River may have had a greater than average effect on the upriver run in 2005
- Ocean conditions may have affected adult fish that remained after their first year in the ocean
- Other predators, including killer whales observed feeding in the Columbia River plume, may have deterred the entrance of adult spring chinook this year
- Salmon may be more sensitive to physical changes in the ocean than suggested by NOAA's ocean indices
- The forecast by TAC was much too high, as was a simple estimate NOAA Fisheries derived from its Snake River database.

Please note that the full texts of Wagner's memos are available via hot-link from today's agenda on the TMT homepage; please refer to these documents for full details of his presentation.

8. Snake River Fall Chinook Summer Spill Passage.

The Corps' Paul Ocker led this presentation, titled "2005 Preliminary Summer Spill Data – Fall Chinook Radiotelemetry Studies." Ocker touched on the following topics:

- Important considerations: these estimates do not address transport vs. in-river survival nor adult return issues; this information is extremely preliminary and the specific numbers are likely to change; this is the first look at subyearling passage at most of these projects including RSWs; these survival estimates are relative survival estimates compared to a tailrace reference, except at Little Goose.
- Legend
- Lower Granite background information – study methodology, study period,

number of fish released (2,200), a summary of Lower Granite operations during the test period.

- Lower Granite Dam – survival by passage route under non-RSW operations (94% of the fish passed the project via spill; spill survival 90.2%; overall dam survival 89.5%, not including bypass)
- Lower Granite Dam – survival by passage rout under summer RSW operations (86.5% of the fish passed the project via spill, including 68% via the RSW; RSW survival was 94.5%; overall dam survival, 93.9%.
- Little Goose background information – study methodology, study period, number of fish studied (about 2,000 of the fish released at Lower Granite), a summary of project operations during the test period.
- Little Goose Dam – survival by passage route under non-RSW operations (84% of the fish passed the project via spill; spill survival 92%; overall dam survival 91.6%, not including bypass)
- Lower Monumental background information – study methodology, study period, number of fish released (2,200), a summary of project operations during the test period.
- Lower Monumental Dam – survival by passage route under non-RSW operations (88% of the fish passed the project via spill; spill survival 90.5%; overall dam survival 86.2%
- Ice Harbor background information – study methodology, study period, number of fish released (4,200), a summary of project operations during the test period.
- Ice Harbor Dam – survival by passage route under non-RSW operations (98% of the fish passed the project via spill; spill survival 99.8%; overall dam survival 99.6%)
- Ice Harbor Dam – survival by passage route under summer RSW operations (87% of the fish passed the project via spill, including 60% via the RSW; spill survival 98.3%; overall dam survival 98%.
- McNary background information – study methodology, study period, number of fish released (2,700), a summary of project operations during the test period.
- McNary survival by passage route under summer RSW operations (64% of the fish passed the project via spill; spill survival 102%; overall dam survival 96.3%)

Ocker then provided the following overall takeaways from the 2005 radiotelemetry studies:

- The results suggest generally high subyearling survival through the projects
- Fish passage efficiency (FPE, the percent of fish passing via non-turbine route) at all projects was relatively high, ranging from 81% to 100%.
- Spill effectiveness (the percent of fish passing through the spillway divided by the percent of total river flow passing through the spillway) was higher than anticipated for the Snake River projects, and was 2-3 times higher for RSWs than spillways.
- Dam passage with RSW had higher survival at Lower Granite and lower at Ice Harbor, yet neither were likely statistically significant.
- Passage metrics (tables)
- Relative survival estimates, by project (table)

In response to a question, Ocker said that, while the tagging and testing process is stressful for the test fish, the feeling in the scientific community is that RSWs generally provide a less-stressful route. In response to a question from Silverberg, Ocker said he will provide an updated presentation on this topic to TMT once the 2005 data have been finalized; a more detailed presentation will be provided at the AFEP annual review in two weeks.

9. Snake River EPA Temperature Modeling.

Dittmer distributed a pair of graphs; the first was titled "Clearwater River at Peck, 1979, 1994, 1995, 1998 Weather," and charted water temperatures from June 12 through September 30 for each of these weather years vs. observed water temperatures in 2005. The second graph, titled "Snake at Lower Granite Dam, 1979, 1994, 1995 and 1998 Weather," provided the same information for that project.

Dittmer noted that he had been asked to approach EPA in Seattle to do their annual water temperature modeling exercise on the release of cool water from Dworshak and its effects on temperatures in the Snake River. He described the study methodology, then went through the information contained in the graphs (available via hot-link from today's agenda on the TMT homepage). The bottom line, said Dittmer, is that in 2005, water temperatures at Lower Granite never exceeded the 20-degree C standard in 2005, because of the effective use of Dworshak water and because the weather was relatively cooperative.

