

TECHNICAL MANAGEMENT TEAM

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COE: Jim Adams / Cathy Hlebechuk / Bob Buchholz

TMT MEETING

Wednesday January 16, 2008 09:00 - 12:00

1125 N.W. Couch Street, Suite 4A34
Portland, Oregon 97209-4142
Map Quest [\[Directions\]](#)

CONFERENCE PHONE LINE

Conference call line: 203-310-2162; PASS CODE = 4703150

To check into the building, take the elevator to the 5th floor and the guard will issue you an ID badge if you need one and will take you down to the meeting room on the 4th floor. If you have NOT attended a TMT meeting in the past you will need to call ahead and let Jim Adams (503) 808-3938, Cathy Hlebechuk (503) 808-3942, or Bob Buchholz (503) 808-3945 know, so you can be added to the TMT Visitor List and issued an ID badge. This badge may be used indefinitely. If you have attended TMT in the past you may re-use your ID badge indefinitely. If you are a federal employee you will also need to have an ID badge issued to you which can be used indefinitely.

We have had disruptions on the phone because people are not hitting 'mute' after dial in.
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*All members are encouraged to call Robin Gumpert with any issues or concerns they would like to see addressed.
Please e-mail her at robin76@cnnw.net or call her at (503) 248-4703.*

AGENDA

1. Welcome and Introductions
2. Review [\[Meeting Minutes\]](#) 
3. January Final Water Supply Forecasts, precipitation data and climate predictions -
Steve King, National Weather Service, River Forecast Center
 - A. [\[Main water supply page - Overview\]](#)
 - B. [\[Current Month precip\]](#)
 - C. [\[Seasonal Month Precip\]](#)
 - D. [\[Snow\]](#)
 - E. Water Supply/ESP
 - i. [\[Libby\]](#)
 - ii. [\[Hungry Horse\]](#)
 - iii. [\[Albeni Falls\]](#)

- iv. [\[Grand Coulee\]](#)
- v. [\[Dworshak\]](#)
- vi. [\[Brownlee\]](#)
- vii. [\[Lower Granite\]](#)
- viii. [\[The Dalles\]](#)
- F. Climate Prediction Center Forecasts
 - i. 1-month outlook
 - a. [\[Precipitation Probability\]](#)
 - b. [\[Temperature Probability\]](#)
 - ii. 90-day outlook
 - a. [\[Precipitation Probability\]](#)
 - b. [\[Temperature Probability\]](#)
- 4. Lessons Learned from 2007 - *All*
[Lessons Learned](#) 
- 5. Draft 2008 Fish Operations Plan - *Rudd Turner, USACE*
 - A. [\[Draft\]](#) 
 - B. [\[Appendix 2\]](#) 
- 6. Updates to the Draft 2008 Water Management Plan - *Scott Boyd, USACE*
- 7. Operations Review
- 8. Other
 - Set agenda for next meeting - **January 23, 2008**
[\[Calendar 2008\]](#) 

Questions about the meeting may be referred to:

*[Jim Adams](#) at (503) 808-3938, or
[Cathy Hlebechuk](#) at (503) 808-3942, or
[Bob Buchholz](#) at (503) 808-3945.*

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CENWD-PDD

January 15, 2008

2008 Fish Operations Plan

BACKGROUND

The 2008 Fish Operations Plan (FOP) describes actions by the U.S. Army Corps of Engineers (Corps) to implement project operations for fish passage at its Federal Columbia River Power System (FCRPS) dams during the April – August 2008 fish migration season. This plan adopts the project operations contained in the 2007 FOP, as incorporated in the Court's May 23, 2007 Opinion and Order, through August 31, and modified through consensus during the 2007 migration season. Consistent with the 2004 Biological Opinion adaptive management strategy, water management and project operations for fish passage not addressed in this FOP will be consistent with the operations considered in the 2004 Biological Opinion and in particular, the 2008 Water Management Plan and 2008 Fish Passage Plan (FPP). Additionally, this plan incorporates operational adjustments necessary to perform essential research and to accommodate the installation or adjustment of surface bypass structures subsequent to the 2007 migration season. The structural modifications necessitating changes in operations are: (1) installation of a removable spillway weir (RSW) at Lower Monumental Dam; (2) installation of two prototype temporary spillway weirs (TSWs) at John Day Dam; and, (3) moving one of the two TSWs at McNary Dam to a different spill bay. In addition, the FOP describes operations during low flow periods and load swing hours which occurred in 2007 and were reported to the court. The following is a detailed description of the fish passage operations for the 2008 migration season.

SPRING SPILL OPERATIONS

Lower Snake River - spring spill will occur from April 3, 2008 through June 20, 2008 at the Lower Granite, Little Goose, Lower Monumental, and Ice Harbor dams.

Lower Columbia River - spring spill will occur from April 10, 2008 through June 30, 2008 at the McNary, John Day, and The Dalles dams and from April 10, 2008 through June 20, 2008 at Bonneville Dam.

Table 1 below summarizes spring spill operations planned for each mainstem dam.

As in 2007, the Corps will manage spill levels to the total dissolved gas (TDG) saturation levels of 120% in the project tailrace and 115% in the forebay of the next project downstream, referred to as "gas caps" in this document. The project spill discharge level needed to meet but not exceed the gas caps is referred to as the "spill cap". Therefore, the spill cap is the maximum flow rate a project can spill for fish passage that does not exceed the gas caps. The gas caps (120% tailrace and 115% forebay) do not change for dams providing spill for fish passage in the spring and summer. Spill caps, on the other hand, may vary daily depending on flow, temperature, and other environmental conditions.

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Table 1. Spring 2008 project spill levels and transport criteria.

Spring 2008

	Planned Operations for Spring 2008 (Day/Night)	Comments
Transport	Initiate transport at Lower Granite Dam between April 20 – May 1 with staggered transport start dates at Little Goose and Lower Monumental. Criteria for start date and stagger days will be provided to TMT *1	Same as 2007
Lower Granite	20kcfs / 20kcfs	Same as 2007
Little Goose	30%/30% Allow for 14 days night Gas Cap spill within the last week of April – second week of May (April 22 – May 15)*. Dates of actual night time spill to be determined by salmon managers within the window of time identified above	Same as 2007
Lower Monumental	gas cap / gas cap (approximately 27 kcfs day/night)	Same as 2007 test program (24 hr gas cap spill), with RSW installed
Ice Harbor	30%/30% vs 45kcfs/gas cap	Same as 2007
McNary	40%/40% (April 10 – June 30)	Same as 2007 for continued prototype temporary spillway weir (TSW) tests
John Day	0 / 60% on non-test days; 30%/30% or ~40%/40% on test days (~April 20 – June 20)	Same as 2007 on non-test days. TSW tests with 24 hour spill planned for 2008
The Dalles	40%/40%	Same as 2007
Bonneville	100kcfs/100kcfs	Same as 2007

*1 Initiation of Transport

* The timing of the 14 days of spill to nighttime gas cap levels will be determined in-season through the TMT processes and is intended to coincide with the peak of the wild spring yearling Chinook migration at Little Goose Dam within the window specified.

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SUMMER SPILL OPERATIONS

Lower Snake River - summer spill will occur from June 21, 2008 through August 31, 2008 at the Lower Granite, Little Goose, Lower Monumental, and Ice Harbor dams.

Lower Columbia River -summer spill will occur from July 1, 2008 through August 31, 2008 at the McNary, John Day, and The Dalles dams and from June 21, 2008 through August 31, 2008 at Bonneville Dam.

Table 2 below summarizes summer spill operations planned for each mainstem dam.

As in 2007, the Corps will manage spill levels to the TDG saturation levels of 120% in the project tailrace and 115% in the forebay of the next project downstream, referred to as “gas caps” in this document. The project spill discharge level needed to meet but not exceed the gas caps is referred to as the “spill cap”. Therefore, the spill cap is the maximum flow rate a project can spill for fish passage that does not exceed the gas caps. The gas caps (120% tailrace and 115% forebay) do not change for dams providing spill for fish passage in the spring and summer. Spill caps, on the other hand, may vary daily depending on flow, temperature, and other environmental conditions.

Table 2. Summer 2008 project spill levels.

Summer 2008

Project	Planned Operations for Summer 2008 (Day/Night)	Comments
Lower Granite	18 kcfs / 18 kcfs	Same as 2007
Little Goose	30% / 30%	Same as 2007
Lower Monumental	17 kcfs / 17 kcfs	Same as 2007
Ice Harbor	30%/30% vs 45kcfs/gas cap	Same as 2007 test program
McNary	40%/40% vs 60%/60%	Same as 2007 test program
John Day	30% / 30% on non-test days; 30%/30% or ~40%/40% on test days (~June 21 – July 20)	Same as 2007 on non-test days. TSW tests with 24 hour spill planned for 2008
The Dalles	40%/40%	Same as 2007
Bonneville	85 or 75kcfs / gas cap (approximately 120 kcfs at night)	Same as 2007 test program

General Guidance for 2008 Fish Operations

For planning purposes, the Corps’ 2008 FOP operations for fish passage assume “average” run-off conditions. However, actual run-off conditions may be higher or lower than average, requiring adjustments in spill levels (kcfs discharge rates, spill percentages, or spill caps) to avoid or minimize poor juvenile or adult fish passage conditions or powerhouse constraints.

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Therefore, actual spill levels may vary from the tables above. In addition, spill levels may require adjustments for the following reasons:

- TDG is managed daily in response to changing conditions. Adjustments will be made to manage the spill operation consistent with the states' 2007 TDG saturation limits of 120% tailrace and 115% forebay for fish passage.
- Power system and other project emergencies, including unplanned/unanticipated facility maintenance or outages, may necessitate temporary adjustments in accordance with established protocols.

The following sections describe the processes for spill management during high and low runoff conditions, TDG management, spillway operation, minimum generation, specific spring and summer operations for fish passage for each mainstem project, juvenile fish transportation program operations, protocols for emergencies, and reporting.

Spill Management

The Corps will initiate spill at 0001 hours, or shortly after midnight, at each of the projects on the start dates specified above. Spill caps will be established at the specified amounts and will continue unless conditions require changing to maintain TDG within the states' 2007 limits of 120% in the tailwater of a dam and 115% in the forebay of the next project downstream (and at Camas/Washougal). Spill will terminate at 2359 hours, or shortly before midnight, at each project on the end dates specified above.

The spill rates represented in Tables 1 and 2 assume average runoff conditions; however, actual conditions may require adjustments to these spill rates. Actual spill rates may increase above the specified rates for several reasons:

1. high runoff conditions where flows exceed the powerhouse hydraulic capacity with the specified spill rates;
2. generation unit outages that reduce powerhouse capacity;
3. power system or other emergencies that reduce powerhouse discharges; and,
4. a lack of power load resulting in an increase in the rate of spill.

Spill below the specified rates could occur during low runoff conditions when meeting minimum generation levels at a project requires reducing spill rates. This would most likely occur in late July and August. Minimum generation and spill rates are included below in the project specific information. Spill also may be reduced to accommodate navigation issues or other exigencies.

To make adjustments in response to changes in conditions, the Corps will utilize the existing Regional Forum committees. Changes in spill rates when flow conditions are higher or lower than anticipated will be coordinated through the regional forum Technical Management Team (TMT). This could include potential issues and adjustments to the juvenile fish transportation program. Spill patterns and biological test issues that have not been coordinated to date will be coordinated through the Corps' Anadromous Fish Evaluation Program (AFEP) subcommittees, which include the Studies Review Work Group (SRWG), Fish Facility Design Review Work Group (FFDRWG), and Fish Passage Operations and Maintenance Coordination Team (FPOM).

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Total Dissolved Gas Management

In order to manage gas cap spill rates consistent with the states' 120%/115% TDG limits for fish passage spill used in 2007, the Corps' Reservoir Control Center (RCC) establishes the spill caps for each project on the lower Columbia and Snake rivers on a daily basis throughout the fish passage season. These spill caps are set so that resultant TDG percent saturation levels are not expected to exceed the 120%/115% TDG limits, measured as an average of the highest 12 hourly readings each day as was done in 2007. Within any given day, some hours of measured TDG levels may be higher or lower than the gas caps due to changing environmental conditions (wind, air temperature, etc). The process of establishing daily spill caps entails reviewing existing hourly data at each dam (including flow, spill, temperature, and TDG levels) and taking into consideration a number of forecast conditions (including total flow, flow through the powerhouse, wind and temperature forecast, etc.). This information is used as input into the SYSTDG (System TDG) modeling tool. The SYSTDG model estimates TDG levels in the rivers several days into the future and is a tool integral to daily decision-making when establishing spill caps at individual dams.

SYSTDG output is used to guide decisions to establish spill caps at each dam to avoid exceedances of the gas caps. However, during the spring freshet when flows are expected to be greater than hydraulic capacity with the specified spill rates at the dams, or if a lack of power load results in an increase in the spill rate, the Corps will attempt to minimize TDG on a system-wide basis. In this case, spill caps are also developed for 125%, 130%, or 135% saturation to minimize TDG throughout the system.

Spill caps set by RCC in daily spill priority requests will be met at the projects by using the spill pattern in the appropriate FPP spill table which most closely corresponds to the requested spill, either over or under the spill request. Spill caps will be adjusted on a daily basis as needed to avoid exceeding the gas caps. Operations to manage TDG will continue to be coordinated through the TMT.

Spillway Operations

Actual hourly spill quantities at dams will be slightly greater or less than shown in Tables 1 and 2. The Action Agencies will meet the requested spill levels to the extent possible, as described in Table 3. However, actual spill levels depend on the precision of spill gate settings, flow variations in real time, varying project head (the elevation difference between a project's forebay and tailwater), and other factors. Operations considerations are as follows:

Spill discharge rates: Due to limits in the precision of spill gates and control devices, short term flow variations, and head changes, it is not possible to discharge exactly the spill rates stated in the Tables 1 and 2, or as stated in RCC spill requests to projects that call for specific spill discharges. Therefore, spillway gates are opened to the settings in FPP spill pattern tables which provide discharges that are the closest to the agreed upon spill discharge rate. The spill rates in Table 3 coincide with specific gate settings in the FPP spill tables. Actual spill may be higher or lower than the identified spill rate.

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Spill percentages: Spill percentages are considered target spill levels. The project control room operator and BPA duty scheduler calculate spill rates to attempt to be within +/- 1% of the target percentage for the following hour (Table 3). These percentages may not be attained due to low flow conditions, periods of minimum generation, when spill caps limit spill amounts, when spill is curtailed for navigation safety, and other circumstances. Operators and schedulers will review the percentages achieved during the day and adjust spill rates in later hours, with the objective of ending the day with a day average spill that achieves the target.

Minimum Generation

The Corps has identified minimum generation flows derived from FPP tables which specify turbine operation within the 1% of best efficiency range. These figures are approximations and do not account for varying head or other small adjustments that may result in variations in the reported minimum generation flow and spill amount. Conditions that may result in minor variations include:

1. Varying pool elevation: as reservoirs fluctuate within the operating range, flow rates through the generating unit change.
2. Generating unit governor "dead band": the governor controls the number of megawatts the unit should generate and cannot precisely control a unit; variations can be +/- 1% to 2% of generation.
3. System disturbances: once the generator is online and connected to the grid, it responds to changes in system voltage and frequency. These changes may cause the unit to increase flow and generation slightly within an hour.
4. Individual units may behave slightly differently or have unit specific constraints.
5. Generation control systems regulate megawatts (MW) generation only, and not flow through turbines.

All of the lower Snake River powerhouses may be required to keep one generating unit on line at all times for power system reliability. During low flows, one generator is run at the bottom of the 1% of best efficiency range. All of the Snake River plants have 2 "families" of turbines with slightly different capacities. In most cases one of the smaller units, with somewhat less generation and flow, will be online during these times. At the Snake River dams, the smaller units are generally numbered 1 – 3 and are the first priority for operation during the fish passage season. However, if smaller units are unavailable, one of the larger units may be used. Further, at Lower Monumental, generating unit 1, which is the first priority unit during fish passage, is damaged and cannot operate at the low end of the design range. However, because this unit is a fish passage priority TMT may recommend use of this unit, which will result in higher turbine discharge rates than shown in the Lower Monumental Summer Operation Considerations section below. In addition, Ice Harbor units cannot be operated at the lower end of the 1% of best efficiency range. These units experience cavitation at a generation level somewhat higher than the lower 1% limit, which damages the turbine and can be detrimental to fish. Therefore, Ice Harbor units will operate at their lower cavitation limits, as in 2007.

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Table 3. Comparison of 2008 spill levels in Tables 1 and 2 with operational spill levels at mainstem dams.

Season/Project	2008 Spill Levels in Tables 1 and 2	2008 Operational Spill Levels	Comments
Spring			
Lower Granite	20 kcfs day/night	20.4 kcfs	Will fluctuate due to project head changes
Little Goose	30% day/night	30% +/- 1% hourly; 14 nights at spill cap	Target* 30% as a day average; meet nightly spill cap for 14 nights
Lower Monumental	27 kcfs day/night (gas cap)	spill cap day/night	Meet spill cap daily
Ice Harbor	30% day/night vs. 45 kcfs day / gas cap night	30% +/- 1% hourly; 45.6 kcfs day / spill cap night	Target 30% as a day average; 45.6 kcfs will fluctuate due to head changes; meet nightly spill cap
McNary	40% day/night	40% +/- 1% hourly	Target 40% as a day average
John Day	0 day / 60% night (non-test dates); 30% & ~40% day/night (test dates)	60%, 30%, ~40% +/- 1% hourly	Target percentages as a nightly or day average
The Dalles	40% day/night	40% +/- 1% hourly	Target 40% as a day average
Bonneville	100 kcfs day/night	100 kcfs	Will fluctuate due to head changes
Summer			
Lower Granite	18 kcfs day/night	18.6 kcfs	Will fluctuate due to head changes
Little Goose	30% day/night	30% +/- 1% hourly	Target 30% as a day average
Lower Monumental	17 kcfs day/night	17.1 kcfs	Will fluctuate due to head changes
Ice Harbor	30% day/night vs. 45 kcfs day / gas cap night	30% +/- 1% hourly; 45.6 kcfs day / spill cap night	Target 30% as a day average; 45.6 kcfs will fluctuate due to head changes; meet nightly spill cap
McNary	40% day/night vs. 60% day/night	40% +/- 1% hourly; 60% +/- 1% hourly	Target 40% or 60% as a day average
John Day	30% day/night	30% +/- 1% hourly	Target 30% as a day average
The Dalles	40% day/night	40% +/- 1% hourly	Target 40% as a day average
Bonneville	85 or 75 kcfs day / 120 kcfs night	85.3 or 74.6 kcfs day / spill cap night **	85.3 & 74.6 kcfs will fluctuate due to head changes; meet nightly spill cap

* Target: Make best effort to meet a specified spill level through frequent monitoring, projections, and spill adjustments within the defined range of variation. This will occur for each project through analysis and coordination between the Corps and BPA.

** The Bonneville Dam summer daytime spill discharge rate will be 85 kcfs until approximately July 20 for testing, then 75 kcfs through August 31.

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Low Flow Operations

Low flow operations on Lower Snake projects are triggered when inflow is not sufficient to provide for both minimum generation and the planned spill levels. In these situations, the projects will operate one unit at minimum generation and spill the remainder of flow coming into the project. As flows transition from higher flows to low flows, there may be situations when flows recede at a higher rate than forecasted. In addition, inflows provided by nonfederal projects upstream are variable and uncertain. The combination of these factors may result in instances where unanticipated changes to inflow result in forebay elevations dropping to the low end of the Minimum Operating Pool (MOP). Since these projects have limited operating flexibility, maintaining minimum generation and the target spill may not be possible on every hour.

Also during these low flow operations, additional flow that is passed through a dam as the result of navigational lockages becomes more apparent. This is because the volume of water needed to empty the navigation lock during periods of low flow is a greater percentage of the total flow than it had been earlier in the season. As a result, the official recorded spill percent through the spillway appears to be reduced since it does not include this volume of water needed to empty the navigation lock.

Operations during Load Swing Hours

Project operations during load swing hours may result in not meeting hourly spill, mostly at McNary, John Day, and The Dalles dams. This occurs because projects must be available to respond to within-hour load variability to satisfy North American Electric Reliability Council (NERC) reserve requirements (“on response”). During periods of rapidly changing loads, projects on response may have significant changes in turbine discharge within the hour. Under normal conditions, within-hour load changes occur mostly on hours immediately preceding and after the peak load hours, while spill quantity remains the same within the hour, however, sometimes several hours after peak load hours the project may still be decreasing total outflow and generation faster than the corresponding spill decreases causing the percent spill to be slightly higher. These hours are referred to as “load swing hours.” Due to the high variability of within-hour load, these load swing hours may have a greater instance of reporting actual spill percentages that vary more than the +/- 1% requirement than other hours. On the days this occurred in 2007, the day or night-time average spill was within the FOP level of +/- 1% of the target spill.

Spring and Summer Operations for Fish Passage by Project

The following describes the spring and summer operations by project. Included in the description is planned research as considered in the 2004 Biological Opinion. The Corps, and the regional agencies and Tribes are interested in the continuation of project research studies under the Corps’ AFEP. These studies have undergone review by the regional agencies and Tribes. The studies are intended to provide further information on project survival and assist the region in making decisions on future operations and configuration actions to improve fish passage at the Lower Snake and Columbia River dams.

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Lower Granite

Spring Spill Operations April 3 – June 20, 2008: 20 kcfs (including approximately 6 kcfs from the RSW and 14 kcfs from the training spill) 24 hours/day with the Removable Spillway Weir (RSW) operating. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Spring research operations: Normal spring spill patterns and rates as described in the FPP will be used. There will be no specific spill variations for testing.

Operation considerations:

- o Unit 2 will be out of service until late September 2008. The powerhouse will operate with no more than 5 units on during the spring and summer spill seasons. A contract for fire protection installation will take one unit at a time out of service, starting in July and continuing through the summer.
- o With one unit out of service, powerhouse capacity is about 85 kcfs. If total river discharge is greater than approximately 105 kcfs, then spillway discharge will be forced above RSW spill + training spill levels. This involuntary spill could result in gas cap exceedances. Lack of power load also could cause involuntary spill at higher total river discharges.
- o Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.

Summer Spill Operations June 21 – August 31, 2008: 18 kcfs (including approximately 6 kcfs from the RSW and 12 kcfs from the training spill) 24 hours/day with the RSW operating. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Summer research operations: Normal summer spill patterns and rates as described in the FPP will be used. There will be no specific spill variations for testing.

Operation considerations:

- o Minimum spill: During periods of low flow before the spring freshet and during the summer period, there may be periods where spill quantities are limited so that tailrace conditions are not advantageous to fish passage. If such low runoff conditions occur, alternative spill operations at the dam will be coordinated through the TMT.
- o Minimum generation: The minimum generation amount represents the operation of one unit at the lower end of its 1% efficiency range and is needed for power system reliability. This generation will be controlled to approximately 81 – 83 MW at units 1 – 3, the priority fish units. If these units are not available, the larger units 4 – 6 will be run at 96 - 100 MW. This will

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result in turbine flows of approximately 11 kcfs – 12 kcfs at units 1 – 3 and 12.5 kcfs - 13.5 kcfs at units 4 - 6. There may be slight variations in the generation due to power system fluctuations. Also, the outflow will fluctuate because of changing head at the dam. This condition may occur in early spring before the freshet and during the late summer period with low flow conditions.

- o Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.

Little Goose

Spring Spill Operations April 3 – June 20, 2008: 30% spill 24 hours/day. In addition, allow for 14 nights of spill up to gas cap spill rates between April 22 and May 15. Nighttime spill hours are 1800 – 0600. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Spill duration for testing: Adult passage will be studied throughout the spring spill period.
- Spring research operations: 30% spill 24 hour/day. Bulk and uniform spill patterns (2 or 3 patterns) will be tested. Final test conditions will be coordinated through the SRWG.
- Objectives of the biological test: The primary objectives of the spring and summer test will be to inform decisions on TSW placement and operation in 2009 to provide effective juvenile fish passage while allowing adult fish to pass. Radio tagged adult fish will be tracked in the tailrace and into the fishway under the various spill operations. No juvenile survival studies are planned for Little Goose during spring or summer 2008.
- Spill pattern during the biological test: The test spill patterns will be developed through ERDC modeling and in coordination with SRWG.

Operation considerations:

- o In the 2005 summer spill period, adult passage was blocked when daytime spill levels were above 30%. Also, adult passage was impaired in May 2007 with a bulk spill pattern. The study is designed to determine the hydraulics causing the blockages. In order to discern cause of the poor adult passage conditions it is necessary to monitor fish during both good and poor passage conditions. Slower fish passage may occur a couple days each week. In-season reporting will allow treatments to be adjusted through SRWG and TMT adaptive management processes to meet the study objectives or to ensure good adult passage is maintained in the course of the season.

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- In both spring and summer, day average flows in the lower Snake River near 30 kcfs can result in incompatible operations with Lower Monumental Dam and cause spill quantity fluctuations.
- Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.
- The powerhouse capacity with all six units in service operating within 1% best efficiency is approximately 107 kcfs. However, Unit 6 is currently forced out of service with a ground fault. Indications are that the unit will remain out of service through the spring season. With 5 units operating, powerhouse turbine capacity within the 1% of best efficiency range is about 88 kcfs. If the total river discharge is greater than approximately 115 kcfs, then spillway discharge will be forced above the planned operation of 30% spill.
- Nighttime spill up to gas cap rates will be provided for 14 days between April 22 and May 15. The spill is intended to coincide with peak passage periods for wild yearling Chinook. The 14 spill days do not have to be consecutive. Actual dates will be determined through coordination with TMT.

Summer Spill Operations June 21 – August 31, 2007: 30% spill 24 hours/day. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Spill duration for testing: Adult passage will be studied throughout the summer spill period.
- Summer research operations: 30% spill 24 hour/day. The spill patterns used in the spring will be continued in the summer. Final test conditions will be coordinated through the SRWG.
- Objectives of the biological test: The primary objectives of the spring and summer test will be to inform decisions on TSW placement and operation in 2009 to provide effective juvenile fish passage while allowing adult fish to pass. Radio tagged adult fish will be tracked in the tailrace and into the fishway under the various spill operations. No juvenile passage studies are planned for Little Goose during spring or summer in 2008.
- Spill pattern during the biological test: The test spill patterns will be developed through ERDC modeling and in coordination with SRWG.

Operation considerations:

- Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.
- Minimum spill: During periods of low flow before the spring freshet and during the late summer period, there may be periods where spill quantities are so low that it creates tailrace conditions not advantageous to fish passage. If

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such flow conditions occur, alternative operations at the dam will be coordinated through the TMT.

- o Minimum generation: The minimum generation amount represents the operation of one unit at the lower end of its 1% efficiency range and is needed for power system reliability. This generation will be controlled to approximately 81 – 83 MW at units 1 – 3, the priority fish units. If these units are not available, the larger units 4 – 6 will be run at 100 - 104 MW. This should result in turbine flows of 11 kcfs – 12 kcfs at units 1 – 3 and 13 kcfs – 14 kcfs at units 4 – 6. There may be slight variations in the generation due to power system fluctuations. Also, the outflow will fluctuate because of changing head at the dam. This situation may occur in early spring before the freshet and during the late summer period with low flow conditions.

Once the operations for research are completed, the spill patterns will return to normal operation as described in the FPP and to the spill levels as shown in the tables above.

Lower Monumental

Spring Spill Operations April 3 – June 20, 2007: Spill to the spill cap 24 hours/day. The estimated spring spill cap rate is 27 kcfs. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Spill duration for testing: Approximately May 1 – May 31. The dates of testing will be dependent on the size of fish and fish availability. Final dates for testing will be coordinated through the SRWG.
- Spring research operations: A two treatment test will be conducted, utilizing the bulk spill pattern from 2006-2007 versus the 2003 uniform (flat) pattern modified for the RSW in spill bay 8. Pattern changes will occur at 0600. However, if the runoff forecast is high, a one treatment study would be conducted as the higher the spill levels the more similar the two patterns become.
- Objectives of the biological test: The objectives of the study are to assess passage distribution and efficiency metrics, forebay retention, tailrace egress, and survival for yearling Chinook, and steelhead for two spill pattern treatments, a bulk spill pattern and a uniform pattern with the RSW. This will be the first year of testing of the RSW at Lower Monumental Dam.
- Spill pattern during the biological test: Spill patterns will be verified through ERDC modeling and SRWG coordination.

Operation considerations:

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- o In the spring and summer, day average flows near 30 kcfs results in incompatible operations with Little Goose Dam and results in spill quantity fluctuation.
- o The Lower Monumental spill cap is affected by Little Goose Dam operations. Therefore, spill discharge could be lower than 27 kcfs.
- o The removable spillway weir (RSW) was installed in October 2007 and will be tested in 2008.
- o Spill will be reduced or stopped as needed to allow safe operation of fish transportation barges near collection facilities downstream of the project. Spill changes will be minimized in order to reduce effects on spill research.
- o Operating units within the 1% of best efficiency range yields up to 19 kcfs per unit at each of the 6 units for a maximum hydraulic capacity of approximately 114 kcfs. The expected spill cap is 27 kcfs. Therefore, if total river discharge is greater than 141 kcfs the gas cap will be exceeded. Either lack of power load or unit outages can also cause forced spill above spill cap rates at higher total river discharges.
- o Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.

During non-test periods, the spill patterns will return to normal operation as described in the FPP and to the spill levels as shown in the tables above.

Summer Spill Operations June 21 – August 31, 2007: Spill 17 kcfs 24 hours per day, subject to gas cap limits. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Spill duration for testing: June 21 – mid-July, or possibly earlier. The dates of testing will be dependent on the availability of Subyearling Chinook of sufficient size for tagging. Final dates for testing will be coordinated through the FFDRWG.
- Summer research operations: 17 kcfs 24 hours per day with one spill pattern treatment. The spill pattern will be the pattern used in 2006 and coordinated through SRWG. The 2007 pattern modified for navigation appears to have reduced fish survival.
- Objectives of the biological test: Estimate passage distribution and survival for subyearling fall Chinook salmon under two spill pattern treatments.
- Spill pattern during the biological test: FPP spill patterns will be provided in February.

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Operation considerations:

- o As in the spring, the summer spill caps may be affected by Little Goose operations.
- o Minimum spill: During periods of low flow before the spring freshet and during the summer period, there may be periods when spill quantities are limited so that tailrace conditions are not advantageous to fish passage. This is interpreted to be a minimum of spill through the RSW only (6.8 kcfs with the reservoir operating at MOP). If such a low flow condition occurs, alternative operations at the dam will be coordinated through the TMT.
- o Minimum generation: The minimum generation amount represents the operation of one unit at the lower end of its 1% of best efficiency range and is needed for power system reliability. This generation will be controlled to approximately 81 – 83 MW at units 2 – 3, the priority fish units. If these units are not available, the larger units 4 – 6 will be run at 104 - 106 MW on units 4 – 6, or 126 – 129 MW on unit 1 which has welded fixed blades. This will result in turbine flows of approximately 11 kcfs – 14 kcfs at units 2 – 6 and 17 kcfs – 19 kcfs if unit 1 is used. There may be slight variations in the generation due to power system fluctuations. Also, the outflow will fluctuate because of changing head at the dam. This limit may occur in early spring before the freshet and during the late summer period with low flow conditions.
- o Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.
- o A spill pattern or spill operation which will not adversely affect barge traffic and juvenile fall Chinook survival is still in development. During 2007 a spill pattern was developed with the assistance of the tow boat operators. However, survival of fall Chinook during 2007 was much lower than that observed in 2006. A period of no spill during the time when barges approach the lock may be the best solution to balancing the needs of barge traffic and fish operations.

Ice Harbor

Spring Spill Operations April 3 – June 20, 2007: Alternate between 45 kcfs day/spill cap night and 30% 24 hours per day with the RSW operating, following the same test schedule used in 2007. Nighttime spill hours are 1800 – 0500. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Spring research operations: Normal spring spill patterns and rates as described in the FPP will be used. While there are no spill tests in 2008, dates for 30% spill 24 hours per day will follow the schedule used in 2007, alternating every 2 days with 45 kcfs day / spill cap night in a randomized block design. This will start May 2 and continue

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through July 16. Spill will be 45 kcfs day / spill cap night before May 2 and after July 16. Both spill operations will have the RSW operating.

- Spill pattern: FPP spill patterns will be used (FPP Tables IHR-9 and IHR-10).

Operation considerations:

- Powerhouse capacity at Ice Harbor is approximately 94 kcfs with all 6 units operating, while spill cap rates are about 100 kcfs. If total river flows exceed about 194 kcfs, TDG levels may exceed the limits set by the states of Oregon and Washington.
- Minimum generation or higher powerhouse operation will occur at all times during both the spring and summer fish spill seasons in 2008. This is due to a transformer failure at BPA's Sacajawea transmission facility near the project. Mobile capacitor groups will be installed at BPA's Franklin transmission facility to partially resolve power system issues. In addition, continuous generation is required at Ice Harbor Dam for power system stability and reliability.
- Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.

Summer Spill Operations June 21 – August 31, 2007: Alternate between 45 kcfs day/spill cap night and 30% 24 hours per day with the RSW operating through July 16, then spill 45 kcfs day / spill cap night through August 31. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Summer research operations: Continue 30% spill vs. 45 kcfs day / spill cap night through July 16, following the test schedule used in 2007. Both operations will have the RSW operating. There are no spill tests in 2008.
- Spill pattern during the biological test: FPP spill patterns will be used (FPP Tables IHR-9 and IHR-10, same as spring).

Operation considerations:

- Minimum spill: During periods of low flow before the spring freshet and during the summer period, there may be periods where spill quantities are limited so that tailrace conditions are not advantageous to fish passage. The minimum spill for Ice Harbor Dam is 15.2 kcfs, which includes providing spill through the RSW and training spill to ensure good tailrace egress conditions. If such a low flow condition occurs, alternative operations at the dam will be coordinated through the TMT.
- Minimum generation: The minimum generation amount represents the operation of one unit at the lower cavitation limit. The cavitation limit is

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within the 1% of best efficiency range. This generation will be controlled to approximately 65 – 70 MW at units 1 and 3, the priority fish units. If these units are not available, the larger units 4 – 6 will be run at 80 – 81 MW. This will result in turbine flows of approximately 9 kcfs – 10 kcfs at units 1 – 3 and 11 kcfs – 12 kcfs at units 4 – 6. Unit 2 has been modified by fixing the blades in a single position to eliminate an oil leak. As a result, its MW output and kcfs discharge at the low end of 1% will be higher than the other 5 units. Unit 2 is the last priority unit to operate and therefore is unlikely to operate to meet minimum generation. There may be slight variations in the generation due to power system fluctuations. Also, the outflow will fluctuate because of changing head at the dam. This limit may occur in early spring before the freshet and during the late summer period with low flow conditions.

- o Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.

McNary

Spring Spill Operations April 10 – June 30, 2007: 40% spill 24 hours/day. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Spill duration for testing: Approximately April 20 to early June (tentative). The dates of testing will be dependent on the size of fish, fish availability, and the number of treatments needed for testing. Final dates for testing will be coordinated through the SRWG.
- Spring research operations: 40% spill 24 hours/day for the second year of prototype Temporary Spillway Weir (TSW) testing. One project spill configuration will be tested. Final test conditions will be coordinated through the SRWG.
- Objectives of the biological test:
 - o Estimate passage and survival rates of yearling Chinook salmon under a single treatment of project operations.
 - o Estimate passage and survival rates of juvenile steelhead under a single treatment of project operations.
 - o Characterize juvenile salmon behavior in the forebay of McNary Dam under a single treatment of project operations.
- Spill pattern: As outlined in an addendum to the FPP. The Corps' Walla Walla District coordinated with regional fishery managers and evaluated new spill patterns with general model observations. Test spill patterns are provided in Appendix 1.

Operation considerations:

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- o TSW1 is placed in spill bay 19 (relocated from spill bay 22) while TSW2 remains in spill bay 20 for 2008 testing. This configuration was regionally reviewed and supported.
- o During the periods when total river discharge exceeds approximately 320 kcfs, involuntary spill in excess of the states' TDG limits for fish passage, may occur.
- o In addition, low power demand may also necessitate involuntary spill during any given spill treatment at total river discharges of less than 320 kcfs.
- o Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.

Once research spill operations are completed, the spill pattern will return to normal operation as described in the FPP (Table MCN-6).

Summer Spill Operations July 1 – August 31, 2007: 40% spill vs. 60% spill 24 hours/day. Spill conditions will be alternated every two days. Spill changes will occur at 0600. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Spill duration for testing: approximately June 15 through July 25 (tentative). The dates of testing will be dependent on the size of fish, fish availability, and the number of treatments needed for testing. Final dates for testing will be coordinated through the SRWG.
- Summer research operations: 40% spill 24 hours/day vs. 60% spill 24 hours/day. Continue to evaluate TSW performance. The spill will be alternated in two day blocks which will be randomized during testing.
- Objectives of the biological test:
 - o Estimate passage and survival rates of subyearling fall Chinook salmon under two treatments of project operations.
 - o Characterize juvenile salmon behavior in the forebay of McNary Dam under two treatments of project operations.
- Spill pattern during the biological test: Spill pattern details were identified using the general model at ERDC by USACE Walla Walla District staff and representatives of the regional fisheries agencies and tribes. Test spill patterns are provided in Appendix 1. A single spill pattern will be tested at the 40% and 60% spill levels, using the 2006 spill pattern modified for placement of the TSWs in spill bays 19 and 20.

Operation considerations:

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- o Spill will be modified or reduced as needed to allow safe operation of fish transportation barges near collection facilities downstream of the project. Spill changes will be minimized in order to reduce effects on spill research. Specifically, spill bays 19 and 20 will be closed during barge operations across the tailrace, using the existing spill gate hoists. The TSWs may be closed for up to 4 – 5 hours for each barge operation.
- o Minimum generation: A minimum powerhouse discharge of 50 kcfs is required at all times to meet minimum generation requirements. The lower Columbia River dams provide some of the required generation capacity reserves for the power system. Due to this requirement and the constant fluctuations in power demands throughout the day, the 50 kcfs flow cannot be maintained precisely on an hourly basis. The flow may increase by as much as 10 kcfs for short periods. Therefore, the minimum generation flow should meet or exceed 50 kcfs for all hours.
- o If total river discharge drops below about 90 kcfs, 40% spill treatments may be reduced to maintain 50 kcfs powerhouse discharge. Similarly, if total river discharge drops below about 135 kcfs, 60% spill treatments may be reduced to maintain a 50 kcfs powerhouse discharge.
- o Minimum spill: During periods of low flow before the spring freshet and during the summer period, there may be periods where spill quantities are limited so that tailrace conditions are not advantageous to fish passage. If such a low flow condition occurs, alternative operations at the dam will be coordinated through the TMT.
- o Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.

Once research spill operations are completed, the spill pattern will return to normal operation as described in the FPP (Table MCN-6).

John Day

Spring Spill Operations April 10 – June 30, 2007: 0 kcfs spill day/60% spill night. Nighttime spill hours are 1800 – 0600 from April 10 through May 14 and 1900 – 0600 May 15 through June 30. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Spill duration for prototype TSW testing: Testing in late April through early June. The dates of testing will be dependent on the size of fish, fish availability, and the number of treatments needed for testing. Final dates for testing will be coordinated through the SRWG.
- Spring research operations: Two prototype TSWs that pass about 10 kcfs spill each will be installed in spill bays 18 and 19. Training spill patterns to support the TSW jets and provide good downstream egress for juvenile salmonids are currently being developed by modeling at ERDC and coordination with regional agencies. Two spill levels will be

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tested to provide spill / TSW efficiency curves. These data will be used to design surface flow outlet and tailrace improvements at John Day Dam.

- Objectives of the biological test: The objectives of the study are to assess passage distribution and efficiency metrics, forebay retention, tailrace egress, and survival for yearling Chinook, and steelhead for two spill treatments. Also, prior to the smolt migration, a direct survival and injury test using balloon-tagged fish will be conducted.
- Spill pattern during biological test: 10 – 20 April, prior to the test, same as 2007 FOP except the spill pattern will be modified to use spill bays 1 – 17 only. Spill bays 18 and 19 will have the TSWs installed, which are not easily opened and closed. During 20 April to June 20, spill patterns for 30% and ~40% spill will be developed at ERDC in coordination with regional agencies.

Operation considerations:

- The hydraulic capacity for John Day is approximately 272 kcfs with all 16 units operating. If total river discharge exceeds this level, involuntary spill will occur during the daytime.
- If total river flow exceeds approximately 400 kcfs at night, 60% night spill levels would be 160 kcfs which may exceed TDG levels.
- Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.

Summer Spill Operations July 1 – August 31, 2007: 30% spill 24 hours/day. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Spill duration for testing: June 21 to approximately July 20. The dates of testing will be dependent on the size of fish, fish availability, and the number of treatments needed for testing. Final dates for testing will be coordinated through the SRWG.
- Summer research operations: Two training spill percentages, 30% and approximately 40%, will be tested.
- Objectives of the biological test: The objectives of the study are to assess passage distribution and efficiency metrics, forebay retention, tailrace egress, and survival will be estimated for subyearling fall Chinook.
- Spill pattern during the biological test: Spill patterns for 30% and ~40% spill will be developed at ERDC in coordination with regional agencies. Outside the test period, spill patterns described in the FPP with two TSWs in place will be used.

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Operation considerations:

- Minimum spill: During periods of low flow before the spring freshet and during the summer period, there may be periods where spill quantities are limited so that tailrace conditions are not advantageous to fish passage. If such a low flow condition occurs, alternative operations at the dam will be coordinated through the TMT.
- Minimum generation: A minimum powerhouse discharge of 50 kcfs is required at all times to meet minimum generation requirements. The lower Columbia River dams provide some of the required generation capacity reserves for the power system. Due to this requirement and the constant fluctuations in power demands throughout the day, the 50 kcfs flow cannot be maintained precisely on an hourly basis. The flow may increase by as much as 10 kcfs for short periods. Therefore, the minimum generation flow should meet or exceed 50 kcfs for all hours.
- Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.
- If river flows drop below about 75 kcfs then spill may need to drop below 30% spill in order to maintain station service and power system needs.

The Dalles

Spring Spill Operations April 10 – June 30, 2007: 40% spill 24 hours/day. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Spill pattern during the biological test: No research is planned for 2008. The FPP spill patterns will be used. Spill patterns for high flows (450 kcfs or higher) are provided in Appendix 1.

Operation considerations:

- Spillway wire ropes at The Dalles Dam were replaced on Bays 1-9 in 2006. These bays are fully operational in 2008. Spill bays 10 – 22 can be operated in emergencies according to the table in Appendix 1.
- When high river flows exceed those shown in the table below such that available bays 1 – 9 cannot maintain 40% spill, FPOM and TMT will discuss the preferred spill pattern and rate. The project may maintain 40% spill of the total river flow and depart from the spill pattern, or spill less than 40% of the total river flow using a pattern other than that shown in the FPP. At no time is spill recommend on the south side of the spillway (Bays 14-22) as this creates a poor tailrace egress condition for spillway-passed fish.
- Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.

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Summer Spill Operations July 1 – August 31, 2007: 40% spill 24 hours/day. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Spill pattern during the biological test: No research is planned for 2008. The FPP spill patterns will be used.

Operation considerations:

- When high river flows exceed those shown in the table above such that available bays 1 – 9 cannot maintain 40% spill, FPOM and TMT will discuss the preferred spill pattern and rate. The project may maintain 40% spill of the total river flow and depart from the spill pattern, or spill less than 40% of the total river flow using a pattern other than that shown in the FPP. At no time is spill recommend on the south side of the spillway (Bays 14-22) as this creates a poor tailrace egress condition for spillway-passed fish.
- Minimum generation: A minimum powerhouse discharge of 50 kcfs is required at all times to meet minimum generation requirements. The lower Columbia River dams provide some of the required generation capacity reserves for the power system. Due to this requirement and the constant fluctuations in power demands throughout the day, the 50 kcfs flow cannot be maintained precisely on an hourly basis. The flow may increase by as much as 10 kcfs for short periods. Therefore, the minimum generation flow should meet or exceed 50 kcfs for all hours.
- Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.
- If river flows drop below about 90 kcfs then spill may need to drop below 40% spill in order to maintain station service and power system needs.

Bonneville

Spring Spill Operations April 10 – June 20, 2007: 100 kcfs spill 24 hours/day. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Spill duration for testing: Approximately April 26 – June 7. The dates of testing will be dependent on the size of fish and fish availability. Final dates for testing will be coordinated through the SRWG.
- Spring research operations: 100 kcfs spill 24 hours/day.
- Objectives of the biological test: Estimate total survival of yearling Chinook passing through the dam and spillway. Focus will be on new spill patterns to improve project spill survival.

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- Spill pattern during the biological test: Spill patterns in the FPP will be used.

Operation considerations:

- Minimum spill discharge rate is 50 kcfs. This is to provide acceptable juvenile fish egress conditions in the tailrace.
- At spring flows less than 135 kcfs, spill will be less than 100 kcfs to maintain minimum powerhouse generation of 30 kcfs plus fish ladder and facility spill (e.g. corner collector).
- Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.
- Actual spill levels at Bonneville Dam may range from 1 to 3 kcfs lower or higher than specified in the 2007 FOP. A number of factors influence this including hydraulic efficiency, exact gate opening calibration, spillway gate hoist cable stretch due to temperature changes, and forebay elevation (a higher forebay results in a greater volume of spill since more water can pass under the spill gate).
- The second powerhouse corner collector (5 kcfs discharge) will operate from March 3 to August 31, 2008. A 2-hour outage will occur the week of April 7 to remove research equipment.
- A 1-hour outage at spill bay 9 may occur monthly during the spill season to facilitate the use of Ground Penetrating Sonar (GPS) to measure and track erosion at spill bay 9 from inside the spillway inspection gallery. GPS data will be evaluated by Corps Portland District engineers to determine if a full spillway outage is required for a hydrographic survey. Such an outage occurred in 2007, but may not be needed in 2008 if GPS provides adequate monitoring data. The Corps will coordinate this work through FFDRWG, FPOM, and TMT.

Summer Spill Operations June 21 through August 31, 2007: 85 or 75 kcfs day / spill cap night. The estimated summer spill cap rate is 120 kcfs. Daytime spill hours change periodically and are defined in FPP Table BON-6. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Spill duration for testing: June 21 through approximately July 20. Continue tests of new spill patterns in the summer. Final dates for testing will be coordinated through the SRWG.
- Summer research operations: 85 or 75 kcfs spill day / spill cap night. Daytime spill will be 85 kcfs until the end of the summer test, approximately July 20, after which the daytime spill will be 75 kcfs through August 31.
- Objectives of the biological test: Estimate total survival of subyearling Chinook passing through the dam and spillway. Focus will be on new spill patterns to improve project spill survival.

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- Spill Patterns for summer operations: Spill patterns in the FPP will be used.

Operation considerations:

- o Minimum generation: A minimum powerhouse discharge of 30 kcfs is required at all times to meet minimum generation requirements. The lower Columbia River dams provide some of the required generation capacity reserves for the power system. Due to this requirement and the constant fluctuations in power demands throughout the day, the 30 kcfs flow cannot be maintained precisely on an hourly basis. The flow may increase by as much as 10 kcfs for short periods. Therefore, the minimum generation flow should meet or exceed 30 kcfs for all hours.
- o Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.
- o Minimum spill discharge level is 50 kcfs. This is to provide acceptable juvenile fish egress conditions in the tailrace.
- o Actual spill levels at Bonneville Dam may range from 1 to 3 kcfs lower or higher than specified in the 2007 FOP. A number of factors influence this including hydraulic efficiency, exact gate opening calibration, spillway gate hoist cable stretch due to temperature changes, and forebay elevation (a higher forebay results in a greater volume of spill since more water can pass under the spill gate).
- o The second powerhouse corner collector (5 kcfs discharge) will operate from March 3 until August 31.
- o A full spillway outage may occur for several hours (up to 8 hours) in July 2008 for a hydrographic survey in the tailrace to measure erosion at spill bay 9. This survey may not be needed if the monthly GPS data are adequate to monitor spillway erosion. The Corps will coordinate this work through FFDRWG, FPOM, and TMT.

Juvenile Fish Transportation Program Operations

As noted above, the Corps' planned fish operations assume average runoff conditions. Based on collaborative discussion with the regional agencies and tribes, and as agreed to in 2007, the following explains the juvenile fish transportation program under all runoff conditions. The lower Snake River projects are described first, followed by McNary project operations. Detailed descriptions of project and transport facility operations to implement the program are contained in FPP Appendix B.

Lower Snake River Dams - Operation and Timing:

If the Snake River projected seasonal average (April 3 – June 20) flow is greater than 70 kcfs, the Corps will initiate transportation at Lower Granite Dam no earlier than April 20 and no later than May 1. The seasonal average flow projection will be based on the Corps' STP model and the April final water supply forecast for Lower Granite. The actual start date in 2008 will be determined through coordination with TMT as informed by the in-season river condition (e.g. river flow and temperature) and the status of the juvenile Chinook and steelhead runs (e.g. percentage of runs having passed the project). Also if the projected flow is greater than 70 kcfs,

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transportation will start 8 days and 11 days after the Lower Granite Dam start date for Little Goose and Lower Monumental dams, respectively. The actual start dates at Little Goose and Lower Monumental dams will be further considered through the TMT process, depending on in-season river conditions and the status of the juvenile Chinook and steelhead runs.

- a. Lower Granite: All ESBSs will be installed by March 25 and juvenile fish bypassed via normal separator operations and routed to the mid-river release outfall. All juvenile fish collected will be interrogated for PIT tags and normal 24-hour sampling for the Smolt Monitoring Program will take place.
- b. Little Goose and Lower Monumental: All ESBSs and STSs will be installed by April 1 and juvenile fish bypassed will occur via the normal separator operations and fish will be routed to normal facility bypass outfalls. All juvenile fish will be interrogated for PIT tags and limited sampling may take place every 3 to 5 days to monitor fish condition. A full sample may be performed every other day to monitor species composition to help inform a decision on initiating transportation at these projects. At Lower Monumental, daily smolt monitoring will occur beginning April 1 and 100 steelhead will be PIT-tagged to assess avian prey selection. Also, study fish will be collected at Little Goose for the Lower Monumental passage and survival study.

In exceptionally low water years, when the projected seasonal average flow is less than 70 kcfs, the Corps will begin transportation on April 20 at all three Snake collector projects. Spill for fish passage will occur under all flow conditions.

April 20 – June 20: The collection of fish at lower Snake River projects for transportation will commence at 0700 hours on the agreed to start dates. Barging of fish will begin the following day and collected juvenile fish will be barged from each facility on a daily or every-other-day basis (depending on the number of fish) throughout the spring. Transport operations will be carried out concurrent with spill operations at each project and in accordance with all relevant FPP operating criteria.

June 21 – August 15: Transportation of juvenile fish from all three Snake River transport projects will continue on an every-other-day basis from June 21 through August 15, via barges.

August 16 – August 31: After August 15, trucks will be used for transporting juvenile fish from the Snake River collector projects on an every-other-day basis through August 31.

September 1 – Completion: Transportation of juvenile fish via trucks on an every-other-day basis will continue through October 31, 2007 at Lower Granite and Little Goose dams. At Lower Monumental Dam, transportation of fish via every-other-day trucking will continue through September 30, 2007.

McNary Dam - Operation and Timing:

Spring: Juvenile fish collected at McNary during the spring, April 1 through June 20, will be bypassed to the river. The normal operation will be to bypass fish through the full flow bypass

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pipe, which has interrogation capability to monitor for PIT tags. Every other day, however, in order to sample fish for the Smolt Monitoring Program, fish will be routed through the separator, interrogated for PIT tags, and then bypassed to the river.

Summer: When river conditions are determined to no longer be “spring like” as defined in the FPP and discussed at TMT, transportation of juvenile fish will begin if it does not conflict with TSW operations. Collected juvenile fish will be barged every other day through August 16 unless they have been marked for in-river passage research. From August 16 through September 30, transportation will occur via trucks.

Planned Research

Juvenile Fish Transportation Research at Lower Granite Dam (three studies):

1. A study will be conducted to determine seasonal effects of transporting fish from the Snake River to optimize a transportation strategy. At Lower Granite, fish will be collected for this study starting on April 6, with marking beginning on April 7, 2008. Depending on the number of fish available, fish will be collected 1-2 days with tagging occurring on the day following collection. A barge will leave each Thursday morning with all fish collected during the previous 1-3 days. By barging all fish (minus the in-river group) during 1 to 3 days of collection, barge densities will be maintained at a level similar to what would occur under normal transport operations that time of year. This pattern will occur in the weeks preceding general transportation and will be incorporated into general transportation once that operation begins. The desired transported sample size is 6,000 wild Chinook and 6,000 wild steelhead weekly for approximately eight weeks.
2. A study to evaluate alternative barge release sites below Bonneville Dam has been underway for three years and will continue in 2008. The first barge for this study is tentatively scheduled to depart on April 21, and tagging of fish at Lower Granite on April 20 following collection on April 18 – 19.
3. A study will be conducted to evaluate latent mortality associated with passage through Snake River dams. The goal of this study is to determine whether migration through Snake River dams and reservoirs causes extra mortality in Snake River yearling (spring/summer) Chinook salmon smolts. Specifically, the study will determine if life-cycle survival downstream from McNary Dam is significantly higher for yearling hatchery Chinook salmon released into the Ice Harbor Dam tailrace than for counterparts which must pass three additional dams and reservoirs after release into the Lower Granite Dam tailrace. Fish will be collected at Lower Granite Dam beginning 20 April 2008 with the goal of tagging approximately 120,000 smolts, about 2/3 of which will be released into the tailrace of Lower Granite Dam, and 1/3 transported by truck and released in the tailrace of Ice Harbor Dam.

Avian Predation at Lower Monumental Dam:

A study will be conducted to evaluate the impacts of avian predation on salmonid smolts from the Columbia and Snake rivers. The study will determine how various biotic and abiotic factors

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are associated with differences in steelhead smolt vulnerability to predation by Crescent Island terns and Foundation Island cormorants. The study requests PIT tagging both hatchery and wild steelhead collected in the smolt monitoring sample at Lower Monumental and Ice Harbor dams, beginning April 1 and continuing through July. The recorded condition of a fish will be attached to a specific tag code and vulnerability to avian predation will be evaluated using PIT tag recovery data collected from the avian bird colonies. The study needs a minimum sample of 100 fish each day that are collected for condition by the smolt monitoring program.

Navigation Safety

Short-term adjustments in spill patterns or reductions in spill discharge rates may be required for navigation safety, primarily at the lower Snake projects but may also be necessary at the lower Columbia projects. This includes both commercial tows and fish barges.

Emergency Protocols

The Corps and Bureau of Reclamation will operate the projects in emergency situations in accordance with the Water Management Plan (WMP) Emergency Protocols (WMP Appendix 1). The Protocols define emergency conditions and situations that may arise while operating the FCRPS, and the immediate actions that may be taken in the face of the emergency. The Corps, BPA, and the Bureau of Reclamation are revising the Emergency Protocols in coordination with TMT. The most recent version of the Emergency Protocols is located at:

<http://www.nwd-wc.usace.army.mil/tmt/documents/wmp/2008/0926Ap1EmerActPlandrft.pdf>

Reporting

The Corps will prepare monthly (April – August) reports on the implementation of 2008 fish passage operations. The reports will include the following information:

- the hourly flow through the powerhouse;
- the hourly flow over the spillway compared to the spill target for that hour; and,
- the resultant 12-hour average TDG for the tailwater at each project and for the next project's forebay downstream.

The reports will also provide information on substantial issues that arise as a result of the spill program (e.g. Little Goose adult passage issues in 2005 and 2007). The reports also will address any emergency situations that arise.

The Corps will continue to provide the following data to the public regarding project flow, spill rate, TDG level, and water temperature.

- Flow and spill quantity data for the lower Snake and Columbia River dams are posted to the following website every hour:
<http://www.nwd-wc.usace.army.mil/report/projdata.htm>

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- Water Quality: TDG and water temperature data are posted to the following website every six hours: <http://www.nwd-wc.usace.army.mil/report/total.html> These data are received via satellite from fixed monitoring sites in the Columbia and Snake rivers every six hours, and placed on a Corps public website upon receipt. Using the hourly TDG readings for each station in the lower Snake and Columbia rivers, the Corps calculates the highest 12-hour average TDG for each station. These averages are reported at: http://www.nwd-wc.usace.army.mil/ftppub/water_quality/12hr/html/

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Appendix 1

Test Spill Patterns

Special spill patterns for 2008 tests and high flow conditions are provided for Little Goose, Lower Monumental, McNary, John Day, and The Dalles dams.

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Little Goose Dam:

The Corps will provide updated patterns for 30% tests.

Lower Monumental Dam:

The Corps will provide updated patterns for TSW tests.

McNary Dam:

The Corps will provide updated patterns for TSW tests.

John Day Dam:

The Corps will provide spill patterns for TSW testing.

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The Dalles Dam:

The Dalles Dam, Special and Emergency Spill Operations, 2008 (and beyond). A total river volume greater than 450,000 cfs is possible that would require additional spillway flows. With Bays 10 – 23 out-of-service, the table below shows the special and emergency spill operations that are recommended at TDA in 2008 to safely accommodate higher flows.

Spill condition	Bays in use	Gate Opening (ft)	Spillway Q (cfs)	Powerhouse Q (cfs)	Total Q (cfs)
Normal, 40% BiOp Special spill	1-6 + 7-9	14 + 12	180,000	270,000	450,000
	1-9	14	189,000	270,000	459,000
	1-6 + 7-9	15 + 14	198,000	270,000	468,000
	1-9	15	202,500	270,000	472,500
	1-6 + 7 -9	16 + 15	211,500	270,000	481,500
	1-9	16	216,000	270,000	486,000
Emergency spill	Continue sequence	Continue sequence			
	1-9	30	405,000	270,000	675,000*
	1-9 + 14	30	450,000	270,000	720,000
	1-9 + 14-15	30	495,000	270,000	765,000
	1-9 + 14-16	30	540,000	270,000	810,000
	1-9 + 14-17	30	585,000	270,000	855,000
	Continue sequence to Bay 21	Max. of 30' opening			
	1-9 + 14-21	30	765,000	270,000	1,035,000
	1-9 + 12 + 14-21	30	810,000	270,000	1,080,000
	1-9 + 12+ 14-22	30	855,000	270,000	1,125,000
	1-9 + 12+ 14-23	30	900,000	270,000	1,170,000
	1-10+ 12 + 14-23	30	945,000	270,000	1,215,000
	1-12 + 14-23	30	990,000	270,000	1,260,000
	1-23	30	1,035,000	270,000	1,305,000

* Project discharge level at which the Corps may declare an emergency operation at The Dalles Dam to open spill bays 14 – 23.

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Appendix 2

Schedule of Major Unit Outages

The following major outages are scheduled for the period 1 April through 30 September, 2008. This schedule is based on the best information available at this time, but circumstances may arise which will necessitate adjustments to the schedule. It does not show all outages; shorter maintenance outages take place throughout the year. This schedule shows outages of longer duration with possible significant impacts to fish operations.

1. The schedule shown is for the 4 Lower Snake and 4 Lower Columbia dams for the period 1 April through 30 September 2008.
2. Where the description under the "Reason" column is preceded by an "F", this represents a forced outage. Estimated return to service dates are given and are the best guess at this time. Usually, the extent of the damage is not fully known.
3. Outage plans are not fully developed at this time. Some major work will depend on contracts which are not in place yet.

Project	Unit	Capacity (MW)	Out of Service Date	Return to Service Date	Reason
LWG	2	155	01/17/2006 0700	09/29/2008 2359	Liner Cavitation & Generator Rewind - Turbine Rehab/Testing
LWG	2	155	6/23/2008 0600	7/5/2008 1700	Main unit C02 Fire Protection
LWG	4	155	07/07/2008 0600	07/31/2008 1700	Annual/PSS Install/Fire Protection
LWG	1	155	7/21/2008 0600	8/1/2008 1700	Main unit C02 Fire Protection
LWG	5	155	08/04/2008 600	8/29/2008 1700	Annual/PSS Install/Fire Protection
LWG	3	155	08/04/2008 0600	12/19/2008 1700	Cavitation Repair/Air Cooler Replacement/Annual
LWG	6	155	09/02/2008 0700	09/26/2008 1700	Annual/PSS/Fire Protection

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LWG	One	155	09/22/2008	0600	9/30/2008	1700	Commission New PSSs, Unit 4-6, One at a time
LGS	6	155	12/11/2007	1500	10/1/2008	1700	F- Water leak caused field ground
LGS	6	155	09/01/2008	0700	02/28/2009	1700	Spillway Deflector Ins. (Out as Needed)
LMN	1-6	930	09/08/2008	0700	09/08/2008	0800	Line Outage to take T1 OOS (Placeholder)
LMN	1-4	620	09/08/2008	0800	09/11/2008	1700	T1 Disconnect Work
LMN	1-6	930	09/11/2008	1700	09/11/2008	1800	Return T1 to service
IHR	6	127	10/01/2007	0000	3/28/2008	1700	F - HIgh gas readings
IHR	One	127	07/01/2008	0630	09/01/2008	1700	Main Unit Strainers
IHR	3	103	07/08/2008	0630	09/04/2008	1700	Overhaul
IHR	3-4	230	07/14/2008	0630	07/17/2008	1700	Doble Test TW 3, 4 Line 2
MCN	7	80	07/07/2008	0600	08/01/2008	1700	ETBOC
MCN	5	80	07/07/2008	0600	09/19/2008	1700	9-Yr Overhaul
MCN	1-2	160	08/04/2008	0600	08/06/2008	1700	T1 Doble Testing
MCN	5	80	08/04/2008	0600	08/29/2008	1700	ETBOC
MCN	8	80	09/02/2008	0600	09/26/2008	1700	ETBOC/Annual and Oil Indication
MCN	One	80	09/02/2008	1000	09/02/2008	1300	ESBS Insp
MCN	Three	240	09/08/2008	0600	09/13/2008	1700	Diving for Fish Studies
MCN	One	62	09/09/2008	1000	09/09/2008	1300	ESBS Inspections
MCN	4	80	09/15/2008	0600	09/19/2008	1700	Annual and Oil Indication
MCN	5-6	160	09/16/2008	0600	09/18/2008	1700	T3 Doble Testing
MCN	6	80	09/22/2008	0600	12/12/2008	1700	9-Yr Overhaul

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MCN	11	80	09/29/2008	0600	10/24/2008	1700	ETBOC
JDA	16	155	04/16/2006	1630	02/29/2008	1700	F - kaplan linkage
JDA	10	155	05/25/2007	1730	02/29/2008	1600	F - field Ground/6 Year Overhaul
JDA	1, 3	310	07/28/2008	0600	09/04/2008	1700	Overhaul
JDA	13-16	620	09/08/2008	0600	09/11/2008	1400	T4 Doble
JDA	9-10	310	09/15/2008	0600	10/23/2008	1400	Overhaul
JDA	5-8	620	10/20/2008	0600	10/23/2008	1400	T2 Doble
TDA	4	90	03/24/2008	0630	05/22/2008	1700	Cavitation Repair
TDA	22	100	05/27/2008	0630	07/31/2008	1700	5-Yr/Blade Cavitation, Seals/ Servo Motors
BON	8	60	09/12/2006	0750	05/15/2008	1600	Turbine Rehab
BON	7	60	06/04/2007	0750	12/25/2008	1700	Rehab Turbine, Stator
BON	1	48	10/23/2007	1551	02/14/2008	1600	F - Governor problems. wicket gate
BON	15	76	11/25/2007	2315	03/31/2008	1600	F - Rotor Pole Failure
BON	One	76	01/17/2008	1701	07/09/2008	1700	Excitor Repl - units 11-18, one unit at a time
BON	3	56	04/14/2008	0700	05/30/2008	1700	PH 1 Unit five year o/haul, turbine obstructions
BON	9	60	07/01/2008	0700	12/20/2009	1700	U9 - Turbine rehab - Generator Rewind
BON	1	48	07/12/2008	0000	08/20/2008	1700	Five year o/haul, turbine obstruction, 300 G ins
BON	15	76	07/28/2008	0700	09/25/2008	1700	Cavitation repair
BON	Two	152	07/29/2008	0000	07/29/2008	1800	Collection Channel Dive, Brush Rigging, F1 & F2
BON	Four	304	08/04/2008	0000	08/07/2008	1700	T11 Bi/Annual Maint., Us 11 & 12 Annual, Install T11 Fault gas monitor, install sync PTs
BON	Four	304	08/11/2008	0000	08/14/2008	1700	T11 Bi/Annual Maint., Us 16 &

Pre-Decisional Draft

18 Annual, Install T12 Fault
gas monitor, install sync PTs

BON	17	76	09/08/2008	0000	10/30/2008	1700	4 year overhaul

COLUMBIA RIVER REGIONAL FORUM TECHNICAL MANAGEMENT TEAM

Overall Lessons Learned: 2007 was a roller coaster of a year with a winter like 1996 (very wet) and a summer/fall similar to 2001 (drought). In spite of this, water temperatures and gas levels were generally well managed—and the fish story, once the data is complete and analyzed, will likely provide useful information for future management strategies in unusual weather years.

RE: Conditions Review

- There is value to using a combined approach to forecasting, utilizing the CRITFC, CIG and NOAA forecasts since no single technology has been proven to be the best for long term forecasting
- With an eye toward combined, collaborative forecasting and modeling, a suggestion was made: **Action:** look back at how well the predictions from CEQUAL and RBM-10 temperature models matched with actual temperatures.
- Increased spill and reduced water travel time show strong correlations to higher survival. Even though this was a low flow year, in river migration rates and survival were relatively high because of the spill provided.
 - **Action:** Spill proportion (not just flow) and travel time are important – this should be considered when making management decisions.
 - Some management actions were not implemented consistent with fish protection goals – so, for example, spill occurred this year during lower flow conditions while transportation might have been the more beneficial action.
 - This year provided a unique opportunity to ‘think outside the box’ and try different management options.
 - **Action:** Adult survival data should be reviewed as a management tool and indicator of in-river management success, not just juvenile survival. It was noted that data is now emerging that allows the region to begin teasing out the resulting impact on adults from management scenarios and other conditions.
 - **Action:** Temperature effects on spring migration should be considered.
 - **Action:** Information on Fall Chinook holdovers should be gathered to help aid in management decisions. Migration timing and size information is also important.
 - **Action:** Need to build time into TMT discussions to integrate new information.
- It was noted that the Dworshak operation went well this year – how was the project operated differently than in the past? **Action:** Cathy offered to look into the specifics and follow up with TMT.
- Will information gathered this year be taken into account during finalization of the 2007 FCRPS BiOp? (NOAA: *Given that this is a unique low flow/high spill year, it is difficult to draw too many definitive conclusions. AND the data does need to be considered.*)

- Need to look at transportation/spill very carefully – are we doing a good job spreading the risk?

RE: Specific Operations

- Re: Fall Chinook Protection Program, peaking operations have potential.
 - Pre- and post-hatching periods continue to see a high level of protection.
 - Dramatic improvements have been observed during emergence and rearing; protection criteria was met 94% of the time in 2007, and the maximum exceedance was 2.9 kcfs.
 - Hourly coordination and the new management philosophy led to success this year.
 - Observations of redds this year showed few stranding. This may be correlated to low escapement numbers.
- Lower Monumental TDG is very sensitive both in modeling and real time monitoring. The COE and the salmon managers need enhanced communication and collaboration regarding setting spill caps and choosing modeling scenarios to improve overall management.
 - In the future, from the salmon manager perspective, TDG management should be more flexible and time travel delays of up-stream operations and changing conditions in the river should be considered.
 - **Action:** The COE will pursue improvements to the weather component of SYSTDG as a long term solution to better TDG management.
- With the installation of an RSW at Lower Monumental next spring, operations might change and will need to be reviewed.
 - **Action:** New RSW's and other structural changes will need to be considered in context in the coming year, and will require early and frequent communication to make the best management choices around navigation safety.
- Better communication, including more notice with special operations, tests, etc. at the projects has proven effective at helping aid safe navigation. Improvements in operations could be made at Lower Granite.
- Constraining one pool impacts all projects, so operating within 6 inches is a challenge – and while it was a soft constraint for the COE, BPA considered it the operation to manage to.
- **Action:** Mechanical issues and scheduled outages that will impact fish measures should be communicated to TMT ahead of time, to the extent possible.
 - **Action:** The salmon managers need to identify for the action agencies which units are important so proper notice and communication can occur; and so they can be folded into the Fish Passage Plan.
 - Given the aging system, everyone supported the need to secure budgets for inspection, maintenance and repair. Questions remain about how to do that.
 - **Action:** given the aging system, a need to create contingency plans was identified by the group for future action.

RE: Reservoir Operations:

- **For Libby:** Setting April 10 flood control targets in the spring causes fluctuations and a less than optimal operation for the fish. A stable flow through the spring migration would be better.
 - Use flexibility of VARQ at the appropriate time – at the end of the period when the threat of flooding has passed and during refill.
 - **Consider** setting guiding criteria January-April similar to Albeni Falls decision tree; also consider setting flat flow targets in the summer based on ending elevation, forecasted flows and available volume. Make weekly adjustments.
- **For Dworshak:** More guidance to the COE would provide for a better coordinated strategy for developing and modeling alternative scenarios for Dworshak operations. This is challenging given varying perspectives around flow/temperature approaches and Idaho Power decisions. Another suggestion was that the COE offer operation recommendations for TMT to discuss.
 - Are there other management targets that could be considered besides the temperature criteria at Lower Granite?
 - **Action:** A control structure is needed for Hell's Canyon/Brownlee as they cause significant temperature impacts on the system.
- **For Upper Snake Flow Augmentation:** Carry over storage water is down so much that it will require an average or above average water year to fill the reservoirs.
 - The Biological Assessment for the 2008 Upper Snake proposes to shift releases (likely out of the Upper Snake and Boise) from June/July/August to May/June/July. **Consideration:** While an agreement has not been set with Idaho Power, the FERC process may require conditions that would aid this shift.
- **For Grand Coulee:** What if the April 10 refill target cannot be met while meeting target flows for chum? NOAA gives preference priority to refill. A retrospective look shows that the action agencies have been successful in operating to meet the upper rule curve.
- **For Bonneville:**
 - The cause of Spring Creek hatchery Fall Chinook mortalities is unknown, and continues to be a concern. A research proposal to further study this issue will be led by NOAA and PFMFC, and will test travel time, descaling rates, and mortality rates. **Action:** This study will be discussed with TMT. Also a transportation test is being proposed for March and April that will require discussion at TMT.
 - Preliminary results indicate that chum may not be as susceptible to negative effects of total dissolved gas in the fry stage compared to other salmonid species that have been studied.

COLUMBIA RIVER REGIONAL FORUM

TECHNICAL MANAGEMENT TEAM

January 16, 2008 Meeting

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Donna Silverberg

Notes: Erin Halton

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.

Official Minutes/Facilitator Notes

The facilitator notes and official meeting minutes from the 11/28 year-end-review, 12/12 meeting and 12/19 conference call had been posted to the web. With no further changes made during the meeting, the notes were finalized.

January Final Water Supply Final Forecasts

Steve King, River Forecast Center, referred TMT to several web links posted to the meeting agenda. He noted a new link off the main page that enables viewers to participate in water supply forecast briefings. King guided meeting participants through links to regional forecasts for the current month's precipitation, as well as seasonal and snow pack outlooks. He said that for the April-September timeframe, most points in the region are predicted to be in the range of 90-110% of normal with slightly drier (75-90%) predictions for the Libby/Hungry Horse area. Climate Prediction Center forecasts were also viewed by the group, with predictions for slightly above normal precipitation over the next few months. TMT members discussed the desire to avoid ‘overshooting’ project draw-downs, in order to provide flows that support fish passage. Kyle Dittmer, CRITFC, referred the group to a presentation linked to the CRITFC website that illustrated the method of plotting the shape/direction of forecasts; he noted that 2008 looks to be a moderate La Niña year, with slightly wetter than normal forecasts.

Lessons Learned from 2007

TMT members discussed some of the lessons and observations that came out of the 11-28-07 year-end-review meeting. Dave Statler, Nez Perce Tribe, noted that management of Dworshak operations overcame the challenges posed by conditions. That said, had warmer water come out of the Snake River, there may not have been the same level of success. As the influence of Idaho Power is one of the challenges posed to Dworshak management, a suggestion was made at the year-end-review that a temperature control structure at Brownlee/Hells Canyon might be needed. Paul Wagner, NOAA, noted that based on further analysis by NOAA, this suggested action was unlikely to provide any benefit. Wagner added that COE modeling did well for supporting successful management of Dworshak in 2007.

Action/Next Steps: TMT members will continue to discuss the observations and recommendations that came out of the 2007 review before making decisions on actions to be implemented in 2008.

Draft 2008 Fish Operations Plan

Rudd Turner, COE, referred TMT to the Draft 2008 Fish Operations Plan (FOP), linked to the TMT meeting agenda. He clarified that the Water Management Plan and Fish Passage Plan are both used by the COE for guidance in management. The FOP, on the other hand, reflects ties to the FCRPS BiOP litigation. It includes outages planned for the year and serves as a “commitment to certain operations made up front.” Turner said that part of the December court hearing was a proposal to roll over 2007 operations to 2008, with minor variations for new structure studies and planned outages (i.e. RSW at Lower Monumental and TSW’s at McNary and John Day.) He reviewed tables in the FOP that show the spill patterns for each of the projects, clarifying the following points:

- Spill during tests on the TSW at John Day will likely be in the 40% range, with a few days of 0-60% on non-test days.
- At McNary, work will be performed on gate hoists, to allow for faster lifting capability at spill bays with TSWs in place.
- There will be staggered starts for transport, with the same criteria as was used for the 2007 season.
 - Specific transport start dates will be coordinated by TMT;
- Spill reduction during barge loading may be needed; the COE Division office will encourage COE District offices to allow for spill reduction while continuing research.
 - The COE anticipates no effect on Fall Chinook Transport Studies.
- New for 2008 Draft: two paragraphs on page 8 that address low flow operations and load swing hours which occurred in 2007 and were reported to the court.
- TDG management will have the same criteria as in 2007.

There was discussion amongst TMT members on the ability to use adaptive management, given the commitments made in this 2008 FOP. A question was raised as to whether the FOP would still be in effect, should there be inconsistencies with a final, signed version of the new BiOP; Turner clarified that if the FOP is adopted, it will be in effect through 8-31-08. Turner acknowledged the desire to adapt the new 2008 FOP based on 2007 observations and suggested that TMT members bring those kinds of suggestions to their Policy Work Group (PWG) representatives. Dave Statler, Nez Perce Tribe, spoke to the desire to not lose sight of non-listed species such as the Pacific Lamprey and for the topic to be discussed in the appropriate forum(s). NOAA said that if there were a proposal for a specific operation, or suggestions for slight adjustments that might be made, both TMT and FPOM are appropriate forums for that type of discussion.

Action/Next Steps:

- TMT members will review the 2008 Draft FOP, in the context of the 2007 FOP and 2004 BiOP.
- A TMT conference call on 1-23 will allow for group discussion of the suggested edits or changes to the document.
- The PWG will meet on 1-24 to discuss the edits to the FOP.

- The court parties will likely review the FOP by the end of January.
- The Draft 2008 Fish Passage Plan is posted to the TMT web page; the COE is taking comments. FPOM will hold a meeting on January 25th to comment on the draft FPP.

Draft 2008 Water Management Plan

Scott Boyd, COE, reported that the Action Agencies were in the process of synchronizing the Draft Water Management Plan (WMP) with the Fish Operations Plan.

Action/Next Step: A revised draft of the WMP will be posted to the web in the next week or two; TMT members will be notified when this occurs, in order to provide comments on the latest draft.

Operations Review

Reservoirs – Grand Coulee was at elevation 1280.4' and releasing water as needed to meet the 11.5 feet minimum tailwater below Bonneville for chum. Hungry Horse was at elevation 3523.3', with outflows in the range of 2.6-2.8 kcfs to meet Columbia Falls minimum flows; Reclamation's January water supply forecast for Hungry Horse was 100% of average, which resulted in an end of January flood control elevation of 3543.6'. Libby was at elevation 2409.9' and was operating to minimum flows; based on the most recent water supply update, the end of January flood control target elevation is 2410.3'. Albeni Falls was operating within an elevation range of 2055-2056'; inflows were at 16.4 kcfs and outflows were at 14.1 kcfs. Dworshak was at elevation 1521.4' with inflows in the range of 1.6-1.7 kcfs and outflows of 1.3 kcfs; currently planned operations at the project will be to pass minimum flows through the end of February. The end of January flood control elevation target for Dworshak is 1536.1'. 7-day average flows at Lower Granite were 24 kcfs range; McNary flows were in the 125-130 kcfs range.

Fish – No report.

Power system – No report.

Water quality – No report.

1/23/08 TMT Conference Call

- Comments on the Draft 2008 Fish Operations Plan

1/30/08 TMT Meeting:

Agenda items may include the following:

- Revised Draft 2008 Water Management Plan
- Update: Fish Operations Plan
- Update: Zebra/Quagga Mussels Rapid Response Plan
- SWRG Trucking Proposal (?)
- Spring Creek Tagging (?)
- Operations Review

**Columbia River Regional Forum
Technical Management Team Meeting
January 16, 2008**

1. Introduction

Today's TMT meeting was chaired by Jim Adams (COE) and facilitated by Donna Silverberg (D.S. Consulting). Representatives from COE, BOR, NOAA, BPA, CRITFC, RFC, the Nez Perce Tribe, Montana, Idaho and others attended in person or by phone. 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

There were no changes to the notes from the November 28 year-end review or the December 12 meeting.

3. January Final Water Supply Forecasts

Steve King (RFC) showed TMT the RFC's main water supply forecast page as well as forecasts of precipitation and for water supplies at individual projects. To see the tables that generated today's discussion, go to NOAA's RFC page (linked to the TMT website) and click on "join us for a water supply briefing."

A. Main water supply. The overall forecast for April-September 2008 is 90-100% of normal in most of the basin, with the arid exceptions being eastern Oregon, the upper Snake, and a pocket in the Hungry Horse/Libby region. The RFC forecasts are coordinated forecasts based on regression techniques, not to be confused with ESP forecasts. Early bird, mid month and final forecasts are available on the main water supply page.

B. Current month precipitation. Most of December has been wet, with the exceptions being eastern Oregon and Washington and the Snake River area.

C. Seasonal precipitation. This shows a slightly more definite pattern of fairly wet conditions throughout the basin, particularly in British Columbia, the middle Snake area, southern Idaho, and the headwaters of the Snake. Eastern Washington and the Hungry Horse/Libby areas are fairly dry.

D. Snowpack. Here is a different story, King said. This forecast, based largely on NRCS information, shows somewhat normal conditions throughout the region including the east side. It looks like snowpack in 2008 will be fairly normal.

King demonstrated how this map works by clicking on Molson Creek in the Mica Dam area of British Columbia. The report shows a steady, above-normal influx of snow to this site, a good sign for water supplies in the upper Columbia River and to The Dalles Dam, which gets 30% of its flows from this area.

E. Water supply/ESP. Using Libby reservoir inflow from April-August as an example, King showed how the various forecasts compare to normal runoff throughout the season. Only the final forecast for each month is coordinated, with the effects of that tuning carrying forward to the next early bird prediction.

Using Dworshak flows, the 50% likely forecast for April-July is 2,610 kaf, or 99% of normal based on a 30-year average. The ESP forecast shows a probability of 2,818 kaf, 200 kaf more than the regression method. The COE's forecast for the same period is 2,717 kaf, or 101% of normal.

The COE methodology is a straightforward progression based on the past 30 years, while the Weather Service lumped all parameters for the past 50 years into one index and regressed that. The Weather Service uses the same equation while the COE uses a different equation each month, which leads to wider fluctuations. Weather Service forecasts tend more toward normal conditions. Wagner asked if that applies to both basins; King replied that's a big unknown.

Another factor is SOI parameters that could be related to El Nino or La Nina conditions, King pointed out. This year the Weather Service is calling for a mild La Nina trend. Inclusion of these parameters tends to yield a slightly wetter forecast, which could account for some of the disparity between COE and Weather Service predictions.

How we handle drawdown now can affect spring flows, Dave Statler (NPT) said. He expressed concern about over drafting reservoirs early in the season for flood control, based on water supply forecasts that don't materialize.

Snowpack as of January 1 was forecasted to be below normal because last year was dry, although precipitation was healthy during the same period. The lower runoff levels and snowpack amounts forecasted recently have as much to do with temperatures as the volumes of rain that fall. Consequently, there's lots of snow this year at lower elevations.

F. Climate Prediction Center forecasts. The one-month outlook for January indicates increased odds for more rain than usual throughout the Northwest, King said.

G. Temperature probability. Temperatures are predicted to be close to normal this year, King said. In general, a La Nina trend identified in August indicates that above normal precipitation is likely the following spring.

Kyle Dittmer presented another view of recent weather conditions. The CRITFC forecast calls for near-normal temperatures in January but below-normal temperatures in February and March, which will tend to lock snow in place. CRITFC's preseason forecast for The Dalles is 119 maf or 111% of normal. This year, CRITFC began doing consensus forecasting using three independent methods. The consensus forecasts over the past three months all point to a medium-high water supply in 2008. Recently, the Australian Bureau of Meteorology updated their January advisory from a weak to a moderate La Nina. More information is available on the CRITFC website under Technical Reports.

4. Lessons Learned from 2007

Dworshak operations. Last year was challenging, but conditions at Dworshak were managed fairly well given the circumstances, Statler said. A lot depended on the low volume of hot water coming out of Hells Canyon complex in the upper Snake. Typically when Dworshak flows are low, the Snake also has a low water year, Adams said. The biggest challenge the COE had in doing CEQUAL modeling last year was predicting what Idaho Power would do.

A lot is at stake for listed stocks in the lower Snake, Statler said, and it could be disastrous if the system gets overwhelmed by hot water from the middle Snake River that Dworshak releases can't moderate. Statler suggested that there was a need for selective temperature withdrawal features at upstream projects. However, NOAA has found little temperature benefit in providing outflow temperature control on Idaho Power releases at Brownlee Dam, Wagner said. He commended the COE on management of Dworshak flows, recalling that the reservoir was allowed to fill when the model indicated drier conditions than usual.

5. Draft 2008 Fish Operations Plan

Rudd Turner (COE) explained the difference between the FOP, the FPP and the WMP:

- Water Management Plan. COE document that spells out system operations in detail, including reservoir storage levels.
- Fish Passage Plan. Involves specific fish passage facility operations and maintenance criteria, including details such as settings for gates and screens, fish sampling and handling procedures, spill patterns, and tables for operators to use in operating the turbines within the 1% of best efficiency range.
- Fish Operations Plan. Spells out Action Agency commitments for spill at mainstem projects, transportation, and fish passage research. The document is a product of FCRPS litigation and was instituted in 2006 as the Fish Passage Implementation Plan.

The draft FOP was posted to the TMT website January 15, Turner said. At the December court hearing, the defendants proposed to roll over 2007 operations into 2008 to conserve human energy for finishing the BiOp. Minor variations for studies related to new structures, such as the RSW delivered to Lower Monumental Dam last fall, will be allowed. The FOP will be in effect from April through August 2008.

Turner focused on projects where 2008 operations will differ from 2007.

Two new TSWs at John Day Dam will be tested in 2008. Wagner asked what the spill levels will be with the TSWs in place. The FOP says the COE will test either 30% or about 40% around the clock. Modeling has shown that a spill level much over 40% has created poor egress conditions at John Day. The precise spill regime to be used during the spill test will be developed based on model studies to be performed at ERDC beginning the week of January 28. The John Day spill testing during spill season is scheduled to begin on April 22nd and would continue through July 20th. Prior to the start of the spill testing, the project will operate as done last year with no spill during the daytime and 60% of total outflow spilled during the nighttime hours. Upon completion of the spill test, the project will spill 30% of total outflows 24 hours per day. There will be a pre-season balloon tag test there in March or April, Tony Norris (BPA) added.

McNary Dam has two new TSWs. The one in bay 22 has been moved to bay 19 and will be tested this year. Project staff at McNary is working on the gate hoist for spill bay 20. They're offering a contract to modify the spill gate so it can be used to close off the TSWs during transport operations. The court's ruling means the same transportation criteria will be in place for 2008. That will require an early morning outage of the TSWs every other day for up to 4-5 hours during transport operations. Otherwise, McNary will spill 40% day and night in spring, alternating 40% and 60% spill round the clock in summer, as it did in 2007.

Spill reduction or stoppage will be allowed this year at Lower Monumental Dam for research or transport operations. The RSW will be in place at bay 8 next to the powerhouse this spring, and spill will need to be stopped for transportation. When transportation starts will be a TMT discussion as the time approaches, Turner said.

Lower Granite Dam operations will be the same as last year, 20 kcfs spill with the RSW in place in spring, and 18 kcfs spill during summer. Bonneville Dam will probably experience a slight change, with about 30 days of 85 kcfs spill. Spring spill levels will be 100 kcfs round the clock. Summer spill levels start June 21, with 85 kcfs daytime spill through July 20 for testing. After that, the project will spill 75 kcfs in daytime and to the gas cap at night.

Different spill patterns will be tested this summer at Little Goose Dam in preparation for the TSW to be installed in 2009 (not 2008 as planned earlier). Goose operations will otherwise remain the same as last year, allowing TMT to call for up to 14 nights of spill to the gas cap between April 22 and May 15. Ice Harbor Dam will follow the same spill program as last year, with daytime spill at 45 kcfs and nighttime spill to the spill cap. From April 20 through July 16, the above operation will alternate with spill at 30% of total outflow.

Given that the system is supposed to operate based on NOAA's best assessment of best available science, Jim Litchfield wondered how the system can be operated based on the 2004 BiOp once it becomes obsolete. He raised the question, What if mimicking last year's operations turns out to be inconsistent with the new BiOp? Montana is still very interested in seeing the operations of Libby and Hungry Horse dams comply with the Council's recommendations regarding the mainstem amendments, he emphasized.

Paul Wagner noted that, if flows are less than 70 kcfs, transport operations should start on April 6, not April 20. *[Clarification: Wagner and Turner discussed this further after the meeting. Fish collections at Lower Granite for transportation research will begin April 6, while transportation operations in low flow years would begin on April 20.]*

Coordination of transportation research will occur in 2008 as it did in 2007, so there's a new section on page 25 of the draft FOP that covers juvenile fish transport research, Turner said. The avian predation study at Lower Monumental has been added to this section. Appendix 2 deals with turbine unit outages, but doesn't include every outage that will occur because a number of them won't affect spill.

Turner offered TMT a conference call next week to discuss the FOP. TMT agreed to a conference call January 23 for this purpose.

Russ Kiefer (Idaho) asked whether the COE and other TMT members would be open to a proposal from FPAC to smooth out 2008 spill and transport operations. The COE's instructions are to replicate last year's operations and not make changes, Turner replied. Perhaps this issue could be discussed at the next Policy Work Group meeting January 24.

Dave Statler asked, what is the relationship of these planning documents to the deliberation at TMT? He wondered whether TMT is the appropriate forum for discussion of lamprey passage issues. If there's a proposal for how the system should be operated for lamprey, TMT would be an appropriate place for that discussion, Wagner said. TMT takes into account other non-listed stocks that are of importance to the region, such as Hanford populations. Wagner and Tony Norris agreed that changing fish ladder operations for lamprey shouldn't affect

system operations. Wagner and Scott Boyd (COE) suggested working out these changes via FPOM and the FPP.

Part of rolling over 2007 operations means TDG levels will continue to be managed to the 120% tailrace/115% forebay criterion, Turner said. The Camas-Washougal gage will continue to serve as a surrogate for the forebay below Bonneville. TDG levels will continue to be defined as the average of the highest 12 nonconsecutive hours in a day.

6. Updates to the Draft 2008 Water Management Plan

The COE has been waiting for the 2007 BiOp to be finished, Scott Boyd (COE) said. The Action Agencies need to produce a draft that is consistent with the FOP. They will notify TMT members via email when it is ready for review.

7. Operations Review

a. Reservoirs. Grand Coulee is at elevation 1,280 feet, with releases to meet power demands and maintain the 11.5-foot tailwater elevation for chum below Bonneville. Hungry Horse is at elevation 3,523.30 feet, discharging 2.6-2.8 kcfs to meet Columbia Falls minimum flows. Two separate BOR forecasts for Hungry Horse predicted that water supplies this year will be 100% of normal.

Libby forebay is at elevation 2,409.9 feet, operating to minimum flows of about 4 kcfs. The January 31 flood control target elevation is 2,410.3 feet.

Albeni Falls continues to operate within a 1-foot range of elevation 2,055-2,056 feet, with fluctuating outflows (16.4 kcfs today, 10.9 kcfs on January 11).

Dworshak forebay is at elevation 1,521.4 feet, continuing to operate at minimum flows. Total outflow is 1.3 kcfs currently, with inflows averaging 1.6-1.7 kcfs over the past week. Inflows at Lower Granite dam were approximately 24 kcfs (7-day average). Inflows at McNary are 125-130 kcfs (7-day average).

b. Fish. There is nothing to report, Wagner said.

c. Power. There is nothing to report, Norris said.

d. Water Quality. There is nothing to report, Adams said.

8. Next Meeting

The next TMT meeting will be a conference call on January 23 to discuss the Fish Operations Plan. The next regular TMT meeting will be January 30, with a briefing on the zebra and quagga mussel rapid response plan USFWS and the PSMFC have been developing; presentation of the draft WMP for comments; a

SRWG trucking proposal; and possibly Spring Creek Hatchery operations on the agenda. This summary prepared by consultant and writer Pat Vivian.

<i>Name</i>	<i>Affiliation</i>
Jim Adams	COE
John Roache	BOR
Paul Wagner	NOAA
Laura Hamilton	COE
Tony Norris	BPA
Kyle Dittmer	CRITFC
Steve King	RFC
Rudd Turner	COE
Dave Statler	NPT
Scott Boyd	COE
Bob Buchholz	COE
Bob XX	PPM Energy
Cathy Hlebechuk	COE
Tim Heizenrader	Centaurus
Terry Weeks	PNGC
Holli Krebs	Bear Stearns
Russ George	WMC
Ruth Burris	PGE
Don Faulkner	COE
Jim Litchfield	Montana

<i>Phone:</i>	
Barry Espensen	CBB
Shane Scott	NPPC
Bruce Mckay	Consultant
Jennifer Miller	Susquehanna
John XX	Constellation
Mike Butchko	Powerex
Dan Bedbury	EWEB
Russ Kiefer	Idaho
Bob Koeppen	XX

TECHNICAL MANAGEMENT TEAM

BOR : John Roache / Mary Mellema / Pat McGrane **BPA :** Robyn MacKay / Tony Norris / Scott Bettin
NOAA-F: Paul Wagner / Richard Dominique **USFWS :** David Wills / Steve Haeseker
OR : Rick Kruger / Ron Boyce **ID :** Russ Kiefer
WDFW : Cindy LeFleur **MT :** Jim Litchfield / Brian Marotz
COE: Jim Adams / Cathy Hlebechuk / Bob Buchholz

TMT CONFERENCE CALL

Friday January 18, 2008 11:00 a.m.

1125 N.W. Couch Street, Suite 4A34
Portland, Oregon 97209-4142
Map Quest [\[Directions\]](#)

CONFERENCE PHONE LINE

Conference call line: 203-310-2162; PASS CODE = 4703150

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Please e-mail her at robin76@cnnm.net or call her at (503) 248-4703.*

AGENDA

1. Welcome and Introductions
2. Emergency Protocols - Tony Norris, BPA
3. Next scheduled meeting - **January 23, 2008**

[\[Calendar 2008\]](#) 

Questions about the meeting may be referred to:

*[Jim Adams](#) at (503) 808-3938, or
[Cathy Hlebechuk](#) at (503) 808-3942, or
[Bob Buchholz](#) at (503) 808-3945.*

COLUMBIA RIVER REGIONAL FORUM

TECHNICAL MANAGEMENT TEAM

January 18, 2008 Conference Call

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Donna Silverberg

Notes: Erin Halton

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.

Emergency Protocols

Tony Norris, BPA, said that there was a chance of a power emergency for the 21st and 22nd of January, due to region wide cold weather, available generation and potential unit outages. He clarified that BPA has planned well for contingencies in our control area but possibility of a connecting control area declaring an emergency is more likely. Norris reiterated that it was not yet a certainty, but that BPA wanted to let its TMT partners know of the possibility. If a power emergency does occur, projects could be impacted for anywhere from 2 hours to 2 days. Norris clarified that all preemptive actions would need to have taken place before another control area could declare a NERC Alert 2 (e.g. all other available energy would need to be purchased before turning to BPA via the merchant alert.) If a NERC Alert 2 is declared, Norris said that Dworshak would be the first project to ramp up; Libby/Hungry Horse would be the last. All TMT members will be contacted by Cathy Hlebechuk, COE, or Jim Adams, COE, in the event of an Alert 2 declaration.

Russ Kiefer, ID, noted his concern regarding fall flood control levels. This will be an agenda item at a future TMT meeting.

**Columbia River Regional Forum
Technical Management Team Conference Call
January 18, 2008**

1. Introduction

Today's TMT call was chaired by Jim Adams (COE) and facilitated by Donna Silverberg (D.S. Consulting). Representatives from BPA, COE, BOR, USFWS, NOAA, Montana, Washington, Idaho and others were on the line. 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. Emergency Protocols

This ad hoc meeting was called in response to the possibility of a NERC 2 power emergency originating from California, where a cold snap is expected next Monday and Tuesday, January 21-22. BPA has planned contingencies to meet its load in its control area, but is worried now about other control areas, Tony Norris (BPA) reported. He assured TMT that BPA would not support a second control area without a NERC alert. That means California utilities must first curtail any sales they can and purchase all the energy available to them, before they can declare an emergency and place a load on BPA.

Drafting Dworshak would be BPA's first response at this time of year; drafting Libby or Hungry Horse would come last. Don Faulkner (COE) asked how much warning the region would get. It could be a few hours' warning, but BPA might have to move some water in advance of that, Norris replied. It's likely that Dworshak reservoir will need to be drafted anyway to reach later flood control targets, whereas Hungry Horse reservoir is already 20 feet below its January flood control target. By the time the declaration of a power emergency reaches BPA, the only energy available will be hydro to respond.

Paul Wagner (NOAA) asked whether the benefit of drafting Dworshak would be the short time frame between drafting the reservoir and subsequent generation downstream. Yes, but Dworshak releases would gain energy as the flows move downstream, whereas Libby and Hungry Horse drafts would provide no such downstream benefit. Hydrologically, the three projects seem very similar, Wagner noted. Even with a 100% of normal inflow forecast, Hungry Horse has only a 10-15% chance of meeting its April 10 target elevation, John Roache (BOR) said. The COE's ESP analysis indicates that Dworshak has a 35% chance of not meeting its April 10 target if any flexibility is used, Cathy Hlebechuk (COE) said. Wagner asked whether the COE has done similar calculations for other projects; the answer was no.

Russ Kiefer (Idaho) expressed frustration with the practice of meeting conservative flood control elevations in fall and drafting too much water for chum, then running short of water needed for winter generation without putting streamflows at risk. BPA has already made arrangements at Grand Coulee to use higher draft rates as needed, and would do that first before drafting Dworshak, Norris said. There was agreement that flood control concerns wouldn't be resolved today, but could be addressed at a later time.

In terms of preemptive actions, Norris referred TMT to the list of emergency protocols available in Appendix 1 of the Water Management Plan, which is posted on the TMT website. All the things on the list will occur prior to a power system emergency declaration. According to the list of emergency actions, the only sources of power available this year are headwater project increases. Dave Wills (USFWS) asked whether the preemptive actions on the September-March emergency list would be taken. We can operate units at 2% if needed because there's no fish attraction at Bonneville Dam now, Norris said. The emergency operation would not violate any fish protection measures.

Wagner asked, is there any guarantee the California utilities would follow the NERC rules? Norris said he believed there are after-the-fact reporting requirements and consequences if utilities don't follow the rules.

If a NERC alert is declared over the weekend, Hlebechuk will send out a new schedule for the projects to follow, then notify TMT members via the emergency contact phone list. Ramping a headwater project up and down has impacts lasting longer than a few hours, Norris said. Problems would probably persist for a day or two early next week.

3. Next Meeting

The next TMT meeting will be a conference call on January 23 to discuss the Fish Operations Plan. This summary prepared by consultant and writer Pat Vivian.

Name	Affiliation
Jim Litchfield	Montana
Cathy Hlebechuk	COE
Tony Norris	BPA
Paul Wagner	NOAA
John Roache	BOR
Margaret Filardo	FPC
Kyle Dittmer	CRITFC
Dave Wills	USFWS
Cindy LeFleur	Washington
Dave Benner	FPC
Russ Kiefer	Idaho

Jim Adams	COE
Bob Buchholz	COE
Scott Boyd	COE
Cathy Hlebechuk	COE
Don Faulkner	COE

TECHNICAL MANAGEMENT TEAM

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WDFW : Cindy LeFleur **MT :** Jim Litchfield / Brian Marotz
COE: Jim Adams / Cathy Hlebechuk / Bob Buchholz

TMT CONFERENCE CALL

Wednesday January 23, 2008 09:00 - 12:00

1125 N.W. Couch Street, Suite 4A34
Portland, Oregon 97209-4142
Map Quest [\[Directions\]](#)

CONFERENCE PHONE LINE

Conference call line: 203-310-2162; PASS CODE = 4703150

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AGENDA

1. Welcome and Introductions
2. Review [\[Meeting Minutes\]](#) 
3. Power System Status Update - Tony Norris, BPA
4. Draft 2008 Fish Operations Plan - Rudd Turner, USACE
 - A. [\[Draft\]](#) 
 - B. [\[Appendix 2\]](#) 
5. Other
 - Set agenda for next meeting - **January 30, 2008**
[\[Calendar 2008\]](#) 

Questions about the meeting may be referred to:

*[Jim Adams](#) at (503) 808-3938, or
[Cathy Hlebechuk](#) at (503) 808-3942, or
[Bob Buchholz](#) at (503) 808-3945.*

COLUMBIA RIVER REGIONAL FORUM

TECHNICAL MANAGEMENT TEAM

January 23, 2008 Conference Call

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Robin Gumpert

Notes: Erin Halton

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.

Official Minutes/Facilitator Notes

The facilitator notes from the 1/16 meeting and 1/18 conference call had been posted to the web. The official meeting minutes from the same dates were expected to be posted by 1/25 and will be finalized at the 1/30 meeting.

Power System Status Update

As follow up from the 1/18 TMT conference call, Tony Norris, BPA, reported that no power emergency had been declared by a connecting control area. He added that the chance of an emergency declaration from a connecting control area had lessened, but that BPA was still planning for contingencies. Kyle Dittmer, CRITFC, noted that the region could expect temperatures to moderate next week.

Next Steps: Norris will provide any follow up details during the operations review portion of the 1/30 TMT meeting.

Draft 2008 Fish Operations Plan

Rudd Turner, COE, referred TMT to the Draft 2008 Fish Operations Plan (FOP) that was presented at the 1/16 TMT meeting and was linked to the TMT meeting agenda. He offered to discuss/answer any questions from TMT members. Paul Wagner, speaking on behalf of the Salmon Managers, said that there had been some discussion of the FOP at the FPAC meeting on 1/22, but that there was no group consensus to report. Dave Wills, USFWS, noted that in 2007 TDG was managed within OR/WA standards and that for 2008, those standards do not include reference to the Camas/Washougal gauge. Turner said that part of the December court hearing was a proposal to roll over 2007 operations to 2008 and that the proposed 2008 FOP was the COE's interpretation of that guidance. He suggested that TMT members share those types of suggestions with their Policy Work Group (PWG) representatives, as the PWG planned to meet the following day. The COE clarified that there is low flow operations language in the FOP. Jim Litchfield, MT, asked whether it might be possible to view comparative analysis of transport start dates that are included in the draft BiOP: Paul Wagner, NOAA, said that he would inquire as to that possibility.

The COE also clarified that Appendix D of the Draft Fish Passage Plan (FPP) will be posted soon, as will a revised Draft Water Management Plan (WMP); both will include references to the 2008 FOP.

Action/Next Steps:

- The PWG will meet on 1-24 to discuss the edits to the FOP.
- The court parties will likely review the FOP by the end of January.
- TMT members will be notified when the Draft FPP and WMP have been posted to the web. (The COE suggested that the WMP would not be posted before the 1/30 TMT meeting, so discussion of this will occur at the 2/13 TMT meeting.)

1/30/08 TMT Meeting:

Agenda items may include the following:

- Revised Draft 2008 Water Management Plan (for further discussion at 2-13 meeting)
- Update: Fish Operations Plan
- Update: Zebra/Quagga Mussels Rapid Response Plan
- Spring Creek Operations
- COE Re-organization Update
- Operations Review

NOTE: The TMT meeting scheduled for 2/13 will be held at the NOAA Fisheries 10th Floor Conference Room

**Columbia River Regional Forum
Technical Management Team Conference Call
January 23, 2008**

1. Introduction

Today's TMT meeting was chaired by Jim Adams (COE) and facilitated by Robin Gumpert (D.S. Consulting), with representatives from COE, BPA, BoR, NOAA, USFWS, CRITFC, FPC, Montana and others on the line. 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

There were no comments today on either the facilitator's notes or the official minutes from the January 16 meeting or the January 18 conference call. These notes will be revisited at the January 30 TMT meeting.

3. Power System Status Update

Things turned out well, but we're not out of the woods yet, Tony Norris reported. BPA is still planning for contingencies, and could still lose generation, but an emergency from a connected control area is less likely. The cold snap is expected to last through next week. Temperatures will moderate by late next week, with no major breaks in the chill until the middle of next week, Kyle Dittmer (CRITFC) said. There could be rain and snow by next weekend. Norris will update TMT on the power situation as part of the operations review at next week's meeting.

4. Draft 2008 Fish Operations Plan

The main purpose of today's call was to give TMT an opportunity to ask questions and discuss aspects of the draft FOP, Rudd Turner (COE) said. The draft has not changed, and the version linked to last week's TMT meeting is the most current. There will be a Policy Work Group meeting tomorrow where the FOP will be discussed.

The Salmon Managers have no consensus to report after yesterday's FPAC meeting regarding the draft FOP, Paul Wagner (NOAA) reported, although individual parties asked questions.

The following three documents will become available for TMT review in the next few weeks:

1. Appendix D, water quality monitoring, to the FPP. It will be posted before the end of January, Adams said. The COE has been waiting for the FOP to firm up before updating Appendix D.
2. The FOP will be finalized around the end of January. It will contain 2007 project-specific spill operations to be repeated in 2008. The exceptions will be JDA, MCN, LMN and BON. John Day pool will spill more than 30% for testing this spring and summer. There will be intensive spill pattern testing soon at ERDC for John Day, McNary and Lower Monumental dams. Spill patterns for these three projects will be finalized by the end of January. The need for spill pattern testing is delaying completion of the FOP. Bonneville operations will continue like last year, except there will be additional days of 85 kcfs spill (about 30 days total in 2008) to accommodate testing that starts around July 20.
3. The new draft Water Management Plan will be released for TMT review at the January 30 TMT meeting, Scott Boyd (COE) said. TMT members decided to comment on it at a later meeting after they've had a chance to review the details.

In 2007 TDG levels were managed within the confines of the state of Oregon waiver and a Washington exemption, so it would be consistent to do the same thing this year, Dave Wills commented. But this year the waivers don't include Camas-Washougal, so using it seems inconsistent with replicating last year's operations. The Department of Justice instructed the COE to continue 2007 operations in terms of what actually occurred, Rudd Turner replied. This issue could be further discussed at the Policy Work Group meeting tomorrow.

Jim Litchfield (Montana) asked whether NOAA has done COMPASS analysis of the proposed 2008 operations. It hasn't been planned, Wagner said, but he'll pass along the idea. NOAA didn't commit to doing modeling at this time.

5. Next Meeting

The next TMT meeting will be in person on January 30. Agenda topics include release of the revised draft WMP; a briefing on the rapid response plan for zebra and quagga mussels; an FOP update; discussion of Spring Creek Hatchery studies, including a SRWG trucking proposal; and a power system update. The next regular TMT face-to-face meeting will be February 13 at NOAA's Portland offices, followed by a meeting February 27 at the COE. This summary prepared by consultant and writer Pat Vivian.

Name	Affiliation
Tony Norris	BPA
John Roache	BoR
Tim Heizenrader	Centaurus

John XX	Constellation
Tom Le	Puget Sound Energy
Mike Butchko	Powerex
Kyle Dittmer	CRITFC
Paul Wagner	NOAA
Richelle Beck	DRA
Jim Litchfield	Montana
Barry Espensen	CBB
Dave Wills	USFWS
Dave Benner	FPC
Margaret Filardo	FPC
Jim Adams	COE
Rudd Turner	COE
Cathy Hlebechuk	COE
Scott Boyd	COE

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WDFW : Cindy LeFleur **MT :** Jim Litchfield / Brian Marotz
COE: Jim Adams / Cathy Hlebechuk / Bob Buchholz

TMT MEETING

Wednesday January 30, 2008 09:00 - 12:00

1125 N.W. Couch Street, Suite 4A34
Portland, Oregon 97208
Map Quest [\[Directions\]](#)

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AGENDA

1. Welcome and Introductions
2. Review [\[Meeting Minutes\]](#) 
3. Revised Draft 2008 Water Management Plan - Scott Boyd, USACE
[\[Draft 2008 WM Plan\]](#) 
4. Fish Operations Plan Update - Rudd Turner, USACE
5. Spring Creek - Dave Wills, USF&WS
6. Zebra/Quagga Mussels Rapid Response Plan - Stephen Phillips, Pacific States Marine Fisheries Commission
 - a. [\[Zebra/Quagga Mussels\]](#) 
7. Operations Review
 - a. Reservoirs
 - b. Fish

- c. Power System
- d. Water Quality
 - 1. [\[Spill Information 2007\]](#)
- e. Other
 - Set agenda for next meeting - **February 13, 2008**
[\[Calendar 2008\]](#) 

Questions about the meeting may be referred to:

*[Jim Adams](#) at (503) 808-3938, or
[Cathy Hlebechuk](#) at (503) 808-3942, or
[Bob Buchholz](#) at (503) 808-3945.*

Columbia River Basin Interagency Invasive Species Response Plan for Zebra Mussels and Other Dreissenid Species



Stephen Phillips
Pacific States Marine Fisheries Commission



IMPACTS OF DREISSENID MUSSELS

Have caused billions of dollars of damage to utilities in the Eastern US as they form dense colonies clogging water pipes used by water utilities and power plants

Can attach to a broad range of surfaces, including water diversion structures, trash racks, fish screens and ladders, and boat hulls and engines resulting in costly maintenance

Can filter enormous amounts of algae, disrupting the food chain, impacting native fish stocks and causing extirpation of some species

A major infestation in the Columbia River Basin (CRB) could cause serious problems for salmon and steelhead recovery efforts

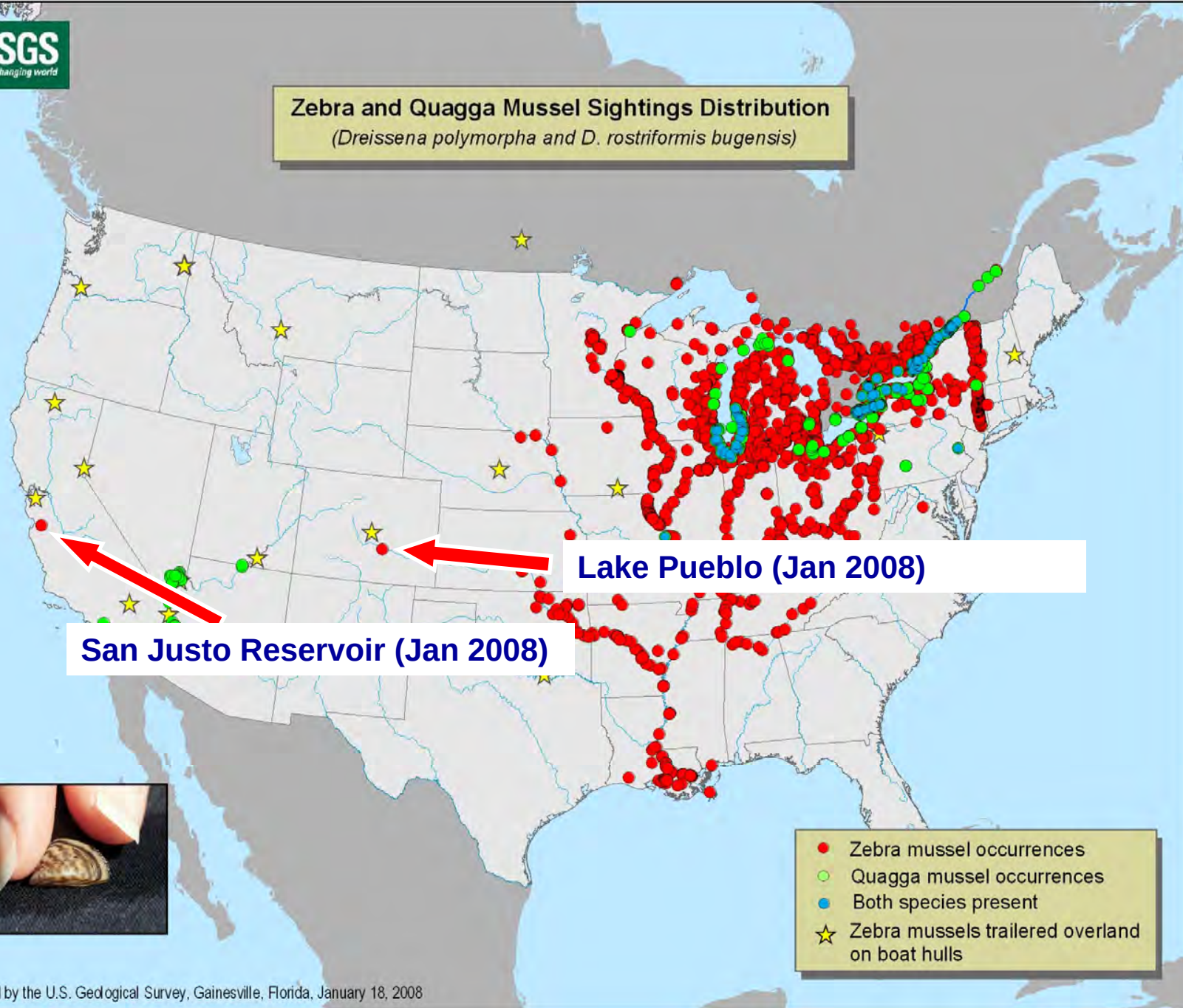


Pipe clogged by one year's growth of zebra mussel



Columbia Basin fish ladders would become fouled with mussels, causing physical damage to salmonids

Zebra and Quagga Mussel Sightings Distribution
(*Dreissena polymorpha* and *D. rostriformis bugensis*)



THE ADVANCE CONTINUES

It is feared that zebra mussels will eventually be introduced into the Columbia River Basin.