10. Snake River Fall Chinook Release Studies.

Billy Connor led this presentation, titled "Post-Release Attributes of Lyons Ferry Hatchery Fall Chinook Salmon Subyearlings Released into the Snake River as Surrogates for Wild Fall Chinok Salmon Subyearlings." He began by acknowledging the contributions made by hundreds of IDFG, Idaho Power and WDFW employees in collecting data for this study.

Connor touched on the following topics:

- Objective: a study to compare the SARs of Snake River fall chinook salmon under alternative transportation and dam operational strategies.
- Basin-wide redd distribution (Clearwater vs. Snake), 2004 (pie chart)
- Groups of PIT-tagged fall chinook salmon subyearlings that provided data for comparing post-release attributes for this presentation (wild and hatchery groups, by facility of origin and number tagged)
- Mean fork length at PIT-tagging – wild (68 +/- 7 mm), surrogate (76 +/- 8 mm) and hatchery 86 +/- 9 mm)
- Attributes compared among groups – passage timing at the first three lower Snake River dams; level of exposure to spill at those three dams; travel time to Lower Monumental Dam; joint probability of actively migrating and surviving to

pass Lower Monumental Dam.

- Use of the Sandford and Smith (2002) method to estimate daily passage
- Cumulative passage vs. passage date at Lower Granite Dam, 2005, wild, surrogate and production groups (median passage date by group: production, June 1; surrogate, June 12; wild, June 18)
- Cumulative passage vs. passage date at Little Goose Dam, 2005, wild, surrogate and production groups (median passage date by group: production, June 4; surrogate, June 27; wild, July 1)
- Cumulative passage vs. passage date at Lower Monumental Dam, 2005, wild, surrogate and production groups (median passage date by group: production, June 8; surrogate, June 29; wild, July 4)
- Percentage of each release group that passed Lower Granite prior to spill – wild, 69%; surrogate, 90%; hatchery, 98%)
- Percentage of each release group that passed Little Goose prior to spill – wild, 10%; surrogate, 28%; hatchery, 98%)
- Percentage of each release group that passed Lower Monumental prior to spill – wild, 5%; surrogate, 16%; hatchery, 90%)
- Travel time to Lower Monumental Dam (days): wild 45 +/- 0.2; surrogate, 41 +/- 0.1; production, 28 +/- 0.1.
- Joint probability of migrating and surviving to the tailrace of Lower Monumental Dam: wild, 26 +/- 11; surrogate, 16 +/- 0; hatchery, 52 +/- 8.

Connor then provided the following summary of 2005 findings:

- The post-release attributes of wild Snake River subyearlings and the Snake River surrogates were not identical, but there were general similarities in passage timing, level of exposure to spill, travel time and the joint probability of migrating and surviving.
- Releasing Snake River surrogates over a three-week period in 2006 might reduce the differences observed in post-release attributes between wild Snake River subyearlings and the Snake River surrogates.
- Compared to wild Snake River subyearlings, production subyearlings passed downstream much earlier, were exposed to very little summer spill, moved seaward rapidly, and had a much higher probability of migrating and surviving.
- Plans are presently being made to represent production fish in the 2006 hydrosystem operation study.

Connor noted that, essentially, the information he presented today is a sneak peak at how well the surrogates performed relative to wild fish – we won't actually know how well they performed until we get SAR information, age composition, life-history variation and other information. And are the hatchery fish exactly the same, genetically, as the wild fish? Wellschlager asked. Are the wild fish genetically predisposed to overwinter? As far as the life-history variation, I don't think we know that, Connor replied; genetically, the Lyons Ferry fall chinook and Snake River fall chinook are similar – the Lyons Ferry stock was developed from wild Snake River broodstock over time. However, I don't know whether there is a genetic link to life-history variation, Connor said.

You said you tagged about 9,600 wild fish, and they had to be 60 mm long, said LeFleur. Obviously you caught a lot more of those fish than that, and I'm wondering whether it might be worthwhile to coded-wire tag some of those fish, because the size limit for a CWT is smaller than the size limit for implanting a radio tag. Do you catch enough juveniles to coded-wire-tag, say, 100,000 of those wild fish? No – not at present, Connor replied. This year, we caught about 40,000 fish, total, and a high percentage of those fish were too small to accept a CWT.

Were the surrogates the only group that were not acclimated? Bob Heinith asked. Yes, Connor replied. That could have something to do with your survivals, said Heinith. It could, Connor agreed. Could you acclimate the surrogates in 2006? Heinith asked. The only way we could do that would be to get some room at the Nez Perce Tribal acclimation facility, Connor replied.