#1 strategy is prevention and the #1 prevention strategy is mandatory boat inspections

Currently only and California and Washington have effective interception capability, OR/MT/ID are in early stages of strengthening regulations and seeking additional state funding for prevention efforts

Although prevention efforts continue, natural resource agencies also must prepare for a region-wide interagency coordinated response to an invasion.

COLUMBIA RIVER BASIN RAPID RESPONSE PLAN

- For the past year, the US Fish and Wildlife Service and Pacific States Marine Fisheries Commission under the auspices of the 100th Meridian Initiative, have been leading the effort to develop a “Columbia River Basin Interagency Invasive Species Response Plan for Zebra Mussels and Other Dreissenid Species” (*Plan*).
- The purpose of the *Plan* is to coordinate a rapid, effective, and efficient interagency response in order to delineate, contain, and when feasible, eradicate zebra, quagga, and other dreissenid mussel populations if they are introduced in CRB waters.
- The *Plan* recognizes that a dreissenid invasion is an environmental emergency and any hope of containment necessitates fast action (note: eradication usually unlikely)
- The provisions of this *Plan* are intended to enhance interagency coordination beginning with the discovery of an infestation by implementing containment and initial control efforts.



PLAN ELEMENTS

- Make initial agency notifications upon discovery of mussels
- Activate appropriate Incident Command System organizational elements for interagency response
- Verify reported introduction
- Define extent of colonization
- Establish external communications system
- Obtain and organize resources
- Prevent further spread via quarantine and pathway management
- Initiate available/relevant control actions
- Institute long-term monitoring



RESPONSE ROLES AND ORGANIZATION

- The *Plan* uses the National Incident Management System (NIMS), and its Incident Command System (ICS) organizational management structure
- Included in NIMS is an executive committee or Multiagency Coordinating Group (MAC) that guides the response
- The MAC will be composed of an executive group that will include the five CRB states, the USFWS, NOAA, and the Columbia River Inter-Tribal Fish Commission.
- Key decisions that the MAC may face include approval of eradication strategies, restrictions of vessel movement and funding for response operations.
- Additional agencies are then added to the MAC group depending on the infestation location and severity.



RAPID RESPONSE EXERCISE OCTOBER 23-24, 2007

A table-top exercise was held in October 2007 to test the Plan.

Twenty state, federal and tribal agencies from throughout the region attended.

The exercise goal was to enhance the ability of the entities within the CRB to coordinate and solve interagency issues that may arise in the event a real situation erupts.

Another goal was to evaluate the proposed organizational structure.

Outcomes included confirmation that the overall NIMS approach (including MAC structure) can work, and a recommendation to build MAC/Support Group relationships via subsequent exercises.

The lessons learned at the exercise, including delegation of authority, resource logistics and legal authorities are currently being incorporated into the next draft of the rapid response plan.

NEXT STEPS

Based on direction and input given at the October Rapid Response Exercise, the following tasks have been identified as priorities:

- Incorporate edits and comments into the *Plan*
- Identify primary notification coordinator
- Develop associated strategic planning document designed to enhance *Plan* implementation
- Distribute summary of lessons learned from exercise
- Obtain written delegations of authority for identified agency representatives
- Compile region-wide inventory of rapid response logistical resources by agency.
- Secure written agreement by MAC agencies (and others) to follow *Plan*.
- Next draft Early February

CALCIUM AS A LIMITING FACTOR

Frontiers in Ecology and the Environment

A calcium-based invasion risk assessment for zebra and quagga mussels (*Dreissena* spp)

Thomas R Whittier, Paul L Ringold, Alan T Herlihy, and Suzanne M Pierson

Front Ecol Environ 2008; 6, doi:10.1890/070073

This article is available (as shown above) and is released from embargo once it is posted to the
Frontiers e-View site (www.frontiersinbiology.org)

Please note: This article was downloaded from Frontiers e-View, a service that publishes fully edited
and formatted manuscripts before they appear in print in Frontiers in Ecology and the Environment.
Readers are strongly advised to check the final print version in case any changes have been made.



very low (< 12 mg/Liter) low (12–20) moderate (20–28) high (> 28)

Figure 2. *Dreissena* invasion risk classes for ecoregions of the contiguous US based on calcium concentrations in streams and rivers. Depending on watershed characteristics, some portions of the highly variable ecoregions will be at high risk, while others will be at very low risk. Dots indicate zebra mussel and quagga mussel observations through October 2007.

The apparent contradictions between our map and some zebra mussel sites (primarily on large rivers) emphasize that a useful risk model for any specific water body will need to include additional information about the watershed, as well as on *Dreissena* autecology. In the case of the portion of the Arkansas River within the very low-risk areas, one must know that most of the upstream river drains high-calcium areas, and high-calcium concentrations in the lower mainstem of the river reflect that water source rather than local conditions. The other key requirement for *Dreissena* in river systems is the presence of an invaded upstream lake or reservoir to maintain a supply of larvae (Horvath *et al.* 1996; Allen and Ramcharan 2001). The Arkansas River system has invaded reservoirs, as well as a series of locks and dams on the mainstem. On the other hand, the lower Missouri River is not dammed and currently does not support mussels (Allen and Ramcharan 2001), despite more than adequate calcium

(WebTable 2). At the mouth of the Tennessee River, the

FOR FURTHER INFORMATION CONTACT:

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COLUMBIA RIVER REGIONAL FORUM

TECHNICAL MANAGEMENT TEAM

January 30, 2008 Meeting

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Robin Gumpert

Notes: Erin Halton

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.

Official Minutes/Facilitator Notes

The facilitator notes and the official meeting minutes from the 1/23 conference call had been posted to the web. Paul Wagner, NOAA, said he planned to submit a comment to the official meeting minutes. TMT members will be notified of the change and the revised notes will be posted on the web.

Draft 2008 WMP

Scott Boyd, COE, referred TMT to a revised, clean version of the draft 2008 WMP and Appendix 4 TDG Management Plan. As TMT members did not have time to review the document before today's meeting, this will be added to the agenda for discussion at the 2/13 TMT meeting.

ACTION: Following the meeting, the COE sent a word version of the draft WMP to TMT members for providing tracked change comments, which will be posted on the TMT web page upon receipt. Folks were encouraged to send in comments in advance of the 2/13 meeting.

Draft 2008 Fish Operations Plan

Rudd Turner, COE, reported that the Policy Work Group (PWG) met following last week's TMT conference call to further discuss the COE's proposed 2008 FOP. One change was made to the last draft, which added language on page 8 to describe that during low flow conditions, transportation would start on April 20 with no staggered start, and that spill would be provided under all flow conditions.

Rudd noted also that language was rolled over from the 2007 FOP indicating that Ice Harbor would be operated under a test condition, but that no test had been planned for this year. Per suggestion, the COE planned to provide some evaluation of in-river tagged fish this year. It was suggested that it would be useful to provide flexibility around test days as well, and the COE responded that any minor proposed changes could be discussed in season at TMT.

Finally, Rudd noted that while no language changes were made to the document, McNary summer transportation and TSW testing at the project may overlap and the COE will

require some operational flexibility for safe passing of barges. They will do their best to meet the criteria in the FOP to minimize impacts to transportation and research.

ACTION: COE attorneys will send a letter to the court in the coming week with notification of the finalized FOP for 2008. Jim Adams will have the final FOP posted and notify TMT that it has been posted.

Spring Creek Operations

Dave Wills, USFWS, reported that full production of Spring Creek hatchery fish will occur this year given high fecundity rates from last year that provided adequate numbers of eggs. 7.5 million are set to be released on March 3 (the same day the B2CC is opened and coincident with the start of a kelt study), about 4 million will be released sometime in April, and 3.5 million will be released in May. The USFWS is finalizing its evaluation of the 2004 test and subsequent collected data, which it will share with co-managers to aid in developing a potential proposal for operations this year.

ACTION: Dave will share any proposals for Spring Creek operations with TMT as they are developed – this item will be held as a placeholder for the 2/13 TMT meeting.

Operations Review

Reservoirs: Grand Coulee was at elevation 1274.6'; Hungry Horse was at 3520.12' and releasing 2.9-3 kcfs. Libby was at elevation 2408.4' with 4 kcfs out and ranging 1.8-3.8 kcfs in. Albeni Falls was at elevation 2055.5'. Dworshak was at 1521.3' with 1.3 kcfs out and 1.2-1.9 kcfs in. The 7-day average flows at Lower Granite were 23.3 kcfs; 141.9 kcfs at McNary and 155.8 kcfs at Bonneville. Bonneville continues to be operated at an 11.5' minimum tailwater to support chum.

Fish: Nothing to report at this time.

Power system: Tony Norris, BPA, followed up from the last TMT conference call with a report that no power emergencies were declared. He also reported that 1 MAF will be stored as of January 31 for summer flow augmentation.

Water quality: Nothing to report at this time.

Zebra/Quagga Mussels Rapid Response Plan

Stephen Phillips, States Marine Fisheries Commission, provided an overview of actions to address the threat of an infestation of zebra and quagga mussels into the Columbia River system. Just this month, it was reported that the mussels were found at the San Justo reservoir in California and Lake Pueblo in Colorado in November. Stephen noted his concern with the delay in reporting. Prevention measures have been taken in the Northwest, primarily around mandatory boat inspections in California and Washington with work to strengthen regulations in Oregon, Montana and Idaho. Education and monitoring is also happening.

In addition, a group of stakeholders led by the USFWS and the 100th Meridian Initiative have developed a Rapid Response Plan that includes a plan for interagency coordination should an infestation occur. A Multi-Agency Coordinating Group (MAC) is put in place to guide the response and includes the states, USFWS and CRITFC. They completed a table top exercise in October (with involvement of over 20 agencies) which resulted in confirmation that the response approach is a good one, and a recommendation to conduct another exercise.

Next Steps – The final Rapid Response Plan will be completed and posted to www.100thmeridian.com in the next two weeks, and available for comment. Stephen shared this and additional next steps, noted that calcium levels may play a role in the risk of infestation, and provided contact information for himself and USFWS colleague Paul Heimowitz. His power point presentation can be found as a link to today's TMT agenda.

2/13/08 TMT Meeting:

Agenda items may include the following:

- Revised Draft 2008 Water Management Plan – discussion of comments
- Spring Creek Operations
- Water Supply Forecasts
- Operations Review

NOTE: The TMT meeting scheduled for 2/13 will be held at the NOAA Fisheries 10th Floor Conference Room

**Columbia River Regional Forum
Technical Management Team Meeting
January 30, 2008**

1. Introduction

Today's TMT meeting was chaired by Jim Adams (COE) and facilitated by Robin Gumpert (D.S. Consulting), with representatives from COE, USFWS, NOAA, BPA, Montana and others participating in person or by phone. 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

Paul Wagner (NOAA) said he would comment on the official minutes for the January 23 conference call sometime soon. There were no other comments on notes today.

3. Revised Draft 2008 Water Management Plan

The revised WMP was posted yesterday to the TMT page for review. Operations will remain essentially the same as last year, Scott Boyd (COE) said. There have been two changes to the draft since the last iteration: revision of the main body of the plan, and a new Appendix 4 which discusses TDG management strategy. Section 4.13.14 refers to the 2008 Fish Operations Plan (see item 4 on today's agenda). Boyd will collect comments on the WMP over the next two weeks, and then Adams will circulate a revised draft to TMT for comments. The WMP will be on the next TMT agenda February 13.

4. 2008 Fish Operations Plan Update

The FOP has been a subject of discussion at the past two TMT meetings, and the PWG also discussed it on January 24, Rudd Turner (COE) said. As a result, the COE has added a third paragraph to the Transportation Operations section on page 8 of the January 15 draft. The paragraph reads as follows:

Dates to start transporting fish at Snake collector projects will be advanced if spring seasonal flows at Lower Granite Dam are projected to be less than 70 kcfs. In that case, transportation will begin on April 20 at all three Snake collector projects, instead of a staggered start as planned if seasonal flows are expected to be 70 kcfs or higher. Transportation operations and research are described in the juvenile fish transportation program operations section on pages 24-26 of this document. Spill for fish passage will be provided under all flow conditions.

The other anomaly in rolling over 2007 operations will be Ice Harbor Dam, Turner said. A test schedule is included in IHR operations for 2008 but no test is planned like there was in 2007. It's unlikely that a new study will be needed this year, so the COE is looking at ways to increase detection of tagged fish that are already in the system. This includes PIT-tagged fish as well as all radio-tagged and acoustically tagged fish that pass the project. It will not be an experimental test but an evaluation of spill conditions and survival results. Passage of all tagged fish at Ice Harbor could be monitored this year without much added expense. An additional year of data might help clarify which operation is best suited to conditions at IHR. However, the 2008 CRFM budget is nearly finalized at this point; SCT will begin discussing priorities for 2009 when the President's budget is released in the next few weeks. There may be some flexibility regarding scheduling of test days, Scott Bettin (BPA) noted. Once the FOP is submitted to the court, the schedule is locked in, Turner said. The Regional Forum would then become the means for making minor changes.

Discussion moved to the McNary transportation schedule. Transportation is slated to begin once conditions are no longer spring-like, as it was in 2007, which could yield a start date of sometime in early July, Turner said. However, the TSWs at McNary are scheduled to be tested on July 25, creating a potential overlap. In this case, language in the FOP will not be changed. The FOP calls for potential outages of up to 4 hours each time the transportation barge passes through the locks at McNary every other day. However, the FOP also directs MCN project operators to minimize spill outages or changes to spill while barges are in the tailrace. It's likely the project operators will be able to simply open and close the TSW gates as needed. A spill outage of about 15-30 minutes will be necessary while the barge is approaching the tailrace, followed by another 15-30 minute outage while the barge is departing the loading dock. The COE is trying to schedule very short outages rather than turn the TSWs off for the entire 4 hours. The goals of this operation are to meet safety needs while minimizing impacts on spill and research at the project.

Adams will notify TMT members when the latest version of the FOP is posted for comments.

5. Spring Creek Update

Last year, there was concern over whether the adult run would provide sufficient eggs for full hatchery production this year, due to low returns of adult females. As it turned out, fecundity was much higher than expected, Dave Wills (USFWS) said. So a full production release is planned this year – more than 7.5 million fish on March 3, 2008, with another 4.2 million to be released in April and 3 million more in May. The March release will coincide with opening of the B2 corner collector for the kelt study through March. Beyond that, nothing has been decided, Wills said. The March release could be scheduled for a single day or on multiple days.

Jim Litchfield asked Dave Wills whether he was looking at CWT data for differences in overall life cycle survival for different release groups? In 2004, USFWS split the March release into two groups, with one group passing BON via the B2 corner collector only, the other via the corner collector plus the spill bays, Wills said. This year, the corner collector will be a means of passage, as well as spill and the transport study, Scott Bettin (BPA) said. TMT will revisit the Spring Creek operation at its February 13 meeting if there is anything new to discuss.

6. Zebra/Quagga Mussels Rapid Response Plan

Stephen Phillips (Pacific State Marine Fisheries Commission) briefed TMT on the preparation of a multi-agency response plan in the event that zebra/quagga mussels invade the Columbia River basin. This highly destructive species came to the Great Lakes in the mid-80s and has proliferated, causing millions of dollars' worth of environmental damage by clogging the pipes in municipal water, irrigation and power systems, as well as fish passage facilities. They have proliferated to the point of filtering the entire volume of Lake Erie in 5 days. The impact on the food chain is devastating. For example, the weight of an average 4-year-old whitefish caught in the Great Lakes region has dropped from 5 pounds to 1.5 pounds due to loss of food supply.

In the west, San Justo Reservoir in California is the area of greatest concern, where zebra mussels were found in mid-January. Due to the reservoir's upstream location and that water is pumped into the reservoir and it doesn't appear that there are outflows from the reservoir; it's possible the infestation could be limited to San Justo. Eradication will be difficult, as the reservoir is a popular site for bass fishing. Zebra mussels have also been detected in Lake Pueblo Reservoir in Colorado as of last November, but the findings weren't released until January. In 2007, quagga mussels were discovered in Lake Mead. Since then, they have migrated into numerous reservoirs in Southern California.

Zebras and quaggas move into an area by attaching to watercraft, and the only sure way to keep them out of the Northwest is border inspections, Phillips emphasized. Currently only California and Washington have effective interception capability. Oregon, Montana and Idaho are in the early stages of strengthening their regulations to involve search and seizure of watercraft crossing state lines. Oregon is considering a \$2.5 million proposal to set up inspection stations at five major entry points to the state by 2009.

If these pests are detected in the Columbia basin, eradication may be difficult or impossible, Phillips said. The rapid response plan involves state, federal, and tribal entities coordinating their efforts via the national incident command system for fires, earthquakes and other environmental emergencies. The five Columbia River basin states (Nevada, Oregon, Idaho, Washington and Montana) and USFWS, NOAA and CRITFC are involved in the multi-agency

coordination group. Representation on the MAC is interchangeable depending on the agencies that have jurisdiction over the affected location.

On October 23-24, 2007, the MAC group staged a mock invasion to rehearse their coordination efforts. One of the recommendations from that exercise was that it be repeated. There have been some false alarms, and one of the main features of the rapid response plan is that a primary notification coordinator will be responsible for spreading the word in the event of a real invasion. In the meantime, agencies are beginning to inventory resources they have available to use in the rapid response. The next steps in the planning process will be agency legal reviews.

It's possible that the spread of zebras and quaggas would be somewhat limited by low calcium levels (less than 15 mg/L) in some areas of the Northwest. Research indicates that they have difficulty reproducing below that level. Calcium levels in the Willamette River are less than 10 mg/L, and there is very low calcium in the Puget Sound area south to the mid-Sierras. However, calcium levels tend to be higher in water bodies east of the Cascades. For example, calcium levels at The Dalles are around 20 mg/L which is plenty to support a zebra or quagga mussel population.

TMT will be notified when the next draft of the rapid response plan is posed online for review and comment, probably within the next few weeks.

7. Operations Review

a. Reservoirs. Grand Coulee is at elevation 1,274.6 feet and operating as needed to meet the Bonneville 11.5 foot tailwater requirement and to meet power demand. Hungry Horse is at elevation 3,520.12, discharging between 2.9-3 kcfs for the Columbia Falls minimum flow. Hungry Horse has been drafting steadily this past week.

Libby is at elevation 2,408.4 feet, maintaining 4.0 kcfs outflows. Inflows are fluctuating from 1.8-3.8 kcfs so the pool is drafting slightly. Albeni Falls is at elevation 2055.5 feet at the Hope gage, with inflows of 12.9 kcfs and outflows of 12.9 kcfs on January 29. The pool is still operating between elevations 2055-2056 feet. Dworshak is at elevation 1,521.3 feet, with outflows of 1.3 kcfs and inflows ranging from 1.2-1.9 kcfs, so that pool elevation is steady most of the time.

The 7-day average for inflows at Lower Granite is 23.3 kcfs. The 7-day average for inflows at McNary is 141.9 kcfs. The 7-day average for inflows at Bonneville is 155.8 kcfs. That operation will continue in order to maintain the 11.5 foot tailwater elevation for chum incubation.

b. Fish. There is nothing happening now to report, Paul Wagner said. There have been no adult counts since December 15. He asked about the contract extension to continue video counts at McNary. The results will be available this summer, Jim Adams said. There were some equipment problems during the extended count, and the video camera might have run out of tape. Scott Bettin noted that FPOM discussed this recently, and the FPP has been modified accordingly.

Adams asked when TMT should discuss pinniped management again. Wagner suggested the end of March.

c. Power System. As noted during TMT's last conference call, a NERC alert was not declared, thanks to offline resources that were brought back online to avert a power emergency, Tony Norris said. The 1 maf of summer flow augmentation, as called for by the treaty with Canada, will be stored by the end of January.

d. Water Quality. There is nothing to report, Jim Adams said.

8. Next Meeting

The next TMT meeting will be in person on February 13 at NOAA's offices in Portland. Agenda topics include the draft 2008 WMP, water supply forecasts, possibly a Spring Creek Hatchery update, and the usual operations review. This summary prepared by consultant and writer Pat Vivian.

Name	Affiliation
Jim Adams	COE
Dave Wills	USFWS
Paul Wagner	NOAA
Tina Lundell	COE
Tony Norris	BPA
Jim Litchfield	Montana
Scott Boyd	COE
Bob Buchholz	COE
Russ George	WMC
Scott Bettin	BPA
Bob Diaz	XXX
Laura Hamilton	COE
Don Faulkner	COE
Cathy Hlebechuk	COE
Rudd Turner	COE
Stephen Phillips	PSMFC

Phone:
Kyle Dittmer CRITFC

John Roache	BOR
Daniel Spear	BPA
Dave Benner	FPC
Barry Espensen	CBB
Glen Trager	Shell Energy
Terry Weeks	PNGC
Tim Heizenrader	Centaurus
Holli Krebs	Bear Stearns
John Ell	Constellation
Ruth Burris	PGE
Tom Le	Puget Sound Energy
Richelle Beck	DRA

TECHNICAL MANAGEMENT TEAM

BOR : John Roache / Mary Mellema / Pat McGrane **BPA :** Robyn MacKay / Tony Norris / Scott Bettin
NOAA-F: Paul Wagner / Richard Dominique **USFWS :** David Wills / Steve Haeseker
OR : Rick Kruger / Ron Boyce **ID :** Russ Kiefer
WDFW : Cindy LeFleur **MT :** Jim Litchfield / Brian Marotz
COE: Jim Adams / Cathy Hlebechuk / Bob Buchholz

TMT MEETING

Wednesday February 13, 2008 09:00 - 12:00

NOTE: This Week's Meeting Location

NOAA Fisheries
1201 N.E. Lloyd Blvd.
Portland, Oregon

Mt. St. Helens Room, 10th Floor Conference Room

CONFERENCE PHONE LINE

Conference call line: 203-310-2162; PASS CODE = 4703150

**We have had disruptions on the phone because people are not hitting 'mute' after dial in.
Please MUTE your Phone**

*All members are encouraged to call Robin Gumpert with any issues or concerns they would like to see addressed.
Please e-mail her at robin76@cnmw.net or call her at (503) 248-4703.*

AGENDA

1. Welcome and Introductions
2. Review [\[Meeting Minutes\]](#) 
3. Water Supply Forecast, Corps
 - A. [\[Main water supply page - Overview\]](#)
 - B. [\[Current Month precip\]](#)
 - C. [\[Seasonal Month Precip\]](#)
 - D. [\[Snow\]](#)
 - E. Corps Volume Inflow Forecast
 - i. [\[Libby\]](#)
 - ii. [\[Dworshak\]](#)
 - F. RFC Water Supply/ESP
 - i. [\[Libby\]](#)
 - ii. [\[Hungry Horse\]](#)
 - iii. [\[Albeni Falls\]](#)
 - iv. [\[Grand Coulee\]](#)

- v. [\[Dworshak\]](#)
- vi. [\[Brownlee\]](#)
- vii. [\[Lower Granite\]](#)
- viii. [\[The Dalles\]](#)

G. Climate Prediction Center Forecasts

- i. 1-month outlook
 - a. [\[Precipitation Probability\]](#)
 - b. [\[Temperature Probability\]](#)
- ii. 90-day outlook
 - a. [\[Precipitation Probability\]](#)
 - b. [\[Temperature Probability\]](#)

4. Revised Draft 2008 Water Management Plan - Scott Boyd, USACE

[\[Draft 2008 WM Plan\]](#) 

5. Spring Creek - David Wills, USF&WS

6. Operations Review

7. Other

- Set agenda for next meeting - **February 27, 2008**

[\[Calendar 2008\]](#) 

Questions about the meeting may be referred to:

[Jim Adams](#) at (503) 808-3938, or

[Cathy Hlebechuk](#) at (503) 808-3942, or

[Bob Buchholz](#) at (503) 808-3945.

COLUMBIA RIVER REGIONAL FORUM

TECHNICAL MANAGEMENT TEAM

February 13, 2008 Meeting

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Robin Gumpert

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.

Official Minutes/Facilitator Notes

Paul Wagner, NOAA, offered a change to the official Meeting Minutes from the 1/16/08 meeting: In the section on Dworshak Lessons Learned, change the word “no” to “little” benefit.

Water Supply Forecast

Several links were posted to this agenda item that offered forecasts from the COE and Regional Forecast Center. Jim Adams, COE, pointed out the disparities between the two forecasts for Libby (COE: 103% of normal, RFC: 95% of normal) and Dworshak (COE: 102%, RFC: 105%), and noted that the COE would use its own forecasting methodology to manage flood control targets. Given the latest forecast, the Libby end of February flood control elevation was set at 2399.5 feet; and at Dworshak it was set at 1521.8 feet. Paul Wagner recalled from a previous RFC presentation that the reason for the disparity in forecasts is in methodology: The COE inputs real-time precipitation (potentially causing more fluctuations in the forecast as the season progresses) while the RFC inputs future weather trends (this year projected at “normal”). It was also noted that the increase from the January to the current forecast was due to lower runoff in January. TMT also looked at snow conditions in the area and noted the very high snow levels in the Cascades in Washington and Oregon. Kyle Dittmer, CRITFC, shared that the ENSO index shows the La Nina, with typical colder temperatures and above normal precipitation, has “peaked” indicating that conditions should return to near normal after spring. Finally, it was reported that The Dalles forecast went up slightly and for April-August is 99% of normal.

Draft 2008 Water Management Plan

Comments on the latest draft WMP had been received by NOAA and would be posted after today's meeting – Paul Wagner reported that the changes were aimed at reducing redundancy and making the document more readable. A BiOp status hearing was scheduled for February 20 during which issues potentially affecting the WMP would be discussed. Given this, TMT decided to defer discussion of the WMP until the February 27 meeting.

Spring Creek Operations

Dave Wills, USFWS, reported that the USFWS evaluation of the 2004 Spring Creek hatchery study returns and other collected data was available for review on the Fish Passage Center website under “Miscellaneous Documents”. A technical group of representatives from USFWS, NOAA, COE and BPA developed a draft set of alternative scenarios for Spring Creek operations that they shared with co-managers for review – as of today’s meeting no proposal had been developed. Any recommended operation will be vetted through TMT – this item will be added as a placeholder on the February 27 TMT agenda.

Operations Review

Reservoirs: Libby was at elevation 2406.5’ and targeting 2399.5’ at the end of February. Albeni Falls continued to stay at 2055-2056’, with inflows and outflows both near 15 kcfs. Dworshak elevation was 1521.9’, and with an expected increase in inflows, Jim Adams suggested that outflows might be increased in the later part of February to meet the target elevation by the end of the month. The 7-day average flows were 23 kcfs at Lower Granite, 120 kcfs at McNary and 130 kcfs at Bonneville. Grand Coulee elevation was 1266.8’ and operating to meet power and chum needs, and targeting an April 10 elevation. Hungry Horse was at elevation 3517.31’ with 2.6 kcfs outflows and about 1 kcfs inflows. The Hungry Horse water supply forecast went up from 100% in January to 101% for February (Feb-Jul volume).

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Fish: Nothing to report at this time.

Power system: Nothing to report at this time.

Water quality: Nothing to report at this time.

Next TMT Meeting, February 27 (note the meeting will be held at the COE):

Agenda items include:

- Update on February 20 BiOp Status Hearing
- 2008 Draft WMP and Fall/Winter Update
- Spring Creek Operations
- Fish Run Forecasts
- Operations Review

TMT March Schedule:

Based on the majority of TMT’s availability in March, it was determined that TMT meetings will be held on **March 12th and 26th**, with a placeholder for conference calls on March 5th and 29th.

**Columbia River Regional Forum
Technical Management Team Meeting
February 13, 2008**

1. Introduction

Today's TMT meeting was chaired by Jim Adams (COE) and facilitated by Robin Gumpert (D.S. Consulting), with representatives of COE, NOAA, BOR, BPA, NPCC, Oregon, Montana, Idaho and others attending in person or by phone. 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

Paul Wagner (NOAA) made a small change to a statement reflected in the official minutes for January 16 under "Lessons Learned from 2007: Dworshak Operations." The minutes currently read "NOAA has found no temperature benefit in providing outflow temperature control on Idaho Power releases at Brownlee Dam." Wagner changed "no" to "little" and explained there is a small benefit to be had in terms of temperature control.

3. Water Supply Forecasts

The agenda for today's meeting contains links to all of the forecasts Steve King (RFC) covered in his January 16 briefing to TMT. For comparison purposes, Adams showed TMT the COE and RFC the water supply forecasts for two reservoirs and invited questions about any of the forecasts.

Libby Dam. The COE forecasts 103% of average water supply with an April-August projected runoff volume of 6,493 kaf and an end of February flood control elevation target of 2,399.5 feet. The RFC forecasts only 95% of average flows for Libby. What accounts for the 8% difference? The weather service regression methodology incorporates a trend toward normal, whereas the COE methodology uses real time precipitation data, Wagner and John Roache (BOR) recalled from Steve King's presentation. Adams pointed out that the end-of-month elevation targets are based on COE methodology, and they change when the forecast does.

Dworshak Dam. The COE forecasts 102% of average water supply with an April-July runoff volume of 2,738 kaf and an end of February flood control elevation of 1,521.8 feet. The RFC forecast for Dworshak is 105% of average for the same period. The main reason for the disparity here, Wagner said, is lack of runoff in January. Precipitation has remained on the ground in the form of snow.

The Dalles Dam. The COE and RFC water supply forecasts are about the same, 99% of average.

There was discussion of heavy snowfall this year, large volumes of which have accumulated at lower elevations than usual. These stored water supplies are generally not reflected in the forecasts, Adams said. If there is a warm rain, large runoff volumes could swell rivers. Tony Norris suggested looking at the forecast for Molson Creek in Canada, the headwaters of the Columbia system: flows there were predicted to be way above average. This bodes well for Northwest rivers this year if it comes downstream slowly, Adams said. The multi-variable ENSO index indicates the La Nina trend has probably peaked and will continue into spring or early summer, Kyle Dittmer (CRITFC) noted.

4. Revised Draft 2008 Water Management Plan

The COE has received comments from NOAA on the latest draft of the WMP, Scott Boyd (COE) said. There will probably be a draft fall/winter update to the WMP available by the next TMT meeting February 27. The group discussed the current dilemma: the WMP is essentially on hold pending the outcome of a status hearing with Judge Redden at 1:30 p.m. February 20, yet the WMP needs to be completed by the time spill season starts on April 3. Because several issues to be discussed at the status hearing could affect water management planning, substantive discussion of the WMP was postponed until the February 27 TMT meeting. In the meantime, NOAA's comments will be linked to the draft WMP that is now available on the TMT website.

5. Spring Creek Update

Dave Wills (USFWS) reported that there is no real news since the last meeting because the Salmon Managers are still discussing their options for handling the March 5 release of 7.5 million fish. They could be released all at once or split into two study groups as they were in 2004. Because 4-year-olds from that study are returning this year, we have a more updated evaluation of that experiment, Wills said. The updated evaluation, dated February 1, is posted on the FPC website under Spring Creek, which is accessible via the TMT agenda. TMT will revisit Spring Creek operations at its February 27 meeting.

6. Operations Review

a. Reservoirs. Grand Coulee is at elevation 1,266.8 feet and operating to meet power demands, maintain the 11.5 foot tailwater elevation for chum spawning below Bonneville Dam, and targeting an April10 elevation for spring flow augmentation. Hungry Horse is at elevation 3,517.31 feet, discharging 2.6 kcfs for Columbia Falls minimums. The inflow forecast at Hungry Horse is 101% of normal for the February-July period, with snowpack currently at 108% of normal.

Libby is at elevation 2,406.5 feet, with a target elevation of 2,399.5 feet at end February. Inflows are running between 1.5-3.5 kcfs. Outflows have been ramped up lately to reach the target end of month elevation. Daily and weekend load shaping is expected to occur. Albeni Falls is still operating between 1,055-2,056 feet at the Hope gage, with inflows of 15 kcfs the past few days. Outflows are averaging 12.9 kcfs as of yesterday.

Dworshak is at elevation 1,521.9 feet, with inflows of 2.4 kcfs and outflows still at the minimum of 1.3 kcfs. Outflows are expected to increase later this month in order to meet the target elevation of 1,521.8 feet by end February. Inflows are generally expected to increase over the next few months, and the end of March target elevation will be adjusted accordingly.

The 7-day average for inflows at Lower Granite is 23 kcfs. The 7-day average for inflows at McNary is 120 kcfs. The 7-day average for inflows at Bonneville is 125-130 kcfs.

b. Fish. There was nothing new to report at this meeting.

c. Power System. There was nothing new to report at this meeting.

d. Water Quality. There was nothing new to report at this meeting.

7. Next Meeting

The next TMT meeting will be in person on February 27 at the usual location. Agenda topics include a Spring Creek Hatchery update, the outcome of the February 20 status hearing, fish run forecasts for 2008, and discussion of the draft 2008 WMP, possibly including a fall/winter update. This summary prepared by consultant and writer Pat Vivian.

Name	Affiliation
Jim Adams	COE
Paul Wagner	NOAA
Scott Boyd	COE
Steven Wallace	XX
John Roache	BOR
Tony Norris	BPA
Dave Wills	USFWS
Kyle Dittmer	CRITFC
Shane Scott	NPCC
Holli Krebs	Bear Stearns
Tim Heizenrader	Centaurus
Daniel Spear	BPA
Rick Kruger	Oregon

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TECHNICAL MANAGEMENT TEAM

BOR : John Roache / Mary Mellema / Pat McGrane **BPA :** Robyn MacKay / Tony Norris / Scott Bettin
NOAA-F: Paul Wagner / Richard Dominique **USFWS :** David Wills / Steve Haeseker
OR : Rick Kruger / Ron Boyce **ID :** Russ Kiefer
WDFW : Cindy LeFleur **MT :** Jim Litchfield / Brian Marotz
COE: Jim Adams / Cathy Hlebechuk / Bob Buchholz

TMT MEETING

Wednesday February 27, 2008 09:00 - 12:00

1125 N.W. Couch Street, Suite 4A34
Portland, Oregon 97209-4142
Map Quest [\[Directions\]](#)

CONFERENCE PHONE LINE

Conference call line: 203-310-2162; PASS CODE = 4703150

To check into the building, take the elevator to the 5th floor and the guard will issue you an ID badge if you need one and will take you down to the meeting room on the 4th floor. If you have NOT attended a TMT meeting in the past you will need to call ahead and let Jim Adams (503) 808-3938, Cathy Hlebechuk (503) 808-3942, or Bob Buchholz (503) 808-3945 know, so you can be added to the TMT Visitor List and issued an ID badge. This badge may be used indefinitely. If you have attended TMT in the past you may re-use your ID badge indefinitely. If you are a federal employee you will also need to have an ID badge issued to you which can be used indefinitely.

**We have had disruptions on the phone because people are not hitting 'mute' after dial in.
Please MUTE your Phone**

*All members are encouraged to call Robin Gumpert with any issues or concerns they would like to see addressed.
Please e-mail her at robin76@cnnw.net or call her at (503) 248-4703.*

AGENDA

1. Welcome and Introductions
2. Review [\[Meeting Minutes\]](#) 
3. Update on FOP Status - Rudd Turner, USACE
 1. [\[2008 Fish Operation Plan - Feb 8, 2008\]](#) 
4. 2008 Draft WMP and Fall/Winter Update - Scott Boyd, USACE
5. Bonneville Operations for Spring Creek Hatchery Release - USACE
 1. [\[SOR 2008-1\]](#) 
6. Transportation Permit - Paul Wagner, NOAAF
7. Ocean Ecosystem Indicators Website - Paul Wagner, NOAAF
 1. [\[Ocean Ecosystems\]](#)
8. Adult Fish Return Forecasts - Cindy LeFleur, WDFW
 1. [\[Col Riv Salmon & Steelhead Forecast\]](#)



9. Operations Review

- a. Reservoirs
- b. Fish
- c. Power System
- d. Water Quality

1. [\[Spill Information 2007\]](#)

10. Other

- Set agenda for next meeting - **March 12, 2008**

[\[Calendar 2008\]](#)



Questions about the meeting may be referred to:

[Jim Adams](#) at (503) 808-3938, or

[Cathy Hlebechuk](#) at (503) 808-3942, or

[Bob Buchholz](#) at (503) 808-3945.

2008 Fish Operations Plan

BACKGROUND

The 2008 Fish Operations Plan (FOP) describes actions by the U.S. Army Corps of Engineers (Corps) to implement project operations for fish passage at its Federal Columbia River Power System (FCRPS) dams during the April – August 2008 fish migration season. This plan adopts the project operations contained in the 2007 FOP, as incorporated in the Court’s May 23, 2007 Opinion and Order, through August 31, and modified through consensus during the 2007 migration season. Consistent with the 2004 Biological Opinion adaptive management strategy, water management and project operations for fish passage not addressed in this FOP will be consistent with the operations considered in the 2004 Biological Opinion and in particular, the 2008 Water Management Plan and 2008 Fish Passage Plan (FPP). Additionally, this plan incorporates operational adjustments necessary to perform essential research and to accommodate the installation or adjustment of surface bypass structures subsequent to the 2007 migration season. The structural modifications necessitating changes in operations are: (1) installation of a removable spillway weir (RSW) at Lower Monumental Dam; (2) installation of two prototype temporary spillway weirs (TSWs) at John Day Dam; and, (3) moving one of the two TSWs at McNary Dam to a different spill bay. In addition, the FOP describes operations during low flow periods and load swing hours which occurred in 2007 and were reported to the court. The following is a detailed description of the fish passage operations for the 2008 migration season.

SPRING SPILL OPERATIONS

Lower Snake River - spring spill will occur from April 3, 2008 through June 20, 2008 at Lower Granite, Little Goose, Lower Monumental, and Ice Harbor dams.

Lower Columbia River - spring spill will occur from April 10, 2008 through June 30, 2008 at McNary, John Day, and The Dalles dams and from April 10, 2008 through June 20, 2008 at Bonneville Dam.

Table 1 below summarizes spring spill and transport operations planned for each mainstem dam.

As in 2007, the Corps will manage spill levels to the total dissolved gas (TDG) saturation levels of 120% in the project tailrace and 115% in the forebay of the next project downstream, referred to as “gas caps” in this document. The project spill discharge level needed to meet but not exceed the gas caps is referred to as the “spill cap”. Therefore, the spill cap is the maximum flow rate a project can spill for fish passage that does not exceed the gas caps. The gas caps (120% tailrace and 115% forebay) do not change for dams providing spill for fish passage in the spring and summer. Spill caps, on the other hand, may vary daily depending on flow, temperature, and other environmental conditions.

Table 1. Spring 2008 project spill levels and transport criteria.

Spring 2008

	Planned Operations for Spring 2008 (Day/Night)	Comments
Transport	Initiate transport at Lower Granite Dam between April 20 – May 1 with staggered transport start dates at Little Goose and Lower Monumental. Criteria for start date and stagger days will be provided to TMT *1	Same as 2007
Lower Granite	20kcfs / 20kcfs	Same as 2007
Little Goose	30%/30% Allow for 14 days night Gas Cap spill within the last week of April – second week of May (April 22 – May 15)*. Dates of actual night time spill to be determined by salmon managers within the window of time identified above	Same as 2007
Lower Monumental	gas cap / gas cap (approximately 27 kcfs day/night)	Same as 2007 test program (24 hr gas cap spill), with RSW installed
Ice Harbor	30%/30% vs 45kcfs/gas cap	Same as 2007
McNary	40%/40% (April 10 – June 30)	Same as 2007 for continued prototype temporary spillway weir (TSW) tests
John Day	0 / 60% on non-test days; 30%/30% or ~40%/40% on test days (~April 20 – June 20)	Same as 2007 on non-test days. TSW tests with 24 hour spill planned for 2008
The Dalles	40%/40%	Same as 2007
Bonneville	100kcfs/100kcfs	Same as 2007

*1 Initiation of Transport

* The timing of the 14 days of spill to nighttime gas cap levels will be determined in-season through the TMT processes and is intended to coincide with the peak of the wild spring yearling Chinook migration at Little Goose Dam within the window specified.

SUMMER SPILL OPERATIONS

Lower Snake River - summer spill will occur from June 21, 2008 through August 31, 2008 at Lower Granite, Little Goose, Lower Monumental, and Ice Harbor dams.

Lower Columbia River -summer spill will occur from July 1, 2008 through August 31, 2008 at McNary, John Day, and The Dalles dams and from June 21, 2008 through August 31, 2008 at Bonneville Dam.

Table 2 below summarizes summer spill operations planned for each mainstem dam.

As in 2007, the Corps will manage spill levels to the TDG saturation levels of 120% in the project tailrace and 115% in the forebay of the next project downstream, referred to as “gas caps” in this document. The project spill discharge level needed to meet but not exceed the gas caps is referred to as the “spill cap”. Therefore, the spill cap is the maximum flow rate a project can spill for fish passage that does not exceed the gas caps. The gas caps (120% tailrace and 115% forebay) do not change for dams providing spill for fish passage in the spring and summer. Spill caps, on the other hand, may vary daily depending on flow, temperature, and other environmental conditions.

Table 2. Summer 2008 project spill levels.

Summer 2008

Project	Planned Operations for Summer 2008 (Day/Night)	Comments
Lower Granite	18 kcfs / 18 kcfs	Same as 2007
Little Goose	30% / 30%	Same as 2007
Lower Monumental	17 kcfs / 17 kcfs	Same as 2007
Ice Harbor	30%/30% vs 45kcfs/gas cap	Same as 2007 test program
McNary	40%/40% vs 60%/60%	Same as 2007 test program
John Day	30% / 30% on non-test days; 30%/30% or ~40%/40% on test days (~June 21 – July 20)	Same as 2007 on non-test days. TSW tests with 24 hour spill planned for 2008
The Dalles	40%/40%	Same as 2007
Bonneville	85 or 75kcfs / gas cap (approximately 120 kcfs at night)	Same as 2007 test program

General Guidance for 2008 Fish Operations

For planning purposes, the Corps’ 2008 FOP operations for fish passage assume “average” run-off conditions. However, actual run-off conditions may be higher or lower than average, requiring adjustments in spill levels (kcfs discharge rates, spill percentages, or spill caps) to avoid or minimize poor juvenile or adult fish passage conditions or powerhouse constraints.

Therefore, actual spill levels may vary from the tables above. In addition, spill levels may require adjustments for the following reasons:

- TDG is managed daily in response to changing conditions. Adjustments will be made to manage the spill operation consistent with the states' 2007 TDG saturation limits of 120% tailrace and 115% forebay for fish passage.
- Power system and other project emergencies, including unplanned/unanticipated facility maintenance or outages, may necessitate temporary adjustments in accordance with established protocols.

The following sections describe the processes for spill management during high and low runoff conditions, TDG management, spillway operation, minimum generation, specific spring and summer operations for fish passage for each mainstem project, juvenile fish transportation program operations, protocols for emergencies, and reporting.

Spill Management

The Corps will initiate spill at 0001 hours, or shortly after midnight, at each of the projects on the start dates specified above. Spill caps will be established at the specified amounts and will continue unless conditions require changing to maintain TDG within the states' 2007 limits of 120% in the tailwater of a dam and 115% in the forebay of the next project downstream (and at Camas/Washougal). Spill will terminate at 2359 hours, or shortly before midnight, at each project on the end dates specified above.

The spill rates represented in Tables 1 and 2 assume average runoff conditions; however, actual conditions may require adjustments to these spill rates. Actual spill rates may increase above the specified rates for several reasons:

1. high runoff conditions where flows exceed the powerhouse hydraulic capacity with the specified spill rates;
2. generation unit outages that reduce powerhouse capacity;
3. power system or other emergencies that reduce powerhouse discharges; and,
4. a lack of power load resulting in an increase in the rate of spill.

Spill below the specified rates could occur during low runoff conditions when meeting minimum generation levels at a project requires reducing spill rates. This would most likely occur in late July and August. Minimum generation and spill rates are included below in the project specific information. Spill also may be reduced to accommodate navigation issues or other exigencies.

To make adjustments in response to changes in conditions, the Corps will utilize the existing Regional Forum committees. Changes in spill rates when flow conditions are higher or lower than anticipated will be coordinated through the regional forum Technical Management Team (TMT). This could include potential issues and adjustments to the juvenile fish transportation program. Spill patterns and biological test issues that have not been coordinated to date will be coordinated through the Corps' Anadromous Fish Evaluation Program (AFEP) subcommittees, which include the Studies Review Work Group (SRWG), Fish Facility Design Review Work Group (FFDRWG), and Fish Passage Operations and Maintenance Coordination Team (FPOM).

Total Dissolved Gas Management

In order to manage gas cap spill rates consistent with the states' 120%/115% TDG limits for fish passage spill used in 2007, the Corps' Reservoir Control Center (RCC) establishes the spill caps for each project on the lower Columbia and Snake rivers on a daily basis throughout the fish passage season. These spill caps are set so that resultant TDG percent saturation levels are not expected to exceed the 120%/115% TDG limits, measured as an average of the highest 12 hourly readings each day as was done in 2007. Within any given day, some hours of measured TDG levels may be higher or lower than the gas caps due to changing environmental conditions (wind, air temperature, etc). The process of establishing daily spill caps entails reviewing existing hourly data at each dam (including flow, spill, temperature, and TDG levels) and taking into consideration a number of forecast conditions (including total flow, flow through the powerhouse, wind and temperature forecast, etc.). This information is used as input into the SYSTDG (System TDG) modeling tool. The SYSTDG model estimates TDG levels in the rivers several days into the future and is a tool integral to daily decision-making when establishing spill caps at individual dams.

SYSTDG output is used to guide decisions to establish spill caps at each dam to avoid exceedances of the gas caps. However, during the spring freshet when flows are expected to be greater than hydraulic capacity with the specified spill rates at the dams, or if a lack of power load results in an increase in the spill rate, the Corps will attempt to minimize TDG on a system-wide basis. In this case, spill caps are also developed for 125%, 130%, or 135% saturation to minimize TDG throughout the system.

Spill caps set by RCC in daily spill priority requests will be met at the projects by using the spill pattern in the appropriate FPP spill table which most closely corresponds to the requested spill, either over or under the spill request. Spill caps will be adjusted on a daily basis as needed to avoid exceeding the gas caps. Operations to manage TDG will continue to be coordinated through the TMT.

Spillway Operations

Actual hourly spill quantities at dams will be slightly greater or less than shown in Tables 1 and 2. The Action Agencies will meet the requested spill levels to the extent possible, as described in Table 3. However, actual spill levels depend on the precision of spill gate settings, flow variations in real time, varying project head (the elevation difference between a project's forebay and tailwater), and other factors. Operations considerations are as follows:

Spill discharge rates: Due to limits in the precision of spill gates and control devices, short term flow variations, and head changes, it is not possible to discharge exactly the spill rates stated in the Tables 1 and 2, or as stated in RCC spill requests to projects that call for specific spill discharges. Therefore, spillway gates are opened to the settings in FPP spill pattern tables which provide discharges that are the closest to the agreed upon spill discharge rate. The spill rates in Table 3 coincide with specific gate settings in the FPP spill tables. Actual spill may be higher or lower than the identified spill rate.

Spill percentages: Spill percentages are considered target spill levels. The project control room operator and BPA duty scheduler calculate spill rates to attempt to be within +/- 1% of the target percentage for the following hour (Table 3). These percentages may not be attained due to low flow conditions, periods of minimum generation, when spill caps limit spill amounts, when spill is curtailed for navigation safety, and other circumstances. Operators and schedulers will review the percentages achieved during the day and adjust spill rates in later hours, with the objective of ending the day with a day average spill that achieves the target.

Minimum Generation

The Corps has identified minimum generation flows derived from FPP tables which specify turbine operation within the 1% of best efficiency range. These figures are approximations and do not account for varying head or other small adjustments that may result in variations in the reported minimum generation flow and spill amount. Conditions that may result in minor variations include:

1. Varying pool elevation: as reservoirs fluctuate within the operating range, flow rates through the generating unit change.
2. Generating unit governor "dead band": the governor controls the number of megawatts the unit should generate and cannot precisely control a unit; variations can be +/- 1% to 2% of generation.
3. System disturbances: once the generator is online and connected to the grid, it responds to changes in system voltage and frequency. These changes may cause the unit to increase flow and generation slightly within an hour.
4. Individual units may behave slightly differently or have unit specific constraints.
5. Generation control systems regulate megawatts (MW) generation only, and not flow through turbines.

All of the lower Snake River powerhouses may be required to keep one generating unit on line at all times for power system reliability. During low flows, one generator is run at the bottom of the 1% of best efficiency range. All of the Snake River plants have 2 "families" of turbines with slightly different capacities. In most cases one of the smaller units, with somewhat less generation and flow, will be online during these times. At the Snake River dams, the smaller units are generally numbered 1 – 3 and are the first priority for operation during the fish passage season. However, if smaller units are unavailable, one of the larger units may be used. Further, at Lower Monumental, generating unit 1, which is the first priority unit during fish passage, is damaged and cannot operate at the low end of the design range. However, because this unit is a fish passage priority TMT may recommend use of this unit, which will result in higher turbine discharge rates than shown in the Lower Monumental Summer Operation Considerations section below. In addition, Ice Harbor units cannot be operated at the lower end of the 1% of best efficiency range. These units experience cavitation at a generation level somewhat higher than the lower 1% limit, which damages the turbine and can be detrimental to fish. Therefore, Ice Harbor units will operate at their lower cavitation limits, as in 2007.

Table 3. Comparison of 2008 spill levels in Tables 1 and 2 with operational spill levels at mainstem dams.

Season/Project	2008 Spill Levels in Tables 1 and 2	2008 Operational Spill Levels	Comments
Spring			
Lower Granite	20 kcfs day/night	20.4 kcfs	Will fluctuate due to project head changes
Little Goose	30% day/night	30% +/- 1% hourly; 14 nights at spill cap	Target* 30% as a day average; meet nightly spill cap for 14 nights
Lower Monumental	27 kcfs day/night (gas cap)	spill cap day/night	Meet spill cap daily
Ice Harbor	30% day/night vs. 45 kcfs day / gas cap night	30% +/- 1% hourly; 45.6 kcfs day / spill cap night	Target 30% as a day average; 45.6 kcfs will fluctuate due to head changes; meet nightly spill cap
McNary	40% day/night	40% +/- 1% hourly	Target 40% as a day average
John Day	0 day / 60% night (non-test dates); 30% & ~40% day/night (test dates)	60%, 30%, ~40% +/- 1% hourly	Target percentages as a nightly or day average
The Dalles	40% day/night	40% +/- 1% hourly	Target 40% as a day average
Bonneville	100 kcfs day/night	100 kcfs	Will fluctuate due to head changes
Summer			
Lower Granite	18 kcfs day/night	18.6 kcfs	Will fluctuate due to head changes
Little Goose	30% day/night	30% +/- 1% hourly	Target 30% as a day average
Lower Monumental	17 kcfs day/night	17.1 kcfs	Will fluctuate due to head changes
Ice Harbor	30% day/night vs. 45 kcfs day / gas cap night	30% +/- 1% hourly; 45.6 kcfs day / spill cap night	Target 30% as a day average; 45.6 kcfs will fluctuate due to head changes; meet nightly spill cap
McNary	40% day/night vs. 60% day/night	40% +/- 1% hourly; 60% +/- 1% hourly	Target 40% or 60% as a day average
John Day	30% day/night	30% +/- 1% hourly	Target 30% as a day average
The Dalles	40% day/night	40% +/- 1% hourly	Target 40% as a day average
Bonneville	85 or 75 kcfs day / 120 kcfs night	85.3 or 74.6 kcfs day / spill cap night **	85.3 & 74.6 kcfs will fluctuate due to head changes; meet nightly spill cap

* Target: Make best effort to meet a specified spill level through frequent monitoring, projections, and spill adjustments within the defined range of variation. This will occur for each project through analysis and coordination between the Corps and BPA.

** The Bonneville Dam summer daytime spill discharge rate will be 85 kcfs until approximately July 20 for testing, then 75 kcfs through August 31.

Low Flow Operations

Low flow operations on Lower Snake projects are triggered when inflow is not sufficient to provide for both minimum generation and the planned spill levels. In these situations, the projects will operate one unit at minimum generation and spill the remainder of flow coming into the project. As flows transition from higher flows to low flows, there may be situations when flows recede at a higher rate than forecasted. In addition, inflows provided by nonfederal projects upstream are variable and uncertain. The combination of these factors may result in instances where unanticipated changes to inflow result in forebay elevations dropping to the low end of the Minimum Operating Pool (MOP). Since these projects have limited operating flexibility, maintaining minimum generation and the target spill may not be possible on every hour.

Also during these low flow operations, additional flow that is passed through a dam as the result of navigational lockages becomes more apparent. This is because the volume of water needed to empty the navigation lock during periods of low flow is a greater percentage of the total flow than it had been earlier in the season. As a result, the official recorded spill percent through the spillway appears to be reduced since it does not include this volume of water needed to empty the navigation lock.

Dates to start transporting fish at the Snake collector projects will be advanced if the spring seasonal flows at Lower Granite Dam are projected to be less than 70 kcfs. In that case, transportation will begin on April 20 at all three Snake collector projects instead of a staggered start as planned when seasonal flows are expected to be 70 kcfs or higher. Transportation operations and research are described in the “Juvenile Fish Transportation Program Operations” section on pages 24 – 26 of this document. Spill for fish passage will be provided under all flow conditions.

Operations during Load Swing Hours

Project operations during load swing hours may result in not meeting hourly spill, mostly at McNary, John Day, and The Dalles dams. This occurs because projects must be available to respond to within-hour load variability to satisfy North American Electric Reliability Council (NERC) reserve requirements (“on response”). During periods of rapidly changing loads, projects on response may have significant changes in turbine discharge within the hour. Under normal conditions, within-hour load changes occur mostly on hours immediately preceding and after the peak load hours, while spill quantity remains the same within the hour, however, sometimes several hours after peak load hours the project may still be decreasing total outflow and generation faster than the corresponding spill decreases causing the percent spill to be slightly higher. These hours are referred to as “load swing hours.” Due to the high variability of within-hour load, these load swing hours may have a greater instance of reporting actual spill percentages that vary more than the +/- 1% requirement than other hours. On the days this occurred in 2007, the day or night-time average spill was within the FOP level of +/- 1% of the target spill.

Spring and Summer Operations for Fish Passage by Project

The following describes the spring and summer operations by project. Included in the description is planned research as considered in the 2004 Biological Opinion. The Corps, and the regional agencies and Tribes are interested in the continuation of project research studies under the Corps' AFEP. These studies have undergone review by the regional agencies and Tribes. The studies are intended to provide further information on project survival and assist the region in making decisions on future operations and configuration actions to improve fish passage at the Lower Snake and Columbia River dams.

Lower Granite

Spring Spill Operations April 3 – June 20, 2008: 20 kcfs (including approximately 6 kcfs from the RSW and 14 kcfs from the training spill) 24 hours/day with the Removable Spillway Weir (RSW) operating. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Spring research operations: Normal spring spill patterns and rates as described in the FPP will be used. There will be no specific spill variations for testing.

Operation considerations:

- Unit 2 will be out of service until late September 2008. The powerhouse will operate with no more than 5 units on during the spring and summer spill seasons. A contract for fire protection installation will take one unit at a time out of service, starting in July and continuing through the summer.
- With one unit out of service, powerhouse capacity is about 85 kcfs. If total river discharge is greater than approximately 105 kcfs, then spillway discharge will be forced above RSW spill + training spill levels. This involuntary spill could result in gas cap exceedances. Lack of power load also could cause involuntary spill at higher total river discharges.
- Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.

Summer Spill Operations June 21 – August 31, 2008: 18 kcfs (including approximately 6 kcfs from the RSW and 12 kcfs from the training spill) 24 hours/day with the RSW operating. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Summer research operations: Normal summer spill patterns and rates as described in the FPP will be used. There will be no specific spill variations for testing.

Operation considerations:

- Minimum spill: During periods of low flow before the spring freshet and during the summer period, there may be periods where spill quantities are limited so that tailrace conditions are not advantageous to fish passage. If such low runoff conditions occur, alternative spill operations at the dam will be coordinated through the TMT.
- Minimum generation: The minimum generation amount represents the operation of one unit at the lower end of its 1% efficiency range and is needed for power system reliability. This generation will be controlled to approximately 81 – 83 MW at units 1 – 3, the priority fish units. If these units are not available, the larger units 4 – 6 will be run at 96 - 100 MW. This will result in turbine flows of approximately 11 kcfs – 12 kcfs at units 1 – 3 and 12.5 kcfs - 13.5 kcfs at units 4 - 6. There may be slight variations in the generation due to power system fluctuations. Also, the outflow will fluctuate because of changing head at the dam. This condition may occur in early spring before the freshet and during the late summer period with low flow conditions.
- Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.

Little Goose

Spring Spill Operations April 3 – June 20, 2008: 30% spill 24 hours/day. In addition, allow for 14 nights of spill up to gas cap spill rates between April 22 and May 15. Nighttime spill hours are 1800 – 0600. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Spill duration for testing: Adult passage will be studied throughout the spring spill period.
- Spring research operations: 30% spill 24 hour/day. Bulk and uniform spill patterns (2 or 3 patterns) will be tested. Final test conditions will be coordinated through the SRWG.
- Objectives of the biological test: The primary objectives of the spring and summer test will be to inform decisions on TSW placement and operation in 2009 to provide effective juvenile fish passage while allowing adult fish to pass. Radio tagged adult fish will be tracked in the tailrace and into the fishway under the various spill operations. No juvenile survival studies are planned for Little Goose during spring or summer 2008.
- Spill pattern during the biological test: The test spill patterns will be developed through ERDC modeling and in coordination with SRWG.

Operation considerations:

- o In the 2005 summer spill period, adult passage was blocked when daytime spill levels exceeded 30%. Also, adult passage was impaired in May 2007 with a bulk spill pattern. The study is designed to determine the hydraulics causing the blockages. In order to discern cause of the poor adult passage conditions it is necessary to monitor fish during both good and poor passage conditions. Slower fish passage may occur a couple days each week. In-season reporting will allow treatments to be adjusted through SRWG and TMT adaptive management processes to meet the study objectives or to ensure good adult passage is maintained in the course of the season.
- o In both spring and summer, day average flows in the lower Snake River near 30 kcfs can result in incompatible operations with Lower Monumental Dam and cause spill quantity fluctuations.
- o Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.
- o The powerhouse capacity with all six units in service operating within 1% best efficiency is approximately 107 kcfs. However, Unit 6 is currently forced out of service with a ground fault. Indications are that the unit will remain out of service through the spring season. With 5 units operating, powerhouse turbine capacity within the 1% of best efficiency range is about 88 kcfs. If the total river discharge is greater than approximately 115 kcfs, then spillway discharge will be forced above the planned operation of 30% spill.
- o Nighttime spill up to gas cap rates will be provided for 14 days between April 22 and May 15. The spill is intended to coincide with peak passage periods for wild yearling Chinook. The 14 spill days do not have to be consecutive. Actual dates will be determined through coordination with TMT.

Summer Spill Operations June 21 – August 31, 2008: 30% spill 24 hours/day. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Spill duration for testing: Adult passage will be studied throughout the summer spill period.
- Summer research operations: 30% spill 24 hour/day. The spill patterns used in the spring will be continued in the summer. Final test conditions will be coordinated through the SRWG.
- Objectives of the biological test: The primary objectives of the spring and summer test will be to inform decisions on TSW placement and operation in 2009 to provide effective juvenile fish passage while allowing adult fish to pass. Radio tagged adult fish will be tracked in the tailrace and into the fishway under the various spill operations. No juvenile passage studies are planned for Little Goose during spring or summer in 2008.

- Spill pattern during the biological test: The test spill patterns will be developed through ERDC modeling and in coordination with SRWG.

Operation considerations:

- Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.
- Minimum spill: During periods of low flow before the spring freshet and during the late summer period, there may be periods where spill quantities are so low that it creates tailrace conditions not advantageous to fish passage. If such flow conditions occur, alternative operations at the dam will be coordinated through the TMT.
- Minimum generation: The minimum generation amount represents the operation of one unit at the lower end of its 1% efficiency range and is needed for power system reliability. This generation will be controlled to approximately 81 – 83 MW at units 1 – 3, the priority fish units. If these units are not available, the larger units 4 – 6 will be run at 100 - 104 MW. This should result in turbine flows of 11 kcfs – 12 kcfs at units 1 – 3 and 13 kcfs – 14 kcfs at units 4 – 6. There may be slight variations in the generation due to power system fluctuations. Also, the outflow will fluctuate because of changing head at the dam. This situation may occur in early spring before the freshet and during the late summer period with low flow conditions.

Once the operations for research are completed, the spill patterns will return to normal operation as described in the FPP and to the spill levels as shown in the tables above.

Lower Monumental

Spring Spill Operations April 3 – June 20, 2008: Spill to the spill cap 24 hours/day. The estimated spring spill cap rate is 27 kcfs. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Spill duration for testing: Approximately May 1 – May 31. The dates of testing will be dependent on the size of fish and fish availability. Final dates for testing will be coordinated through the SRWG.
- Spring research operations: A two treatment test will be conducted, utilizing the bulk spill pattern from 2006-2007 versus the 2003 uniform (flat) pattern modified for the RSW in spill bay 8. Pattern changes will occur at 0600. However, if the runoff forecast is high, a one treatment study would be conducted as the higher the spill levels the more similar the two patterns become.

- Objectives of the biological test: The objectives of the study are to assess passage distribution and efficiency metrics, forebay retention, tailrace egress, and survival for yearling Chinook, and steelhead for two spill pattern treatments, a bulk spill pattern and a uniform pattern with the RSW. This will be the first year of testing of the RSW at Lower Monumental Dam.
- Spill pattern during the biological test: Spill patterns will be verified through ERDC modeling and SRWG coordination.

Operation considerations:

- In the spring and summer, day average flows near 30 kcfs results in incompatible operations with Little Goose Dam and results in spill quantity fluctuation.
- The Lower Monumental spill cap is affected by Little Goose Dam operations. Therefore, spill discharge could be lower than 27 kcfs.
- The removable spillway weir (RSW) was installed in October 2007 and will be tested in 2008.
- Spill will be reduced or stopped as needed to allow safe operation of fish transportation barges near collection facilities downstream of the project. Spill changes will be minimized in order to reduce effects on spill research.
- Operating units within the 1% of best efficiency range yields up to 19 kcfs per unit at each of the 6 units for a maximum hydraulic capacity of approximately 114 kcfs. The expected spill cap is 27 kcfs. Therefore, if total river discharge is greater than 141 kcfs the gas cap will be exceeded. Either lack of power load or unit outages can also cause forced spill above spill cap rates at higher total river discharges.
- Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.

During non-test periods, the spill patterns will return to normal operation as described in the FPP and to the spill levels as shown in the tables above.

Summer Spill Operations June 21 – August 31, 2008: Spill 17 kcfs 24 hours per day, subject to gas cap limits. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Spill duration for testing: June 21 – mid-July, or possibly earlier. The dates of testing will be dependent on the availability of Subyearling Chinook of sufficient size for tagging. Final dates for testing will be coordinated through the FFDRWG.

- Summer research operations: 17 kcfs 24 hours per day with one spill pattern treatment. The spill pattern will be the pattern used in 2006 and coordinated through SRWG. The 2007 pattern for navigation appeared to have lower fish survival than in 2006.
- Objectives of the biological test: Estimate passage distribution and survival for subyearling fall Chinook salmon under two spill pattern treatments.
- Spill pattern during the biological test: FPP spill patterns will be provided in February.

Operation considerations:

- As in the spring, the summer spill caps may be affected by Little Goose operations.
- Minimum spill: During periods of low flow before the spring freshet and during the summer period, there may be periods when spill quantities are limited so that tailrace conditions are not advantageous to fish passage. This is interpreted to be a minimum of spill through the RSW only (6.8 kcfs with the reservoir operating at MOP). If such a low flow condition occurs, alternative operations at the dam will be coordinated through the TMT.
- Minimum generation: The minimum generation amount represents the operation of one unit at the lower end of its 1% of best efficiency range and is needed for power system reliability. This generation will be controlled to approximately 81 – 83 MW at units 2 – 3, the priority fish units. If these units are not available, the larger units 4 – 6 will be run at 104 - 106 MW on units 4 – 6, or 126 – 129 MW on unit 1 which has welded fixed blades. This will result in turbine flows of approximately 11 kcfs – 14 kcfs at units 2 – 6 and 17 kcfs – 19 kcfs if unit 1 is used. There may be slight variations in the generation due to power system fluctuations. Also, the outflow will fluctuate because of changing head at the dam. This limit may occur in early spring before the freshet and during the late summer period with low flow conditions.
- Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.
- A spill pattern or spill operation which will not adversely affect barge traffic and juvenile fall Chinook survival is still in development. During 2007 a spill pattern was developed with the assistance of the tow boat operators. However, survival of fall Chinook during 2007 was lower than that observed in 2006. A period of no spill during the time when barges approach the lock may be the best solution to balancing the needs of barge traffic and fish operations.

Ice Harbor

Spring Spill Operations April 3 – June 20, 2008: Alternate between 45 kcfs day/spill cap night and 30% 24 hours per day with the RSW operating, following a test schedule similar to that used in 2007. Nighttime spill hours are 1800 – 0500. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Spring research operations: Normal spring spill patterns and rates as described in the FPP will be used. Radio tagged fish will be monitored to evaluate spill and project survival for two test conditions (single release model). Dates for 30% spill 24 hours per day will follow a schedule similar to that used in 2007, alternating every 2 days with 45 kcfs day / spill cap night in a randomized block design. This will start May 2 and continue through July 16. Spill will be 45 kcfs day / spill cap night before May 2 and after July 16. Both spill operations will have the RSW operating.
- Objectives of the biological test: The primary objective of the test is to determine spill and project survival under two spill conditions for yearling Chinook and steelhead.
- Spill pattern: FPP spill patterns will be used (FPP Tables IHR-9 and IHR-10).

Operation considerations:

- Powerhouse capacity at Ice Harbor is approximately 94 kcfs with all 6 units operating, while spill cap rates are about 100 kcfs. If total river flows exceed about 194 kcfs, TDG levels may exceed the limits set by the states of Oregon and Washington.
- Minimum generation or higher powerhouse operation will occur at all times during both the spring and summer fish spill seasons in 2008. This is due to a transformer failure at BPA's Sacajawea transmission facility near the project. Mobile capacitor groups will be installed at BPA's Franklin transmission facility to partially resolve power system issues. In addition, continuous generation is required at Ice Harbor Dam for power system stability and reliability.
- Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.

Summer Spill Operations June 21 – August 31, 2008: Alternate between 45 kcfs day/spill cap night and 30% 24 hours per day with the RSW operating through July 16, then spill 45 kcfs day / spill cap night through August 31. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Summer research operations: Continue 30% spill vs. 45 kcfs day / spill cap night through July 16, following a test schedule similar to that used in 2007. Both operations will have the RSW operating.
- Objectives of the biological test: The primary objective of the test is to determine spill and project survival under two spill conditions for subyearling Chinook.
- Spill pattern during the biological test: FPP spill patterns will be used (FPP Tables IHR-9 and IHR-10, same as spring).

Operation considerations:

- Minimum spill: During periods of low flow before the spring freshet and during the summer period, there may be periods where spill quantities are limited so that tailrace conditions are not advantageous to fish passage. The minimum spill for Ice Harbor Dam is 15.2 kcfs, which includes providing spill through the RSW and training spill to ensure good tailrace egress conditions. If such a low flow condition occurs, alternative operations at the dam will be coordinated through the TMT.
- Minimum generation: The minimum generation amount represents the operation of one unit at the lower cavitation limit. The cavitation limit is within the 1% of best efficiency range. This generation will be controlled to approximately 65 – 70 MW at units 1 and 3, the priority fish units. If these units are not available, the larger units 4 – 6 will be run at 80 – 81 MW. This will result in turbine flows of approximately 9 kcfs – 10 kcfs at units 1 – 3 and 11 kcfs – 12 kcfs at units 4 – 6. Unit 2 has been modified by fixing the blades in a single position to eliminate an oil leak. As a result, its MW output and kcfs discharge at the low end of 1% will be higher than the other 5 units. Unit 2 is the last priority unit to operate and therefore is unlikely to operate to meet minimum generation. There may be slight variations in the generation due to power system fluctuations. Also, the outflow will fluctuate because of changing head at the dam. This limit may occur in early spring before the freshet and during the late summer period with low flow conditions.
- Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.

McNary

Spring Spill Operations April 10 – June 30, 2008: 40% spill 24 hours/day. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Spill duration for testing: Approximately April 20 to early June (tentative). The dates of testing will be dependent on the size of fish, fish availability, and the number

of treatments needed for testing. Final dates for testing will be coordinated through the SRWG.

- Spring research operations: 40% spill 24 hours/day for the second year of prototype Temporary Spillway Weir (TSW) testing. One project spill configuration will be tested. Final test conditions will be coordinated through the SRWG.
- Objectives of the biological test:
 - Estimate passage and survival rates of yearling Chinook salmon under a single treatment of project operations.
 - Estimate passage and survival rates of juvenile steelhead under a single treatment of project operations.
 - Characterize juvenile salmon behavior in the forebay of McNary Dam under a single treatment of project operations.
- Spill pattern: As outlined in an addendum to the FPP. The Corps' Walla Walla District coordinated with regional fishery managers and evaluated new spill patterns with general model observations. Test spill patterns are provided in Appendix 1.

Operation considerations:

- TSW1 is placed in spill bay 19 (relocated from spill bay 22) while TSW2 remains in spill bay 20 for 2008 testing. This configuration was regionally reviewed and supported.
- During the periods when total river discharge exceeds approximately 320 kcfs, involuntary spill in excess of the states' TDG limits for fish passage, may occur.
- In addition, low power demand may also necessitate involuntary spill during any given spill treatment at total river discharges of less than 320 kcfs.
- Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.

Once research spill operations are completed, the spill pattern will return to normal operation as described in the FPP (Table MCN-6).

Summer Spill Operations July 1 – August 31, 2008: 40% spill vs. 60% spill 24 hours/day. Spill conditions will be alternated every two days. Spill changes will occur at 0600. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Spill duration for testing: approximately June 15 through July 25 (tentative). The dates of testing will be dependent on the size of fish, fish availability, and the number of treatments needed for testing. Final dates for testing will be coordinated through the SRWG.

- Summer research operations: 40% spill 24 hours/day vs. 60% spill 24 hours/day. Continue to evaluate TSW performance. The spill will be alternated in two day blocks which will be randomized during testing.
- Objectives of the biological test:
 - Estimate passage and survival rates of subyearling fall Chinook salmon under two treatments of project operations.
 - Characterize juvenile salmon behavior in the forebay of McNary Dam under two treatments of project operations.
- Spill pattern during the biological test: Spill pattern details were identified using the general model at ERDC by USACE Walla Walla District staff and representatives of the regional fisheries agencies and tribes. Test spill patterns are provided in Appendix 1. A single spill pattern will be tested at the 40% and 60% spill levels, using the 2006 spill pattern modified for placement of the TSWs in spill bays 19 and 20.

Operation considerations:

- Spill will be curtailed as needed to allow safe operation of fish transportation barges near collection facilities downstream of the project. Spill changes will be minimized in order to reduce effects on spill research. Specifically, the spillway, including TSWs in spill bays 19 and 20, will be closed while barges are crossing the tailrace (15 – 30 minutes per crossing). Gate hoists at spill bays 19 and 20 will be modified to allow closure with TSWs in place.
- Minimum generation: A minimum powerhouse discharge of 50 kcfs is required at all times to meet minimum generation requirements. The lower Columbia River dams provide some of the required generation capacity reserves for the power system. Due to this requirement and the constant fluctuations in power demands throughout the day, the 50 kcfs flow cannot be maintained precisely on an hourly basis. The flow may increase by as much as 10 kcfs for short periods. Therefore, the minimum generation flow should meet or exceed 50 kcfs for all hours.
- If total river discharge drops below about 90 kcfs, 40% spill treatments may be reduced to maintain 50 kcfs powerhouse discharge. Similarly, if total river discharge drops below about 135 kcfs, 60% spill treatments may be reduced to maintain a 50 kcfs powerhouse discharge.
- Minimum spill: During periods of low flow before the spring freshet and during the summer period, there may be periods where spill quantities are limited so that tailrace conditions are not advantageous to fish passage. If such a low flow condition occurs, alternative operations at the dam will be coordinated through the TMT.

- o Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.

Once research spill operations are completed, the spill pattern will return to normal operation as described in the FPP (Table MCN-6).

John Day

Spring Spill Operations April 10 – June 30, 2008: 0 kcfs spill day/60% spill night. Nighttime spill hours are 1800 – 0600 from April 10 through May 14 and 1900 – 0600 May 15 through June 30. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Spill duration for prototype TSW testing: Testing in late April through early June. The dates of testing will be dependent on the size of fish, fish availability, and the number of treatments needed for testing. Final dates for testing will be coordinated through the SRWG.
- Spring research operations: Two prototype TSWs that pass about 10 kcfs spill each will be installed in spill bays 18 and 19. Training spill patterns to support the TSW jets and provide good downstream egress for juvenile salmonids are currently being developed by modeling at ERDC and coordination with regional agencies. Two spill levels will be tested to provide spill / TSW efficiency curves. These data will be used to design surface flow outlet and tailrace improvements at John Day Dam.
- Objectives of the biological test: The objectives of the study are to assess passage distribution and efficiency metrics, forebay retention, tailrace egress, and survival for yearling Chinook, and juvenile steelhead for two spill treatments. Also, prior to the smolt migration, a direct survival and injury test using balloon-tagged fish will be conducted.
- Spill pattern during biological test: 10 – 20 April, prior to the test, same as 2007 FOP except the spill pattern will be modified to use spill bays 1 – 17 only. Spill bays 18 and 19 will have the TSWs installed, which are not easily opened and closed. During 20 April to June 20, spill patterns for 30% and ~40% spill will be developed at ERDC in coordination with regional agencies.

Operation considerations:

- o The hydraulic capacity for John Day is approximately 272 kcfs with all 16 units operating. If total river discharge exceeds this level, involuntary spill will occur during the daytime.
- o If total river flow exceeds approximately 400 kcfs at night, 60% night spill levels would be 160 kcfs which may exceed TDG levels.
- o Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.

Summer Spill Operations July 1 – August 31, 2008: 30% spill 24 hours/day. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Spill duration for testing: June 21 to approximately July 20. The dates of testing will be dependent on the size of fish, fish availability, and the number of treatments needed for testing. Final dates for testing will be coordinated through the SRWG.
- Summer research operations: Two training spill percentages, 30% and approximately 40%, will be tested.
- Objectives of the biological test: The objectives of the study are to assess passage distribution and efficiency metrics, forebay retention, tailrace egress, and survival will be estimated for subyearling fall Chinook.
- Spill pattern during the biological test: Spill patterns for 30% and ~40% spill will be developed at ERDC in coordination with regional agencies. Outside the test period, spill patterns described in the FPP with two TSWs in place will be used.

Operation considerations:

- Minimum spill: During periods of low flow before the spring freshet and during the summer period, there may be periods where spill quantities are limited so that tailrace conditions are not advantageous to fish passage. If such a low flow condition occurs, alternative operations at the dam will be coordinated through the TMT.
- Minimum generation: A minimum powerhouse discharge of 50 kcfs is required at all times to meet minimum generation requirements. The lower Columbia River dams provide some of the required generation capacity reserves for the power system. Due to this requirement and the constant fluctuations in power demands throughout the day, the 50 kcfs flow cannot be maintained precisely on an hourly basis. The flow may increase by as much as 10 kcfs for short periods. Therefore, the minimum generation flow should meet or exceed 50 kcfs for all hours.
- Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.
- If river flows drop below about 75 kcfs then spill may need to drop below 30% spill in order to maintain station service and power system needs.

The Dalles

Spring Spill Operations April 10 – June 30, 2008: 40% spill 24 hours/day. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Spill pattern during the biological test: No research is planned for 2008. The FPP spill patterns will be used. Spill patterns for high flows (450 kcfs or higher) are provided in Appendix 1.

Operation considerations:

- Spillway wire ropes at The Dalles Dam were replaced on Bays 1-9 in 2006. These bays are fully operational in 2008. Spill bays 10 – 22 can be operated in emergencies according to the table in Appendix 1.
- When high river flows exceed those shown in the table below such that available bays 1 – 9 cannot maintain 40% spill, FPOM and TMT will discuss the preferred spill pattern and rate. The project may maintain 40% spill of the total river flow and depart from the spill pattern, or spill less than 40% of the total river flow using a pattern other than that shown in the FPP. At no time is spill recommend on the south side of the spillway (Bays 14-22) as this creates a poor tailrace egress condition for spillway-passed fish.
- Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.

Summer Spill Operations July 1 – August 31, 2008: 40% spill 24 hours/day. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Spill pattern during the biological test: No research is planned for 2008. The FPP spill patterns will be used.

Operation considerations:

- When high river flows exceed those shown in the table above such that available bays 1 – 9 cannot maintain 40% spill, FPOM and TMT will discuss the preferred spill pattern and rate. The project may maintain 40% spill of the total river flow and depart from the spill pattern, or spill less than 40% of the total river flow using a pattern other than that shown in the FPP. At no time is spill recommend on the south side of the spillway (Bays 14-22) as this creates a poor tailrace egress condition for spillway-passed fish.

- o Minimum generation: A minimum powerhouse discharge of 50 kcfs is required at all times to meet minimum generation requirements. The lower Columbia River dams provide some of the required generation capacity reserves for the power system. Due to this requirement and the constant fluctuations in power demands throughout the day, the 50 kcfs flow cannot be maintained precisely on an hourly basis. The flow may increase by as much as 10 kcfs for short periods. Therefore, the minimum generation flow should meet or exceed 50 kcfs for all hours.
- o Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.
- o If river flows drop below about 90 kcfs then spill may need to drop below 40% spill in order to maintain station service and power system needs.

Bonneville

Spring Spill Operations April 10 – June 20, 2008: 100 kcfs spill 24 hours/day. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Spill duration for testing: Approximately April 26 – June 7. The dates of testing will be dependent on the size of fish and fish availability. Final dates for testing will be coordinated through the SRWG.
- Spring research operations: 100 kcfs spill 24 hours/day.
- Objectives of the biological test: Estimate survival of yearling Chinook passing through the dam and spillway. Focus will be on new spill patterns to improve project spill survival.
- Spill pattern during the biological test: Spill patterns in the FPP will be used.

Operation considerations:

- o Minimum spill discharge rate is 50 kcfs. This is to provide acceptable juvenile fish egress conditions in the tailrace.
- o At spring flows less than 135 kcfs, spill will be less than 100 kcfs to maintain minimum powerhouse generation of 30 kcfs plus fish ladder and facility spill (e.g. corner collector).
- o Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.
- o Actual spill levels at Bonneville Dam may range from 1 to 3 kcfs lower or higher than specified in the 2008 FOP. A number of factors influence this including hydraulic efficiency, exact gate opening calibration, spillway gate hoist cable stretch due to temperature changes, and forebay elevation (a higher forebay results in a greater volume of spill since more water can pass under the spill gate).

- o The second powerhouse corner collector (5 kcfs discharge) will operate from early March to August 31, 2008. The March start date will be set to accommodate a passage study for migrating steelhead kelts and a potential passage study of juvenile fish released from the Spring Creek National Fish Hatchery. A 2-hour outage will occur the week of April 7 to remove research equipment.
- o A 1-hour outage at spill bay 9 may occur monthly during the spill season to facilitate the use of Ground Penetrating Sonar (GPS) to measure and track erosion at spill bay 9 from inside the spillway inspection gallery. GPS data will be evaluated by Corps Portland District engineers to determine if a full spillway outage is required for a hydrographic survey. Such an outage occurred in 2007, but may not be needed in 2008 if GPS provides adequate monitoring data. The Corps will coordinate this work through FFDRWG, FPOM, and TMT.

Summer Spill Operations June 21 through August 31, 2008: 85 kcfs day from June 21 through approximately July 20, then 75 kcfs day for the remainder of the season through August 31. Spill to the spill cap at night. The estimated summer spill cap rate is 120 kcfs. Daytime spill hours change periodically and are defined in FPP Table BON-6. See Table 3 for operational spill levels.

Changes in Operations for Research Purposes:

- Spill duration for testing: June 21 through approximately July 20. Continue tests of new spill patterns in the summer. Final dates for testing will be coordinated through the SRWG.
- Summer research operations: Daytime spill will be 85 kcfs until the end of the summer test, approximately July 20, after which the daytime spill will be 75 kcfs through August 31. Spill to the spill cap at night.
- Objectives of the biological test: Estimate survival of subyearling Chinook passing through the dam and spillway. Focus will be on new spill patterns to improve project spill survival.
- Spill Patterns for summer operations: Spill patterns in the FPP will be used.

Operation considerations:

- o **Minimum generation:** A minimum powerhouse discharge of 30 kcfs is required at all times to meet minimum generation requirements. The lower Columbia River dams provide some of the required generation capacity reserves for the power system. Due to this requirement and the constant fluctuations in power demands throughout the day, the 30 kcfs flow cannot be maintained precisely on an hourly basis. The flow may increase by as much as 10 kcfs for short periods. Therefore, the minimum generation flow should meet or exceed 30 kcfs for all hours.

- o Unit outages will occur for required maintenance activities. The outage schedule for the project is shown in Appendix 2. Dates are subject to change.
- o Minimum spill discharge level is 50 kcfs. This is to provide acceptable juvenile fish egress conditions in the tailrace.
- o Actual spill levels at Bonneville Dam may range from 1 to 3 kcfs lower or higher than specified in the 2008 FOP. A number of factors influence this including hydraulic efficiency, exact gate opening calibration, spillway gate hoist cable stretch due to temperature changes, and forebay elevation (a higher forebay results in a greater volume of spill since more water can pass under the spill gate).
- o The second powerhouse corner collector (5 kcfs discharge) will operate from early March until August 31.
- o A full spillway outage may occur for several hours (up to 8 hours) in July 2008 for a hydrographic survey in the tailrace to measure erosion at spill bay 9. This survey may not be needed if the monthly GPS data are adequate to monitor spillway erosion. The Corps will coordinate this work through FFDRWG, FPOM, and TMT.

Juvenile Fish Transportation Program Operations

As noted above, the Corps' planned fish operations assume average runoff conditions. Based on collaborative discussion with the regional agencies and tribes, and as agreed to in 2007, the following explains the juvenile fish transportation program under all runoff conditions. The lower Snake River projects are described first, followed by McNary project operations. Detailed descriptions of project and transport facility operations to implement the program are contained in FPP Appendix B.

Lower Snake River Dams - Operation and Timing:

If the Snake River projected seasonal average (April 3 – June 20) flow is greater than 70 kcfs, the Corps will initiate transportation at Lower Granite Dam no earlier than April 20 and no later than May 1. The seasonal average flow projection will be based on the Corps' STP model and the April final water supply forecast for Lower Granite. The actual start date in 2008 will be determined through coordination with TMT as informed by the in-season river condition (e.g. river flow and temperature) and the status of the juvenile Chinook and steelhead runs (e.g. percentage of runs having passed the project). Also if the projected flow is greater than 70 kcfs, transportation will start 8 days and 11 days after the Lower Granite Dam start date for Little Goose and Lower Monumental dams, respectively. The actual start dates at Little Goose and Lower Monumental dams will be further considered through the TMT process, depending on in-season river conditions and the status of the juvenile Chinook and steelhead runs.

- a. Lower Granite: All ESBSs will be installed by March 25 and juvenile fish will be bypassed via normal separator operations and routed to the mid-river release outfall. All juvenile fish collected will be interrogated for PIT tags and normal 24-hour sampling for the Smolt Monitoring Program will take place.

b. Little Goose and Lower Monumental: All ESBSs and STSs will be installed by April 1 and juvenile fish will be bypassed via normal separator operations and fish will be routed to normal facility bypass outfalls. All juvenile fish will be interrogated for PIT tags and limited sampling may take place every 3 to 5 days to monitor fish condition. A full sample may be performed every other day to monitor species composition to help inform a decision on initiating transportation at these projects. At Lower Monumental, daily smolt monitoring will occur beginning April 1 and 100 steelhead will be PIT-tagged to assess avian prey selection. Also, study fish will be collected at Little Goose for the Lower Monumental passage and survival study.

In exceptionally low water years, when the projected seasonal average flow is less than 70 kcfs, the Corps will begin transportation on April 20 at all three Snake collector projects. Spill for fish passage will occur under all flow conditions.

April 20 – June 20: The collection of fish at lower Snake River projects for transportation will commence at 0700 hours on the agreed to start dates. Barging of fish will begin the following day and collected juvenile fish will be barged from each facility on a daily or every-other-day basis (depending on the number of fish) throughout the spring. Transport operations will be carried out concurrent with spill operations at each project and in accordance with all relevant FPP operating criteria.

June 21 – August 15: Transportation of juvenile fish from all three Snake River transport projects will continue on an every-other-day basis from June 21 through August 15, via barges.

August 16 – August 31: After August 15, trucks will be used for transporting juvenile fish from the Snake River collector projects on an every-other-day basis through August 31.

September 1 – Completion: Transportation of juvenile fish via trucks on an every-other-day basis will continue through October 31, 2008 at Lower Granite and Little Goose dams. At Lower Monumental Dam, transportation of fish via every-other-day trucking will continue through September 30, 2008.

McNary Dam - Operation and Timing:

Spring: Juvenile fish collected at McNary during the spring, April 1 through June 20, will be bypassed to the river. The normal operation will be to bypass fish through the full flow bypass pipe, which has interrogation capability to monitor for PIT tags. Every other day, however, in order to sample fish for the Smolt Monitoring Program, fish will be routed through the separator, interrogated for PIT tags, and then bypassed to the river.

Summer: When river conditions are determined to no longer be “spring like” as defined in the FPP and discussed at TMT, transportation of juvenile fish will begin if it does not significantly conflict with TSW operations. Collected juvenile fish will be barged every other day through August 16 unless they have been marked for in-river passage research. From August 16 through September 30, transportation will occur via trucks.

Other Planned Research

Juvenile Fish Transportation Research at Lower Granite Dam (three studies):

1. A study will be conducted to determine seasonal effects of transporting fish from the Snake River to optimize a transportation strategy. At Lower Granite, fish will be collected for this study starting on April 6, with marking beginning on April 7, 2008. Depending on the number of fish available, fish will be collected 1-2 days with tagging occurring on the day following collection. A barge will leave each Thursday morning with all fish collected during the previous 1-3 days. By barging all fish (minus the in-river group) during 1 to 3 days of collection, barge densities will be maintained at a level similar to what would occur under normal transport operations that time of year. This pattern will occur in the weeks preceding general transportation and will be incorporated into general transportation once that operation begins. The desired transported sample size is 6,000 wild Chinook and 6,000 wild steelhead weekly for approximately eight weeks.
2. A study to evaluate alternative barge release sites below Bonneville Dam has been underway for three years and will continue in 2008. The first barge for this study is tentatively scheduled to depart on April 21, and tagging of fish at Lower Granite on April 20 following collection on April 18 – 19.
3. A study will be conducted to evaluate latent mortality associated with passage through Snake River dams. The goal of this study is to determine whether migration through Snake River dams and reservoirs causes extra mortality in Snake River yearling (spring/summer) Chinook salmon smolts. Specifically, the study will determine if life-cycle survival downstream from McNary Dam is significantly higher for yearling hatchery Chinook salmon released into the Ice Harbor Dam tailrace than for counterparts which must pass three additional dams and reservoirs after release into the Lower Granite Dam tailrace. Fish will be collected at Lower Granite Dam beginning 20 April 2008 with the goal of tagging approximately 120,000 smolts, about 2/3 of which will be released into the tailrace of Lower Granite Dam, and 1/3 transported by truck and released in the tailrace of Ice Harbor Dam.

Avian Predation at Lower Monumental Dam:

A study will be conducted to evaluate the impacts of avian predation on salmonid smolts from the Columbia and Snake rivers. The study will determine how various biotic and abiotic factors are associated with differences in steelhead smolt vulnerability to predation by Crescent Island terns and Foundation Island cormorants. The study requests PIT tagging both hatchery and wild steelhead collected in the smolt monitoring sample at Lower Monumental and Ice Harbor dams, beginning April 1 and continuing through July. The recorded condition of a fish will be attached to a specific tag code and vulnerability to avian predation will be evaluated using PIT tag recovery data collected from the avian bird colonies. The study needs a minimum sample of 100 fish each day that are collected for condition by the smolt monitoring program.

Navigation Safety

Short-term adjustments in spill patterns or reductions in spill discharge rates may be required for navigation safety, primarily at the lower Snake projects but may also be necessary at the lower Columbia projects. This includes both commercial tows and fish barges.

Emergency Protocols

The Corps and Bureau of Reclamation will operate the projects in emergency situations in accordance with the Water Management Plan (WMP) Emergency Protocols (WMP Appendix 1). The Protocols define emergency conditions and situations that may arise while operating the FCRPS, and the immediate actions that may be taken in the face of the emergency. The Corps, BPA, and the Bureau of Reclamation are revising the Emergency Protocols in coordination with TMT. The most recent version of the Emergency Protocols is located at:

<http://www.nwd-wc.usace.army.mil/tmt/documents/wmp/2008/0926Ap1EmerActPlandrft.pdf>

Reporting

The Corps will prepare monthly (April – August) reports on the implementation of 2008 fish passage operations. The reports will include the following information:

- the hourly flow through the powerhouse;
- the hourly flow over the spillway compared to the spill target for that hour; and,
- the resultant 12-hour average TDG for the tailwater at each project and for the next project's forebay downstream.

The reports will also provide information on substantial issues that arise as a result of the spill program (e.g. Little Goose adult passage issues in 2005 and 2007). The reports also will address any emergency situations that arise.

The Corps will continue to provide the following data to the public regarding project flow, spill rate, TDG level, and water temperature.

- Flow and spill quantity data for the lower Snake and Columbia River dams are posted to the following website every hour:
<http://www.nwd-wc.usace.army.mil/report/projdata.htm>
- Water Quality: TDG and water temperature data are posted to the following website every six hours: <http://www.nwd-wc.usace.army.mil/report/total.html> These data are received via satellite from fixed monitoring sites in the Columbia and Snake rivers every six hours, and placed on a Corps public website upon receipt. Using the hourly TDG readings for each station in the lower Snake and Columbia rivers, the Corps calculates the highest 12-hour average TDG for each station. These averages are reported at:
http://www.nwd-wc.usace.army.mil/ftppub/water_quality/12hr/html/

Appendix 1

Test Spill Patterns

Special spill patterns for 2008 tests and high flow conditions are provided for Little Goose, Lower Monumental, McNary, John Day, and The Dalles dams.

Little Goose Dam:

The Corps will provide updated patterns for 30% tests.

Lower Monumental Dam:

The Corps will provide updated patterns for TSW tests.

McNary Dam:

The Corps will provide updated patterns for TSW tests.

John Day Dam:

The Corps will provide spill patterns for TSW testing.

The Dalles Dam:

The Dalles Dam, Special and Emergency Spill Operations, 2008 (and beyond). A total river volume greater than 450,000 cfs is possible that would require additional spillway flows. With Bays 10 – 23 out-of-service, the table below shows the special and emergency spill operations that are recommended at TDA in 2008 to safely accommodate higher flows.

Spill condition	Bays in use	Gate Opening (ft)	Spillway Q (cfs)	Powerhouse Q (cfs)	Total Q (cfs)
Normal, 40% BiOp Special spill	1-6 + 7-9	14 + 12	180,000	270,000	450,000
	1-9	14	189,000	270,000	459,000
	1-6 + 7-9	15 + 14	198,000	270,000	468,000
	1-9	15	202,500	270,000	472,500
	1-6 + 7 -9	16 + 15	211,500	270,000	481,500
	1-9	16	216,000	270,000	486,000
Emergency spill	Continue sequence	Continue sequence			
	1-9	30	405,000	270,000	675,000*
	1-9 + 14	30	450,000	270,000	720,000
	1-9 + 14-15	30	495,000	270,000	765,000
	1-9 + 14-16	30	540,000	270,000	810,000
	1-9 + 14-17	30	585,000	270,000	855,000
	Continue sequence to Bay 21	Max. of 30' opening			
	1-9 + 14-21	30	765,000	270,000	1,035,000
	1-9 + 12 + 14-21	30	810,000	270,000	1,080,000
	1-9 + 12+ 14-22	30	855,000	270,000	1,125,000
	1-9 + 12+ 14-23	30	900,000	270,000	1,170,000
	1-10+ 12 + 14-23	30	945,000	270,000	1,215,000
	1-12 + 14-23	30	990,000	270,000	1,260,000
	1-23	30	1,035,000	270,000	1,305,000

* Project discharge level at which the Corps may declare an emergency operation at The Dalles Dam to open spill bays 14 – 23.

Appendix 2

Schedule of Major Unit Outages

The following major outages are scheduled for the period April 1 through September 30, 2008. This schedule is based on the best information available at this time, but circumstances may arise which will necessitate adjustments to the schedule. It does not show all outages; shorter maintenance outages take place throughout the year. This schedule shows outages of longer duration with possible significant impacts to fish operations.

1. The schedule shown is for the four Lower Snake and four Lower Columbia projects for the period April 1 through September 30, 2008.
2. Where the description under the "Reason" column is preceded by an "F", this represents a forced outage. Estimated return to service dates are given and are the best guess at this time. Usually, the extent of the damage is not fully known.
3. Outage plans are not fully developed at this time. Some major work will depend on contracts which are not in place yet.

Project	Unit	Capacity (MW)	Out of Service Date		Return to Service Date		Reason
LWG	2	155	01/17/2006	0700	09/29/2008	2359	Liner Cavitation & Generator Rewind - Turbine Rehab/Testing
LWG	2	155	6/23/2008	0600	7/5/2008	1700	Main unit C02 Fire Protection
LWG	4	155	07/07/2008	0600	07/31/2008	1700	Annual/PSS Install/Fire Protection
LWG	1	155	7/21/2008	0600	8/1/2008	1700	Main unit C02 Fire Protection
LWG	5	155	08/04/2008	600	8/29/2008	1700	Annual/PSS Install/Fire Protection
LWG	3	155	08/04/2008	0600	12/19/2008	1700	Cavitation Repair/Air Cooler Replacement/Annual

LWG	6	155	09/02/2008	0700	09/26/2008	1700	Annual/PSS/Fire Protection
LWG	One	155	09/22/2008	0600	9/30/2008	1700	Commission New PSSs, Unit 4-6, One at a time
LGS*	6	155	12/11/2007	1500	10/1/2008	1700	F- Water leak caused field ground
LGS*	6	155	09/01/2008	0700	02/28/2009	1700	Spillway Deflector Ins. (Out as Needed)
LMN	1-6	930	09/08/2008	0700	09/08/2008	0800	Line Outage to take T1 OOS (Placeholder)
LMN	1-4	620	09/08/2008	0800	09/11/2008	1700	T1 Disconnect Work
LMN	1-6	930	09/11/2008	1700	09/11/2008	1800	Return T1 to service
IHR	6	127	10/01/2007	0000	3/28/2008	1700	F - HIGH gas readings
IHR	One	127	07/01/2008	0630	09/01/2008	1700	Main Unit Strainers
IHR	3	103	07/08/2008	0630	09/04/2008	1700	Overhaul
IHR	3-4	230	07/14/2008	0630	07/17/2008	1700	Doble Test TW 3, 4 Line 2
MCN	7	80	07/07/2008	0600	08/01/2008	1700	ETBOC
MCN	5	80	07/07/2008	0600	09/19/2008	1700	9-Yr Overhaul
MCN	1-2	160	08/04/2008	0600	08/06/2008	1700	T1 Doble Testing
MCN	5	80	08/04/2008	0600	08/29/2008	1700	ETBOC
MCN	8	80	09/02/2008	0600	09/26/2008	1700	ETBOC/Annual and Oil Indication
MCN	One	80	09/02/2008	1000	09/02/2008	1300	ESBS Insp
MCN	Three	240	09/08/2008	0600	09/13/2008	1700	Diving for Fish Studies
MCN	One	62	09/09/2008	1000	09/09/2008	1300	ESBS Inspections
MCN	4	80	09/15/2008	0600	09/19/2008	1700	Annual and Oil Indication
MCN	5-6	160	09/16/2008	0600	09/18/2008	1700	T3 Doble Testing
MCN	6	80	09/22/2008	0600	12/12/2008	1700	9-Yr Overhaul

MCN	11	80	09/29/2008	0600	10/24/2008	1700	ETBOC
JDA	16	155	04/16/2006	1630	02/29/2008	1700	F - kaplan linkage
JDA	10	155	05/25/2007	1730	02/29/2008	1600	F - field Ground/6 Year Overhaul
JDA	1, 3	310	07/28/2008	0600	09/04/2008	1700	Overhaul
JDA	13-16	620	09/08/2008	0600	09/11/2008	1400	T4 Doble
JDA	9-10	310	09/15/2008	0600	10/23/2008	1400	Overhaul
JDA	5-8	620	10/20/2008	0600	10/23/2008	1400	T2 Doble
TDA	4	90	03/24/2008	0630	05/22/2008	1700	Cavitation Repair
TDA	22	100	05/27/2008	0630	07/31/2008	1700	5-Yr/Blade Cavitation, Seals/ Servo Motors
BON	8	60	09/12/2006	0750	05/15/2008	1600	Turbine Rehab
BON	7	60	06/04/2007	0750	12/25/2008	1700	Rehab Turbine, Stator
BON	1	48	10/23/2007	1551	02/14/2008	1600	F - Governor problems. wicket gate
BON	15	76	11/25/2007	2315	03/31/2008	1600	F - Rotor Pole Failure
BON	One	76	01/17/2008	1701	07/09/2008	1700	Excitor Repl - units 11-18, one unit at a time
BON	One	76	1/1/ 2008	0700	05/01/2008	1700	Fish guidance exclusion mods.
BON	3	56	04/14/2008	0700	05/30/2008	1700	PH 1 Unit five year o/haul, turbine obstructions
BON	9	60	07/01/2008	0700	12/20/2009	1700	U9 - Turbine rehab - Generator Rewind
BON	1	48	07/12/2008	0000	08/20/2008	1700	Five year o/haul, turbine obstruction, 300 G ins
BON	15	76	07/28/2008	0700	09/25/2008	1700	Cavitation repair
BON	Two	152	07/29/2008	0000	07/29/2008	1800	Collection Channel Dive, Brush Rigging, F1 & F2
BON	Four	304	08/04/2008	0000	08/07/2008	1700	T11 Bi/Annual Maint., Us 11 & 12 Annual, Install T11 Fault gas monitor, install sync PTs

BON	Four	304	08/11/2008	0000	08/14/2008	1700	T11 Bi/Annual Maint., Us 16 & 18 Annual, Install T12 Fault gas monitor, install sync PTs
BON	17	76	09/08/2008	0000	10/30/2008	1700	4 year overhaul

* Little Goose Dam: In addition to the Unit 6 outage, one unit at a time will be taken out of service for annual maintenance, starting July 28, 2008. Each outage will last approximately 3 weeks.

Columbia River Salmon and Steelhead – 2008 Forecasts and 2007 Returns				
Run	2008 Forecast		2007	
			Preseason Forecast	Actual Return
<u>Spring Chinook</u>				
Willamette	34,000	Lowest return since the mid-1990s	52,000	40,500
Sandy	6,800	Greater than 2007 return - similar to 5-yr ave.	7,900	3,400
Cowlitz	5,200	Greater than 2007 return - less than 5-yr ave.	6,400	3,700
Kalama	7,300	Less than 2007 return - greater than 5-yr ave.	4,000	7,300
Lewis	3,500	Less than 2007 return and recent 5-yr ave.	5,500	6,700
Select Areas	3,700	Well below average due to poor expected survival of 2004 brood	9,700	6,400
<u>Upriver Spring (Includes Snake River Summer Chinook)</u>				
Total Upriver Run	269,300	Greater than 2007 return, 3rd highest since 1977	78,500	86,200
Sneah River Wild	21,100	Greater than 2007 return, similar to 5-yr ave.	13,100	10,600
Upper Columbia Wild	2,900	Greater than 2007 return, similar to 5-yr ave.	1,200	900
<u>Summer Chinook</u>				
Upper Columbia	52,000	Greater than 2007 return-similar to 5-yr ave.	45,600	37,200
<u>Sockeye</u>				
Upriver	75,600	Greater than 2007 return and 5-yr ave.	27,300	26,100
Sneah River	700	Up from recent years, returns from captive brood	300	57
<u>Steelhead</u>				
Wild Winter	15,300	Similar to 2007 return, less than 5-yr ave.	16,200	15,000
Skamania Index	10,400	Greater than 2007 return, less than 5-yr ave.	16,700	9,400
Group A Index	266,300	Similar to 2007 return, less than recent 5-yr ave.	241,500	258,900
Group B Index	49,700	Less than 2007 return, less than recent 5- yr ave.	56,400	51,100
Total Upriver Index	326,400	Similar to 2007 return and 5-yr ave.	314,600	319,400

COLUMBIA RIVER REGIONAL FORUM

TECHNICAL MANAGEMENT TEAM

February 27, 2008 Meeting

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Robin Gumpert

Notes: Erin Halton

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.

Official Minutes/Facilitator Notes

The facilitator notes and the official meeting minutes from the 2/13 TMT meeting had been posted to the web. Kyle Dittmer, CRITFC, asked that language on page one of the facilitator notes be changed to: “conditions should return to near normal after spring.” Dittmer also asked that his affiliation be listed as “CRITFC” in the 1/30 and 2/13 official meeting minutes. The facilitation team and official note taker will make the above changes and the revised notes will be posted on the web.

Draft 2008 Fish Operations Plan

Rudd Turner, COE, reported on the review process for the 2008 Fish Operations Plan (FOP). Comments received from TMT, the Policy Work Group (PWG) and individually submitted comments resulted in the following changes made to the document:

- Language added to clarify low flow operations and initiation of transportation;
- Language added to clarify the data collection, limited flexibility for test schedule, and primary objectives for research operations at Ice Harbor
- Language modified to clarify spill curtailment for barge loading operations at McNary;
- Corrections made to dates referenced in the document.

Turner reported that Judge Redden did not accept proposed changes to the FOP (regarding Libby operations and the use of the Camas/Washougal TDG gauge) that were discussed during a 2/20 hearing; the FOP was signed as a court order on 2/25.

Action/Next Steps: A final version of the FOP, including updated spill patterns for John Day, is expected to be posted to the web early the week of March 3rd. The FOP will be coordinated into the Fish Passage Plan and Water Management Plan as appropriate.

Bonneville Operation for Spring Creek Hatchery: SOR # 2008-1

Cindy LeFleur, WA, referred TMT members to an SOR linked to the TMT agenda:

the states of Oregon, Washington and Idaho, and the Shoshone Bannock Tribes submitted an SOR to support effective movement of Spring Creek hatchery fish released past Bonneville Dam on or by March 6, 2008.

The COE expressed a desire to work with TMT members to implement other aspects of the request, but stated that, as a policy perspective, the COE will seek to implement the desired results of the SOR without using spill. Similarly, Oregon stated that at the policy level, Oregon supports using spill for this operation. Pros and cons of implementing the spill component of the SOR were discussed during the TMT meeting were as follows:

Pros

- Fish are tagged and test ready for this year.
- The fish released in March are important to United States/Canada, tribal treaty and domestic west coast fisheries.
- Because this hatchery is the only one that produces tule fall Chinook above Bonneville dam, these fish are considered to be the backbone of the northwest fishery and have related cultural and financial values.
- Spill is generally accepted as the safest route for fish passage at the FCRPS facilities and is necessary for maximizing fish passage efficiency.
- This operation would support an important fishery for tribes and states while discussions about reprogramming of the Spring Creek Hatchery are on-going in other forums, including US v. OR.

Cons

- Significant investments have been made to provide proven safe passage via the Bonneville corner collector and bypass system.
- Questions remain about spillway passage survival at Bonneville.
 - The one year test of spillway passage showed ‘not statistically significant results’ that are yet to be peer reviewed.
- Cost to provide the requested spill is around \$3 million. [NOTE: it was clarified during the IT call that the actual cost is between 2-2.5 million.]
- There is an unclear impact on the ability for action agencies to meet the April 10 refill elevation at Grand Coulee.

TMT members were not able to reach consensus and the State of Oregon requested that the question below be considered, from a policy perspective, by IT:

- Should the COE implement the spill component of SOR 2008-1?

Action/Next Steps: An IT conference call was planned for 3 p.m. on Thursday, 2/28. The Salmon Managers planned to discuss options for hatchery releases and issues around specification #7 of the SOR; results of this discussion are expected to be shared with the COE on 2/29.

UPDATE: The IT met and was unable to reach consensus on the spill component of the SOR. Oregon requested that the issue be elevated to the Regional Executive level for discussion and decision, preferably early the week of March 3.

Draft 2008 Water Management Plan

Scott Boyd, COE, reported that comments from NOAA on the draft Water Management Plan had been posted as a link to the TMT web page and would be incorporated into the document. Language from the FOP will also be folded in and the COE expects to finalize the document by early March.