11. Snake River Review.

Ken Tiffan led this presentation, titled "Snake River Fall Chinook Salmon Summer Travel Time and Winter Passage." Emphasizing that the data he is presenting today is only preliminary, Tiffan touched on the following major topics:

- Detections, by fixed site locations, 2005 (graph)
- Travel rate vs. location (graph)
- Travel rate and spill (graph)
- Fish travel rate vs. water velocity, 2005, Billy Creek to Lower Granite Dam (graph)
- Fish travel rate vs. water velocity, 2005, Lower Granite reservoir only (graph)
- Winter passage: when do reservoir-type juvenile fall chinook pass the dams?
- Study parameters: collected fish from November-February last year, 104 fish radio-tagged in all, monitored forebay and tailrace of each Snake River Dam through the beginning of May
- Total detections, Lower Granite-Ice Harbor
- Detections before bypass
- Detections after bypass
- Detections by location (graph)
- Passage by month – passage high in December and January, drops off during February and March, and picks up again in April
- Hourly passage (graphs) – fish pass at all hours of the day; little relationship with flow and temperature
- Residence times – Lower Granite forebay through Ice Harbor forebay – up to 150 days in the Lower Granite forebay
- Detections of PIT-tagged holdovers – numbers detected at each site in 2005 (graph)

What conclusions do you draw from this? Silverberg asked. That fish do pass during the winter, and some radio-tagged fish pass through the system undetected, Tiffan replied. And of the 104 radio-tagged fish you released, how many did you account for? Wagner asked. We detected 102 of those fish in the forebay, and 88 of them eventually passed Lower Granite, Tiffan replied. In response to another question, Tiffan said his group's annual report will be provided to Bonneville very soon.

12. 2005 Study Results that Might Impact 2006 Operations.

A. Ice Harbor RSW Results. Paul Hackett led this presentation. He touched on the following topics:

- Important considerations
- Legend – passage metrics, survival metrics
- Ice Harbor 2005 yearling chinook research background information
- Ice Harbor Dam – spring non-RSW operations – yearling chinook passage and survival by route: spillway (97% of fish passed this route, 97% survived), turbine passage (1% passed by this route) bypass passage (1% passed by this route). Overall project survival: 97%
- Ice Harbor Dam spring RSW operations – yearling chinook: 77% passed

via spill (48% via training spill, 29% via RSW), 95% survived training spill passage, 97% survived RSW passage, 7% passed via the turbines, 16% passed via bypass; there was 100% bypass survival and 96% overall dam survival

Hackett offered the following key takeaways from the 2005 Ice Harbor yearling chinook studies:

- More fish went through turbines and bypass during RSW operations vs. non-RSW
- More fish appeared to go through training spill than through the RSW. This may be due to spill volume or spill pattern
- Project survival was not likely statistically different between RSW (95%) and non-RSW (97%) operations (34% vs. 82% spill)
- There may be room for improvement in RSW operations if we look closely at training spill and forebay delay.

Moving on, Hackett provided information on 2005 Ice Harbor steelhead research. He touched on the following topics:

- Study and operational parameters
- Ice Harbor dam steelhead – spring non-RSW vs. RSW operations: comparative passage routes and survivals

He offered the following key takeaways:

- More fish went through turbines and bypass during RSW operations vs. non-RSW
- Project survival was not likely statistically different between RSW (91%) and non-RSW (93%) operations (34% vs. 82% spill)
- Concrete survival was likely not statistically different between RSW (97%) and non-RSW (99%) operations.
- There may be room for improvement in RSW operations if we look closely at training spill

Boyce observed that, until adult return data is available, it is impossible to know how much of an impact RSW operation has on ultimate survival. There are obviously much-reduced spill levels while the RSW is operating, he said; some of the highest SARs we're seeing are from non-detected, non-transported fish.

13. Other Lessons Learned.

What, if anything, is the group taking away from the information that has been presented today? Silverberg asked. I think it would be helpful if someone could summarize the spring and summer water temperature information that was collected this year, said Heinith. Is there still a tri-level thermograph system in the Snake? I don't know, replied Filardo, – we haven't specifically looked at that at WQT.

One other thing we could look at is autumn operations at Libby in the context of the SOI index, said Dittmer – I'm not sure we're making the best possible use of the available tools. There's a lot of information to digest, said Boyce – much of it is very pertinent to next year's operations. We should continue to discuss today's presentations at TMT, and work them into our long-term planning. I thought the Ice Harbor information, and the information on the overwintering fall chinook, was particularly interesting, Boyce said.

One thing that has concerned me is that, this year, the criteria we used to decide to maximize spring transport was disappointing, said Russ Kiefer – we probably need to step back and re-evaluate how we make that determination, because I believe we missed the boat in 2005, in terms of an opportunity to leave more fish in-river while maximizing in-river migratory conditions.

Larry Beck noted that one of the takeaway messages, for him, is that sometimes the benefits of a given operation disproportionately favor one species over another. I would add that, to me, the spill results for McNary are very encouraging, said Heinith; I think the region needs to look closely at continuing that operation. Again, however, while the survival through spill numbers were encouraging, we're going to need to see how the SARs play out before we can draw conclusions about the ultimate benefits of that operation, Hackett observed.

14. Next TMT Meeting Date.

The next Technical Management Team meeting was set for Wednesday, November 9. Meeting summary prepared by Jeff Kuechle, BPA contractor.