Action/Next Steps: TMT members were asked to submit comments on the draft plan by Friday, 2/29.

Transportation Permit

Paul Wagner, NOAA, reported that as the BiOP is not expected to be finalized until May 6, and potentially after the start of transportation, the existing permit will be extended for one year.

Ocean Indicators Website

Paul Wagner, NOAA, referred TMT to a NOAA website linked to the TMT agenda that illustrates year-to-year comparisons of oceanic conditions associated with stock returns: <http://www.nwfsc.noaa.gov/research/divisions/fed/oeip/a-ecinhome.cfm>. Wagner characterized the outlook for 2008 ocean conditions as good; he encouraged TMT members to refer to the website, as it provides helpful indicators that affect return sizes. TMT members noted the influence of climate change on ocean conditions, as well as the varying degrees of effect on a species during its first, second and third year in the ocean.

Action/Next Steps: Wagner will coordinate a visit from Phil Peterson, NOAA, to discuss the website further at an upcoming TMT meeting.

Adult Return Forecasts:

Cindy LeFleur, WA, referred TMT to Columbia River Salmon and Steelhead forecast spreadsheet linked to the agenda. She noted the following predictions for 2008 returns: 260,000 for Spring Chinook; 52,000 for Summer Chinook; and 75,000 for Sockeye, with 700 of those as Snake River Sockeye. LeFleur clarified the age-based forecasting system and noted that individual forecasts are made for ESA-listed species. She noted that there are unique conditions for fisheries this year (e.g. the 12-day season for sport fishing below the Willamette River.) LeFleur noted the mix of strong and poor return predictions for 2008 and encouraged TMT members to review trends of returns along with the predicted vs. actual statistics.

Operations Review

Reservoirs: Libby was at elevation 2400.4', with inflows of 2.6 kcfs outflows of 9.2 kcfs shaping flows daily/weekly to meet the 2399.5' end of February target. Albeni Falls was at elevation 2055.4', with inflows of 15.5 kcfs and outflows of 16.9 kcfs. Dworshak was at 1521.2' with inflows of 2.5 kcfs, outflows of 1.3 kcfs and operating with a single unit and minimum flows. The 7-day average flows at Lower Granite were 25.8 kcfs; 120.8 kcfs at McNary and 135.7 kcfs at Bonneville. Hungry Horse was at 3514.21', with outflows of 2.8 kcfs. Grand Coulee was at 1258.8, with outflows of 9.6 kcfs. In response to a question, Tony Norris, BPA, clarified that the April 10 flood control target will be

confirmed by the March final forecast and said that BPA has a very high level of confidence that objectives will be met.

Fish: Nothing to report at this time.

Power system: Nothing to report at this time.

Water Quality: Jim Adams, COE, reported that WA TDG regulations have been signed which specifies use of the 12 highest consecutive gauge readings to report daily TDG levels. As per direction from the U.S. Federal District Court, the COE will continue to manage operations according to the highest 12 readings, but will report the 12 highest consecutive readings to WADOE. Both sets of data will be posted as links to the TMT agenda.

3/12/08 TMT Meeting:

Agenda items may include the following:

- Spring Creek Operations
- March Final Water Supply Forecasts
- Operations Review

**Columbia River Regional Forum
Technical Management Team Meeting
February 27, 2008**

1. Introduction

Today's TMT meeting was chaired by Jim Adams (COE) and facilitated by Robin Gumpert (D.S. Consulting), with representatives of COE, NOAA, BPA, BOR, Washington, CRITFC, Oregon, Idaho and others attending in person or by phone. 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

Kyle Dittmer (CRITFC) requested two small changes to previous minutes. (1) In the last paragraph on page 1 of the February 13 facilitator's notes, change "conditions should return to normal by spring" to "conditions should return to normal *after* spring" in relation to the water supply and El Nino. (2) In the February 13 and January 30 official minutes, correct Dittmer's affiliation in the attendance list.

3. Update on Fish Operations Plan Status

After several TMT sessions and a policy work group meeting discussing the Fish Operation Plan, the COE made a few changes. They added a paragraph to the Low Flow Operations section that says initiation of transport will be altered if low flow conditions exist on the Snake River.

The COE also made changes to the Ice Harbor section based on comments from the policy work group and the state of Oregon. Rudd Turner (COE) explained. Commenters said it would be a good idea to get data on two conditions being rolled over at Ice Harbor from 2007. So the COE has set up a study with the Science Center to collect information on passage and survival at Ice Harbor this year under two conditions. Language to this effect has been added to the Fish Operations Plan on page 15. There will be no change to the number of 30% spill days or the number of 45% to spill cap days to aid passage of yearling Chinook and steelhead. The FOP now says the COE will alternate between 45% daytime spill and to the spill cap at night, and 30% spill for 24 hours per day at Ice Harbor, with the RSW following a test schedule similar to that in 2007. There are radiotagged fish available for two test conditions using the single release model, planned for dates similar to those in 2007.

In the McNary section of the FOP, the paragraph on spill curtailment during summer fish barging operations has been modified to allow spill while the

barge is at the dock loading fish There will be a 15-minute spill curtailment for all barges proceeding across the navlock and tailrace to the fish loading facility, and a second 15-minute curtailment while the barge is leaving the dock and moving downstream. Language on page 18 of the FOP has been modified accordingly.

After making some date corrections throughout, the 2008 draft FOP dated February 8 was submitted to the court, along with a proposed order for the judge to sign. A hearing on February 20 elicited two outstanding issues: continued use of the Camas Washougal gage to monitor TDG levels below Bonneville Dam, and Libby operations. In both cases, Judge Redden allowed these operations to continue as they did in 2007.

Regarding the spill operations plan, Russ Kiefer (Idaho) asked about the John Day test schedule. For now, the FOP lists either 30% spill or 40% spill day and night on test days for the spring and summer test, Turner said.

In addition to John Day, there are four projects – Little Goose, Lower Monumental and McNary – that have placeholders in the FOP for updated spill patterns. These will be provided before spill season starts. There were suggestions that in-season changes in spill patterns at these projects be considered via FPOM's changes throughout the year to the Fish Passage Plan, or via the spring/summer update to the Water Management Plan.

There's a desire to use the Regional Forum process and existing documentation as much as possible this year. Turner pointed to Item 3 in the court order, Seasonal Adjustment, which says federal defendants will use existing committees to make in season adjustments as set forth in the 2008 FOP.

4. Bonneville Operations for Spring Creek Hatchery Release – SOR 2008-1

Cindy LeFleur (Washington) presented the SOR. It asks for 100 kcfs spill at Bonneville following the Spring Creek Hatchery release of 7.5 million fish beginning March 5, as well as other operational and powerhouse configurations to aid their passage. To accommodate concerns about high densities of fish hitting the project all at once, two releases of approximately equal size are planned for March 5 and 10. Signatories to the SOR include IDFG, ODFW, WDFW and the Shoshone Bannock Tribes. CRITFC and the Nez Perce Tribe support the SOR but refrained from joining the request.

Jim Adams asked for clarification of items 6 and 7 which appear to be contradictory. Item 6 says operate Powerhouse 2 as first priority; fully load Powerhouse 2 before operating Powerhouse1. Item 7 says operate the turbine units toward the low end of the 1% peak efficiency range. The intent was to make sure all possible turbines and Powerhouse 2 were running before switching to Powerhouse 1, Dave Wills suggested. Operating Powerhouse 2 is a higher priority than operating the turbines at the lower end of the 1% range, Russ Kiefer

suggested. Margaret Filardo (FPC) agreed the request is to keep turbines fully loaded at the low end of 1% efficiency.

Adams asked whether the target is the exact mid point of the 1% range, or near-peak efficiency, something less than the mid point. The COE's recommendation is to operate the units as close as possible to the mid point instead of the lower end of 1%, said COE fish biologist Dennis Schwartz. He suggested using the mid point as a starting place for special operations (low, middle, and high range) for gateway testing of Spring Creek fish on March 3 and 4 at Bonneville. Data from this operation will be available Wednesday, March 5, to email to TMT to help with decision-making.

In terms of the dual release of fish, Schwartz noted the COE has other research planned on March 10 which would conflict with the second group of fish passing through. That research would have to be postponed until March 17. Schwartz suggested testing the crowding theory with a single release of hatchery fish on March 5.

The signatories hadn't decided whether the SOR is requesting special operations for both releases. The SOR did not request special turbine operations for the second release, Turner said. The COE and the Salmon Managers will touch base again at the end of this week regarding scheduling of fish releases. They agreed a follow-up TMT call is not needed.

Discussion focused on the spill component of the SOR, the only aspect of the SOR that the COE does not support. The rationale for not implementing spill for passing Spring Creek Hatchery fish through Bonneville dam is that spillway passage may not be the safest route for fish, based on results of the 2004 study and other research results, Turner said. After making significant investments in both powerhouses, plus the development of the B2 corner collector and the bypass facility, the bypass system is considered to be the highest survival passage route at Bonneville.

The other Action Agencies and TMT members stated their positions on the spill component of the SOR as follows:

BPA: Hatchery reprogramming, not spill, is the primary solution to the Spring Creek issue. A spill operation would be costly at around \$2 million in lost revenues. Also, study results to date don't show a statistically significant difference in survival rates between the bypass and the spillway.

BOR: The BOR has no official position on this SOR.

NOAA: Generally, spill provides the highest route of survival. However, there have been significant passage improvements at Bonneville to the bypass route. Predation is lower in spring than in summer, when spill is required for safe

passage. The hatchery fish, while highly valued for fisheries enhancement, are not members of a listed species, therefore NOAA doesn't require the Action Agencies to offer the highest route of passage.

USFWS: Reprogramming isn't an entity all its own, but a small part of a larger process that's out of the hands of TMT and individual Action Agencies. It is part of the discussion under *U.S. v. OR* with regard to mitigation at John Day Dam. That issue will not be resolved any time soon, so USFWS currently seeks best practices for hatchery management in the meantime. USFWS wants to see the 2004 test repeated from a technical perspective. While USFWS agrees with what the signatories are asking for in the SOR, a policy level decision was made not to sign it.

Washington: How should the signatories go about getting two more years of study at Bonneville in addition to the 2004 study so questions about the route of safest passage can be answered? Should they submit a proposal for AFEP review? This research would not be funded by the COE under the CRFM program, Schwartz noted. Last year's return of these fish barely made the escapement goal, and they are critical to coastal and ocean fisheries, LeFleur pointed out.

Oregon: The state of Oregon supports this SOR. Because the COE has made a policy level decision not to implement the spill component, Oregon requested that the issue be elevated to IT for further discussion. An emergency meeting was planned for 3 p.m. the following day, Thursday, February 28.

5. 2008 Draft WMP

No changes have been to the Water Management Plan since the Fish Operations Plan became official, Scott Boyd (COE) said. So far, NOAA has been the only commenter. The WMP will need to go through legal review for concurrence with the Fish Operations Plan and should be finalized next week.

6. Transportation Permit

NOAA plans to extend the transportation permit for another year, Wagner said. There is a transportation permit in the new BiOp to be released May 6, 2008. The transportation schedule runs from April 20-May 1, 2008, so the transportation program needs to operate from April 20 until the new BiOp takes effect on May 5. Jim Litchfield (Montana) asked whether the BiOp will extend the incidental take statement. The 2004 Bi Op covers any incidental take associated with research, FCRPS operation or the transportation program, Wagner said. However, not all of this coverage will be extended. Incidental take associated with states' research will be covered under individual permits. Judge Redden's order has extended 2007 operations into 2008, but the incidental take portion of the new Bi Op will not be implemented.

7. Ocean Ecosystem Indicators

The NOAA presenter for this topic was not available today and will join TMT at some point. In the meantime, Wagner referred TMT to the ocean indicators website, which has information on many aspects of ocean conditions such as coastal upwelling, conveyed in accessible terms. A link to this website is attached to today's TMT agenda.

Fish that migrated to the ocean in 2005 faced bad conditions, and last year's returns were poor as a result. Fish that went into the ocean in 2007 encountered good conditions, and there are indications they will this year as well. This represents a new way of forecasting future adult returns, Wagner said. Good Coho returns are expected in 2009 relative to ocean conditions.

There was discussion of the effects of spending 1-4 years in the ocean. Some smolts will be in the ocean spanning years of good and bad conditions, LeFleur said. For Coho and Chinook, the first year is most essential in terms of survival, Wagner said. Much is driven by conditions during the year of entry.

8. Adult Fish Return Forecasts

Cindy LeFleur presented a summary of the 2008 spring and summer Chinook forecast. The prediction for upriver spring Chinook is 269,000, a very good return and the third highest since 1977. That prediction includes 21,000 Snake River wild ESA fish. It will include some 4-year-old fish and some 5-year-olds. The summer Chinook run is expected to be around 52,000. Sockeye are predicted to be 75,000, also high. Predictions show fall runs are in better shape than last year, but not great. Certain stocks are having trouble, such as the Lewis River fall Chinook and Coho runs.

Operations Review

a. Reservoirs. Grand Coulee is at elevation 1,258.8 feet, discharging outflows of 96.6 kcfs. There was discussion of planning to meet the April 10 flood control elevation of 1,255 feet *{Additional clarification by Mary Mellema: This April 10 flood control elevation is based on the February 1 forecast and no shift from Dworshak}*. The reservoir is well above the lower limits to draft for the end of February target and expect to meet the end of March target elevation as well, Tony Norris (BPA) said. There is a high level of confidence these objectives will be met even if the water supply forecast goes down.

Hungry Horse is at elevation 3,514.21 feet, with discharges of 2,844 kcfs to support the Columbia Falls minimum flow.

Libby is at elevation 2,404 feet, with inflows of 2.6 kcfs and outflows of 9.2 kcfs. Flows are being shaped both daily and weekly, ramping down to meet the end of February elevation target of 2,399.5 feet.

Albeni Falls is at elevation 2,055.4 feet, with inflows of 15.5 kcfs and outflows of 16.9 kcfs, still operating within a 1-foot range of 2,055-2,056 feet elevation.

Dworshak is at elevation 1,521.2 feet, with inflows of 2.5 kcfs and outflows of 1.3 kcfs. Operations have gone back to a single unit at the low end of efficiency and minimum flows.

The 7-day average for inflows at Lower Granite is 25.8 kcfs. The 7-day average for inflows at McNary is 120.8 kcfs. The 7-day average for inflows at Bonneville is 135.7 kcfs.

b. Fish. There was nothing to report at this meeting except that a very few fish have passed.

c. Power System. There was nothing to report at this meeting.

d. Water Quality. Washington State's new water quality regulations have gone into effect, calling for daily TDG levels to be reported as the high 12-hour consecutive average. Because the Fish Operations Plan is a rollover of last year's operations, the COE will manage to the high 12-hour average, but will include in its end-year report a high consecutive 12-hour average for the state of Washington, Adams said. The method of calculating the high consecutive 12-hour average hasn't yet been determined.

7. Next Meeting

The next regular TMT meetings will be on March 12 and 26. The March 12 meeting will focus largely on Spring Creek Hatchery operations. This summary prepared by Pat Vivian.

Name	Affiliation
Jim Adams	COE
Dave Wills	USFWS
Paul Wagner	NOAA
Laura Hamilton	COE
Tony Norris	BPA
Cindy LeFleur	Washington
Kyle Dittmer	CRITFC
Russ George	WMC
Dan Feil	BPA
Dennis Schwartz	COE

Dan Spear	BPA
Scott Boyd	COE
Bob Diaz	PPM Energy
Holli Krebs	Bear Stearns
John Crandall	Constellation Energy
Bob Buchholz	COE
Rudd Turner	COE
Dan Faulkner	COE

Phone:

Russ Kiefer	Idaho
Mary Mellema	BOR
Tim Heizenrader	Cascade
John Wasach	Bear Stearns
Margaret Filardo	FPC
Barry Espensen	CBB
Glen Trager	Shell Energy
Jennifer Miller	Susquehanna
Richelle Beck	DRA
Shane Scott	PPC
Bob Fischer	Constellation
Tom Le	Puget Sound Energy
Bill Rudolph	NW Fish Letter
Ron Boyce	Oregon
Jim Litchfield	Montana

TECHNICAL MANAGEMENT TEAM

BOR : John Roache / Mary Mellema / Pat McGrane **BPA :** Robyn MacKay / Tony Norris / Scott Bettin
NOAA-F: Paul Wagner / Richard Dominique **USFWS :** David Wills / Steve Haeseker
OR : Rick Kruger / Ron Boyce **ID :** Russ Kiefer
WDFW : Cindy LeFleur **MT :** Jim Litchfield / Brian Marotz
COE: Jim Adams / Cathy Hlebechuk / Bob Buchholz

TMT MEETING

Wednesday March 12, 2008 09:00 - 12:00

1125 N.W. Couch Street, Suite 4A34
Portland, Oregon 97209-4142
Map Quest [\[Directions\]](#)

CONFERENCE PHONE LINE

Conference call line: 203-310-2162; PASS CODE = 4703150

To check into the building, take the elevator to the 5th floor and the guard will issue you an ID badge if you need one and will take you down to the meeting room on the 4th floor. If you have NOT attended a TMT meeting in the past you will need to call ahead and let Jim Adams (503) 808-3938, Cathy Hlebechuk (503) 808-3942, or Bob Buchholz (503) 808-3945 know, so you can be added to the TMT Visitor List and issued an ID badge. This badge may be used indefinitely. If you have attended TMT in the past you may re-use your ID badge indefinitely. If you are a federal employee you will also need to have an ID badge issued to you which can be used indefinitely.

We have had disruptions on the phone because people are not hitting 'mute' after dial in.
Please MUTE your Phone

*All members are encouraged to call Robin Gumper with any issues or concerns they would like to see addressed.
Please e-mail her at robin76@cnnw.net or call her at (503) 248-4703.*

AGENDA

1. Welcome and Introductions
2. Review [\[Meeting Minutes\]](#) 
3. Spring Creek Hatchery Release
 - A. [\[Bonneville Operations\]](#) - Cathy Hlebechuck, USACE
 - B. [\[Depth Compensated TDG Levels at Warrendale\]](#) - Laura Hamilton, - USACE
 - C. Spring Creek Release Monitoring - Dave Wills, - USF&WS
4. Water Supply Forecast, Corps
 - A. [\[Water Supply Forecast for Main Points\]](#)
 - B. [\[Main Water Supply Page - Overview\]](#)
 - C. [\[Summary of Columbia River Flood Control\]](#)
 - D. [\[Current Month precip\]](#)
 - E. [\[Seasonal Month Precip\]](#)

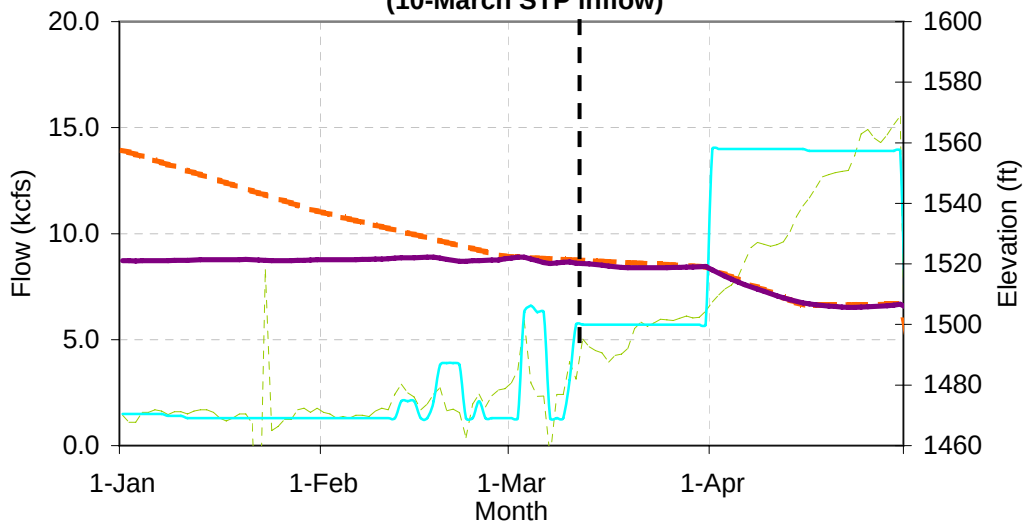
- F. [\[Snow\]](#)
- G. Corps Volume Inflow Forecast
 - i. [\[Libby\]](#)
 - ii. [\[Dworshak\]](#)
- H. RFC Water Supply/ESP
 - i. [\[Libby\]](#)
 - ii. [\[Hungry Horse\]](#)
 - iii. [\[Albeni Falls\]](#)
 - iv. [\[Grand Coulee\]](#)
 - v. [\[Dworshak\]](#)
 - vi. [\[Brownlee\]](#)
 - vii. [\[Lower Granite\]](#)
 - viii. [\[The Dalles\]](#)
- I. Climate Prediction Center Forecasts
 - i. 1-month outlook
 - a. [\[Precipitation Probability\]](#)
 - b. [\[Temperature Probability\]](#)
 - ii. 90-day outlook
 - a. [\[Precipitation Probability\]](#)
 - b. [\[Temperature Probability\]](#)
- 5. Dworshak Flood Control Shift - *Cathy Hlebechuk, USACE*
[\[DWR STP Operations\]](#) 
- 6. Revised Draft 2008 Water Management Plan/Fall Winter Update - *Scott Boyd, USACE*
[\[Draft 2008 WM Plan/Fall Winter Update\]](#) 
- 7. Operations Review
- 8. Other
 - Set agenda for next meeting - **March 26, 2008**
[\[Calendar 2008\]](#) 

Questions about the meeting may be referred to:

*[Jim Adams](#) at (503) 808-3938, or
[Cathy Hlebechuk](#) at (503) 808-3942, or
[Bob Buchholz](#) at (503) 808-3945.*

Flood control based on 1-March WSF,
2810 kaf (J. McCoskery)

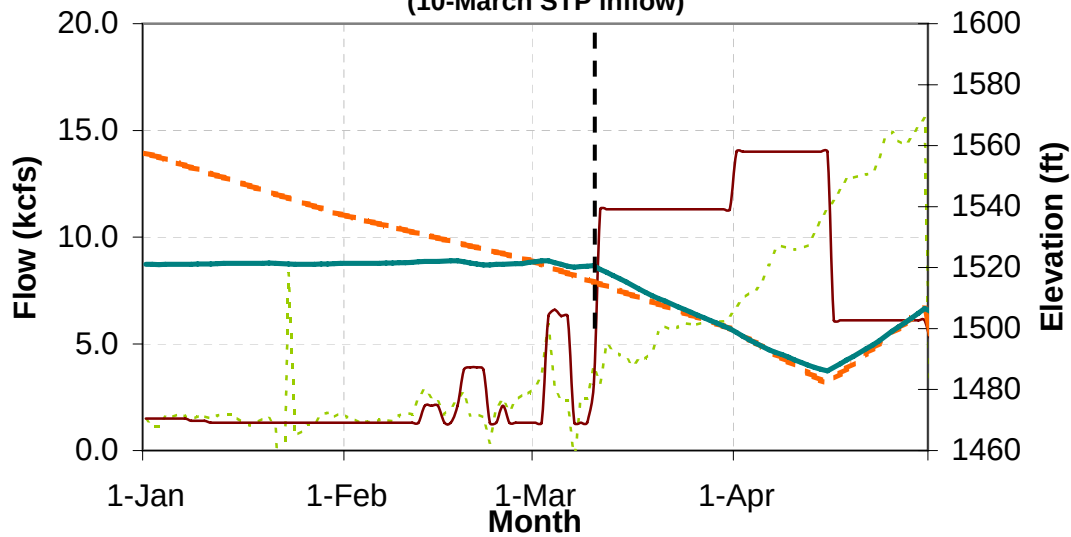
Scenario 1 - Dworshak Full Shift Ops w/ 14 kcfs Max (10-March STP inflow)



--- Inflow — Full Shift Outflow - - - URC Elevation — Full Shift Elevation

Flood control based on 1-March WSF,
2810 kaf (J. McCoskery)

Scenario 1 - Dworshak No Shift Ops w/ 14 kcfs Max (10-March STP inflow)

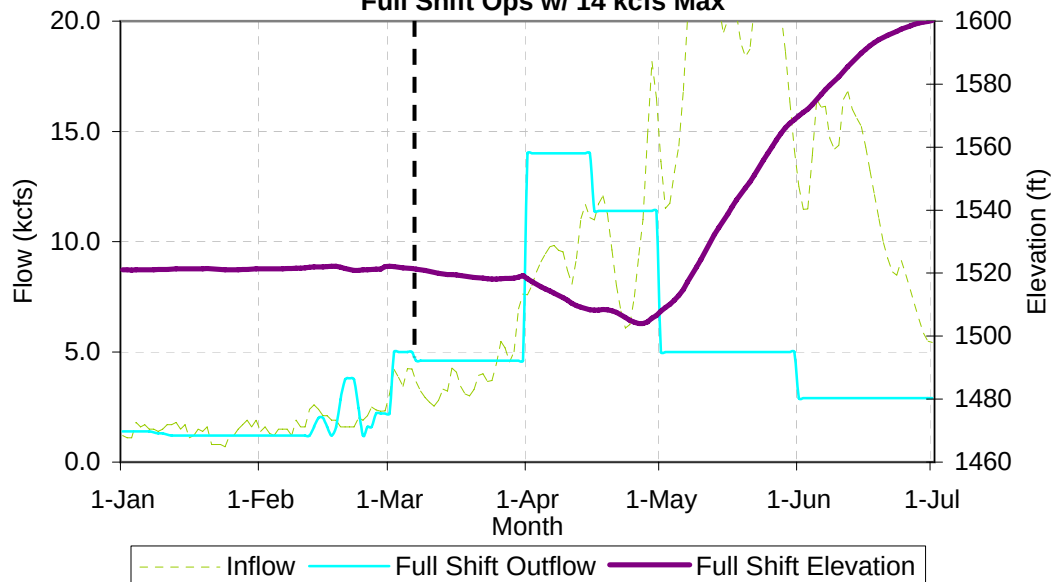


--- Inflow — No Spill >14 Outflow - - - URC Elev — No Spill >14 Elev

APR-JUL VOLUME = 2.7 MAF

Scenario 1 Dworshak

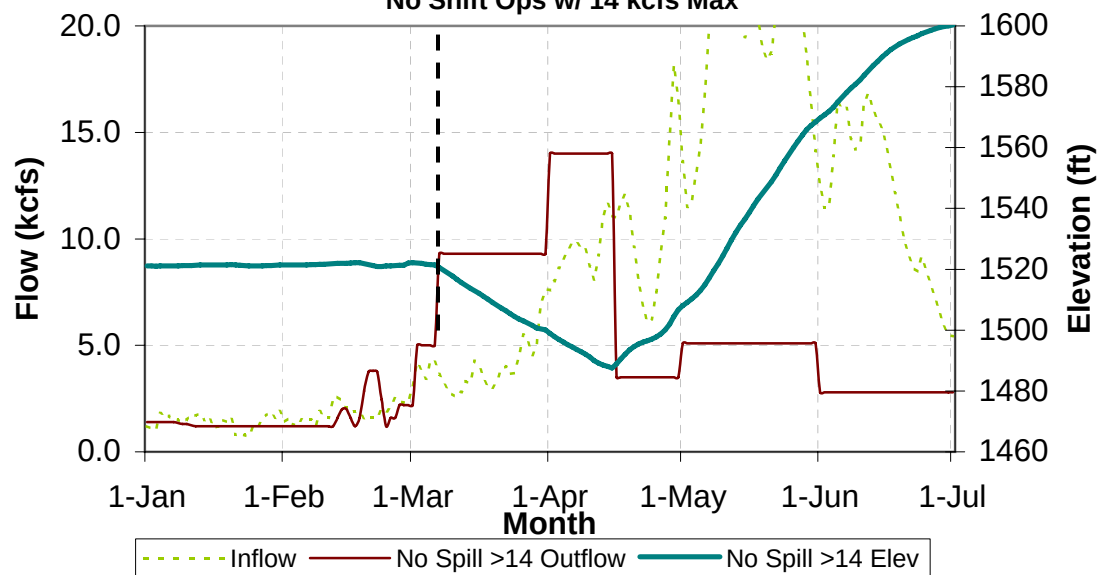
Full Shift Ops w/ 14 kcfs Max



APR-JUL VOLUME = 2.7 MAF

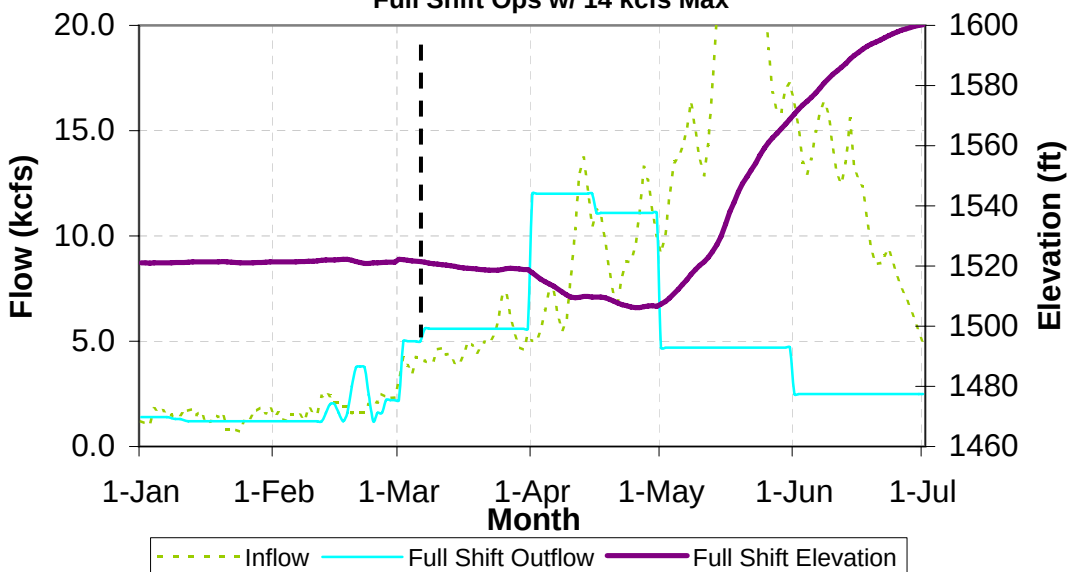
Scenario 1 Dworshak

No Shift Ops w/ 14 kcfs Max



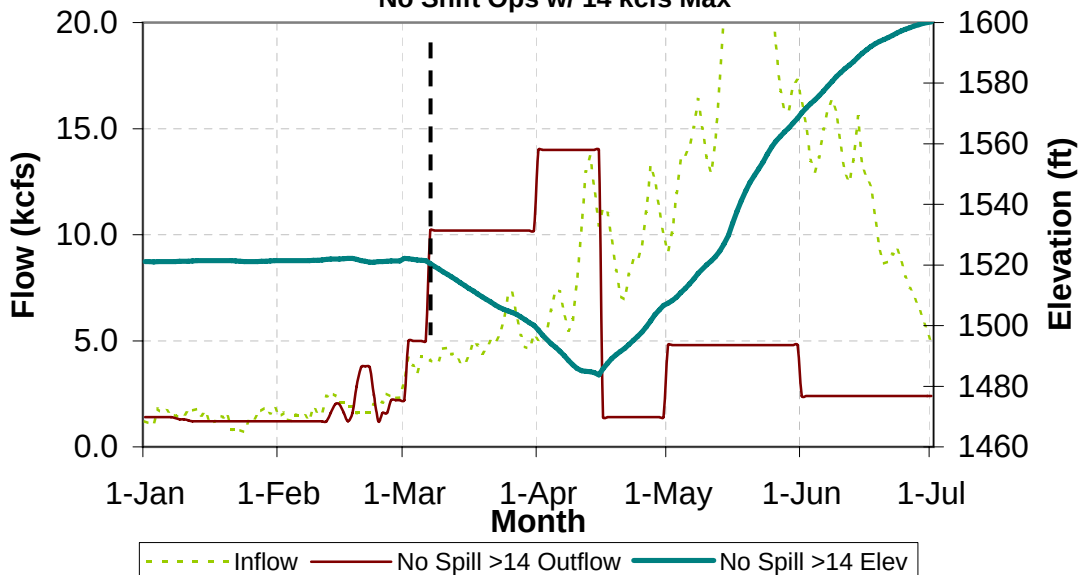
APR-JUL VOLUME = 2.5 MAF

**Scenario 2
Dworshak
Full Shift Ops w/ 14 kcfs Max**



APR-JUL VOLUME = 2.5 MAF

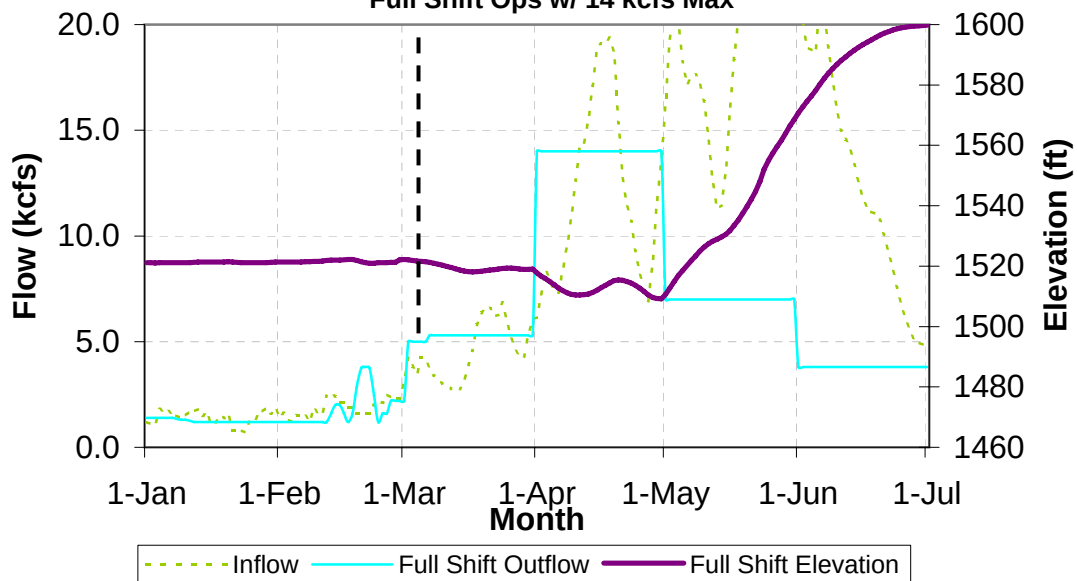
**Scenario 2
Dworshak
No Shift Ops w/ 14 kcfs Max**



APR-JUL VOLUME = 2.9 MAF

Scenario 3 Dworshak

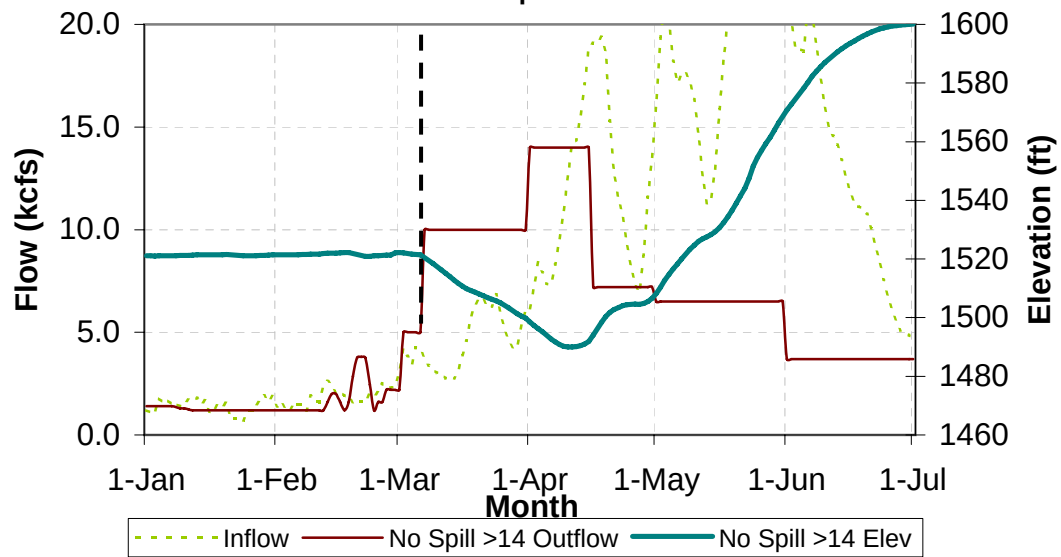
Full Shift Ops w/ 14 kcfs Max



APR-JUL VOLUME = 2.9 MAF

Scenario 3 Dworshak

No Shift Ops w/ 14 kcfs Max



Corps Planned Operation at Bonneville Dam for Spring Creek Hatchery releases

Background:

The Spring Creek National Fish Hatchery released 7.6 million subyearling fall Chinook salmon into the Columbia River upstream of Bonneville Dam on March 5 & 6, 2008. The Corps, BPA, USFWS, and NOAA Fisheries technical and policy staff held meetings in February to discuss biological information, project operations and potential tests for released fish. A System Operational Request (SOR) was received on February 26, 2008, and was discussed in TMT and IT. Consensus was not reached on the spill portion of the project operation at TMT and IT. The Federal agencies position was that spill would not be provided in 2008 because, based on the best available data, corner collector survival is higher than any other passage routes, there is uncertainty about biological benefit from additional spill for returning Spring Creek adults, and questions concerning the 2008 test protocol. Further discussion identified that there is biological uncertainty in the available data and concerns about overcrowding potentially contributing to mortality.

Federal Agencies developed a proposed operation in conjunction with representatives from the Warm Springs Tribe, the Yakama Indian Nation, the Nez Perce Tribe, and the Umatilla Tribe. This proposal has the endorsement and support of the above mentioned parties. This proposal was then shared with the States of Oregon, Washington, and Idaho and we considered their views and concerns in furthering the proposal.

After fully considering the technical input received and subsequent policy discussions, the Corps has decided to operate Bonneville project in the following manner.

2008 Operations:

Starting on March 5 at 1600 hours, Operate the second powerhouse corner collector (5 kcfs discharge)

Starting on March 6 at 0600 hours

1. Operate the second powerhouse as first priority.
2. Operate fish passage facilities in accordance with the Fish Passage Plan (FPP).
3. Operate second powerhouse turbine units toward the low end of the 1% of best efficiency range until 0600 hours March 10.
4. Operate first powerhouse Minimum Gap Runner (MGR) units on a first on/last off basis when that powerhouse operates, and operate the units within the 1% of best efficiency range. Follow FPP unit operating priorities at both powerhouses.

Starting midnight on March 6 and culminating at 0600 hours on March 10, provide 36 kcfs spill using a modified spill pattern that will provide good fish passage conditions. In addition, 2 kcfs spill will be provided during daytime hours at the end spill bays for adult fish attraction,

according to the FPP. Every other spillbay will be open 2 ft at spillbays 3-17. Adequate flows will be provided to protect incubating chum salmon downstream of Bonneville Dam from the effects of elevated Total Dissolved Gas levels.

Biological Rationale in Support of the Operation:

One relevant biological consideration is the issue of crowding at the bypass, because of the concentrated fish release. This is not a large concern, but in the interest of compromise and optimizing conditions for fish we agreed to spill for this purpose for one year only, as part of a broader multi-year agreement. Based on advice from NOAA Fisheries and our biologists, we believe that a spill of 35 kcfs would help to alleviate the crowding issue.

We remain convinced, based on the available data, that there may be no biological benefit from the additional spill for returning Spring Creek adults. However, we recognize that there is biological uncertainty in the available data, and have heard the differing views of the parties on this. In addition, we have heard from the States and Tribes regarding the importance of these fish for tribal and offshore fisheries.

The Corps believes that these operations will result in acceptable survival for fish passing the project and relieve crowding in gatewells that was implicated in fish mortalities in 2007.

Our priority is to reprogram the Spring Creek Hatchery production so that this release and early spill are unnecessary. We believe there is no need for further testing to inform future operations. Nevertheless, some information may be collected because the fish have already been marked. The sovereigns and the action agencies will work together towards achieving the reprogramming goal. The Corps' Reservoir Control Center issued teletypes to cover 2008 operations.

Future years Operations:

Next year (2009) and beyond, spill would not be provided, but the federal agencies will work with the sovereign parties to stagger fish releases to minimize crowding. In the meantime, we will work to address sources of mortality, including crowding. A mutual commitment is expected from the sovereign parties to join us in supporting and implementing Spring Creek reprogramming as early as 2010, but no later than 2012.

March Water Supply Forecasts.

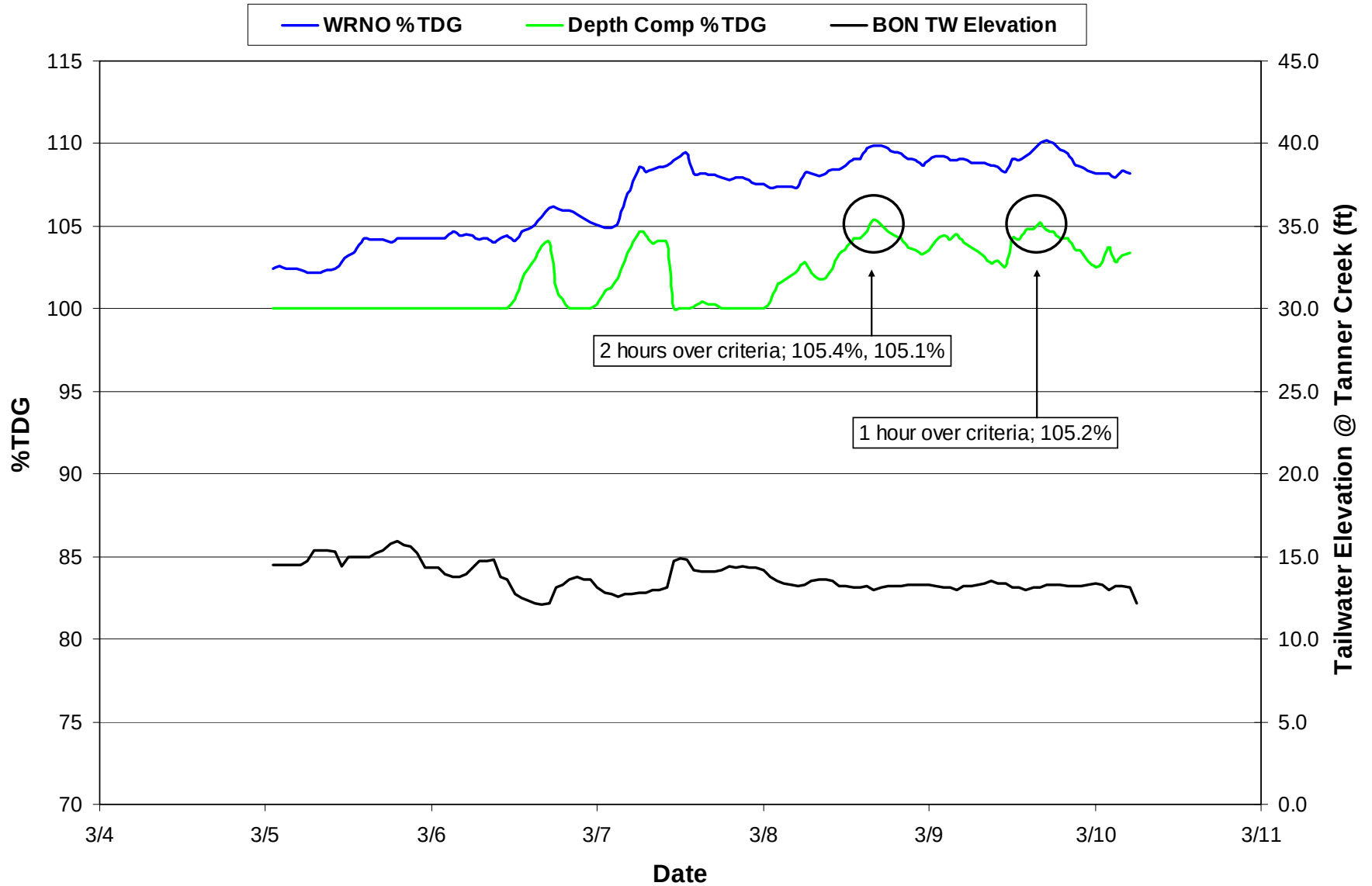
The March Final water supply forecasts by the National Weather Service River Forecast Center (NWRFC) and the Corps official forecasts for Dworshak and Libby are available. The observed volumes for 2007 and latest forecasts for 2008 volume runoff at selected basins are below. The units are million acre feet:

Project	Jan-Jul 07		Apr-Aug 07		Apr-Aug 08	
	Observed	%	Observed	%	Forecasted	%
Libby*	7.3	115	6.8	109	6.4	102
Albeni Falls	13.1	86	10.1	76	13.5	101
Grand Coulee	63.9	102	57.4	95	61.3	102
Dworshak*	2.7	77	1.8	67	2.8	105
Lower Granite**	18.9	63	13.5	59	24.2	106
The Dalles	95.7	89	78.9	85	94.3	101

* Corps of Engineers' forecast (Apr – Aug period at Libby, Apr-Jul period at Dworshak)

**This is Lower Granite April Through July forecast which will be used to compute flow objectives for fish flow augmentation.

Depth Compensated %TDG at WRNO (11.5 ft)



COLUMBIA RIVER REGIONAL FORUM

TECHNICAL MANAGEMENT TEAM

March 12, 2008 Meeting

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Robin Gumpert

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.

Announcements

It was announced that Dan Feil has taken a post as fish biologist for the COE and will participate at TMT as appropriate.

Official Minutes/Facilitator Notes

The Official Meeting Minutes from the 2/27 meeting had not yet been posted. Cathy Hlebechuk, COE, offered to let TMT know when the notes are posted, and TMT will look to finalize them at their March 26 meeting.

Spring Creek Hatchery Operations

Cathy Hlebechuk, COE, provided a handout (also linked to the TMT agenda) describing the COE planned operation for Spring Creek Hatchery releases. The federal action agencies developed a proposed operation in conjunction with Warm Springs Tribe, Yakama Indian Nation, Nez Perce Tribe and Confederated Tribes of the Umatilla, and shared it with the States of Oregon, Idaho and Washington. 7.6 million fish were released on March 5 and 6. The specifications of the operation are listed in the document, and included spill of 36 kcfs from midnight on March 6 to 6am on March 10. Cathy noted that the second powerhouse turbine units were operated to the low end of 1% beyond the specified March 10 date in the planned operation. Initially the COE targeted 12.5 feet tailwater and later increased it to 13.0 feet to address TDG concerns.

Laura Hamilton, COE, provided graphics depicting three brief TDG exceedances that went just above 105% depth compensation, and shared that the tailwater fluctuated between 12.2 feet and 14.9 feet during that time. Dave Wills, USFWS, shared that TDG levels at chum redds monitored further downstream near Multnomah Falls showed no signs of gas levels above 105%, with depth compensation, thus preventing the potential of bubble trauma for fish at this location. The USFWS did not believe that this operation caused any TDG problems. He added that the Spring Creek fish did pass slightly slower than in the past, averaging an arrival time of about 36 hours instead of 24 hours. When the low end of 1% efficiency operation ended on 3/10, an increase in mortalities was observed at the smolt monitoring facility. When the operation to the low end of 1% efficiency was resumed, mortalities decreased. The COE said they would check in on 3/13 and if fish passage was nearly complete, would end the low end of 1% efficiency

requirement. BPA and the COE were commended for their efforts on this operation. Dave Wills added that no crowding was reported and that preliminary analysis showed that no mortalities resulted from crowding. Peak passage of 345,000 fish occurred on 3/9. A full review of the operation will be conducted in the next few months and the USFWS will share a report with TMT as available.

It was noted that TMT will likely need to discuss operating the turbine to the lower end of 1% efficiency for the next Spring Creek hatchery release in April. Finally, TMT members heard that the region has committed to developing and implementing re-programming as a long term solution to the production issue by 2010, no later than 2012. A clarification was made that there was no adult survival test this year because the USFWS agreed to release all the hatchery fish, rather than stagger the release, to coincide with spill.

Water Supply Forecasts

Cathy Hlebechuk, COE, provided information on March final forecasts, noting that the Libby forecast dropped slightly from 102.5% to 102%; Grand Coulee increased from 98.2% to 102%; Dworshak increased from 102% to 105%; Lower Granite increased from 103% to 106%; and The Dalles increased from 99% to 101%.

TMT also looked at the summary of current flood control elevation targets based on the March final forecast. It was noted that folks should focus on columns 9 and 11 on page 2 of the summary to see Grand Coulee and Dworshak shifted flood control targets.

Dworshak Shifted Flood Control Operations

Paul Wagner, NOAA, reported that FPAC discussed Dworshak shift to Grand Coulee operations and all salmon managers recommended a full shift to the extent possible, to provide more flow in the Snake River in April during fish migration, and provide greater assurance that flow in the Snake River would be augmented to the extent possible which will be important if natural runoff is delayed due to a cold spring. Additionally, resident fish, primarily kokanee and bull trout, would benefit from this proposed operation. Idaho added that they have been very supportive of the way this complex operation has been implemented in the past.

The action agencies responded that they would plan to implement a full shift. Graphs were linked to the agenda showing STP runs for Dworshak with a full shift vs. a no shift operation, based on current forecasts. Paul noted that these graphs show the shifted operation would provide water to support fish passage while the no shift operation would move the water away from the migration, and thanked the COE for providing the visual.

Action: Cathy Hlebechuk will email updated ESP runs to TMT and have them posted to the TMT web page next week to show bookend scenarios for this operation.

2008 Water Management Plan and Fall/Winter Update

Scott Boyd, COE, directed TMT to the web posting of the latest 3/11 draft of the WMP and offered that the draft had been updated with comments, included Fish Passage Plan

information and referenced the Fish Operations Plan. The Fall/Winter Update included March final water supply forecast information and the Spring Creek Hatchery operation for this year.

Action: TMT will be notified when the Fish Passage Plan has been posted, later this week. TMT will review and provide comments on the Fall/Winter update with the goal of ‘finalizing’ both the WMP and Fall/Winter Update at the next TMT meeting – and removing it from future agendas. Finally, spill patterns being discussed and coordinated in other forums will be shared at the next TMT meeting.

Operations Review

Reservoirs – Grand Coulee was at elevation 1255.75’ and providing releases for chum. The April 10 target was 1244.2’ and 1229’ end of April. Hungry Horse was at elevation 3511.16’, releasing 2.7-2.8 kcfs out. The BOR water supply forecast showed Hungry Horse at 102% of normal, and no flood control releases were projected to occur in March. Libby was at elevation 2397.9’, targeting 2399.8’ end of March. Dworshak was at 1520.1’ and the shifted end of April elevation was 1519.1’. The project was shaping minimum flow to full load during the week and minimums during the weekends. Bonneville 7-day average flows were 133-182 kcfs.

Fish – Paul Wagner, NOAA, reported that 20 adult spring chinook had been observed passing Bonneville dam at this point.

Power system – Nothing to report at this time.

Water quality – Laura Hamilton, COE, reported that water quality gauges were being put into the system in time for the spill season, and that she would provide updates on water quality data at future TMT meetings.

Next TMT Meeting, March 26, 9am-noon

Agenda Items include:

- Fish Operations Plan – Spill patterns
- Final WMP and Fall/Winter Update
- Priest Rapids Update
- Scheduled Outage Updates
- Spring Spill/Transport Operations
- Planned Tests: RSWs, TSWs, etc.
- Start of MOP Operations
- Operations Review

Scott Bettin, BPA, asked TMT to consider briefly interrupting minimum flow during a scheduled Lower Monumental RSW test on March 18 – this would require a 2-hour period of reduced flow.

Action: Dan Feil, COE, said he would check on duration and conditions of the test, and whether the test would be impacted by Scott’s request.

UPDATE: Following today's meeting, an email was sent to TMT regarding this issue:
The 6 unit CO2 outage scheduled for 3/18 will not overlap with the balloon tag test. Unless we [the COE]hear from you otherwise, spill for the 3/18 will be 11.5 kcfs (min flow). Training spill is needed for this study. This will occur approximately 1200 - 1400 hours.

**Columbia River Regional Forum
Technical Management Team Meeting
March 12, 2008**

1. Introduction

Today's TMT meeting was chaired by Cathy Hlebechuk (COE) and facilitated by Robin Gumpert (D.S. Consulting), with representatives of COE, BOR, USFWS, NOAA, BPA, CRITFC, Idaho and others attending in person or by phone. 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

There were no comments on meeting minutes today. TMT will check in next week on the official minutes for the February 27 TMT meeting.

3. Spring Creek Hatchery Release

Bonneville Operations: The COE posted to TMT's website a paper describing the planned operations at Bonneville Dam for the Spring Creek Hatchery release of 7.6 million fall Chinook; Hlebechuk distributed hard copies. Federal agencies developed the proposed operation with representatives from the Warm Springs Tribe, the Yakama Indian Nation, the Nez Perce Tribe, and the Umatilla Tribe. Starting midnight March 6, the COE provided 36 kcfs spill round the clock until March 10 using a modified spill pattern. In addition, 2 kcfs spill was provided at the end spill bays during daylight hours for adult fish attraction. The COE does not believe spill aids returning adults and provided spill this year only to address concerns about crowding at the bypass. The second powerhouse was operated as first priority, with the turbine units toward the low end of the 1% best efficiency range. The operation was planned in conjunction with tribal representatives and includes a mutual commitment to implement Spring Creek Hatchery reprogramming as early as 2010, but no later than 2012. The COE specified a minimum tailwater elevation below Bonneville of 12.5 feet, which was subsequently altered to 13 feet for protection of chum redds.

Next year and beyond, spill will not be provided to accompany the Spring Creek Hatchery release but the federal agencies will work with the sovereign parties to stagger fish releases to minimize crowding.

Depth Compensated TDG Levels at Warrendale: Laura Hamilton (COE) presented a graph depicting discharges and spill levels at Warrendale gage. The total project discharge averaged 147.8 kcfs, with spill averaging 36 kcfs. The actual compensation depth averaged 102.9%TDG. During three hours, the actual

compensation depth exceeded the 105% TDG criteria but the exceedances were small (105.2-105.4%). The tailwater elevation below Bonneville during the spill period averaged 13.4 feet.

Spring Creek Release Monitoring: Spring Creek Release Monitoring: USFWS monitored TDG and water depth over the chum redds at the Ives Island complex and Multnomah Falls. The TDG readings at the Multnomah Falls chum redd sites were a bit lower than the Warrendale gage readings, Dave Wills reported. BPA and the COE did a very good job of maintaining depth compensation for this operation, Wills said. Based on the monitoring results the USFWS does not believe that the spill operation caused any TDG or GBT problems. The fish took 36 hours to travel from the hatchery to the dam; normally it's around 24 hours. They passed without incident until the turbines went off the low end of the 1% efficiency range on March 10 and mortalities occurred. When the turbines were returned to the low end of 1% efficiency, the mortalities immediately decreased. The plan is to continue operating the turbines at the low end of 1% efficiency until passage numbers have dropped off, probably by the morning of March 13.

Tony Norris (BPA) asked whether overcrowding occurred at the juvenile bypass facility; Wills said none was reported. The highest density was 345,000 fish that passed on March 9. Further analysis will occur over the next few months. Dan Feil agreed that no problems with crowding and mortality were observed on high passage days. More discussion is needed on whether the turbines should be operated at the low end of 1% efficiency for the April release. The coded wire tag study did not go forward because USFWS decided, in light of the commitment to reprogramming, to take advantage of spill for the entire release.

4. Water Supply Forecast

All of the March water supply final forecasts for the April-August period were higher than the February forecasts except Libby, Hlebechuk said. Libby is now at 102% of normal, down from 102.5% at the end of February. Grand Coulee is 102% of normal; Dworshak is 105%, Lower Granite 106%, and The Dalles 101% of normal.

The end of March flood control elevation for Libby is 2399.8 feet, a flat elevation through April 30 unless VARQ flows start. On March 31, the full shifted elevation target will move from Dworshak to Grand Coulee: The shifted flood control elevation for March 31 at Grand Coulee is 1256.7 feet; the elevation objective for April 10 is 1,244.2 feet; and the flood control elevation for the end of April is 1,229.1 feet. The shifted flood control elevation for March 31 at Dworshak is 1519.1 feet.

5. Dworshak Flood Control Shift

FPAC discussed whether to recommend a full or partial flood control shift from Dworshak and recommends the full shift if possible, Paul Wagner (NOAA) said. He and Russ Kiefer (Idaho) agreed that keeping Dworshak at a higher elevation benefits both anadromous fish and resident kokanee and bull trout. The COE should be able to shift the full amount from Dworshak to Grand Coulee, Hlebechuk said. The full shift operation will mean releasing 14 kcfs from Dworshak throughout April, which could raise concerns about exceeding 110% TDG standards. Last year, the Salmon Managers preferred higher flows in the second half of April; Kiefer confirmed that's true again this year. Hlebechuk showed graphs of the full shift versus no shift, with Dworshak reaching 1,500 feet elevation at the end of March. The graphics clarify that no shift would shape water out of the migration period, Wagner observed.

6. Revised Draft 2008 WMP and Fall/Winter Update

Language in the WMP has been updated to correspond with the Fish Passage Plan, Scott Boyd (COE) said. It is now being reviewed by COE's legal counsel. TMT will work on finalizing both the WMP and the fall/winter update at its next meeting.

There have been no changes to the Fish Operations Plan since the last meeting. Project-specific spill patterns are being developed for John Day and Little Goose by FFDRWG and SRWG, Rudd Turner (COE) said. These will be shared with TMT at its next meeting.

The Fish Passage Plan will be posted on the web today.

7. Operations Review

a. Reservoirs. Grand Coulee is at elevation 1,255.75 feet, releasing flows for chum protection below Bonneville and to meet the April 10 target elevation of 1,244.2 feet. The end of April flood control elevation is 1,229.1 feet.

Hungry Horse is at elevation 3,511.16 feet, with discharges of 2.7-2.8 kcfs to support the Columbia Falls minimum flow. The water supply forecast for March is 102% of normal, with no flood control releases anticipated until April at the earliest.

Libby is at elevation 2,397.9 feet, at minimum flows and trying to fill. The end of March flood control elevation is 2,399.8 feet.

Dworshak is at elevation 1,520.1 feet. The end of March shifted flood control elevation is 1,519.1 feet. The project is shaping during the week between

minimum flows of 1.3 kcfs and a full load of 8.2 kcfs, with minimum flows on weekends for fish passage.

The 7 day average for discharges at Bonneville ranged from 133-182 kcfs.

There was discussion of whether there will be a spill test of the RSW at John Day before spill season starts; Feil will report back on that. There was also discussion of the balloon tag test planned for March 18 at Lower Monumental. Six units will be out of service, with spill over the RSW and in one additional bay because the minimum flow is 11.5 kcfs and the RSW will only spill 9.5 kcfs. Scott Bettin asked whether 9.5 kcfs spill would be sufficient for 2 hours. Feil will find out whether that would impact the test. He and Wagner agreed to work together outside TMT to answer this question.

b. Fish. The migration is not underway yet, although a few fish have passed.

c. Power System. There was nothing to report at this meeting.

d. Water Quality. The COE is in the process of installing gages and will let TMT know when they are operating.

7. Next Meeting

The next regular TMT meeting will be on March 26. The agenda will include FOP spill patterns, finalizing the WMP and the fall/winter update, a B2 corner collector outage as well as any other planned outages, spring spill and transport operations, the start of MOP operations, review of the February 27 official minutes, and possibly a chum emergence report. This summary prepared by consultant and writer Pat Vivian.

Name	Affiliation
Cathy Hlebechuk	COE
John Roache	BOR
Dave Wills	USFWS
Paul Wagner	NOAA
Laura Hamilton	COE
Ruth Burris	PGE
Rudd Turner	COE
Dan Spear	BPA
Tim Heizenrader	Cascade
Bob Diaz	PPM Energy
Scott Boyd	COE
Bob Buchholz	COE
Dan Feil	COE

Phone:

Kyle Dittmer	CRITFC
Shane Scott	PPC
Margaret Filardo	FPC
Russ George	WMC
Dave Benner	FPC
Richelle Beck	DRA
Jennifer Miller	Susquehanna
Scott Bettin	BPA
John El	Constellation Energy
Russ Kiefer	Idaho

TECHNICAL MANAGEMENT TEAM

BOR : John Roache / Mary Mellema / Pat McGrane **BPA :** Robyn MacKay / Tony Norris / Scott Bettin
NOAA-F: Paul Wagner / Richard Dominique **USFWS :** David Wills / Steve Haeseker
OR : Rick Kruger / Ron Boyce **ID :** Russ Kiefer
WDFW : Cindy LeFleur **MT :** Jim Litchfield / Brian Marotz
COE: Jim Adams / Cathy Hlebechuk / Bob Buchholz

TMT MEETING

Wednesday March 26, 2008 09:00 - 12:00

NOTE: This Week's Meeting Location

NOAA Fisheries
1201 N.E. Lloyd Blvd.
Portland, Oregon

Mt. St. Helens Room, 10th Floor Conference Room

CONFERENCE PHONE LINE

Conference call line: 203-310-2162; PASS CODE = 4703150

**We have had disruptions on the phone because people are not hitting 'mute' after dial in.
Please MUTE your Phone**

*All members are encouraged to call Robin Gumpert with any issues or concerns they would like to see addressed.
Please e-mail her at robin76@cnmw.net or call her at (503) 248-4703.*

AGENDA

1. Welcome and Introductions
2. Review [\[Meeting Minutes\]](#) 
3. Priest Rapids Update - Russell Langshaw, Grant County PUD
4. Dworshak Operations - Cathy Hlebechuk, USACE
[\[ESP Inflow Statistics\]](#) 
 - a. [\[DWR Operations, 28Mar08\]](#) 
 - b. [\[Dworshak Operations, 01Apr08\]](#) 
5. Final Water Management Plan and Spring-Summer Update - Scott Boyd, USACE
6. 2008 Project Activities Update - [\[Handout\]](#) Dan Feil, USACE
 - a. Planned Tests / Spill Patterns
 - i. Little Goose
[\[Bulk "A" Spill Pattern\]](#) 
[\[Bulk "B" Spill Pattern\]](#) 
[\[Uniform Spill Pattern\]](#) 

- ii. Lower Monumental
 - [\[LMN Dam Spill Pattern\]](#) 
- iii. McNary
 - [\[Spill Pattern for Fish Passage\]](#) 
 - [\[Unit Operating Priority\]](#) 
- iv. John Day
 - [\[Unit Operating Priority\]](#) 
- b. Spring Spill/Transport Operations
- c. Start of MOP Operations
- 7. Ocean Ecosystem Indicators Website - *Bill Peterson, NOAAAF*
 - a. [\[Ocean Ecosystems\]](#)
- 8. Columbia River Basin ESP Plots
 - a. [\[ESP Plots\]](#)
- 9. Operations Review
 - a. Reservoirs
 - b. Fish
 - c. Power System
 - d. Water Quality
 - [\[Spill Information 2008\]](#)
- 10. Other
 - a. Guidelines for TMT [\[Guidelines for TMT\]](#)
 - b. Set agenda for next meeting - **April 09, 2008**
[\[Calendar 2008\]](#) 

Questions about the meeting may be referred to:

*[Jim Adams](#) at (503) 808-3938, or
[Cathy Hlebechuk](#) at (503) 808-3942, or
[Bob Buchholz](#) at (503) 808-3945.*

2008 CRFM Activities

March 26, 2008

Bonneville Dam

1. BII Shallow Draft Behavioral Guidance Structure Evaluation
 - o A ~700' long, 10' deep guidance boom has been installed in the BII forebay to guide more fish to the BII Corner Collector.
 - o Acoustic telemetry will be used to assess yearling Chinook, steelhead, and subyearling Chinook behavioral response to the BGS and to estimate passage distribution at BII.
2. Spillway Survival Evaluation
 - o Survival for yearling Chinook that pass the spillway and dam will be estimated for a 100 kcfs, 24-hours/day spill operation from approximately April 21 to June 20.
 - o Survival for subyearling Chinook that pass the spillway and dam will be estimated for a 85 kcfs daytime/TDG cap nighttime spill operation from June 21 to approximately July 20.
3. B2 FGE Improvements Evaluation
 - o JBS fish condition, mortality, and OPE of Spring Creek March releases and run of fish under various turbine loading (March-June).
4. BII Corner Collector Kelt Passage Evaluation
 - o Hydroacoustic monitoring of kelt passage at the BII Corner Collector during March/April.
5. Chum Redd TDG Monitoring
 - o Field and lab component Feb-May monitoring and examining the effects of TDG.
6. Sea Lion Predation Observations
 - o We will continue to observe and document sea lion predation on spring Chinook, steelhead, lamprey and sturgeon in the tailrace of Bonneville Dam.
7. Adult Lamprey Passage Evaluation
 - o Examine the effect of reducing nighttime ladder entrance flow on adult lamprey entrance and passage through BII fishways.

The Dalles Dam

1. No research planned for 2008.
2. We will initiate construction of a 850' long spillwall that extends downstream between bays 8 and 9. We are asking for an extension of the in-water work window – from 1 October through 31 March. Construction will take two complete in-water work periods (winter) and be complete for a 2010 post-construction evaluation.

John Day Dam

1. Top Spillway Weirs (TSWs) Evaluation

- o Two TSWs will be installed, one in bay 15 and one in bay 16. Each TSW passes approximately 10 kcfs. Spill pattern* development will be completed on April 4 (ERDC spill pattern trip planned for week of 3/31) for operating the spillway with TSWs.
- o Direct effects of yearling Chinook passage through the TSWs vs a standard spill bay will be evaluated from March 31 - April 4 (Hi-Z balloon tag).
- o From approximately April 27 (depending on fish availability) through July 20, we will evaluate passage and survival at 30% vs. 40% spill with the TSWs operating. Yearling Chinook, steelhead, and subyearling Chinook passage will be evaluated using acoustic telemetry:
 - Forebay residence time (from ~2km upstream to passage)
 - 2-D and 3-D near-dam behavior
 - Survival through the dam and for all routes
 - Tailrace egress times
 - GPS drogue tailrace egress times and paths

McNary Dam

1. Top Spillway Weirs (TSWs) Evaluation
 - o TSWs in bays 19 and 20.
 - o 2008 spill pattern* development complete.
 - o Revised unit operating priority to improve tailrace egress*.
 - o Spring acoustic telemetry passage and survival evaluation consists of a single 40% spill treatment to begin ~April 10.
 - o Summer acoustic telemetry passage and survival evaluation will examine of two spill treatments (40% vs. 60%) with a single spill pattern to begin ~mid-June.

Ice Harbor Dam

1. Project Passage and Survival Evaluation
 - o 30% vs. 45kcfs/TDG cap spill.
 - o Single release project survival estimates using LMN study fish.
2. Avian Predation of Steelhead
 - o Steelhead collected and tagged at JBS for release.

Lower Monumental Dam

1. Removable Spillway Weir (RSW) Evaluation
 - o RSW installed in Bay 8.
 - o Spring two-treatment test to evaluate two spill patterns* (Bulk vs. Flat) at TDG cap spill.
 - o Summer single treatment test to evaluate RSW performance at 17 kcfs spill.
 - o "Bulk" pattern (Table 1) will be used outside of study window.

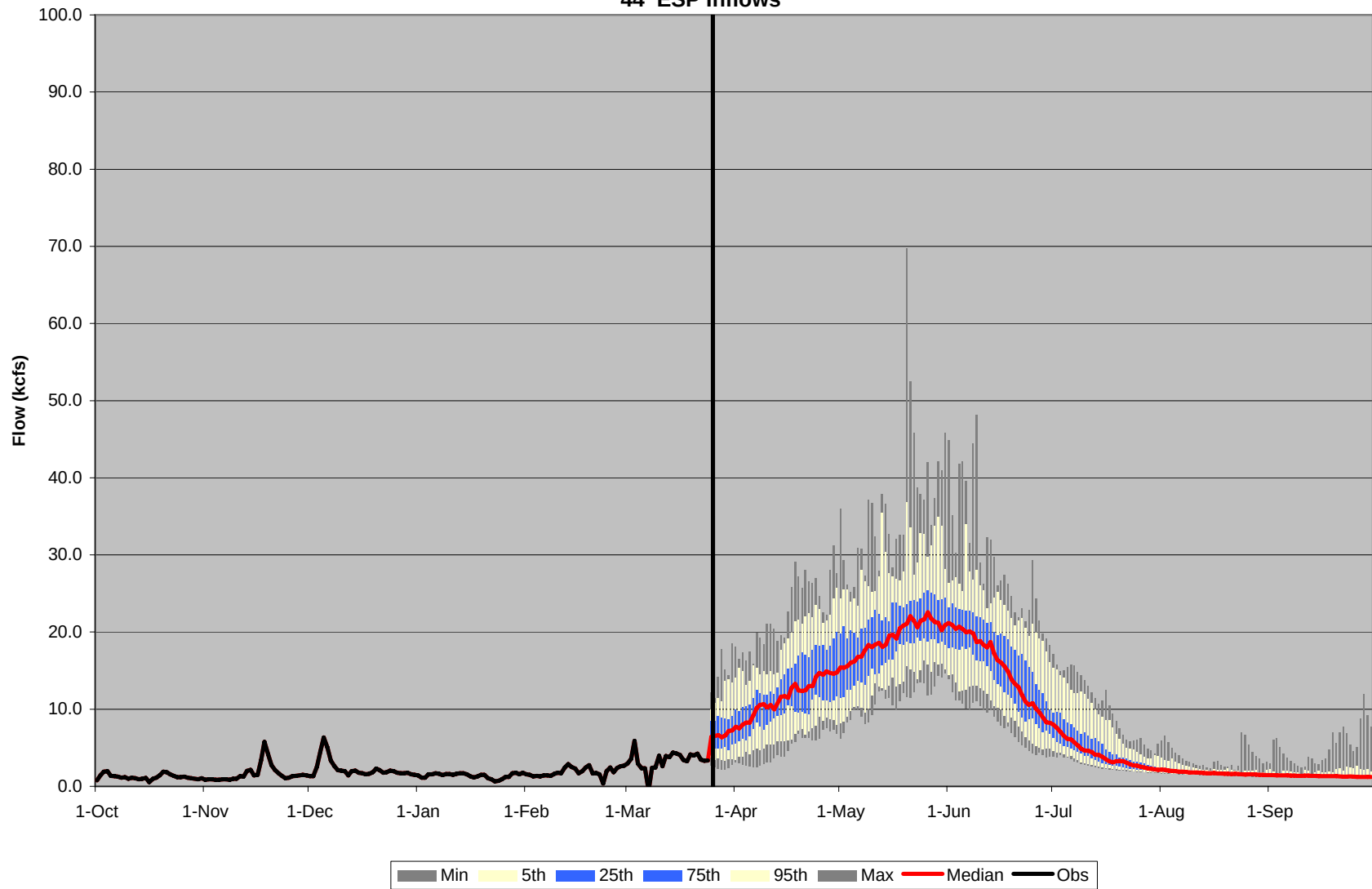
Little Goose Dam

1. Adult Passage Evaluation
 - o Three treatment (spill patterns*) radio telemetry evaluation to determine the effects of tailrace hydraulics on adult passage.

Lower Granite Dam

1. Adult Passage Evaluation
 - o Second year of transition pool modification post-construction evaluation. Also, examine passage behavior relative to temperature differentials in ladder.
2. Transportation Seasonal Effects Evaluation
 - o Weekly barging begins April 10 to determine an optimal transportation strategy.
3. Alternate Barging Strategies
 - o Weekly barging begins April 21 to determine effects of releasing smolts at alternative sites below Bonneville Dam.

ESP Inflow Statistics
March 24th, 2008
44 ESP Inflows



The Action Agencies plan is to operate Dworshak and Grand Coulee as follows from 3/26/08 forward:

Dworshak will maintain two unit operation of 8.3 kcfs through Sunday night at 2100 hours. At that time the project will increase flows to full load, which will result in a flow of about 10.7 kcfs. The plan is to maintain this flow until the April final water supply forecast is issued on April 1 or 2. A decision for future flows will be made at that time. Based on the latest inflow forecast, this operation is expected to result in a 31 March Dworshak forebay elevation of about 1513 feet, equivalent to a flood control shift of about 156 kaf from Dworshak to Grand Coulee. The expected March 31 elevation at Dworshak of 1513 feet is 3 feet lower than that reported at TMT on March 26th. This lower elevation still fits with the strategy to lower the chance of exceeding State of Idaho TDG standard of 110% as the project is drafted to the April 15 flood control elevation. The difference between the submitted March 31 Flood Control Elevation of 1519.1 ft, based on the full shift of 232 kaf and the adjusted partial shift of 156 kaf is 76 kaf. If this were translated to the computation of the April 10 elevation objective at Grand Coulee it would result in an upward adjustment of 3 tenths of a foot from 1244.2 feet to 1244.5 feet. This is a relatively small adjustment and Reclamation and BPA have agreed to target an elevation of 1244.5 feet on April 10 for this particular case.

The April final volume forecast has been completed. The volume is 3010 kaf and is 112% of normal, up from 2810 kaf for the April – July period. Based on most recent forecasted STP inflows the target end of April flood control elevation is 1463.7 ft. This target is being revisited as we enter the refill season and will be updated as forecasted inflows are replaced with actual inflows and newly updated forecasted inflows. . Beginning at midnight tonight, the project will begin to spill, initially at a total outflow of 14000 and increasing spill if able to stay below 110% tdg..

John Day Dam Unit Operating Priority 2008

Existing 2007 Priority: 5, 1, 2, 3, 4, then 6-16 in any order.

Recommended 2008 Priority: 5, 1, 3, 16, 14, 12, 10, 8, 15, 2, 11, 7, 4, 13, 9, 6.

Reason for Change: The recommended change will improve forebay attraction flow for the TSWs while maintaining adequate water velocity at the juvenile bypass outfall.

LITTLE GOOSE
2008 BULK "A" SPILL PATTERN

Spill Bays -- Stops								Total Stops	Total Spill Q (kcfs)	Total PH Q (kcfs)	Total River Q (kcfs) (see Note 1)
1	2	3	4	5	6	7	8				
	3							3	5.7	13.3	18.9
	4							4	7.7	17.9	25.5
	4	1						5	9.4	22.0	31.4
	4	2						6	11.3	26.5	37.8
	4	3						7	13.3	31.1	44.5
1	4	3						8	15.1	35.3	50.4
1	4	4						9	17.1	39.9	57.0
1	4	4	1					10	18.9	44.0	62.9
1	5	4	1					11	20.8	48.6	69.5
1	5	4	2					12	22.8	53.1	75.8
1	5	4	3					13	24.8	57.8	82.5
1	5	4	4					14	26.7	62.4	89.1
1	5	5	4					15	28.7	67.0	95.7
	5	5	5	1				16	30.7	71.6	102.3
	5	5	5	2				17	32.6	76.1	108.7
	5	5	5	3				18	34.6	80.7	115.3
	5	3	3	3	3	2		19	36.0	84.1	120.1
	5	3	3	3	3	3		20	38.0	88.8	126.8
	5	4	3	3	3	3		21	40.0	90.3	130.3
	5	4	4	3	3	3		22	42.0	90.3	132.3
	5	4	4	4	3	3		23	44.0	90.3	134.3
	5	4	4	4	4	3		24	46.0	90.3	136.3
	5	4	4	4	4	4		25	47.9	90.3	138.2
	5	5	4	4	4	4		26	49.9	90.3	140.2
	5	5	5	4	4	4		27	51.9	90.3	142.2
	5	5	5	5	4	4		28	53.9	90.3	144.2
	5	5	5	5	5	4		29	55.9	90.3	146.2
	5	5	5	5	5	5		30	57.8	90.3	148.1
	6	5	5	5	5	5		31	59.8	90.3	150.1
	6	6	5	5	5	5		32	61.8	90.3	152.1
	6	6	6	5	5	5		33	63.8	90.3	154.1
	6	6	6	6	5	5		34	65.7	90.3	156.0
	6	6	6	6	6	5		35	67.7	90.3	158.0
	6	6	6	6	6	6		36	69.7	90.3	160.0
	7	6	6	6	6	6		37	71.6	90.3	161.9
	7	7	6	6	6	6		38	73.6	90.3	163.9
	7	7	7	6	6	6		39	75.5	90.3	165.8
	7	7	7	7	6	6		40	77.5	90.3	167.8
	7	7	7	7	7	6		41	79.4	90.3	169.7
	7	7	7	7	7	7		42	81.4	90.3	171.7
	8	7	7	7	7	7		43	83.3	90.3	173.6
	8	8	7	7	7	7		44	85.3	90.3	175.6
	8	8	8	7	7	7		45	87.3	90.3	177.6
	8	8	8	8	7	7		46	89.3	90.3	179.6
	8	8	8	8	8	7		47	91.3	90.3	181.6
	8	8	8	8	8	8		48	93.2	90.3	183.5
	9	8	8	8	8	8		49	95.2	90.3	185.5
	9	9	8	8	8	8		50	97.1	90.3	187.4

** Note 2

** Note 3

LITTLE GOOSE
2008 BULK "A" SPILL PATTERN

Spill Bays -- Stops								Total Stops	Total Spill Q (kcfs)	Total PH Q (kcfs)	Total River Q (kcfs) (see Note 1)
1	2	3	4	5	6	7	8				
	9	9	9	8	8	8		51	99.1	90.3	189.4
	9	9	9	9	8	8		52	101.0	90.3	191.3
	9	9	9	9	9	8		53	102.9	90.3	193.2
	9	9	9	9	9	9		54	104.9	90.3	195.2
	10	9	9	9	9	9		55	106.9	90.3	197.2
	10	10	9	9	9	9		56	108.9	90.3	199.2
	10	10	10	9	9	9		57	110.9	90.3	201.2
	10	10	10	10	9	9		58	113.0	90.3	203.3
	10	10	10	10	10	9		59	115.0	90.3	205.3
	10	10	10	10	10	10		60	117.0	90.3	207.3
	11	10	10	10	10	10		61	119.0	90.3	209.3
	11	11	10	10	10	10		62	121.1	90.3	211.4
	11	11	11	10	10	10		63	123.1	90.3	213.4
	11	11	11	11	10	10		64	125.1	90.3	215.4
	11	11	11	11	11	10		65	127.2	90.3	217.5
	11	11	11	11	11	11		66	129.2	90.3	219.5
	12	11	11	11	11	11		67	131.2	90.3	221.5
	12	12	11	11	11	11		68	133.2	90.3	223.5
	12	12	12	11	11	11		69	135.3	90.3	225.6
	12	12	12	12	11	11		70	137.3	90.3	227.6
	12	12	12	12	12	11		71	139.3	90.3	229.6
	12	12	12	12	12	12		72	141.4	90.3	231.7
	13	12	12	12	12	12		73	143.4	90.3	233.7
	13	13	12	12	12	12		74	145.4	90.3	235.7
	13	13	13	12	12	12		75	147.4	90.3	237.7
	13	13	13	13	12	12		76	149.4	90.3	239.7
	13	13	13	13	13	12		77	151.4	90.3	241.7
	13	13	13	13	13	13		78	153.4	90.3	243.7
	14	13	13	13	13	13		79	155.4	90.3	245.7
	14	14	13	13	13	13		80	157.4	90.3	247.7
	14	14	14	13	13	13		81	159.4	90.3	249.7
	14	14	14	14	13	13		82	161.4	90.3	251.7
	14	14	14	14	14	13		83	163.4	90.3	253.7
	14	14	14	14	14	14		84	165.4	90.3	255.7
	15	14	14	14	14	14		85	167.4	90.3	257.7
	15	15	14	14	14	14		86	169.4	90.3	259.7
	15	15	15	14	14	14		87	171.4	90.3	261.7
	15	15	15	15	14	14		88	173.4	90.3	263.7
	15	15	15	15	15	14		89	175.4	90.3	265.7
	15	15	15	15	15	15		90	177.4	90.3	267.7
	16	15	15	15	15	15		91	179.3	90.3	269.6
	16	16	15	15	15	15		92	181.3	90.3	271.6
	16	16	16	15	15	15		93	183.3	90.3	273.6
	16	16	16	16	15	15		94	185.2	90.3	275.5
	16	16	16	16	16	15		95	187.2	90.3	277.5
	16	16	16	16	16	16		96	189.2	90.3	279.5

Notes:

1. The total river discharges shown in this table assume 30% spill. Actual total discharge (and thus % spill) may vary slightly for a given spill pattern to keep turbines within 1% of peak efficiency. This is true up to 25

LITTLE GOOSE 2008 BULK "A" SPILL PATTERN

total stops (with 6 turbines operating) or 21 stops (with 5 turbines operating), after which powerhouse capacity is reached and higher than 30% spill will be required as in Notes 3 or 4.

2. This is the highest spill level (18 total stops or 34.1 kcfs) for this "A" bulk spill configuration. For river discharges higher than 115 kcfs, the spill pattern will be essentially a uniform spill pattern, with 5 stops retained in Bay 2 to simulate an RSW. For higher river discharges, there is not enough difference in tailwater flow patterns to distinguish between treatments, and the spill pattern should reach a uniform pattern by the time the gas cap is reached as well.
3. This the approximate powerhouse discharge (90 kcfs) at which full powerhouse capacity is reached, with 5 turbine units operating within 1% peak efficiency rules. This is the maximum river discharge for which 30% spill can be maintained; above this will be a higher % spill. Unit 6 is currently out of service, and will likely remain out of service for the duration of the study.
4. Discharge estimates shown in this table are based on a forebay elevation of 634.0 ft.
5. Once the spill discharge reaches about 30 kcfs, Bays 1 and 8 are not operated to avoid gas cap problems because there are no spillway deflectors in those bays.
6. Powerhouse unit priority should be 1 ==> 6. It is especially important for Unit 1 to be on as much as possible during the duration of the study.

LITTLE GOOSE
2008 BULK "B" SPILL PATTERN

Spill Bays -- Stops								Total Stops	Total Spill Q (kcfs)	Total PH Q (kcfs)	Total River Q (kcfs) (see Note 1)
1	2	3	4	5	6	7	8				
				3				3	5.7	13.3	18.9
				4				4	7.7	17.9	25.5
				4	1			5	9.4	22.0	31.4
				4	1	1		6	11.2	26.1	37.3
1	4	1	1					7	13.0	30.3	43.2
1	4	1	1	1				8	14.7	34.4	49.1
1	4	1	1	1	1			9	16.5	38.5	55.0
1	4	1	1	1	1	1		10	18.3	42.7	60.9
1	4	2	1	1	1	1		11	20.2	47.1	67.3
1	4	2	2	1	1	1		12	22.1	51.6	73.7
1	4	2	2	2	1	1		13	24.0	56.0	80.0
1	4	2	2	2	2	1		14	25.9	60.5	86.4
1	4	2	2	2	2	2		15	27.8	64.9	92.8
	5	3	2	2	2	2		16	30.0	70.1	100.1
	5	3	3	2	2	2		17	32.0	74.8	106.8
	5	3	3	3	2	2		18	34.0	79.4	113.5
	5	3	3	3	3	2		19	36.0	84.1	120.1
	5	3	3	3	3	3		20	38.0	88.8	126.8
	5	4	3	3	3	3		21	40.0	90.3	130.3
	5	4	4	3	3	3		22	42.0	90.3	132.3
	5	4	4	4	3	3		23	44.0	90.3	134.3
	5	4	4	4	4	3		24	46.0	90.3	136.3
	5	4	4	4	4	4		25	47.9	90.3	138.2
	5	5	4	4	4	4		26	49.9	90.3	140.2
	5	5	5	4	4	4		27	51.9	90.3	142.2
	5	5	5	5	4	4		28	53.9	90.3	144.2
	5	5	5	5	5	4		29	55.9	90.3	146.2
	5	5	5	5	5	5		30	57.8	90.3	148.1
	6	5	5	5	5	5		31	59.8	90.3	150.1
	6	6	5	5	5	5		32	61.8	90.3	152.1
	6	6	6	5	5	5		33	63.8	90.3	154.1
	6	6	6	6	5	5		34	65.7	90.3	156.0
	6	6	6	6	6	5		35	67.7	90.3	158.0
	6	6	6	6	6	6		36	69.7	90.3	160.0
	7	6	6	6	6	6		37	71.6	90.3	161.9
	7	7	6	6	6	6		38	73.6	90.3	163.9
	7	7	7	6	6	6		39	75.5	90.3	165.8
	7	7	7	7	6	6		40	77.5	90.3	167.8
	7	7	7	7	7	6		41	79.4	90.3	169.7
	7	7	7	7	7	7		42	81.4	90.3	171.7
	8	7	7	7	7	7		43	83.3	90.3	173.6
	8	8	7	7	7	7		44	85.3	90.3	175.6
	8	8	8	7	7	7		45	87.3	90.3	177.6
	8	8	8	8	7	7		46	89.3	90.3	179.6
	8	8	8	8	8	7		47	91.3	90.3	181.6
	8	8	8	8	8	8		48	93.2	90.3	183.5
	9	8	8	8	8	8		49	95.2	90.3	185.5
	9	9	8	8	8	8		50	97.1	90.3	187.4

** Note 2

** Note 3

LITTLE GOOSE
2008 BULK "B" SPILL PATTERN

Spill Bays -- Stops								Total Stops	Total Spill Q (kcfs)	Total PH Q (kcfs)	Total River Q (kcfs) (see Note 1)
1	2	3	4	5	6	7	8				
	9	9	9	8	8	8		51	99.1	90.3	189.4
	9	9	9	9	8	8		52	101.0	90.3	191.3
	9	9	9	9	9	8		53	102.9	90.3	193.2
	9	9	9	9	9	9		54	104.9	90.3	195.2
	10	9	9	9	9	9		55	106.9	90.3	197.2
	10	10	9	9	9	9		56	108.9	90.3	199.2
	10	10	10	9	9	9		57	110.9	90.3	201.2
	10	10	10	10	9	9		58	113.0	90.3	203.3
	10	10	10	10	10	9		59	115.0	90.3	205.3
	10	10	10	10	10	10		60	117.0	90.3	207.3
	11	10	10	10	10	10		61	119.0	90.3	209.3
	11	11	10	10	10	10		62	121.1	90.3	211.4
	11	11	11	10	10	10		63	123.1	90.3	213.4
	11	11	11	11	10	10		64	125.1	90.3	215.4
	11	11	11	11	11	10		65	127.2	90.3	217.5
	11	11	11	11	11	11		66	129.2	90.3	219.5
	12	11	11	11	11	11		67	131.2	90.3	221.5
	12	12	11	11	11	11		68	133.2	90.3	223.5
	12	12	12	11	11	11		69	135.3	90.3	225.6
	12	12	12	12	11	11		70	137.3	90.3	227.6
	12	12	12	12	12	11		71	139.3	90.3	229.6
	12	12	12	12	12	12		72	141.4	90.3	231.7
	13	12	12	12	12	12		73	143.4	90.3	233.7
	13	13	12	12	12	12		74	145.4	90.3	235.7
	13	13	13	12	12	12		75	147.4	90.3	237.7
	13	13	13	13	12	12		76	149.4	90.3	239.7
	13	13	13	13	13	12		77	151.4	90.3	241.7
	13	13	13	13	13	13		78	153.4	90.3	243.7
	14	13	13	13	13	13		79	155.4	90.3	245.7
	14	14	13	13	13	13		80	157.4	90.3	247.7
	14	14	14	13	13	13		81	159.4	90.3	249.7
	14	14	14	14	13	13		82	161.4	90.3	251.7
	14	14	14	14	14	13		83	163.4	90.3	253.7
	14	14	14	14	14	14		84	165.4	90.3	255.7
	15	14	14	14	14	14		85	167.4	90.3	257.7
	15	15	14	14	14	14		86	169.4	90.3	259.7
	15	15	15	14	14	14		87	171.4	90.3	261.7
	15	15	15	15	14	14		88	173.4	90.3	263.7
	15	15	15	15	15	14		89	175.4	90.3	265.7
	15	15	15	15	15	15		90	177.4	90.3	267.7
	16	15	15	15	15	15		91	179.3	90.3	269.6
	16	16	15	15	15	15		92	181.3	90.3	271.6
	16	16	16	15	15	15		93	183.3	90.3	273.6
	16	16	16	16	15	15		94	185.2	90.3	275.5
	16	16	16	16	16	15		95	187.2	90.3	277.5
	16	16	16	16	16	16		96	189.2	90.3	279.5

Notes:

1. The total river discharges shown in this table assume 30% spill. Actual total discharge (and thus % spill) may vary slightly for a given spill pattern to keep turbines within 1% of peak efficiency. This is true up to 25

LITTLE GOOSE 2008 BULK "B" SPILL PATTERN

total stops (with 6 turbines operating) or 21 stops (with 5 turbines operating), after which powerhouse capacity is reached and higher than 30% spill will be required as in Notes 3 or 4.

2. This is the highest spill level (18 total stops or 34.1 kcfs) for which this "B" bulk spill pattern is different from the "A" bulk spill configuration. For river discharges higher than 115 kcfs, the spill pattern will be essentially a uniform spill pattern, with 5 stops retained in Bay 2 to simulate an RSW. For higher river discharges, there is not enough difference in tailwater flow patterns to distinguish between treatments, and the spill pattern should reach a uniform pattern by the time the gas cap is reached as well.
3. This the approximate powerhouse discharge (90 kcfs) at which full powerhouse capacity is reached, with 5 turbine units operating within 1% peak efficiency rules. This is the maximum river discharge for which 30% spill can be maintained; above this will be a higher % spill. Unit 6 is currently out of service, and will likely remain out of service for the duration of the study.
4. Discharge estimates shown in this table are based on a forebay elevation of 634.0 ft.
5. Once the spill discharge reaches about 30 kcfs, Bays 1 and 8 are not operated to avoid gas cap problems because there are no spillway deflectors in those bays.
6. Powerhouse unit priority should be 1 ==> 6. It is especially important for Unit 1 to be on as much as possible during the duration of the study.

LITTLE GOOSE
2008 UNIFORM SPILL PATTERN

Spill Bays -- Stops								Total Stops	Total Spill Q (kcfs)	Total PH Q (kcfs)	Total River Q (kcfs) (see Note 1)
1	2	3	4	5	6	7	8				
	1							1	1.8	4.1	5.9
	1	1						2	3.5	8.3	11.8
	1	1	1					3	5.3	12.4	17.7
	1	1	1	1				4	7.1	16.5	23.6
	1	1	1	1	1			5	8.9	20.7	29.5
	1	1	1	1	1	1		6	10.6	24.8	35.4
	2	1	1	1	1	1		7	12.5	29.2	41.8
	2	2	1	1	1	1		8	14.4	33.7	48.1
	2	2	2	1	1	1		9	16.4	38.2	54.5
	2	2	2	2	1	1		10	18.3	42.6	60.9
	2	2	2	2	2	1		11	20.2	47.1	67.2
	2	2	2	2	2	2		12	22.1	51.5	73.6
	3	2	2	2	2	2		13	24.1	56.2	80.3
	3	3	2	2	2	2		14	26.1	60.9	86.9
	3	3	3	2	2	2		15	28.1	65.5	93.6
	3	3	3	3	2	2		16	30.1	70.2	100.3
	3	3	3	3	3	2		17	32.1	74.9	106.9
	3	3	3	3	3	3		18	34.1	79.5	113.6
	4	3	3	3	3	3		19	36.1	84.1	120.2
	4	4	3	3	3	3		20	38.0	88.8	126.8
	4	4	4	3	3	3		21	40.0	90.3	130.3
	4	4	4	4	3	3		22	42.0	90.3	132.3
	4	4	4	4	4	3		23	44.0	90.3	134.3
	4	4	4	4	4	4		24	46.0	90.3	136.3
	5	4	4	4	4	4		25	47.9	90.3	138.2
	5	5	4	4	4	4		26	49.9	90.3	140.2
	5	5	5	4	4	4		27	51.9	90.3	142.2
	5	5	5	5	4	4		28	53.9	90.3	144.2
	5	5	5	5	5	4		29	55.9	90.3	146.2
	5	5	5	5	5	5		30	57.8	90.3	148.1
	6	5	5	5	5	5		31	59.8	90.3	150.1
	6	6	5	5	5	5		32	61.8	90.3	152.1
	6	6	6	5	5	5		33	63.8	90.3	154.1
	6	6	6	6	5	5		34	65.7	90.3	156.0
	6	6	6	6	6	5		35	67.7	90.3	158.0
	6	6	6	6	6	6		36	69.7	90.3	160.0
	7	6	6	6	6	6		37	71.6	90.3	161.9
	7	7	6	6	6	6		38	73.6	90.3	163.9
	7	7	7	6	6	6		39	75.5	90.3	165.8
	7	7	7	7	6	6		40	77.5	90.3	167.8
	7	7	7	7	7	6		41	79.4	90.3	169.7
	7	7	7	7	7	7		42	81.4	90.3	171.7
	8	7	7	7	7	7		43	83.3	90.3	173.6
	8	8	7	7	7	7		44	85.3	90.3	175.6
	8	8	8	7	7	7		45	87.3	90.3	177.6
	8	8	8	8	7	7		46	89.3	90.3	179.6
	8	8	8	8	8	7		47	91.3	90.3	181.6
	8	8	8	8	8	8		48	93.2	90.3	183.5
	9	8	8	8	8	8		49	95.2	90.3	185.5
	9	9	8	8	8	8		50	97.1	90.3	187.4

** Note 3

LITTLE GOOSE
2008 UNIFORM SPILL PATTERN

Spill Bays -- Stops								Total Stops	Total Spill Q (kcfs)	Total PH Q (kcfs)	Total River Q (kcfs) (see Note 1)
1	2	3	4	5	6	7	8				
	9	9	9	8	8	8		51	99.1	90.3	189.4
	9	9	9	9	8	8		52	101.0	90.3	191.3
	9	9	9	9	9	8		53	102.9	90.3	193.2
	9	9	9	9	9	9		54	104.9	90.3	195.2
	10	9	9	9	9	9		55	106.9	90.3	197.2
	10	10	9	9	9	9		56	108.9	90.3	199.2
	10	10	10	9	9	9		57	110.9	90.3	201.2
	10	10	10	10	9	9		58	113.0	90.3	203.3
	10	10	10	10	10	9		59	115.0	90.3	205.3
	10	10	10	10	10	10		60	117.0	90.3	207.3
	11	10	10	10	10	10		61	119.0	90.3	209.3
	11	11	10	10	10	10		62	121.1	90.3	211.4
	11	11	11	10	10	10		63	123.1	90.3	213.4
	11	11	11	11	10	10		64	125.1	90.3	215.4
	11	11	11	11	11	10		65	127.2	90.3	217.5
	11	11	11	11	11	11		66	129.2	90.3	219.5
	12	11	11	11	11	11		67	131.2	90.3	221.5
	12	12	11	11	11	11		68	133.2	90.3	223.5
	12	12	12	11	11	11		69	135.3	90.3	225.6
	12	12	12	12	11	11		70	137.3	90.3	227.6
	12	12	12	12	12	11		71	139.3	90.3	229.6
	12	12	12	12	12	12		72	141.4	90.3	231.7
	13	12	12	12	12	12		73	143.4	90.3	233.7
	13	13	12	12	12	12		74	145.4	90.3	235.7
	13	13	13	12	12	12		75	147.4	90.3	237.7
	13	13	13	13	12	12		76	149.4	90.3	239.7
	13	13	13	13	13	12		77	151.4	90.3	241.7
	13	13	13	13	13	13		78	153.4	90.3	243.7
	14	13	13	13	13	13		79	155.4	90.3	245.7
	14	14	13	13	13	13		80	157.4	90.3	247.7
	14	14	14	13	13	13		81	159.4	90.3	249.7
	14	14	14	14	13	13		82	161.4	90.3	251.7
	14	14	14	14	14	13		83	163.4	90.3	253.7
	14	14	14	14	14	14		84	165.4	90.3	255.7
	15	14	14	14	14	14		85	167.4	90.3	257.7
	15	15	14	14	14	14		86	169.4	90.3	259.7
	15	15	15	14	14	14		87	171.4	90.3	261.7
	15	15	15	15	14	14		88	173.4	90.3	263.7
	15	15	15	15	15	14		89	175.4	90.3	265.7
	15	15	15	15	15	15		90	177.4	90.3	267.7
	16	15	15	15	15	15		91	179.3	90.3	269.6
	16	16	15	15	15	15		92	181.3	90.3	271.6
	16	16	16	15	15	15		93	183.3	90.3	273.6
	16	16	16	16	15	15		94	185.2	90.3	275.5
	16	16	16	16	16	15		95	187.2	90.3	277.5
	16	16	16	16	16	16		96	189.2	90.3	279.5

Notes:

1. The total river discharges shown in this table assume 30% spill. Actual total discharge (and thus % spill) may vary slightly for a given spill pattern to keep turbines within 1% of peak efficiency. This is true up to 25 total stops (with 6 turbines operating) or 21 stops (with 5 turbines operating), after which powerhouse

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- capacity is reached and higher than 30% spill will be required as in Notes 3 or 4.
2. During gas cap spill operations, the powerhouse discharge and total river discharge columns are not directly tied to the spill discharge. Instead, spill to the allowable gas cap discharge, with the balance passing through the powerhouse for any given total river discharge, regardless of % spill.
 3. This the approximate powerhouse discharge (90 kcfs) at which full powerhouse capacity is reached, with 5 turbine units operating within 1% peak efficiency rules. This is the maximum river discharge for which 30% spill can be maintained; above this will be a higher % spill. Unit 6 is currently out of service, and will likely remain out of service for the duration of the study.
 4. Discharge estimates shown in this table are based on a forebay elevation of 634.0 ft.
 5. Bays 1 and 8 are not operated because there are no spillway deflectors in those bays.
 6. Powerhouse unit priority should be 1 ==> 6. It is especially important for Unit 1 to be on as much as possible during the duration of the study.

Table LMN-1. Lower Monumental Dam Spill Pattern 2008

Spill Bay Stops								Total Stops	Total Spill	
1	2	3	4	5	6	7	8			
0	1	0	0	0	0	0	R	5.5	7.9	MINIMUM SPILL
0	2	0	0	0	0	0	R	6.5	9.6	
0	2	0	0	0	1	0	R	7.5	10.7	
0	2	0	0	0	2	0	R	8.5	12.4	
0	2	0	0	0	3	0	R	9.5	14.1	
0	2	0	0	0	4	0	R	10.5	15.8	SUMMER
0	3	0	0	0	4	0	R	11.5	17.5	
0	3	0	0	1	4	0	R	12.5	18.6	
0	3	0	0	1	5	0	R	13.5	20.3	
1	3	0	0	1	5	0	R	14.5	21.4	
1	1	1	1	1	6	0	R	15.5	21.9	
1	1	1	1	2	6	0	R	16.5	23.6	
1	1	1	2	2	6	0	R	17.5	25.3	
1	1	1	2	5	5	0	R	19.5	28.7	
2	1	1	2	5	5	0	R	20.5	30.4	
2	1	2	2	5	5	0	R	21.5	32.1	
2	2	2	2	5	5	0	R	22.5	33.8	
3	2	2	2	5	5	0	R	23.5	35.5	
3	3	2	2	5	5	0	R	24.5	37.2	
3	3	2	2	5	5	1	R	25.5	38.3	
3	3	2	2	5	5	2	R	26.5	40.0	
3	3	2	3	5	5	2	R	27.5	41.7	
3	3	3	3	5	5	2	R	28.5	43.4	
3	3	3	3	5	5	2	R	28.5	43.4	
3	3	3	3	5	6	2	R	29.5	45.1	
3	3	3	3	6	6	2	R	30.5	46.8	
3	3	3	3	6	6	3	R	31.5	48.5	
3	3	3	3	6	6	4	R	32.5	50.2	
3	3	3	3	6	6	5	R	33.5	51.9	
3	3	3	3	6	6	6	R	34.5	53.6	
3	3	3	4	6	6	6	R	35.5	55.3	
3	3	4	4	6	6	6	R	36.5	57.0	
3	4	4	4	6	6	6	R	37.5	58.7	
4	4	4	4	6	6	6	R	38.5	60.4	
4	4	4	5	6	6	6	R	39.5	62.1	

Table LMN-1. Lower Monumental Dam Spill Pattern 2008

Spill Bay Stops								Total Stops	Total Spill
1	2	3	4	5	6	7	8		
4	4	5	5	6	6	6	R	40.5	63.8
4	5	5	5	6	6	6	R	41.5	65.5
5	5	5	5	6	6	6	R	42.5	67.2
5	5	5	6	6	6	6	R	43.5	68.9
5	5	6	6	6	6	6	R	44.5	70.6
5	6	6	6	6	6	6	R	45.5	72.3
6	6	6	6	6	6	6	R	46.5	74.0
6	6	6	6	6	7	6	R	47.5	75.6
6	7	6	6	6	7	6	R	48.5	77.2
6	7	6	6	7	7	6	R	49.5	78.8
6	7	7	6	7	7	6	R	50.5	80.4
6	7	7	7	7	7	6	R	51.5	82.0
7	7	7	7	7	7	6	R	52.5	83.6
7	7	7	7	7	7	7	R	53.5	85.2
7	7	7	7	7	8	7	R	54.5	87.0
7	8	7	7	7	8	7	R	55.5	88.8
7	8	7	7	8	8	7	R	56.5	90.6
7	8	8	7	8	8	7	R	57.5	92.4
7	8	8	8	8	8	7	R	58.5	94.2
8	8	8	8	8	8	7	R	59.5	96.0
8	8	8	8	8	8	8	R	60.5	97.8
8	8	8	8	8	9	8	R	61.5	99.4
8	9	8	8	8	9	8	R	62.5	101.0
8	9	8	8	9	9	8	R	63.5	102.6
8	9	9	8	9	9	8	R	64.5	104.2
8	9	9	9	9	9	8	R	65.5	105.8
9	9	9	9	9	9	8	R	66.5	107.4
9	9	9	9	9	9	9	R	67.5	109.0
9	9	9	9	9	10	9	R	68.5	110.8
9	10	9	9	9	10	9	R	69.5	112.6
9	10	9	9	10	10	9	R	70.5	114.4
9	10	10	9	10	10	9	R	71.5	116.2
9	10	10	10	10	10	9	R	72.5	118.0
10	10	10	10	10	10	9	R	73.5	119.8
10	10	10	10	10	10	10	R	74.5	121.6

Table LMN-1. Lower Monumental Dam Spill Pattern 2008

Spill Bay Stops								Total Stops	Total Spill
1	2	3	4	5	6	7	8		
10	10	10	10	10	11	10	R	75.5	123.3
10	11	10	10	10	11	10	R	76.5	125.0
10	11	10	10	11	11	10	R	77.5	126.7
10	11	11	10	11	11	10	R	78.5	128.4
10	11	11	11	11	11	10	R	79.5	130.1
11	11	11	11	11	11	10	R	80.5	131.8
11	11	11	11	11	11	11	R	81.5	133.5
11	11	11	11	11	12	11	R	82.5	135.2
11	12	11	11	11	12	11	R	83.5	136.9
11	12	11	11	12	12	11	R	84.5	138.6
11	12	12	11	12	12	11	R	85.5	140.3
11	12	12	12	12	12	11	R	86.5	142.0
12	12	12	12	12	12	11	R	87.5	143.7
12	12	12	12	12	12	12	R	88.5	145.4
12	12	12	12	12	13	12	R	89.5	147.1
12	13	12	12	12	13	12	R	90.5	148.8
12	13	12	12	13	13	12	R	91.5	150.5
12	13	13	12	13	13	12	R	92.5	152.2
12	13	13	13	13	13	12	R	93.5	153.9
13	13	13	13	13	13	12	R	94.5	155.6
13	13	13	13	13	13	13	R	95.5	157.3
13	13	13	13	13	14	13	R	96.5	159.0
13	14	13	13	13	14	13	R	97.5	160.7
13	14	13	13	14	14	13	R	98.5	162.4
13	14	14	13	14	14	13	R	99.5	164.1
13	14	14	14	14	14	13	R	100.5	165.8
14	14	14	14	14	14	13	R	101.5	167.5
14	14	14	14	14	14	14	R	102.5	169.2
14	14	14	14	14	15	14	R	103.5	171.0
14	15	14	14	14	15	14	R	104.5	172.8
14	15	14	14	15	15	14	R	105.5	174.6
14	15	15	14	15	15	14	R	106.5	176.4
14	15	15	15	15	15	14	R	107.5	178.2
15	15	15	15	15	15	14	R	108.5	180.0
15	15	15	15	15	15	15	R	109.5	181.8

Table LMN-2. Lower Monumental Dam Spill Pattern 2008

Spill Bay Stops								Total Stops	Total Spill
1	2	3	4	5	6	7	8		
0	0	0	0	0	1	0	R	5.5	7.9
0	1	0	0	0	1	0	R	6.5	9.0
0	1	0	0	1	1	0	R	7.5	10.1
0	1	1	0	1	1	0	R	8.5	11.2
0	1	1	1	1	1	0	R	9.5	12.3
1	1	1	1	1	1	0	R	10.5	13.4
1	1	1	1	1	1	1	R	11.5	14.5
1	1	1	1	1	2	1	R	12.5	16.2
1	2	1	1	1	2	1	R	13.5	17.9
1	2	1	1	2	2	1	R	14.5	19.6
1	2	2	1	2	2	1	R	15.5	21.3
1	2	2	2	2	2	1	R	16.5	23.0
2	2	2	2	2	2	1	R	17.5	24.7
2	2	2	2	2	2	2	R	18.5	26.4
2	2	2	2	2	3	2	R	19.5	28.1
2	3	2	2	2	3	2	R	20.5	29.8
2	3	2	2	3	3	2	R	21.5	31.5
2	3	3	2	3	3	2	R	22.5	33.2
2	3	3	3	3	3	2	R	23.5	34.9
3	3	3	3	3	3	2	R	24.5	36.6
3	3	3	3	3	3	3	R	25.5	38.3
3	3	3	3	3	4	3	R	26.5	40.0
3	4	3	3	3	4	3	R	27.5	41.7
3	4	3	3	4	4	3	R	28.5	43.4
3	4	4	3	4	4	3	R	29.5	45.1
3	4	4	4	4	4	3	R	30.5	46.8
4	4	4	4	4	4	3	R	31.5	48.5
4	4	4	4	4	4	4	R	32.5	50.2
4	4	4	4	4	5	4	R	33.5	51.9
4	5	4	4	4	5	4	R	34.5	53.6
4	5	4	4	5	5	4	R	35.5	55.3
4	5	5	4	5	5	4	R	36.5	57.0
4	5	5	5	5	5	4	R	37.5	58.7
5	5	5	5	5	5	4	R	38.5	60.4
5	5	5	5	5	5	5	R	39.5	62.1

Table LMN-2. Lower Monumental Dam Spill Pattern 2008

Spill Bay Stops								Total Stops	Total Spill
1	2	3	4	5	6	7	8		
5	5	5	5	5	6	5	R	40.5	63.8
5	6	5	5	5	6	5	R	41.5	65.5
5	6	5	5	6	6	5	R	42.5	67.2
5	6	6	5	6	6	5	R	43.5	68.9
5	6	6	6	6	6	5	R	44.5	70.6
6	6	6	6	6	6	5	R	45.5	72.3
6	6	6	6	6	6	6	R	46.5	74.0
6	6	6	6	6	7	6	R	47.5	75.6
6	7	6	6	6	7	6	R	48.5	77.2
6	7	6	6	7	7	6	R	49.5	78.8
6	7	7	6	7	7	6	R	50.5	80.4
6	7	7	7	7	7	6	R	51.5	82.0
7	7	7	7	7	7	6	R	52.5	83.6
7	7	7	7	7	7	7	R	53.5	85.2
7	7	7	7	7	8	7	R	54.5	87.0
7	8	7	7	7	8	7	R	55.5	88.8
7	8	7	7	8	8	7	R	56.5	90.6
7	8	8	7	8	8	7	R	57.5	92.4
7	8	8	8	8	8	7	R	58.5	94.2
8	8	8	8	8	8	7	R	59.5	96.0
8	8	8	8	8	8	8	R	60.5	97.8
8	8	8	8	8	9	8	R	61.5	99.4
8	9	8	8	8	9	8	R	62.5	101.0
8	9	8	8	9	9	8	R	63.5	102.6
8	9	9	8	9	9	8	R	64.5	104.2
8	9	9	9	9	9	8	R	65.5	105.8
9	9	9	9	9	9	8	R	66.5	107.4
9	9	9	9	9	9	9	R	67.5	109.0
9	9	9	9	9	10	9	R	68.5	110.8
9	10	9	9	9	10	9	R	69.5	112.6
9	10	9	9	10	10	9	R	70.5	114.4
9	10	10	9	10	10	9	R	71.5	116.2
9	10	10	10	10	10	9	R	72.5	118.0
10	10	10	10	10	10	9	R	73.5	119.8
10	10	10	10	10	10	10	R	74.5	121.6

Table LMN-2. Lower Monumental Dam Spill Pattern 2008

Spill Bay Stops								Total Stops	Total Spill
1	2	3	4	5	6	7	8		
10	10	10	10	10	11	10	R	75.5	123.3
10	11	10	10	10	11	10	R	76.5	125.0
10	11	10	10	11	11	10	R	77.5	126.7
10	11	11	10	11	11	10	R	78.5	128.4
10	11	11	11	11	11	10	R	79.5	130.1
11	11	11	11	11	11	10	R	80.5	131.8
11	11	11	11	11	11	11	R	81.5	133.5
11	11	11	11	11	12	11	R	82.5	135.2
11	12	11	11	11	12	11	R	83.5	136.9
11	12	11	11	12	12	11	R	84.5	138.6
11	12	12	11	12	12	11	R	85.5	140.3
11	12	12	12	12	12	11	R	86.5	142.0
12	12	12	12	12	12	11	R	87.5	143.7
12	12	12	12	12	12	12	R	88.5	145.4
12	12	12	12	12	13	12	R	89.5	147.1
12	13	12	12	12	13	12	R	90.5	148.8
12	13	12	12	13	13	12	R	91.5	150.5
12	13	13	12	13	13	12	R	92.5	152.2
12	13	13	13	13	13	12	R	93.5	153.9
13	13	13	13	13	13	12	R	94.5	155.6
13	13	13	13	13	13	13	R	95.5	157.3
13	13	13	13	13	14	13	R	96.5	159.0
13	14	13	13	13	14	13	R	97.5	160.7
13	14	13	13	14	14	13	R	98.5	162.4
13	14	14	13	14	14	13	R	99.5	164.1
13	14	14	14	14	14	13	R	100.5	165.8
14	14	14	14	14	14	13	R	101.5	167.5
14	14	14	14	14	14	14	R	102.5	169.2
14	14	14	14	14	15	14	R	103.5	171.0
14	15	14	14	14	15	14	R	104.5	172.8
14	15	14	14	15	15	14	R	105.5	174.6
14	15	15	14	15	15	14	R	106.5	176.4
14	15	15	15	15	15	14	R	107.5	178.2
15	15	15	15	15	15	14	R	108.5	180.0
15	15	15	15	15	15	15	R	109.5	181.8

Table MCN-7. McNary 2008 Spill Pattern for fish passage. (Discharge at forebay elevation 339)

(13 March 2008)

SPILLWAY BAY (Gate Opening in feet)																						Total Stops	Total Spill (kcfs)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		
																		5.5	5.2	1		11.7	20.7
																	1	5.5	5.2	1		12.7	22.7
																	1	5.5	5.2	1	1	13.7	24.7
																	1	5.5	5.2	2	1	14.7	26.6
																	2	5.5	5.2	2	1	15.7	28.5
																1	2	5.5	5.2	2	1	16.7	30.5
																2	2	5.5	5.2	2	1	17.7	32.4
														1		2	2	5.5	5.2	2	1	18.7	34.4
														1		2	2	5.5	5.2	2	2	19.7	36.3
														2		2	2	5.5	5.2	2	2	20.7	38.2
														2	1	2	2	5.5	5.2	2	2	21.7	40.2
														2	2	2	2	5.5	5.2	2	2	22.7	42.1
													1	2	2	2	2	5.5	5.2	2	2	23.7	44.1
													2	2	2	2	2	5.5	5.2	2	2	24.7	46.0
										1		2		2	2	2	2	5.5	5.2	2	2	25.7	48.0
										2		2		2	2	2	2	5.5	5.2	2	2	26.7	49.9
								1		2		2		2	2	2	2	5.5	5.2	2	2	27.7	51.9
								2		2		2		2	2	2	2	5.5	5.2	2	2	28.7	53.8
								2	1	2		2		2	2	2	2	5.5	5.2	2	2	29.7	55.8
								2	2	2		2		2	2	2	2	5.5	5.2	2	2	30.7	57.7
								2	2	2		2	1	2	2	2	2	5.5	5.2	2	2	31.7	59.7
								2	2	2		2	2	2	2	2	2	5.5	5.2	2	2	32.7	61.6
								2	2	2	1	2	2	2	2	2	2	5.5	5.2	2	2	33.7	63.6
								2	2	2	2	2	2	2	2	2	2	5.5	5.2	2	2	34.7	65.5
						1		2	2	2	2	2	2	2	2	2	2	5.5	5.2	2	2	35.7	67.5

1) TSWs in bays 19 and 20 have flow equivalent to 5.5 and 5.2 stops at forebay elevation of 339, respectively.

2) Raise gates for TSWs approximately 3 to 5 feet above water surface to ensure free surface and debris passage.

Table MCN-7. McNary 2008 Spill Pattern for fish passage. (Discharge at forebay elevation 339)

(13 March 2008)

SPILLWAY BAY (Gate Opening in feet)																						Total Stops	Total Spill (kcfs)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		
						2		2	2	2	2	2	2	2	2	2	2	5.5	5.2	2	2	36.7	69.4
				1		2		2	2	2	2	2	2	2	2	2	2	5.5	5.2	2	2	37.7	71.4
				2		2		2	2	2	2	2	2	2	2	2	2	5.5	5.2	2	2	38.7	73.3
2.5	2	3.5		2		2		2		2		2	1	2		2	2	5.5	5.2	2	2	39.7	74.8
2.5	2	3.5		2		2		2		2		2	1	2	1	2	2	5.5	5.2	2	2	40.7	76.8
2.5	2	3.5		2	1	2		2		2		2	1	2	1	2	2	5.5	5.2	2	2	41.7	78.8
2.5	2	3.5		2	1	2		2	1	2		2	1	2	1	2	2	5.5	5.2	2	2	42.7	80.8
2.5	2	3.5		2	1	2		2	1	2	1	2	1	2	1	2	2	5.5	5.2	2	2	43.7	82.8
2.5	2	3.5		2	1	2	1	2	1	2	1	2	1	2	1	2	2	5.5	5.2	2	2	44.7	84.8
2.5	2	3.5	1	2	1	2	1	2	1	2	1	2	1	2	1	2	2	5.5	5.2	2	2	45.7	86.8
2.5	2	3.5	1	2	1	2	1	2	1	2	1	2	1	2	1	2	2	5.5	5.2	2.5	2.5	46.7	88.5
2.5	2	3.5	1	2	1	2	1	2	1	2	1	2	2	2	1	2	2	5.5	5.2	2.5	2.5	47.7	90.4
2.5	2	3.5	1	2	1	2	1	2	1	2	1	2	2	2	1	2	2	5.5	5.2	2.5	2.5	47.7	90.4
2.5	2	3.5	1	2	1	2	1	2	1	2	1	2	2	2	2	2	2	5.5	5.2	2.5	2.5	48.7	92.3
2.5	2	3.5	1	2	2	2	1	2	1	2	1	2	2	2	2	2	2	5.5	5.2	2.5	2.5	49.7	94.2
2.5	2	3.5	1	2	2	2	1	2	2	2	1	2	2	2	2	2	2	5.5	5.2	2.5	2.5	50.7	96.1
2.5	2	3.5	1	2	2	2	1	2	2	2	2	2	2	2	2	2	2	5.5	5.2	2.5	2.5	51.7	98.0
2.5	2	3.5	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	5.5	5.2	2.5	2.5	52.7	99.9
2.5	2	3.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	5.5	5.2	2.5	2.5	53.7	101.8
2.5	2.5	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	5.5	5.2	2.5	2.5	54.7	103.4
2.5	2.5	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	5.5	5.2	3.5	2.5	55.7	105.1
2.5	2.5	4	2	2	2	2	2	2	2	2	2	2	2	2	2.5	2.5	3	5.5	5.2	2.5	2.5	56.7	106.8
2.5	2.5	4	2	2	2	2.5	2	2	2	2.5	2	2	2	2	2.5	2.5	3	5.5	5.2	2.5	2.5	57.7	108.5
2.5	2.5	4	2	2.5	2	2.5	2	2	2	2.5	2	2	2	2.5	2.5	2.5	3	5.5	5.2	2.5	2.5	58.7	110.2
2.5	2.5	4	2	2.5	2	2.5	2	2.5	2	2.5	2	2.5	2	2.5	2.5	2.5	3	5.5	5.2	2.5	2.5	59.7	111.9

- 1) TSWs in bays 19 and 20 have flow equivalent to 5.5 and 5.2 stops at forebay elevation of 339, respectively.
- 2) Raise gates for TSWs approximately 3 to 5 feet above water surface to ensure free surface and debris passage.

Table MCN-7. McNary 2008 Spill Pattern for fish passage. (Discharge at forebay elevation 339)

(13 March 2008)

SPILLWAY BAY (Gate Opening in feet)																						Total Stops	Total Spill (kcfs)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		
2.5	2.5	4	2	2.5	2.5	2.5	2	2.5	2.5	2.5	2	2.5	2	2.5	2.5	2.5	3	5.5	5.2	2.5	2.5	60.7	113.6
2.5	2.5	4	2	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2	2.5	2.5	2.5	3	5.5	5.2	2.5	2.5	61.7	115.3
2.5	2.5	4	3	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2	2.5	2.5	2.5	3	5.5	5.2	2.5	2.5	62.7	117.0
2.5	2.5	4	3	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3	5.5	5.2	3	2.5	63.7	118.7
2.5	2.5	4	3	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3	3	3	5.5	5.2	3	2.5	64.7	120.4
2.5	2.5	4.5	3	2.5	2.5	2.5	2.5	2.5	2.5	3	2.5	2.5	2.5	2.5	3	3	3	5.5	5.2	3	2.5	65.7	122.1
2.5	2.5	4.5	3	2.5	2.5	3	2.5	2.5	2.5	3	2.5	3	2.5	2.5	3	3	3	5.5	5.2	3	2.5	66.7	123.8
2.5	2.5	4.5	3	3	2.5	3	2.5	3	2.5	3	2.5	3	2.5	2.5	3	3	3	5.5	5.2	3	2.5	67.7	125.5
2.5	2.5	4.5	3	3	3	3	3	2.5	3	2.5	3	2.5	3	3	3	3	3	5.5	5.2	3	2.5	68.7	127.2
2.5	2.5	5	3	3	3	3	3	2.5	3	3	3	2.5	3	2.5	3	3	3	5.5	5.2	3	2.5	69.7	128.8
2.5	2.5	5	3	3	3	3	3	3	3	3	3	3	2.5	3	3	3	3	5.5	5.2	3	2.5	70.7	130.5
3	3	5	3	3	3	3	3	3	3	3	3	3	2.5	3	3	3	3	5.5	5.2	3	2.5	71.7	132.2
3	3	5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	5.5	5.2	3	3	72.7	133.9
3	3	5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	5.5	5.2	3	3	73.7	135.5
3	3	5	3	3	3	3	3	3	3	3	3	3	3	3	3	4	4	5.5	5.2	3	3	74.7	137.1
3	4	5	3	3	3	3	3	3	3	3	3	3	3	3	3	4	4	5.5	5.2	3	3	75.7	138.7
4	4	5	3	3	3	3	3	3	3	3	3	3	3	3	3	4	4	5.5	5.2	3	3	76.7	140.3
4	4	5	3	3	3	4	3	3	3	3	3	3	3	3	3	4	4	5.5	5.2	3	3	77.7	141.9
4	4	5	3	3	3	4	3	3	3	4	3	3	3	3	3	4	4	5.5	5.2	3	3	78.7	143.5
4	4	5	3	4	3	4	3	3	3	4	3	3	3	3	3	4	4	5.5	5.2	3	3	79.7	145.1
4	4	5	3	4	3	4	3	3	3	4	3	3	3	4	3	4	4	5.5	5.2	3	3	80.7	146.7
4	4	5	3	4	3	4	3	4	3	4	3	3	3	4	3	4	4	5.5	5.2	3	3	81.7	148.3
4	4	5	3	4	3	4	3	4	3	4	3	4	3	4	3	4	4	5.5	5.2	3	3	82.7	149.9
4	4	5	3	4	4	4	3	4	3	4	3	4	3	4	3	4	4	5.5	5.2	3	3	83.7	151.5
4	4	5	3	4	4	4	3	4	4	4	3	4	3	4	3	4	4	5.5	5.2	3	3	84.7	153.1

- 1) TSWs in bays 19 and 20 have flow equivalent to 5.5 and 5.2 stops at forebay elevation of 339, respectively.
- 2) Raise gates for TSWs approximately 3 to 5 feet above water surface to ensure free surface and debris passage.

Table MCN-7. McNary 2008 Spill Pattern for fish passage. (Discharge at forebay elevation 339)

(13 March 2008)

SPILLWAY BAY (Gate Opening in feet)																						Total Stops	Total Spill (kcfs)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		
4	4	5	3	4	4	4	3	4	4	4	4	4	3	4	3	4	4	5.5	5.2	3	3	85.7	154.7
4	4	5	3	4	4	4	4	4	4	4	4	4	3	4	3	4	4	5.5	5.2	3	3	86.7	156.3
4	4	5	3	4	4	4	4	4	4	4	4	4	3	4	4	4	4	5.5	5.2	3	3	87.7	157.9
4	4	5	4	4	4	4	4	4	4	4	4	4	3	4	4	4	4	5.5	5.2	3	3	88.7	159.5
4	4	5	4	4	4	4	4	4	4	4	4	4	3	4	4	4	4	5.5	5.2	4	3	89.7	161.1
4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	5.5	5.2	4	3	90.7	162.7
4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	5	5.5	5.2	4	3	91.7	164.3
4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	5	5	5.5	5.2	4	3	92.7	165.9
4	5	5	4	4	4	4	4	4	4	4	4	4	4	4	4	5	5	5.5	5.2	4	3	93.7	167.5
5	5	5	4	4	4	4	4	4	4	4	4	4	4	4	4	5	5	5.5	5.2	4	3	94.7	169.1
5	5	5	4	4	4	5	4	4	4	4	4	4	4	4	4	5	5	5.5	5.2	4	3	95.7	170.7
5	5	5	4	4	4	5	4	4	4	5	4	4	4	4	4	5	5	5.5	5.2	4	3	96.7	172.3
5	5	5	4	5	4	5	4	4	4	5	4	4	4	4	4	5	5	5.5	5.2	4	3	97.7	173.9
5	5	5	4	5	4	5	4	4	4	5	4	4	4	5	4	5	5	5.5	5.2	4	3	98.7	175.5
5	5	5	4	5	4	5	4	5	4	5	4	4	4	5	4	5	5	5.5	5.2	4	3	99.7	177.1
5	5	5	4	5	4	5	4	5	4	5	4	5	4	5	4	5	5	5.5	5.2	4	3	100.7	178.7
5	5	5	4	5	4	5	4	5	4	5	4	5	4	5	4	5	5	5.5	5.2	5	3	101.7	180.3
5	5	5	4	5	5	5	4	5	4	5	4	5	4	5	4	5	5	5.5	5.2	5	3	102.7	181.9
5	5	5	4	5	5	5	4	5	5	5	4	5	4	5	4	5	5	5.5	5.2	5	3	103.7	183.5
5	5	5	4	5	5	5	4	5	5	5	5	5	4	5	4	5	5	5.5	5.2	5	3	104.7	185.1
5	5	5	4	5	5	5	5	5	5	5	5	5	4	5	4	5	5	5.5	5.2	5	3	105.7	186.7
5	5	5	4	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5.5	5.2	5	3	106.7	188.3
5	5	5	5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5.5	5.2	5	3	107.7	189.9
5	5	6	5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5.5	5.2	5	3	108.7	191.5
5	5	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5.5	5.2	5	3	109.7	193.1

- 1) TSWs in bays 19 and 20 have flow equivalent to 5.5 and 5.2 stops at forebay elevation of 339, respectively.
- 2) Raise gates for TSWs approximately 3 to 5 feet above water surface to ensure free surface and debris passage.

Table MCN-7. McNary 2008 Spill Pattern for fish passage. (Discharge at forebay elevation 339)

(13 March 2008)

SPILLWAY BAY (Gate Opening in feet)																						Total Stops	Total Spill (kcfs)	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22			
5	5	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	6	5.5	5.2	5	3	110.7	194.7	
5	5	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	6	6	5.5	5.2	5	3	111.7	196.3
5	5	6	5	5	5	5	5	5	5	5	5	5	5	6	5	6	6	6	5.5	5.2	5	3	112.7	197.9
5	5	6	5	5	5	5	5	5	5	5	5	6	5	6	5	6	6	6	5.5	5.2	5	3	113.7	199.5
5	5	6	5	5	5	5	5	5	5	5	5	6	5	6	6	6	6	6	5.5	5.2	5	3	114.7	201.1
5	5	6	6	5	5	5	5	5	5	5	5	6	5	6	6	6	6	6	5.5	5.2	5	3	115.7	202.7
5	5	6	6	5	5	5	5	5	5	5	5	6	5	6	6	6	6	6	5.5	5.2	6	3	116.7	204.3
5	5	6	6	5	5	5	5	5	5	5	6	6	5	6	6	6	6	6	5.5	5.2	6	3	117.7	205.9
5	5	6	6	5	5	5	5	5	5	5	5	6	6	6	6	6	6	6	5.5	5.2	6	4	118.7	207.5
5	5	6	6	6	5	5	5	5	5	5	6	6	6	6	6	6	6	6	5.5	5.2	6	4	120.7	210.7
5	5	6	6	6	5	6	5	5	5	6	6	6	6	6	6	6	6	6	5.5	5.2	6	4	122.7	213.9
5	5	6	6	6	6	6	5	6	5	6	6	6	6	6	6	6	6	6	5.5	5.2	6	4	124.7	217.1
5	5	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5.5	5.2	6	4	126.7	220.3
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5.5	5.2	6	4	128.7	223.5
6	6	6	6	6	6	6	6	6	6	6	7	6	7	6	7	6	7	6	5.5	5.2	6	4	132.7	229.9
6	6	6	6	6	6	7	6	7	6	7	6	7	6	7	6	7	6	7	5.5	5.2	6	4	134.7	233.1
6	6	7	6	7	6	7	6	7	6	7	6	7	6	7	6	7	6	7	5.5	5.2	6	4	136.7	236.3
7	6	7	6	7	6	7	6	7	6	7	6	7	6	7	6	7	7	7	5.5	5.2	6	4	138.7	239.5
7	6	7	6	7	6	7	6	7	6	7	6	7	7	7	7	7	7	7	5.5	5.2	6	4	140.7	242.7
7	6	7	6	7	6	7	6	7	7	7	7	7	7	7	7	7	7	7	5.5	5.2	6	4	142.7	245.9
7	6	7	6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	5.5	5.2	6	4	144.7	249.1
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	5.5	5.2	6	4	146.7	252.3
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	5.5	5.2	6	6	148.7	255.5
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	5.5	5.2	7	7	150.7	258.7

- 1) TSWs in bays 19 and 20 have flow equivalent to 5.5 and 5.2 stops at forebay elevation of 339, respectively.
- 2) Raise gates for TSWs approximately 3 to 5 feet above water surface to ensure free surface and debris passage.

McNary Dam Unit Operating Priority 2008

Existing 2007 Priority: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14

Recommended 2008 Priority: 1, 2, 3, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4
(units 1-3, then switch to northern units, moving north to south).

Reason for Change: The recommended change will improve tailrace egress with operation of the TSWs while maintaining adequate water velocity at the juvenile bypass outfall.

GUIDELINES FOR TECHNICAL MANAGEMENT TEAM

~~-March~~ ~~May~~ 2003³⁸

I. Introduction

The National Marine Fisheries Service's (NMFS) Biological Opinion on the "Reinitiation of Consultation on Operation of the Federal Columbia River Power System (FCRPS), Including the Juvenile Fish Transportation Program, and 19 Bureau of Reclamation Projects in the Columbia Basin", dated December 21, 2000, and the U.S. Fish and Wildlife Service's (USFWS) Biological Opinion on the "Effects to Listed Species from Operations of the FCRPS", dated December 20, 2000, call for the utilization of a Technical Management Team (TMT) to advise the operating agencies on dam and reservoir operations, thus optimizing passage conditions for juvenile and adult anadromous salmonids and resident fish. These guidelines are adopted in accordance with those Opinions.

The TMT is one of several technical teams within the Columbia River Regional Forum established by the NMFS, USFWS, the U.S. Army Corps of Engineers (COE), the U.S. Bureau of Reclamation (BOR), and the Bonneville Power Administration (BPA). The Regional Forum provides for regional discussion and recommendation on the operation and configuration of the FCRPS. Its goal is to develop consensus among the various members on these recommendations. The TMT's mission is specifically to ensure broad technical participation and use of the best available technical information, and to encourage consensus in recommendations on operating the FCRPS. When consensus is not achieved, the TMT ensures that the basis for participants' recommendations and Federal decisions is fully explained and documented. In such situations, questions can be elevated to the Implementation Team (IT) for resolution if requested by a TMT member.

The TMT operates under the Guidelines and Procedures approved November 7, 2002, for the Columbia River Regional Implementation Forum. The following more specific guidelines supplement the Forum's procedures for TMT operations. As the Forum procedures are refined, these guidelines may be revised.

II. Scope

The focus of the TMT is to implement the NMFS and USFWS Biological Opinions on operation of the FCRPS while considering the provisions of (and effects on) the Northwest Power Planning Council's (NPPC) Fish and Wildlife Program, other biological opinions, State and Tribal plans and programs, and other relevant operational requirements. Specifically, the TMT should explore operational scenarios under the Biological Opinions that would serve to protect other fish and wildlife in the Columbia River Basin and promote coordination and consistency with these other objectives to the extent possible.

III. Membership

See Forum Guidelines and Procedures.

The members and alternates of the TMT are listed in Attachment 1. Initial confirmation of membership, designation of representatives, and any changes in representation should be provided in writing to the NMFS Implementation Team Chair.

IV. Roles and Responsibilities

The TMT is responsible for discussion and recommendations to the Action Agencies (COE, BOR, and BPA) on hydro system flows at designated control points and expected project operations to implement the Biological Opinions for listed salmon, steelhead, sturgeon, and bull trout species within the Columbia River basin while taking into account the needs of (and effects on) other listed and non-listed species.

The TMT is to engage in joint decision-making that works toward consensus within the recognized authorities and management jurisdictions of its participating members. Specifically, the State, Tribal and Federal salmon managers (Salmon Managers) recommend the flows at the control points that best meet the needs of salmon and steelhead. These may include specific project operations, but this does not foreclose TMT consideration of alternative means of providing the same operating condition. Other participants (e.g., Resident Fish Managers) may also make recommendations consistent with the scope of these guidelines. The vehicle for communicating a river or project condition, which will benefit salmon/steelhead/sturgeon migrations or resident fish, is a system operational request (SOR). See Section V(d). All parties submitting SORs are encouraged to coordinate with other participants to the extent possible.

The Salmon Managers are responsible for the management of anadromous and resident fish in the basin. The COE and BOR are responsible for decisions on operation of the FCRPS projects; and the COE and BPA are responsible for Treaty agreements with Canada regarding storage in Canada and other Treaty-related matters. The participation of other affected sovereign and non-sovereign entities is intended to ensure that decision-makers have the broadest possible source of information upon which to base their decisions. All parties are encouraged to succinctly present their views regarding biological or operational recommendations. Input can provide alternative options for the appropriate authority to consider when making their decisions, but authority for implementing the request remains with the appropriate agencies.

The TMT is a year-round technical body. Winter planning will consist of development of a Water Management Plan and updating the 1-year and 5-year Biological Opinion Implementation Plans. The purpose of in-season management is to implement the Biological Opinions and the Water Management Plan. Post-season review will consist of a review of the previous year's activities and performances, and updating operating procedures as needed. Throughout the year the COE, BOR, and BPA will coordinate planning and operational decisions that may affect salmon and other species, through the TMT (e.g., yearly agreement on Non-Treaty Storage Agreement spring/summer operation, the 5-year

Idaho Power Company Agreement, and the Libby/Arrow swap). The COE, BOR and BPA will specifically use the TMT as a forum for the coordination and consideration of potential effects on salmon, steelhead and other species prior to a final decision. Idaho Power Company, the Mid-Columbia Public Utility Districts, and other non-sovereign participants are also encouraged to use TMT as a forum for coordination of planning and operational decisions throughout the year.

V. Operating Procedures

a) Annual Water Management Plan

The Annual Water Management Plan is used by the action agencies as a decision-making and management tool, and includes all known or typical operations that will be implemented throughout the year based on prior years' gathered data.

Each year, the TMT will finalize an annual Water Management Plan based on the run-off forecast and other factors specific to that year. A draft Spring/Summer Update will be available for review within two weeks of the March final forecast. A draft Fall/Winter update will be available for review in October. All interested parties may participate in the plan development and will be given an opportunity to review and comment on the draft plan. In general, the Salmon Managers will provide information on salmon and salmon operational requirements to be included in the plan. Resident Fish Managers will provide information on resident fish needs. The Action Agencies will provide information on reservoir status; planned project operations (and operating constraints); flow forecasts; anticipated special operations for research and other purposes; turbine outage and maintenance plans; and operating agreements and contracts that may affect annual operations. Priorities among competing needs should be resolved within the context of the scope of these guidelines.

~~By April 15 each year, the TMT will finalize an annual Water Management Plan based on the run-off forecast and other factors specific to that year. A complete draft, subject to refinement based on the April 1 forecast, should be available for review no later than March 10 each year. All interested parties may participate in the plan development and will be given an opportunity to review and comment on the draft plan. In general, the Salmon Managers will provide information on salmon and salmon operational requirements to be included in the plan. Resident Fish Managers will provide information on resident fish needs. The Action Agencies will provide information on reservoir status; planned project operations (and operating constraints); flow forecasts; anticipated special operations for research and other purposes; turbine outage and maintenance plans; and operating agreements and contracts that may affect annual operations. Priorities among competing needs should be resolved within the context of the scope of these guidelines.~~

b) Summary of In-season Management Key Events

Monday	Begin implementing operations based on last week's decision.
Tuesday (9 a.m.)	The COE posts or otherwise distributes flow projections to TMT members for Priest Rapids, McNary and Lower Granite, along with resulting reservoir operations and elevations, and current dissolved

gas and temperature data. Salmon Managers will post or otherwise distribute biological information.

- Tuesday (4 p.m.) TMT Members (or others) submit SORs to the Reservoir Control Center (RCC) and send (fax) hard copies to TMT members and participants. The Salmon Managers will fax SORs to all project owners for which an operation is requested. The Salmon Managers will post the SOR to the Fish Passage Center web page, or an electronic version of any SOR will be simultaneously sent to the Corps so that it is available for the TMT web page as soon as possible.
- Wednesday 9 a.m. The TMT meets bi-weekly, with conference call on alternate weeks if needed, to discuss in-season management data and SORs, document operations, and recommend the following two week's operations. By the start of the meeting all SORs and the disposition will be posted to the TMT web page for use by members who can not attend the meeting. If necessary, the TMT frames the issue(s) to be raised to the IT before 12 a.m.
- Thursday (3 p.m.) In case of impasse, disputes are resolved through the IT.
- Friday (noon) In the event an issue has been raised to the IT and the IT has resolved the issue, the Action Agencies document the operation to begin on the following Monday. This decision, and rationale, should be documented before the next regularly scheduled TMT meeting and sent to the Chair of TMT, who will post it on the TMT homepage
- Friday (p.m.) The TMT draft meeting notes are posted or otherwise distributed

c) In-season Management Data

The TMT will use the National Weather Service's River Forecast Center's (RFC) streamflow forecast for the Columbia River Basin. This forecast (and the basic reservoir operations that are assumed when producing it) is the official forecast to be used for the decision-making process. The BPA forecast may be used as supplemental information. The COE will use the RFC forecast to prepare flow projections for Priest Rapids, McNary and Lower Granite. By 9 a.m. (or as early as possible after that) on Tuesday, the flow projections and resulting reservoir operations will be distributed to TMT members. The Action Agencies will also provide dissolved gas, temperature, and other physical monitoring data available for decision-making.

During the anadromous fish migration period, the Salmon Managers will provide biological information on salmon and steelhead numbers, migration timing and condition, for both the current year and historically. The USFWS, and others as appropriate, will provide relevant information on other fish and wildlife resources. These data will be posted by NMFS and USFWS each Tuesday by 4 p.m.

d) System Operational Requests

System Operational Requests (SOR) are an in-season management tool for bringing forth requests to deviate from or refine planned, existing or BiOp recommended operations. These requests should be intended to provide an operation that is biologically necessary to protect listed and other aquatic species of concern and human health and safety given in-season fluctuations of the hydro system and the status of the fish.

TMT members may provide recommendations to the TMT on hydro system flows and/or expected project operations consistent with the scope of these guidelines. Non-TMT members may also submit recommendations for consideration. These recommendations will be in the form of system operational requests (SORs) stating the flow objective(s) sought (e.g., keep flows at a location X in a W-Z range). Expected project operations may also be added. Each SOR will include the biological basis for the recommendation. Each SOR will also indicate whether the request is to implement a NMFS or USFWS Biological Opinion, NPPC Fish and Wildlife Program, or other Federal, State or Tribal program. Non-TMT members may also submit SORs for special operating purposes for TMT consideration.

All SORs will be submitted by 4:00 p.m. on Tuesday via fax to the action agencies, or any other project owner that may be required to deliver a specified operation, provided that the flow projections were available by 9 a.m. that day. Electronic submittal through the Proposal Submission/Review form on the TMT homepage may also be used. TMT and public comments on the proposal can also be appended via the Internet form. If proposals are incomplete, or are not received in time for sufficient review, the TMT may choose to delay action, but lack of an SOR should not preclude discussion of relevant matters at the meeting.

SORs should list members of the agencies who have reviewed and support the request. The SOR will be outlined for description on the TMT SOR disposition web page. The SOR will be posted to the agenda prior to the start of the TMT meeting so that telephone participants can follow the conversation at the meeting.

When an SOR has been properly submitted, the Action Agencies (COE, BOR, BPA) should be prepared at TMT to describe the operational options and implications of meeting the request. Any decision to implement or not implement will be recorded in the official meeting materials and summarized at the end of those minutes. The meeting facilitator will clarify the decision at the meeting to assure that the record accurately reflects the disposition of the request.

TMT members will provide recommendations to the TMT on hydro system flows and/or expected project operations consistent with the scope of these guidelines. Non-TMT members may also submit recommendations for consideration. These recommendations will be in the form of system operational requests (SORs) stating the flow objective(s) sought (e.g., keep flows at a location X in a W-Z range). Expected project operations may also be added. Each SOR will include the biological basis for the recommendation. Each SOR will also indicate whether the request is to implement a NMFS or USFWS Biological Opinion, NPPC Fish and Wildlife Program, or other Federal, State or Tribal program. Non-TMT

~~members may also submit SORs for special operating purposes for TMT consideration.~~

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~~When an SOR has been properly submitted, the Action Agencies (COE, BOR, BPA) should be prepared at TMT to describe the operational options and implications of meeting the request.~~

e) Meetings

Between the last week of March and up to at least August 31 the TMT will meet every other Wednesday, or more often if necessary, to conduct in-season management. All meetings will be open to interested parties. A conference line will be available for those who cannot attend in person.

An agenda for each meeting will be distributed at least two business days prior to the meeting (the preceding Monday in the case of the regularly scheduled in-season meetings). The principal purpose of the meetings and standing agenda items during the migration season is to review the status of the preceding week's SOR and operations, biological data, new SORs and project operating data, and to reach informed decisions on FCRPS operations for the following week(s). As other items are brought forward for TMT consideration they will be added to the agenda for future discussion, but lack of an agenda item will not preclude discussion of relevant matters at the meeting.

The discussion of SORs at TMT meetings will include distinct segments dealing with both biological and operational issues. Biological questions associated with an SOR will be addressed to ensure that the biological basis of the SOR is clear, and to allow the TMT to consider any additional biological information that may be made available at the meeting. The meeting will then move on to a discussion of operational alternatives to meet the SOR by the Action Agencies and members of the TMT. The Chair should ensure that adequate time is allotted to each segment of the meeting.

The Chair should also ensure that the support or opposition of each TMT member for an SOR and a final decision by the Action Agencies are noted in the minutes.

f) Meeting Facilitation

Meetings of the TMT will be facilitated by an impartial facilitator, who will allow all TMT members the opportunity to fully participate in discussions and to help members resolve conflicts as they arise. The meeting facilitator shall serve at the will of all members of TMT and should have skills as a meeting manager and conflict resolver. The meeting facilitator's role will include:

- Assisting the chair and TMT members in the development of meeting agendas
- Managing the meeting agenda in a balanced and even-handed fashion so that all members have an opportunity to speak and be heard
- Helping the group stay focused on the agenda and prioritize items that need action and further discussion
- Enforcing the ground rules established by the TMT (see Attachment 2)
- Helping the group reach consensus on decisions
- Helping the group resolve conflicts that may arise in the course of discussion
- Highlighting any decisions the group may reach
- Working with members between meetings to clarify issues, resolve disputes, and seek potential solutions to impasses
- Assisting members to develop opportunities that may resolve conflicts and increase the overall satisfaction with the TMT process in the long term, and
- Helping the group maintain a sense of humor

TMT members may give feedback directly to the facilitator or to the chair if they have concerns with the manner by which meetings are managed. The facilitator will be replaced if, after discussion with the facilitator, members believe he or she is not remaining impartial in the delivery of service.

g) In-season Decision making

On Wednesday morning the TMT will decide on operations for the following two weeks based on the available information and any pending SORs. These operating decisions will be made by consensus whenever possible. Consensus is defined as lack of a strong objection that would prompt one or more of the TMT members to elevate the issue to the IT. In the absence of consensus, the decision will be referred to the IT in accordance with the dispute resolution process described below. Objections to decisions that are not strong enough to prompt one or more TMT members to elevate the issue will be documented in the minutes of the TMT meeting.

If the recommendation is to implement the SOR or a modification of the SOR as agreed to by the TMT, then this should be documented for the minutes, and the SOR (and the Biological Opinion, Council's program or other plan on which it is based) may form the basis for the decision. If the Action Agencies do not agree to implement an SOR, they will describe for the minutes both the intended operation and the basis for that decision. The basis for the decision could include that the proposed operation is inconsistent with a Biological Opinion, that operational constraints prevent its implementation, that cost is prohibitive beyond that already included in the so-called "Fish Cap", or that the Action

Agency has an alternative view of the best available biological information. If the Action Agencies believe the best available biological information supports a position that differs from that of the SOR sponsor(s), then the explanation should acknowledge this difference and should provide a clear, succinct written explanation of the data, analysis or judgment that supports the alternative view. In each case, a full explanation will be provided by the Action Agencies to the TMT and IT.

The final decision made by the COE and BOR on the following week's operation will be made at the meeting whenever possible. The TMT will try to avoid making decisions outside the established process. In-season FCRPS operating decisions made through a separate process, such as those under the Action Agencies' authority for emergency situations, will be explained and documented as soon as possible, but in any case no later than Friday following the TMT meeting.

h) Documentation

Minutes of all TMT meetings will be prepared in accordance with Regional Forum procedures and approved by the TMT. Every effort will be made to post the draft meeting notes to the TMT home page by close of business Friday afternoon following the meeting. Comments will be due by the following meeting.

The TMT meeting minutes will be used to keep track of the decision-making process. The minutes will include the substance of any SOR, the decision, the decision-maker, and the basis for the decision. The minutes will also include: (1) documentation of consensus or a listing of members objecting to an SOR or a final decision; and (2) when an SOR is not implemented, clear documentation of the reasons provided by the decision-maker.

If a decision is elevated to the IT and therefore not made at the weekly TMT meeting, documentation on the final decision reached will be provided separately in writing by the IT and will include the same information noted above. This documentation of the decision should happen before the next regularly scheduled TMT meeting and be sent to the Chair of TMT, who will post it on the TMT homepage.

Each member is responsible for reviewing the decision documentation and the meeting minutes, especially if the agency he/she represents is one of the decision-makers.

Interested parties may request copies of the minutes if they have no access to the TMT homepage.

i) Distribution of Information

Meeting notes and material will be made available to TMT participants throughout the year. These materials will be made available through the TMT home page and may be reproduced on other Internet home pages where available. They will also be faxed to members and participants that request such services. Regular mail may be used for materials when time permits.

j) Public Participation

The public may comment on an issue at the end of the discussion on that issue or at the end of the meeting, based on the discretion of the group and the facilitator. They may also comment outside the TMT process.

VI. TMT Dispute Resolution Process

In the event that the TMT is unable to reach consensus on an issue, any member may request that the item be elevated to the IT. Every effort should be made to ensure that the issue is raised at least one week in advance of the monthly IT meeting (first Thursday of the month).

If, despite all efforts to the contrary, the TMT finds at its Wednesday morning meeting that it is unable to resolve a weekly in-season management dispute, and the decision cannot await consideration at the next regularly scheduled meeting, the IT will meet by conference call at 3:00 on Thursday afternoon. In the event that such a meeting is necessary, the TMT will prepare, and agree to, a brief summary of the issue(s) and a short description of the opposing viewpoints. This document will be given to the IT members by 1:00 p.m. on Thursday afternoon.

The IT will attempt to reach consensus. If the IT is unable to reach a consensus, then a final recommendation will be made by the appropriate agency (e.g., NMFS or USFWS if the issue relates to implementation of a Biological Opinion, or NPPC if the issue relates to implementation of the Fish and Wildlife Program). The member with the authority for the action will then make the decision and explain the rationale in writing. Whether IT acts by consensus, or the member with the authority for the action makes the decision to resolve a TMT conflict, it should be documented before the next regularly scheduled TMT meeting and sent to the Chair of TMT, who will post it on the TMT homepage.

VII. Emergency Meetings

Any member of the TMT may call a meeting when an emergency situation requires action of the TMT.

ATTACHMENT 1

TECHNICAL MANAGEMENT TEAM (TMT) MEMBERS

ORGANIZATION - REPRESENTATIVE / ALTERNATES

National Marine Fisheries Service - Paul Wagner / ~~Chris Ross~~ Richard Dominigue
U. S. Army Corps of Engineers - ~~Cindy Henriksen / Rudd Turner~~ Jim Adams / Cathy Hlebechuk / Bob Buchholz
Bonneville Power Administration - ~~Robyn MacKay / Tony Norris~~ / Scott Bettin ~~John Wellschlager~~
U.S. Bureau of Reclamation - ~~Tony Norris~~ John Roache / Mary Mellema / Pat McGrane
U.S. Fish & Wildlife Service - David Wills / Steve Haeseker
State of Washington - Cindy LaFleur
State of Oregon - Rick Kruger / Ron Boyce
State of Idaho - Russ Kiefer
State of Montana - Jim Litchfield / Brian Marotz

Confederated Tribes of the Colville Indian Reservation - Reservations
Jerry Marco / Kirk Truscott
Shoshone-Bannock Tribes of Fort Hall - Keith Kutchins

ELIGIBLE ORGANIZATION WITH
NO OFFICIALLY DESIGNATED
MEMBER - CONTACT PERSON / ALTERNATE

Kootenai Tribe of Idaho
Confederated Tribes of the Umatilla Indian Reservation Reservation
Confederated Salish & Kootenai Tribes of the Flathead Reservation Flathead Reservation
Confederated Tribes of the Warm Springs Reservation Reservation
Yakama Indian Nation
Shoshone-Paiute Tribes of Duck Valley Reservation Reservation
Burns Paiute Tribe
Kalispel Tribe
Spokane Tribe of Indians Deanne Pavlik Chuck Lee
Nez Perce Tribe of Idaho - Dave Statler / Greg Haller
Coeur d'Alene Tribe of Idaho
State of Alaska

ATTACHMENT 2.

MEETING GROUND-RULES & EXPECTATIONS

The following meeting ground-rules and expectations were discussed and agreed to by all members present at the _____meeting of the TMT. They may be changed at the request of the Team.

I. Ground-Rules

Meetings will start and end on time unless members agree otherwise.

Members will treat each other with respect, which includes:

- ° Separating the people from the problem
- ° Listening to what others have to say
- ° No interruptions
- ° Monitoring your own air time
- ° No side conversations
- ° Letting the facilitator or chair know when you would like to speak
- ° Being mindful of tone when speaking directly to others
- ° Remembering that members are representing agencies, not stating individual opinions

During in-season management, each member agency/group will have one primary TMT representative who will sit at the table during meetings. Alternates or technical resource staff are welcome to attend and provide input through their primary representative, or when called on by TMT members. All are welcome to sit at the table --with preference for the primary representatives if there is a space limitation.

Any issues elevated from the TMT to the Implementation Team (IT) will be thoroughly discussed at TMT. TMT members will agree on the “issue statement” for the IT. The TMT Chair will then present the issue at the IT meeting. All TMT members will brief their agency IT representative on the issue prior to the IT meeting.

The meeting facilitator may make process comments in order to keep the group on track, focused and productive.

II. Expectations

Members are expected to come prepared to participate in the meetings. This means, they will provide necessary input to discussions and work towards making decisions based on information they have gathered from their respective agencies between meetings.

Members are expected to keep their agencies and staff apprised of decisions or important meeting discussions.

Members are expected to attend all meetings or send an alternate. If an alternate attends the meeting, a briefing, both before and after the meeting, is expected of the primary representative. The group will not revisit information for members who were absent from or late to a meeting.

Members are expected to follow through on assignments to which they agree, or are given by other team members, on a timely basis. This includes requests for comments on information or reports from other team agencies.

The meeting facilitator is expected to keep the group on track and focused on agenda items. Additionally, the group expects the facilitator to assure equal participation, highlight any decisions that the group reaches, and maintain a sense of humor.

People who listen in on the telephone are expected to “sign-in” as they call in on the conference telephone line.

Group members may contact the facilitator at any time to make process suggestions, raise concerns or request additional assistance at or between meetings.

COLUMBIA RIVER REGIONAL FORUM

TECHNICAL MANAGEMENT TEAM

March 26, 2008 Meeting

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Robin Gumpert

Notes: Erin Halton

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.

Official Minutes/Facilitator Notes

Paul Wagner, NOAA, made the following clarification to the 2/27 Official Meeting Minutes: under Transport Permit, clarify that the permit will be extended for this year. Dave Wills made the following edit to the 3/12 facilitator notes: under Spring Creek Hatchery Operations, add “with depth compensation” to the second sentence of the second paragraph. The 3/12 official meeting minutes had been posted on 3/24; TMT requested more time to review the minutes before finalization.

Action/Next Steps: Wagner will send 2/27 official minutes revisions to the COE for reposting. DS Consulting will make the edit to the 3/12 facilitator notes and send to the COE for posting. With the above edits made, these sets of notes will be considered final. TMT will look to finalize the 3/12 official minutes at the next business meeting, scheduled for 4/9.

Priest Rapids Operations

Russell Langshaw, Grant County PUD, reported that temperature units were at 990 and that rearing protection will commence on 3/29. Based on the most recent forecasts, Langshaw said he expected that flow bands will likely be in the range of 20-30 kcfs. As in past year, rearing protection will continue through mid May/mid June, with conclusions determined by water temperatures.

Action/Next Steps: Langshaw will provide an update at the next TMT meeting, scheduled for 4/9.

Dworshak Operations

Cathy Hlebechuk, COE, referred TMT to a 44-year ESP comparison graph for Dworshak. She noted that over the 44 years, average flows ranged from 6 kcfs to 17 kcfs and that for 24 out of the 44 years, there were slight exceedances of the 110% gas cap. Hlebechuk said that the end of March shifted flood control elevation was 1519' and that flows at the project had been shaped during the week, with flat flows on the weekends. Hlebechuk said the current end of April flood control elevation target was 1506.7' (based on the March Final water supply forecast) and clarified that it will be influenced by the new April forecast.

TMT members discussed how to balance the need to meet flood control targets, meet fish needs and make efforts to minimize the risk of elevated TDG levels. A potential operation of minimum flows through the weekend, then shifting to full load (about 14 kcfs) on April 1 was discussed.

After a caucus, the Salmon Managers complimented the COE's management of this complex operation. Russ Kiefer, speaking on behalf of the Salmon Managers, stated the preferred path forward: flows as smooth as possible through the weekend, with the least dramatic shift to nighttime flows on 4/1 and one big/one small unit. The Salmon Managers requested that higher flows be passed in the latter part of April, but deferred to the COE to do what was needed to meet flood control targets. The Salmon Managers recognized the risk of spilling beyond 110% TDG. The COE noted that they will work to keep the lines of communication open as they discuss April flow shifts with the Salmon Managers and other TMT members. The path forward for Dworshak operations is summarized below. Action Agencies clarified that the operation is expected to draft the project to 3' below the full shift, which the Salmon Managers acknowledged as acceptable.

Action/Next Steps:

- The COE will operate Dworshak with one big / one small unit through the weekend.
- At 2100 hours on Sunday, March 30, the COE will shift the project to full powerhouse (~10.7 kcfs).
- Based on the new forecast (expected on 4/1), the COE may adjust project operations. The COE will communicate their decision, including their rationale, via an email to TMT members (expect to send on 4/2.)
 - o The decision/rationale will also be posted by the COE as a link to today's TMT agenda.
- NOTED: Salmon Managers prefer that the project spill later rather than early in April; however, they defer final management decisions to the COE and they will continue to discuss their needs with the Action Agencies as time progresses.

2008 Water Management Plan and Fall/Winter Update

Scott Boyd, COE, reported that no additional comments to the Water Management Plan had been received and said that the document was currently under internal COE legal review and expected to be finalized soon.

Action/Next Steps: The COE will email a notice out to TMT members once the document has been finalized. The COE expects to post the Spring/Summer update as a link to the TMT web page by 4/9.

2008 Project Activities Update

Dan Feil, COE, referred TMT to several links to the TMT agenda. He provided the group with a project-by-project review of the anticipated activities and newly developed spill patterns, noting those that deviate from what was written into the 2008 Fish Operations Plan and Fish Passage Plan. A bulleted summary of Feil's overview was

linked to the agenda as a handout. TMT discussion during the meeting helped clarify the following points:

- One additional spill pattern for John Day is expected and will be emailed to TMT members for their review by the end of next week.
- Hydro –acoustic monitoring of steelhead kelt passage is currently underway at the Bonneville Powerhouse II Corner Collector.
- Construction for the new spillway wall at The Dalles will occur over two in-water work periods (2008-09 and 2009-10).
- At John Day, the TSWs went into bays 15&16; there will still be spill in bays 17-18-19.
- The John Day revised unit operating priority has yet to be vetted through FPOM.
- John Day's start date for the TSW evaluation has shifted from April 21 to April 27.
- The new spill patterns for McNary TSW's have been vetted through FPOM; TMT has an opportunity to review these patterns as well.
- Regarding McNary navigation for towboaters, there are no anticipated issues; however, good communication with the towboaters will help the effort to stay ahead of any developments that may arise.
- For Lower Monumental, two new spill patterns have been developed; TMT review is requested.
- For Little Goose, three new spill patterns have been developed; TMT review is requested.
- It was suggested that the COE remove the "good vs. bad" language from Little Goose bulk spill patterns.
- As TMT will need to determine the start date for Snake River transport, after operations there may be a newly scheduled TMT meeting or call for April 16th.
 - Salmon Managers have discussed the likelihood of a recommendation similar to last year's start on May 1; migration trends will influence the recommended date.
 - Note: Walla Wall District will need a minimum two-day notice to begin the operation.
 - Paul Wagner, NOAA, will talk with Jim Litchfield, MT offline about providing additional information to aid in the discussions about transport.
- It is expected that TMT will discuss the specific anticipated effects of Little Goose test operations during the scheduled April 9th TMT meeting.
- It is expected that MOP operations will commence as planned, on April 3. The Salmon Manager preferred sequence for start of MOP is: a staggered approach as has been implemented in recent past years (Granite – Goose – LoMo – Ice), with one or ½ day between starts.
 - Note: BPA will reserve the right to stagger starts as needed, but will be mindful of the recommendation

Action/Next Steps: TMT member comments on the new spill patterns are due to the COE by the week of 4/7. The April 9 and April 16 TMT agendas will include discussion on MOP and Transport operations.

Ocean Indicators Website

Bill Peterson, NOAA, referred TMT to the NOAA-hosted “Ocean Indicators” website linked to the TMT agenda. A desire to have a fuller view of the ecosystem, as well as a format for information sharing and multi-agency collaboration led to the development of the website. He described current data sampling efforts and methods of interpreting data and noted that sampling is conducted in June and September. Peterson said that the hope is to enhance the ability to address areas where there are poor (red) indicators for each stock and ultimately use this site as a management tool.

Action/Next Steps:

- TMT members are encouraged to provide feedback regarding the website directly to Peterson: phone: 541-867-0201 / email: bill.peterson@noaa.gov
- Peterson was encouraged to make a presentation on the website to the CR TAC group.
- Cindy LeFleur, WA, will help Peterson make contact with members of the TAC; she also planned to assist with refining the “adult returns by year of ocean entry” data section.

ESP Plots

Jim Adams, COE, referred TMT to the ESP graphs linked to the TMT web page. The new archive feature of previous ESP runs is a new feature and was greatly appreciated by other TMT members. Adams said that the plots from this week would be uploaded to the link soon.

Operations Review

Reservoirs – Grand Coulee was at elevation 1251.9' and providing releases for chum. Hungry Horse was at elevation 3508.29', with outflows of 2.7 kcfs and inflows of .6-.8 kcfs. Libby was at elevation 2396.8', with inflows of 2.7 kcfs, outflows of 4 kcfs and targeting 2399.8' end of March. The new water supply forecast is expected to be available 4/8. Dworshak was at 1518.3'. 7-day average flows were 37.1 kcfs at Lower Granite, 128 kcfs at McNary, and 152.3 kcfs at Bonneville. Adams added that a Lower Granite transistor will need repair work, requiring a unit outage.

Action: The specific date and duration of the Lower Granite repair will be shared with TMT as soon as the information is available.

Fish – Paul Wagner, NOAA, reported that 20 adult spring chinook and about 22 steelhead had been observed passing Bonneville Dam.

Power system – Tony Norris, BPA, reported that some of the 1 maf of flow augmentation previously stored in Canada has been released by Canada. It is expected that BPA will be able to restore most of the augmentation volume during the spring freshet. The amounts of flow augmentation released and the amount that will be restored are not yet known.

Water quality – Jim Adams gave TMT members an FYI: Lower Columbia forebay monitors are in; Little Goose, Lower Monumental and Ice Harbor monitors are not yet in.

Other – **Action:** TMT members were asked to review an updated draft of the TMT Guidelines, linked to the meeting agenda. TMT will look to finalize the guidelines at the TMT meeting on 4/9.

Next TMT Meeting: April 9th, 9am-noon

Agenda Items include:

- Priest Rapids Update
- Dworshak Operations Update
- Spring Spill/Transport Operations
- MOP Operations
- Spring Creek Hatchery Release
- TMT Guidelines
- Operations Review

**Columbia River Regional Forum
Technical Management Team Meeting
March 26, 2008**

1. Introduction

Today's TMT meeting was chaired by Jim Adams (COE) and facilitated by Robin Gumpert (D.S. Consulting), with representatives of BOR, USFWS, BPA, NOAA, COE, FPC, CRITFC, Nez Perce, Oregon, Montana, Idaho, Washington and others attending in person or by phone. 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

The February 27 facilitator's notes were finalized today. Paul Wagner (NOAA) commented on the February 27 official minutes, agenda item #6, Transportation Permit, amending a previous statement on permitting and the 2008 BiOp. NOAA's current plan is to extend the existing permit to cover this year's operation because it's already been defined. The new permit under the 2008 BiOp will take effect in 2009. Wagner will edit accordingly; with that change the February 27 official minutes will be considered final.

The facilitator's notes for the March 12 meeting received comments and have been revised and reposted. The changes came from Dave Wills (USFWS), Paul Wagner (NOAA) and Scott Bettin (BPA). Regarding Spring Creek Hatchery operations, Wills added "with depth compensation" after "105%" in the second paragraph under Spring Creek Hatchery Operations. Wagner edited the first paragraph under Dworshak shifted flood control operations for clarification of FPAC's discussion. Bettin sent comments clarifying the Lower Monumental RSW test conditions described on page 3 of the notes. The 2-hour outage would have required zero flow. The version currently posted is correct.

3. Priest Rapids Update

Russell Langshaw (Grant Co. PUD) gave the first of this season's updates on chum rearing protections, which will begin Saturday, March 29. As of today, 990 temperature units have accumulated since the initiation of spawning. This coming weekend marks the beginning of official spawning season and spring flow band protections, which will last into May or June depending on how quickly the water warms up. Grant County PUD operations this coming weekend will be based on Friday's BPA forecast and inflows. There will probably be a flow band daily delta constraint of 20-30 kcfs. Langshaw will continue to give updates at TMT meetings throughout the 2008 spawning season.

4. Dworshak Operations

Cathy Hlebechuk (COE) presented an ESP graph depicting this week's inflows into Dworshak. Based on the 1929 -1999 weather sequence that serves as a forecast of initial conditions every month in 2008, the minimum average inflow for April is 6 kcfs and the maximum average inflow is 17 kcfs. {Note: Cathy has indicated that the correct dates of the weather sequence are 1949 - 1992}. The max and min average inflows are based on the 44 different April ESP average inflows Hlebechuk explained. Dworshak is now attempting to shift the full 232 kaf of flood control volume to Grand Coulee Dam per the Salmon Managers' request. This will result in a 19-foot shift in the Dworshak end of March elevation, or 1,519 feet vs. the unshifted elevation of 1,500 feet.

The current operations plan is to go to full load plus spill on April 1, starting with 14 kcfs outflows and increase spill slightly while keeping gas levels below 110%. Hlebechuk explained the reason for the gradual increase. According to ESP analysis, the COE would meet its end of April flood control elevation and would have had to release more than 15 kcfs in 20 of the 44 ESP years. This would could cause total dissolved gas levels to exceed the 110% limit. In 24 of the 44 years the end of April flood control was met without exceeding 15 kcfs. Just prior to reaching elevation 1,519 feet at the end of March, the project will probably be at minimum flows for the weekend, so there will be a sudden increase in spill at the end of the month. In previous years, gas production has been higher at a given spill rate when water temperatures increase by 1-2 degrees. Current water temperatures at Dworshak are around 40 degrees F, with units in undershot mode to keep conditions cool. Gas caps will have to drop as the project warms in April.

From now until April 1 is the last opportunity we have to create additional space in the reservoir, Bettin and Adams emphasized. The current operations plan involves releasing more flows during day and dropping to minimum flows at night and on the weekend. A large volume of inflows under that strategy could increase the chance of needing to spill past the gas cap, Hlebechuk warned. The only exception would be if an initial control flow of 350 kcfs is met at The Dalles. In that case the COE would begin refill mode, and Dworshak would not need to reach its 1,506.7 foot end of April elevation target, but that scenario appears unlikely. {Note: Cathy has indicated the refill actually can start before the initial control flow is reached if certain conditions are met}

Yesterday, the Salmon Managers discussed current conditions at Dworshak and expressed a preference to stick with the flood control shift, Wagner reported. If the situation changes and only a partial shift becomes possible, the Salmon Managers would want to be informed. The Salmon Managers deferred to the COE's expertise in flood control to make the final decision. Kiefer asked whether it would be advantageous to continue current operations into early next week, then keep the reservoir slightly below elevation

1,519 feet on April 1 to avoid having to begin spill then. Flat flows on the weekend are needed for fishing, Hlebechuk replied. There's enough load to accommodate full powerhouse from now until April 1, Bettin added.

The Salmon Managers caucused and made a recommendation, presented by Russ Kiefer, to increase flows as much as possible in April with higher flows in late April. They asked the COE to smooth out diurnal flows to reduce the likelihood that resident fish in Dworshak reservoir will be entrained. While the Salmon Managers acknowledged that diurnal fluctuations may be necessary, they preferred less dramatic fluctuations than from minimum powerhouse at night to full powerhouse during the day. They recommended operating up to the big unit and the small unit during the day, and either one big unit or one small unit and night as well as throughout the weekend. The Salmon Managers also asked the COE not to start spill on April 1. Spill to the gas cap should be delayed until late April if possible.

Norris suggested running 7.5 kcfs flat flows, or a big unit and a small unit, through April 1. The Salmon Managers agreed to that operation. The COE proposed an operation of 7.5 kcfs outflows using the big and small unit for 24 hours a day until the morning of April 1, then ramping up to 14 kcfs outflows, or full powerhouse plus spill. The proposed operation will probably draft Dworshak 3 feet below elevation 1,519 feet. Inflows at Dworshak are currently averaging 3.5 kcfs daily.

Scott Bettin suggested increasing flows by 8 kcfs now for 5 days in order to delay the start of spill by 5 more days. TMT members agreed to communicate via email regarding this option. As of today, there was agreement to operate the big unit and the small unit through the weekend and go to full powerhouse at 9 pm Sunday, March 30, with further discussion once the April forecast is released. The Salmon Managers acknowledged a lower risk of exceeding the gas cap as a result of this operation and asked the COE to minimize the risk as much as possible. On April 1, the COE will inform TMT via email of the actual operation. TMT agreed not to meet on April 2 unless the email triggers a need for an emergency meeting.

Dworshak Hatchery is planning its spring Chinook release beginning the end of this month, Dave Wills announced. In some years, Dworshak flows have had to be increased to accommodate that release, as called for in the WMP. This year, an increase won't be necessary.

5. 2008 Final Water Management Plan and Spring/Summer Update

There have been no more comments on the 2008 WMP. It will be considered final once it passes COE legal review, Scott Boyd (COE) reported. The WMP spring/summer update will be posted on the web page for review in time for the April 9 TMT meeting.

6. 2008 Project Activities Update

A. Planned Test and Spill Patterns. The COE has developed new spill patterns for three of the four projects whose patterns have needed changing from those specified in the Fish Operations Plan – Little Goose, Lower Monumental, and McNary. These patterns have been finalized and vetted by FPOM and are linked to today's agenda. Spill patterns for the fourth project, John Day, will be finalized after an ERDC trip next week to address them. Dan Feil (COE) gave TMT a heads up that the new John Day spill patterns will arrive in an email sometime the week of April 7.

Rudd Turner requested that TMT members alert the COE soon if they have any issues with the spill patterns attached to today's agenda or the RSW bay location changes at John Day (described below). These changes require TMT approval because they are departures from the Fish Operations Plan.

Feil showed TMT an online summary of ongoing project work:

Bonneville Dam: Early in March, the COE installed a 700-foot-wide, 10-foot-deep behavioral guidance structure in the B2 powerhouse to guide more fish to the corner collector. An acoustic telemetry study during 2008 passage season will shed light on fish behavior and passage distribution as a result of the BGS. There will also be a spring spillway survival evaluation from April 21 through mid-June of 100 kcfs spill for 24 hours a day. The summer evaluation will be of 85 kcfs daytime spill with spill to the gas cap at night. Acoustic telemetry will be used for both of these studies.

Other work at Bonneville includes an evaluation of 2nd powerhouse fish guidance efficiency improvements using hydro acoustics; a corner collector kelt passage evaluation; chum redd TDG monitoring; sea lion predation observations; and an adult lamprey passage evaluation. The 2nd powerhouse FGE improvement study is being repeated because of poor reception last year. This year, a high resolution camera with a 30-foot range is being used for that study and also to monitor chum spawning. The adult lamprey passage evaluation will look at effects of reducing nighttime flows at the ladder entrance.

The Dalles Dam: There will be no research at The Dalles this year. Next fall the COE will begin construction of an 850-foot spill wall between bays 8 and 9. This project will be completed in 2010 if all goes as planned.

John Day Dam: Two TSWs have been installed in bays 15 and 16, which was changed from bays 18 and 19 as stated in the FOP due to concerns about eddies and predation in the tailrace. Each RSW will pass approximately 10 kcfs. Spill pattern development for John Day is still underway. A passage survival test during spring and summer will look at 30% vs. 40% spill, using acoustic

telemetry. The spring test will start later than previously thought, April 27 instead of April 20. The revised operating priority for turbines at John Day is linked to today's agenda. The delay in testing needs to be vetted by FPAC and technical committees. The other departures from the FOP have already been approved.

McNary Dam: The two TSWs will be evaluated again this year. They were moved from their location last year in bays 20 and 22 to bays 19 and 20 due to concerns about predation. The revised spill pattern for McNary (linked to today's TMT agenda) has been approved by technical committees and FPAC. The spring test will be a single treatment of 40% spill; the summer test will be a randomized block spill test to compare 40% and 60% spill. Jim Adams asked whether there were any navigation issues when the spill patterns were investigated at ERDC. There were not, but navigation will need to be tracked throughout spill season. Feil replied.

Ice Harbor Dam: The FOP states that Ice Harbor will operate at 30% spill vs. a 45 kcfs gas cap at night for 2-day treatments, but recently the COE determined that the study can be conducted using a single release from the Lower Monumental RSW evaluation. That study will yield an estimate of project survival and an avian predation evaluation of steelhead being tagged at Lower Monumental and Ice Harbor.

Lower Monumental Dam: The RSW is being evaluated using balloon tags, with an injury test to be conducted this week. The spring survival test will consist of two spill patterns, one flat and one bulk. The summer test will consist of one treatment using a bulk pattern of 17.5 kcfs.

Little Goose Dam: Three spill patterns used for an evaluation of adult passage at Goose are linked to today's agenda. A uniform pattern and two variations of a bulk pattern will be documented using radio telemetry to evaluate the effects of hydraulics on adult passage. Hydraulic conditions set up to benefit juveniles may be inhibiting adults from finding the ladder entrance at Goose. The test will evaluate the suspect patterns, with preparation to switch out of them if adults begin to experience inordinate delays.

B. Spring Spill and Transport Operations. TMT will need to decide when transportation starts, as stated on page 24 of the FOP, Feil noted. If the projected seasonal average flow is greater than 70 kcfs, transportation is to begin sometime between April 20 and May 1, with TMT to pick the exact start date. The COE Walla Walla district wants as much lead time as possible. TMT considered meeting on April 16 to make this decision. Most of the Salmon Managers believe this year's operation will be similar to last year's, meaning it's unlikely that transportation will start before April 20, Wagner said. Therefore, an extra meeting is probably unnecessary. Russ Kiefer suggested scheduling the transportation discussion for April 9 so the COE has time to plan, given that FPAC will probably

recommend that transportation start at Lower Granite on May 1. TMT added transportation planning to its April 9 meeting agenda.

FPAC will probably place the 14 days of nighttime gas cap spill at Goose (to be scheduled sometime between April 22 and May 15) on the same fish that are either spilled or intentionally bypassed at Lower Granite, Kiefer added. Jim Litchfield asked whether updated information on 2008 transport vs. in-river ratios will be available. He and Wagner will coordinate on this.

C. Start of MOP Operations. MOP operations will begin as planned, Fiel reported. FPAC discussed this issue yesterday and made a recommendation consistent with prior years' recommendations, Wagner reported. Norris asked whether that recommendation includes a staggered date for each project. A full day or half a day between projects would be optimal, Wagner said.

7. Ocean Ecosystem Indicators Website

Bill Peterson (NOAA) showed TMT this website which has been up for about 6 months: www.nwfsc.noaa.gov/research/divisions/fed/oeip/a-ecinhome.cfm. The web page is a storehouse of information on studies correlating ocean conditions with salmon survival. A major goal of this effort is the capability to forecast adult returns based on past years' ocean conditions. As an example of how salmon runs are tied to the ocean, 2005 was the worst year on record with the highest PDO, a factor that has been linked with poor salmon survival. Returns in 2007 were correspondingly low. Because 2006 was not much better, low returns can also be expected this year. In future, ocean conditions could be used to predict a number of factors relative to salmon runs, such as optimal times for barge transportation. The NOAA researchers have been working on how to account in their data reporting for the number of years a fish has spent in the ocean. Cindy LeFleur (Washington) offered to help with this.

Peterson welcomed comments on how to make the website as clear as possible. He can be reached at: bill.peterson@noaa.gov or 541-867-0201.

8. Columbia River Basin ESP Plots

Adams introduced TMT to a new feature available on the web page under the "documents" and "ESP forecasts" buttons. The COE plans to generate weekly spaghetti plots and box whiskers plots like these whenever new ESP information becomes available. The information will be archived.

9. Operations Review

a. Reservoirs. Grand Coulee is at elevation 1,251.9 feet and providing releases to meet chum flows.

Hungry Horse is at elevation 3,508.29 feet, discharging 2.7 kcfs to meet the Columbia Falls minimum. Inflows are low at 600-800 cfs, however the March final water supply forecast is 102% of normal.

Libby is at elevation 2,396.8 feet, with inflows of 2.7 kcfs and outflows holding steady at 4 kcfs. The end of March flood control elevation is 2,399.8 feet. The water supply forecast is still 102% of normal.

Albeni Falls is at elevation 2,055.3 feet at the Hope gage, with inflows of 15.5 kcfs and outflow of 13.2 kcfs, still operating within the 1-foot range of 2,055-2,056 feet.

Dworshak is at elevation 1,518.3 feet.

The 7-day average for inflows at Lower Granite is 37.1 kcfs. The 7-day average for inflows at McNary is 128.7 kcfs. The 7-day average for inflows at Bonneville is 152.3 kcfs.

Adams informed TMT of two operations issues: (1) Yesterday the COE discovered a transformer bushing issue at Lower Granite that requires unit 5 to be operated continually until repairs are completed. If flows and generation drop, this will influence the unit priority scheme at Lower Granite. If flows are sufficiently high, it won't be a problem. The COE is investigating how long the repair will take. (2) The Bonneville 2nd powerhouse corner collector will be out of service on the morning of March 29 from 6 am-6 pm so divers can realign the BGS.

b. Fish. It's still early in the passage season, with fish counts in the 20s at Bonneville. Numbers should pick up in the next few weeks, Wagner reported.

c. Power System. A month ago, BPA had stored the full amount of flow augmentation under the non-power uses agreement with Canada, but since then Canada has exercised its right to release some of that water, Norris reported. BPA expects to be able to replenish the volume lost on the freshet and will store it for the rest of the season.

d. Water Quality. Water temperatures and gas production continue to be low. All monitors on lower Columbia projects have been installed including Camas Washougal. Forebay monitors are in the process of being installed on the Snake River projects.

e. Other. With the anticipation of spring spill starting at midnight on April 10, Spring Creek Hatchery is planning its second release that morning, Wills reported. There could be a request to go to 1% operations at Bonneville on April 11. TMT will discuss this at its April 9 meeting.

TMT members were asked to review an updated draft of the TMT Guidelines, linked to the meeting agenda. TMT will look to finalize the guidelines at the TMT meeting on April 9.

7. Next Meeting

The next regular TMT meetings will be on April 9 and April 23. The April 9 agenda will include a review of the TMT guidelines, the next Spring Creek Hatchery release, John Day spill patterns, spring transportation planning, and follow-up reports on Little Goose, Lower Granite, and MOP operations. This summary prepared by consultant and writer Pat Vivian.

<i>Name</i>	<i>Affiliation</i>
John Roache	BOR
Rick Kruger	Oregon
Dave Wills	USFWS
Jason Sweet	BPA
Tony Norris	BPA
Paul Wagner	NOAA
Jim Adams	COE
Kyle Dittmer	CRITFC
Jennifer Miller	Susquehanna
Holli Krebs	Bear Stearns
Russ George	WMC
Scott Boyd	COE
Stephen Hall	COE
Cathy Hlebechuk	COE
John Crandall	Constellation Energy
Dan Spear	BPA
John El	Constellation
Dan Feil	COE
Jim Litchfield	Montana
Scott Bettin	BPA

Phone:

Shane Scott	PPC
Laura Hamilton	COE
Cindy LeFleur	Washington
Russ Kiefer	Idaho
Rudd Turner	COE
John Wasach	Bear Energy
Dave Benner	FPC
Bruce Mckary	Consultant
Bob Buchholz	COE
Tim Heizenrader	Centaurus
Glen Trager	Shell Energy

Mike Butchko
Tom Le
Richelle Beck
Russell Langshaw
Bill Peterson
Dave Statler

Powerex
Puget Sound Energy
DRA
Grant Co. PUD
NOAA
Nez Perce

TECHNICAL MANAGEMENT TEAM

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COE: Jim Adams / Cathy Hlebechuk / Bob Buchholz

SPECIAL TMT CONFERENCE CALL

Wednesday April 2, 2008 1:00 - 3:00 p.m.

1125 N.W. Couch Street, Suite 4A34
Portland, Oregon 97209-4142
Map Quest [\[Directions\]](#)

CONFERENCE PHONE LINE

Conference call line: 203-310-2162; PASS CODE = 4703150

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Please e-mail her at robin76@cnmw.net or call her at (503) 248-4703.*

AGENDA

1. Welcome and Introductions
2. Ice Harbor Operations
 - a. [\[ICE Harbor Seal Replacement\]](#) 
 - b. [\[ICE Harbor Spill Pattern - Divers in Water\]](#) 
 - c. [\[ICE Harbor Spill Patterns - Divers out of water\]](#) 
3. Next scheduled meeting - **April 9, 2008**
[\[Calendar 2008\]](#) 

Questions about the meeting may be referred to:

*[Jim Adams](#) at (503) 808-3938, or
[Cathy Hlebechuk](#) at (503) 808-3942, or
[Bob Buchholz](#) at (503) 808-3945.*

**Ice Harbor RSW Seal Replacement
Plan of Action
April 2, 2008**

1. Thursday April 3, 2008 at 0001 hours – Spill begins.
 - a. Spill 45 kcfs during the daytime (0501-1759 hours).
 - b. Spill to the TDG gas cap during the nighttime (1800-0500 hours).
 - c. Use the spill pattern contained in Table IHR-9 from the 2008 Fish Passage Plan (excludes spill from bays 1 and 2 (RSW) at current flow levels).
2. Monday April 7, 2008 at ~ 0600 hours – Move RSW into partially stowed 45 degree tilt back position.
 - a. Spill 45 kcfs during the daytime (0501-1759 hours).
 - b. Spill to the TDG gas cap during the nighttime (1800-0500 hours).
 - c. Spill only through bays 6-10.
 - i. Using spill pattern: “IHR 2008 Temporary Spill Pattern (Divers out of water).pdf”.
3. Tuesday April 8, 2008 at ~ 0600 hours – Divers begin repair of damaged RSW seal.
 - a. Spill 18.7 kcfs through bays 6-10 during the daytime when divers are working (0501-1759 hours) using pattern below.
 - i. Bay 6 – open 2 stops.
 - ii. Bay 7 – open 2 stops.
 - iii. Bay 8 – open 2 stops.
 - iv. Bay 9 – open 2 stops.
 - v. Bay 10 – open 3 stops.
 - b. Spill to the TDG gas cap through bays 6-10 during the nighttime (1800-0500 hours).
 - i. Using spill patterns: “IHR 2008 Temporary Spill Pattern (Divers out of water).pdf” and “IHR 2008 Temporary Spill Pattern (Divers in water).pdf” as appropriate.
4. Friday April 11, 2008 – Seal repair complete.
 - a. Move RSW back into operating position on April 11 or 12, 2008.
 - b. Resume planned spill operations that include use of the RSW on April 12 or 13, 2008.

Ice Harbor Temporary Spill Pattern -- RSW repair with divers in water

Spill Bay										Total Stops	Total Spill (kcfs)
1	2	3	4	5	6	7	8	9	10		
					2	2	2	2	3	11	18.7

Ice Harbor Temporary Spill Pattern -- RSW repair with divers out of water

Spill Bay										Total Stops	Total Spill (kcfs)
1	2	3	4	5	6	7	8	9	10		
					5	4	0	5	1	15	25.5
					5	5	0	5	1	16	27.2
					6	5	0	5	1	17	28.9
					6	5	0	6	1	18	30.5
					6	5	0	7	1	19	32
					7	5	0	7	1	20	34
					5	5	5	5	1	21	35.7
					5.5	5	5	5.5	1	22	37.3
					5.5	5.5	5.5	5.5	1	23	39
					6	5.5	5.5	6	1	24	40.6
					6	6	6	6	1	25	42.1
					6	6	6	6	2	26	44.2
					6.5	6	6	6.5	2	27	45.8
					7	6	6	7	2	28	47.5
					6.5	6	6	6.5	4	29	49.1
					6	6	6	6	6	30	50.7
					6.5	6	6	6.5	6	31	52.2
					6.5	6.5	6.5	6.5	6	32	54
					7	6.5	6.5	7	6	33	55.8
					7	7	7	7	6	34	57.5
					7	7	7	7	7	35	59.1
					7.5	7	7	7.5	7	36	60.7
					7.5	7.5	7.5	7.5	7	37	62.3
					8	7.5	7.5	8	7	38	64.1
					8	8	8	8	7	39	65.7
					8	8	8	8	8	40	67.4
					8.5	8	8	8.5	8	41	69.1
					8.5	8.5	8.5	8.5	8	42	70.8
					9	8.5	8.5	9	8	43	72.5
					9	9	9	9	8	44	74.1
					9	9	9	9	9	45	75.8
					9.5	9	9	9.5	9	46	77.5
					9.5	9.5	9.5	9.5	9	47	79.2
					10	9.5	9.5	10	9	48	80.9
					10	10	10	10	9	49	82.5
					10	10	10	10	10	50	84.2
					10.5	10	10	10.5	10	51	85.9
					10.5	10.5	10.5	10.5	10	52	87.6
					11	10.5	10.5	11	10	53	89.3
					11	11	11	11	10	54	91
					11	11	11	11	11	55	92.7

**Columbia River Regional Forum
Technical Management Team Conference Call
April 2, 2008**

1. Introduction

Today's unscheduled TMT call was chaired and facilitated by Jim Adams (COE) with representatives of BPA, BOR, NOAA, COE, FPC, CRITFC, Idaho, and others attending in person or by phone. 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. Ice Harbor Operations

Dan Feil (COE) and Tim Dykstra (COE Walla Walla) discussed the reason for today's call with TMT. Problems have arisen with the seals of the RSW to Ice Harbor Dam, meaning that repairs will be required. Spill at Ice Harbor is scheduled to start at midnight tonight, but the start of any repair work will only be able to start by Monday. The planned operation was to spill, with the spill alternating between 30% spill and 45 kcfs spill during the day and to the gas cap at night.

However, the repairs will require changing these spill levels. The revised Ice Harbor operations plan is as follows:

From now until Monday, April 7, spill 45 kcfs at Ice Harbor during the day (instead of 30% spill) and to the gas cap at night through bays 3-10, using the spill pattern for no RSW found in the Fish Passage Plan (Table IHR-9).

Beginning Monday, April 7, limit spill to bays 6-10 while the RSW is moved away from the dam. This will take all day Monday. Spill on Monday through bays 6-10 will continue to be 45 kcfs and to the gas cap at night unless increased flows change the gas cap spill levels.

Beginning Tuesday, April 8, limit spill to 18.7 kcfs through bays 6-10 until close of business Friday, April 11, while divers are in the water for an average of 10 hours per day. At night, spill will return to the gas cap. It could take another day or two of 45 kcfs daytime spill after the seals are repaired and divers are out of the water to reposition the RSW against the dam and to inspect the new seals. Planned operations at Ice Harbor will most likely resume on Monday, April 14.

Representatives of NOAA, Idaho, BPA, and BOR found this operation acceptable. The spill patterns will be linked to today's agenda when they are finalized later today.

3. Next Meeting

The next regular TMT meetings will be on April 9 and April 23. The April 9 agenda will include a review of the TMT guidelines, the next Spring Creek Hatchery release, John Day spill patterns, spring transportation planning, and follow-up reports on Little Goose, Lower Granite, and MOP operations. This summary prepared by consultant and writer Pat Vivian.

<i>Name</i>	<i>Affiliation</i>
Jim Adams	COE
Kyle Dittmer	CRITFC
Tony Norris	BPA
Scott Bettin	BPA
Dave Benner	FPC
Mary Mellema	BOR
Margaret Filardo	FPC
Dan Feil	COE
Russ Kiefer	Idaho
Tim Dykstra	COE Walla Walla
Marvin Shutters	COE Walla Walla
Paul Wagner	NOAA
Cathy Hlebechuk	COE

TECHNICAL MANAGEMENT TEAM

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COE: Jim Adams / Cathy Hlebechuk / Bob Buchholz

TMT MEETING

Wednesday April 9, 2008 09:00 - 12:00

1125 N.W. Couch Street, Suite 4A34
Portland, Oregon 97209-4142
Map Quest [\[Directions\]](#)

CONFERENCE PHONE LINE

Conference call line: 203-310-2162; PASS CODE = 4703150

To check into the building, take the elevator to the 5th floor and the guard will issue you an ID badge if you need one and will take you down to the meeting room on the 4th floor. If you have NOT attended a TMT meeting in the past you will need to call ahead and let Jim Adams (503) 808-3938, Cathy Hlebechuk (503) 808-3942, or Bob Buchholz (503) 808-3945 know, so you can be added to the TMT Visitor List and issued an ID badge. This badge may be used indefinitely. If you have attended TMT in the past you may re-use your ID badge indefinitely. If you are a federal employee you will also need to have an ID badge issued to you which can be used indefinitely.

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Please e-mail her at robin76@cnnw.net or call her at (503) 248-4703.*

AGENDA

1. Welcome and Introductions
2. Review [\[Meeting Minutes\]](#) 
3. Priest Rapids Update - Russell Langshaw, Grant County PUD
[\[Priest Rapids Operations 2008\]](#) 
4. Water Management Plan - Spring/Summer Update - Scott Boyd, USACE
5. Spring Creek Hatchery Release - Steve Haeseker, USWS
6. Dworshak Operations - Cathy Hlebechuk, USACE
[\[Columbia River Basin ESP Plots\]](#) 
7. Transport Operations - Dan Feil
8. Spring Spill Operations
 - a. Ice Harbor Spill - Dan Feil
 - b. John Day Spill - Dan Feil

[\[JDA Unit Operating Priority\]](#) 
[\[JDA Spill Patterns without TSWs\]](#) 
[\[JDA Spill Patterns with TSWs\]](#) 

9. Bonneville Operations

- a. B2CC Outage - *Dennis Schwartz, USACE*

[\[BON BGS TMT Briefing\]](#) 

- b. Chum Protection Flows - *Dan Feil, USACE*

10. TMT Guidelines - *All*

11. Emergency Action List - *Tony Norris, BPA*

[\[Emer Act List - 31 Mar 2008\]](#) 

12. Operations Review

- a. Reservoirs
b. Fish
c. Power System
d. Water Quality

[\[Spill Information 2008\]](#)

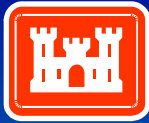
13. Other

- a. Set agenda for next meeting - **April 23, 2008**

[\[Calendar 2008\]](#) 

Questions about the meeting may be referred to:

*[Jim Adams](#) at (503) 808-3938, or
[Cathy Hlebechuk](#) at (503) 808-3942, or
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US Army Corps
of Engineers
Portland District

TMT Status Update Bonneville Second Powerhouse Behavioral Guidance Structure (BGS)

Technical Management Team Briefing
April 9, 2008



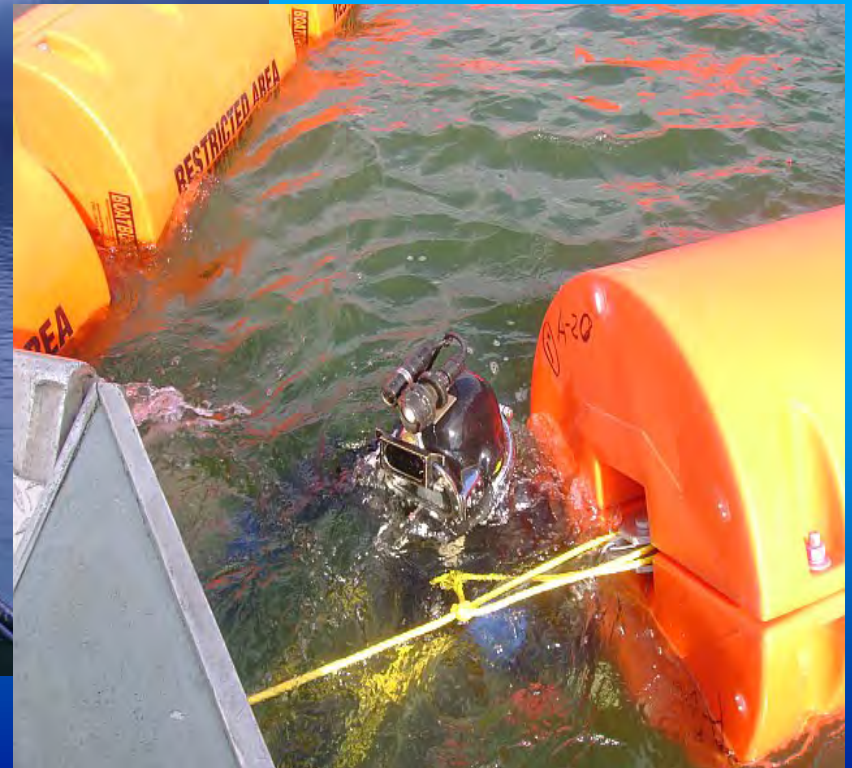
US Army Corps
of Engineers
Portland District

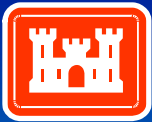
Status of BGS

- **CRFM Funded \$3 Million for Construction**
- **\$1.1 Million for Research Evaluation**
- **Installation complete as of 29 March**
- **Total overall Length of 720'**
- **10' steel panels create wall effect**
- **Intent to increase guidance of Yearling and Subyearling Chinook to B2CC.**
- **Historical Guidance Findings**
 - ◆ **33% Yearling guidance**
 - ◆ **39% Subyearling guidance**



BON BGS Installation





US Army Corps
of Engineers

Portland District

BGS Construction Solid Panels





US Army Corps
of Engineers

BGS Installed





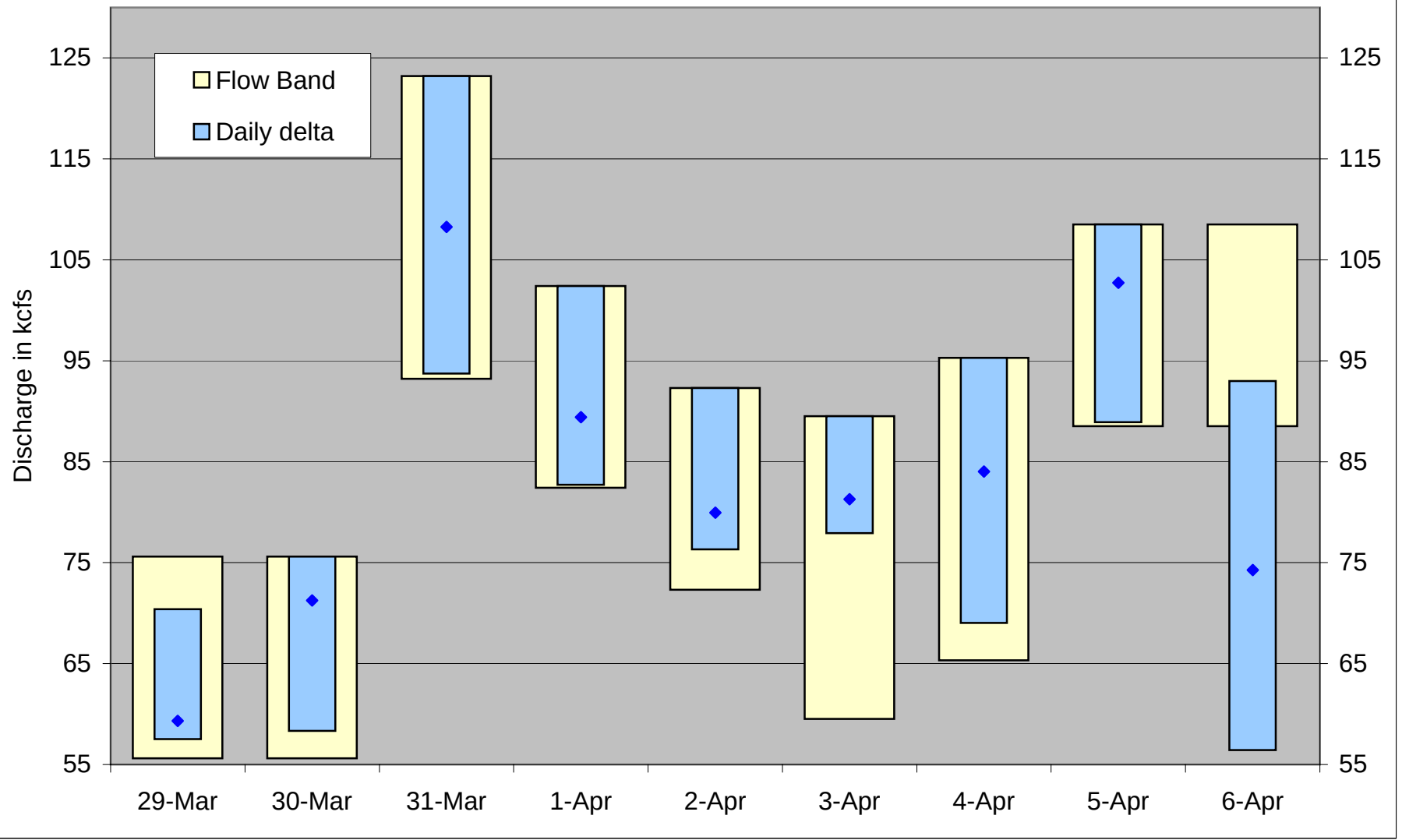
US Army Corps
of Engineers
Portland District

Final Forebay Configuration



Priest Rapids Operations 2008

Number of exceedances: 1



Emergency Actions List

April – August period

- Increase generation at MCN to operate outside 1% up to 16.5 kcfs per unit
- Increase generation at BON to operate outside 1% up to full load.
- Increase generation at JDA to operate outside 1% up to full load.
- Increase generation at TDA to operate outside 1% up to full load.
- Reduce spill at IHR to RSW (19 kcfs **and training spill**)
- Reduce spill at LWG to 9 kcfs (**RSW only**)
- Reduce spill at LWG to 0
- Reduce spill at LGS to 0
- **Reduce spill at LMN to 9 kcfs (RSW only)**
- Reduce spill at LMN to 0
- Reduce spill at IHR to RSW only (9 kcfs)
- Reduce spill at IHR to 0 (*Transmission constraints may limit the use of the Snake projects*)
- Reduce spill at BON to 50 kcfs while maintain B2CC spill
- Reduce spill at MCN to 20% of flow
- Reduce spill at BON to 0
- Reduce spill at JDA to 0 (**this will take 5 hours with TSW's in place**)
- Reduce spill at TDA to 30%
- Reduce spill at TDA to 0
- Reduce spill at MCN to 0 (**this will take four hours to implement with TSW's in place**)
- **Reduce spill to 0 at BON2 Corner Collector (up to one day to implement)**
- **Reduce spill at TDA sluiceway to 0.**
- **Violate biop ramp rates at HGH and LIB**
- **Increase spill to move water to downstream projects (ADDED BY PGSD MGR)**

John Day Dam Unit Operating Priority 2008

Existing 2007 Priority: 5, 1, 2, 3, 4, then 6-16 in any order.

Recommended 2008 Priority: 5, 1, 3, 16, 14, 12, 10, 8, 15, 2, 11, 7, 4, 13, 9, 6.

Reason for Change: The recommended change will improve forebay attraction flow for the TSWs while maintaining adequate water velocity at the juvenile bypass outfall.

	7.2	6.4	4.8	5.6	6.4	6.4	6.4	6.4	5.6	5.6	5.6	7.2	7.2	9.7	9.7	8.0	8.0	5.6	2.4	124.2	0.8
	7.2	6.4	4.8	5.6	6.4	6.4	6.4	6.4	5.6	5.6	6.4	7.2	7.2	9.7	9.7	8.0	8.0	5.6	2.4	125.0	0.8
	7.2	6.4	4.8	5.6	6.4	6.4	6.4	6.4	5.6	6.4	6.4	7.2	7.2	9.7	9.7	8.0	8.0	5.6	2.4	125.8	0.8
	7.2	6.4	4.8	5.6	6.4	6.4	6.4	6.4	5.6	6.4	6.4	7.2	7.2	9.7	9.7	8.0	8.0	5.6	3.2	126.6	0.8
	7.2	6.4	4.8	6.4	6.4	6.4	6.4	6.4	5.6	6.4	6.4	7.2	7.2	9.7	9.7	8.0	8.0	5.6	3.2	127.4	0.8
	7.2	6.4	5.6	6.4	6.4	6.4	6.4	6.4	5.6	6.4	6.4	7.2	7.2	9.7	9.7	8.0	8.0	5.6	3.2	128.2	0.8
	7.2	6.4	5.6	6.4	6.4	6.4	6.4	6.4	5.6	6.4	6.4	7.2	7.2	9.7	9.7	8.0	8.0	6.4	3.2	129.0	0.8
0.0	7.2	6.4	5.6	6.4	6.4	6.4	6.4	6.4	5.6	6.4	6.4	7.2	7.2	9.7	9.7	8.0	8.0	6.4	4.0	129.8	0.8
	7.2	6.4	5.6	6.4	6.4	6.4	6.4	6.4	5.6	6.4	6.4	7.2	7.2	9.7	9.7	8.0	8.0	7.2	4.0	130.6	0.8
	7.2	6.4	5.6	6.4	6.4	6.4	6.4	6.4	5.6	6.4	6.4	8.0	7.2	9.7	9.7	8.0	8.0	7.2	4.0	131.4	0.8
	7.2	7.2	5.6	6.4	6.4	6.4	6.4	6.4	5.6	6.4	6.4	8.0	7.2	9.7	9.7	8.0	8.0	7.2	4.0	132.2	0.8
	7.2	7.2	5.6	6.4	6.4	6.4	7.2	6.4	5.6	6.4	6.4	8.0	7.2	9.7	9.7	8.0	8.0	7.2	4.0	133.0	0.8
	7.2	7.2	5.6	6.4	6.4	6.4	7.2	6.4	5.6	6.4	7.2	8.0	7.2	9.7	9.7	8.0	8.0	7.2	4.0	133.8	0.8
	7.2	7.2	5.6	6.4	6.4	6.4	7.2	6.4	5.6	6.4	7.2	8.0	7.2	9.7	9.7	8.0	8.0	8.0	4.0	134.6	0.8
	7.2	7.2	5.6	6.4	6.4	6.4	7.2	6.4	6.4	7.2	8.0	7.2	9.7	9.7	9.7	8.0	8.0	8.0	4.0	135.4	0.8
	7.2	7.2	5.6	6.4	6.4	7.2	7.2	6.4	6.4	6.4	7.2	8.0	7.2	9.7	9.7	8.0	8.0	8.0	4.0	136.2	0.8
	7.2	7.2	5.6	6.4	6.4	7.2	7.2	6.4	6.4	7.2	8.0	7.2	9.7	9.7	9.7	8.0	8.0	8.0	4.0	137.0	0.8
	7.2	7.2	5.6	6.4	6.4	7.2	7.2	6.4	6.4	7.2	8.0	8.0	7.2	9.7	9.7	8.0	8.0	8.0	4.0	137.8	0.8
	7.2	7.2	5.6	7.2	6.4	7.2	7.2	6.4	6.4	7.2	8.0	8.0	7.2	9.7	9.7	8.0	8.0	8.0	4.0	138.6	0.8
	7.2	7.2	5.6	7.2	6.4	7.2	7.2	6.4	6.4	7.2	8.0	8.0	7.2	9.7	9.7	8.0	8.0	8.0	4.0	139.4	0.8
0.0	7.2	7.2	6.4	7.2	6.4	7.2	7.2	6.4	6.4	7.2	8.0	8.0	7.2	9.7	9.7	8.0	8.0	8.8	4.0	140.2	0.8
	7.2	7.2	6.4	7.2	6.4	7.2	7.2	6.4	6.4	7.2	8.0	8.0	7.2	9.7	9.7	8.8	8.0	8.8	4.0	141.0	0.8
	7.2	7.2	6.4	7.2	6.4	7.2	7.2	6.4	6.4	7.2	8.0	8.0	8.0	9.7	9.7	8.8	8.0	8.8	4.0	141.8	

7.2	9.6	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	16.0	16.0	9.7	9.7	16.0	16.0	14.4	14.4	258.6	1.6
7.2	9.6	14.4	14.4	14.4	14.4	14.4	16.0	14.4	14.4	14.4	14.4	14.4	14.4	14.4	16.0	16.0	9.7	9.7	16.0	16.0	14.4	14.4	260.2	1.6
7.2	9.6	14.4	14.4	14.4	14.4	14.4	16.0	14.4	14.4	14.4	16.0	16.0	16.0	9.7	9.7	16.0	16.0	14.4	14.4	261.8	1.6			
7.2	9.6	14.4	14.4	14.4	14.4	14.4	16.0	14.4	14.4	16.0	14.4	16.0	16.0	16.0	9.7	9.7	16.0	16.0	14.4	14.4	263.4	1.6		
7.2	9.6	14.4	14.4	14.4	16.0	16.0	14.4	16.0	14.4	16.0	14.4	16.0	16.0	16.0	9.7	9.7	16.0	16.0	14.4	14.4	265.0	1.6		
7.2	9.6	14.4	14.4	14.4	14.4	16.0	16.0	16.0	14.4	16.0	16.0	16.0	16.0	16.0	9.7	9.7	16.0	16.0	14.4	14.4	266.6	1.6		
7.2	9.6	14.4	14.4	14.4	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	9.7	9.7	16.0	16.0	14.4	14.4	268.2	1.6		
7.2	9.6	14.4	16.0	14.4	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	9.7	9.7	16.0	16.0	14.4	14.4	269.8	1.6		
7.2	9.6	14.4	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	9.7	9.7	16.0	16.0	14.4	14.4	271.4	1.6		
7.2	9.6	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	9.7	9.7	16.0	16.0	14.4	14.4	273.0	1.6		
7.2	9.6	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	9.7	9.7	16.0	16.0	16.0	14.4	274.6	1.6		
7.2	9.6	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	9.7	9.7	16.0	16.0	16.0	16.0	276.2	1.6		
7.2	9.6	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	9.7	9.7	17.6	16.0	16.0	16.0	277.8	1.6		
7.2	9.6	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	9.7	9.7	17.6	17.6	16.0	16.0	279.4	1.6		
7.2	9.6	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	9.7	9.7	17.6	17.6	16.0	16.0	281.0	1.6		
7.2	9.6	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	17.6	17.6	9.7	9.7	17.6	17.6	16.0	16.0	282.6	1.6	
7.2	9.6	16.0	16.0	16.0	16.0	16.0	17.6	16.0	16.0	16.0	16.0	16.0	17.6	17.6	17.6	9.7	9.7	17.6	17.6	16.0	16.0	284.2	1.6	
7.2	9.6	16.0	16.0	16.0	16.0	16.0	17.6	16.0	16.0	16.0	16.0	17.6	17.6	17.6	17.6	9.7	9.7	17.6	17.6	16.0	16.0	285.8	1.6	
7.2	9.6	16.0	16.0	16.0	16.0	16.0	17.6	16.0	17.6	16.0	17.6	16.0	17.6	17.6	17.6	9.7	9.7	17.6	17.6	16.0	16.0	287.4	1.6	
7.2	9.6	16.0	16.0	16.0	16.0	17.6	17.6	16.0	17.6	16.0	17.6	16.0	17.6	17.6	17.6	9.7	9.7	17.6	17.6	16.0	16.0	289.0	1.6	
7.2	9.6	16.0	16.0	16.0	16.0	17.6	17.6	16.0	17.6	16.0	17.6	17.6	17.6	17.6	17.6	9.7	9.7	17.6	17.6	16.0	16.0	290.6	1.6	
7.2	9.6	16.0	16.0	16.0	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	9.7	9.7	17.6	17.6	16.0	16.0	292.2	1.6	
7.2	9.6	16.0	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	9.7	9.7	17.6	17.6	16.0	16.0	293.8	1.6	
7.2	9.6	16.0	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	9.7	9.7	17.6	17.6	16.0	16.0	295.4	1.6	
7.2	9.6	16.0	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	9.7	9.7	17.6	17.6	17.6	16.0	297.0	1.6	
7.2	9.6	16.0	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	9.7	9.7	17.6	17.6	17.6	17.6	298.6	1.6	
7.2	9.6	16.0	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	9.7	9.7	19.2	17.6	17.6	17.6	300.2	1.6	
7.2	9.6	16.0	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	9.7	9.7	19.2	19.2	17.6	17.6	301.8	1.6	
7.2	9.6	16.0	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	19.2	9.7	9.7	19.2	19.2	17.6	17.6	303.4	1.6	
7.2	9.6	16.0	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	19.2	19.2	9.7	9.7	19.2	19.2	17.6	17.6	305.0	1.6	
7.2	9.6	16.0	17.6	17.6	17.6	19.2	17.6	17.6	17.6	17.6	17.6	17.6	19.2	19.2	19.2	9.7	9.7	19.2	19.2	17.6	17.6	306.6	1.6	
7.2	9.6	16.0	17.6	17.6	17.6	17.6	19.2	17.6	17.6	17.6	17.6	19.2	19.2	19.2	19.2	9.7	9.7	19.2	19.2	17.6	17.6	308.2	1.6	
7.2	9.6	16.0	17.6	17.6	17.6	19.2	19.2	17.6	19.2	17.6	19.2	17.6	19.2	19.2	19.2	9.7	9.7	19.2	19.2	17.6	17.6	309.8	1.6	
7.2	9.6	16.0	17.6	17.6	17.6	19.2	19.2	17.6	19.2	17.6	19.2	17.6	19.2	19.2	19.2	9.7	9.7	19.2	19.2	17.6	17.6	311.4	1.6	
7.2	9.6	16.0	17.6	17.6	19.2	19.2	19.2	17.6	19.2	19.2	19.2	19.2	19.2	19.2	19.2	9.7	9.7	19.2	19.2	17.6	17.6	313.0	1.6	
7.2	9.6	16.0	17.6	17.6	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	9.7	9.7	19.2	19.2	17.6	17.6	314.6	1.6	
7.2	9.6	16.0	19.2	17.6	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	9.7	9.7	19.2	19.2	17.6	17.6	316.2	1.6	
7.2	9.6	16.0	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	9.7	9.7	19.2	19.2	17.6	17.6	317.8	1.6	
7.2	9.6	16.0	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	9.7	9.7	19.2	19.2	19.2	17.6	319.4	1.6	
7.2	9.6	16.0	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	9.7	9.7	19.2	19.2	19.2	19.2	321.0	1.6	
7.2	9.6	16.0	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	9.7	9.7	20.8	19.2	19.2	19.2	322.6	1.6	
7.2	9.6	16.0	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	9.7	9.7	20.8	20.8	19.2	19.2	324.2	1.6	
7.2	9.6	16.0	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	20.8	9.7	9.7	20.8	20.8	19.2	19.2	325.8	1.6	
7.2	9.6	16.0	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	20.8	20.8	9.7	9.7	20.8	20.8	19.2	19.2	327.4	1.6	
7.2	9.6	16.0	19.2	19.2	19.2	20.8	19.2	19.2	19.2	19.2	19.2	20.8	20.8	20.8	20.8	9.7	9.7	20.8	20.8	19.2	19.2	329.0	1.6	
7.2	9.6	16.0	19.2	19.2	19.2	20.8	20.8	19.2	19.2	19.2	20.8	20.8	20.8	20.8	20.8	9.7	9.7	20.8	20.8	19.2	19.2	330.6	1.6	
7.2	9.6	16.0	19.2	19.2	19.2	20.8	20.8	19.2	20.8	19.2	20.8	20.8	20.8	20.8	20.8	9.7	9.7	20.8	20.8	19.2	19.2	332.2	1.6	
7.2	9.6	16.0	19.2	19.2	20.8	20.8	20.8	19.2	20.8	19.2	20.8	20.8	20.8	20.8	20.8	9.7	9.7	20.8	20.8	19.2	19.2	333.8	1.6	
7.2	9.6	16.0	19.2	19.2	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	9.7	9.7	20.8	20.8	19.2	19.2	335.4	1.6	
7.2	9.6	16.0	19.2	19.2	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	9.7	9.7	20.8	20.8	19.2	19.2	337.0	1.6	
7.2	9.6	16.0	20.8	19.2	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	9.7	9.7	20.8	20.8	19.2	19.2	338.6	1.6	
7.2	9.6	16.0	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	9.7	9.7	20.8	20.8	19.2	19.2	340.2	1.6	

SPILLWAY BAY (STOPS) (assumes JDA pool of 264.0 ft)												TSW		TSW								TOTAL TOTAL	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	STOPS	STOPS	STOPS	STOPS
0	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	STOPS	STOPS	STOPS	STOPS
0	3	2	1																	6	9.6	6	9.6
0	3	2	2																	7	11.2	7	11.2
0	3	3	2																	8	12.8	8	12.8
0	3	3	2	1																9	14.4	9	14.4
0	3	3	2	2																10	16.0	10	16.0
0	3	3	2	2	1															11	17.6	11	17.6
0	3	3	2	2	2															12	19.2	12	19.2
0	3	3	2	2	2	1														13	20.8	13	20.8
0	3	3	2	2	2	2														14	22.4	14	22.4
0	3	3	2	2	2	2	1													15	24.0	15	24.0
0	3	3	3	2	2	2	1													16	25.6	16	25.6
0	3	3	3	2	2	2	2													17	27.2	17	27.2
0	3	3	3	2	2	2	2	1												18	28.8	18	28.8
0	3	3	3	3	2	2	2	2	1											19	30.4	19	30.4
0	3	3	3	3	3	2	2	2	1											20	32.0	20	32.0
0	3	3	3	3	3	3	2	2	2											21	33.6	21	33.6
0	3	3	3	3	3	3	2	2	2	1										22	35.2	22	35.2
0	3	3	3	3	3	3	2	2	2	2										23	36.8	23	36.8
0	3	3	3	3	3	3	2	2	2	2	1									24	38.4	24	38.4
0	3	3	3	3	3	3	2	2	2	2	2									25	40.0	25	40.0
0	3	3	3	3	3	3	2	2	2	2	2	1								26	41.6	26	41.6
0	3	3	3	3	3	3	2	2	2	2	2	2								27	43.2	27	43.2
0	3	3	3	3	3	3	2	2	2	2	2	2								28	44.8	28	44.8
0	3	3	3	3	3	3	3	2	2	2	2	2	1							29	46.4	29	46.4
0	3	3	3	3	3	3	3	2	2	2	2	2	2							30	48.0	30	48.0
0	3	3	3	3	3	3	3	3	3	3	3	3	2							31	49.6	31	49.6
0	3	3	3	3	3	3	3	3	3	3	3	3	2	1						32	51.2	32	51.2
0	3	3	3	3	3	3	3	3	3	3	3	3	2	2						33	52.8	33	52.8
0	3	3	3	3	3	3	3	3	3	3	3	3	2	2						34	54.4	34	54.4
0	3	3	3	3	3	3	3	3	3	3	3	3	2	2						35	56.0	35	56.0
0	3	3	3	3	3	3	3	3	3	3	3	3	2	2						36	57.6	36	57.6
0	3	3	3	3	3	3	3	3	3	3	3	3	3	2						37	59.2	37	59.2
0	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2					38	60.8	38	60.8
0	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3					39	62.4	39	62.4
0	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3					40	64.0	40	64.0
0	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3					41	65.6	41	65.6
0	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3					42	67.2	42	67.2
0	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3					43	68.8	43	68.8
0	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3					44	70.4	44	70.4
0	4	4	4	3	3	3	3	3	3	3	3	3	3	3	3					45	72.0	45	72.0
0	4	4	4	3	3	3	3	3	3	3	3	3	3	3	3					46	73.6	46	73.6
0	4	4	4	3	3	3	3	3	3	3	3	3	3	3	3					47	75.2	47	75.2
0	4	4	4	4	3	3	3	3	3	3	3	3	3	3	3					48	76.8	48	76.8
0	4	4	4	4	3	3	3	3	3	3	3	3	3	3	3					49	78.4	49	78.4
0	4	4	4	4	4	3	3	3	3	3	3	3	3	3	3					50	80.0	50	80.0
0	4	4	4	4	4	3	3	3	3	3	3	3	3	3	3					51	81.6	51	81.6
0	4	4	4	4	4	4	3	3	3	3	3	3	3	3	3					52	83.2	52	83.2
0	4	4	4	4	4	4	4	3	3	3	3	3	3	3	3					53	84.8	53	84.8
0	4	4	4	4	4	4	4	4	3	3	3	3	3	3	3					54	86.4	54	86.4
0	4	4	4	4	4	4	4	4	4	3	3	3	3	3	3					55	88.0	55	88.0
0	4	4	4	4	4	4	4	4	4	4	3	3	3	3	3					56	89.6	56	89.6
0	4	4	4	4	4	4	4	4	4	4	4	3	3	3	3					57	91.2	57	91.2
0	4	4	4	4	4	4	4	4	4	4	4	4	3	3	3					58	92.8	58	92.8
0	4	4	4	4	4	4	4	4	4	4	4	4	4	3	3					59	94.4	59	94.4
0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3					60	96.0	60	96.0
0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					61	97.6	61	97.6
0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					62	99.2	62	99.2
0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					63	100.8	63	100.8
0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					64	102.4	64	102.4
0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					65	104.0	65	104.0
0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					66	105.6	66	105.6
0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					67	107.2	67	107.2
0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					68	108.8	68	108.8
0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					69	110.4	69	110.4
0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					70	112.0	70	112.0
0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					71	113.6	71	113.6
0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					72	115.2	72	115.2
0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					73	116.8	73	116.8
0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					74	118.4	74	118.4
0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					75	120.0	75	120.0
0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					76	121.6	76	121.6
0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					77	123.2	77	123.2
0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					78	124.8	78	124.8
0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					79	126.4	79	126.4
0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					80	128.0	80	128.0
0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					81	129.6	81	129.6
0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					82	131.2	82	131.2
0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					83	132.8	83	132.8
0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					84	134.4	84	134.4
0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					85	136.0	85	136.0
0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					86	137.6	86	137.6
0	4																						

0	4	6	8	10	10	10	11	11	11	11	11	11	11	125	200.0
0	4	6	8	10	10	11	11	11	11	11	11	11	11	126	201.6
0	4	6	8	10	11	11	11	11	11	11	11	11	11	127	203.2
0	4	6	8	11	11	11	11	11	11	11	11	11	11	128	204.8
0	4	6	8	11	11	11	11	11	11	11	11	11	12	129	206.4
0	4	6	8	11	11	11	11	11	11	11	11	12	12	130	208.0
0	4	6	8	11	11	11	11	11	11	11	12	12	12	131	209.6
0	4	6	8	11	11	11	11	11	12	12	12	12	12	132	211.2
0	4	6	8	11	11	11	11	12	12	12	12	12	12	133	212.8
0	4	6	8	11	11	11	11	12	12	12	12	12	12	134	214.4
0	4	6	8	11	11	11	12	12	12	12	12	12	12	135	216.0
0	4	6	8	11	11	12	12	12	12	12	12	12	12	136	217.6
0	4	6	8	11	12	12	12	12	12	12	12	12	12	137	219.2
0	4	6	8	12	12	12	12	12	12	12	12	12	12	138	220.8
0	4	6	8	12	12	12	12	12	12	12	12	12	13	139	222.4
0	4	6	8	12	12	12	12	12	12	12	12	13	13	140	224.0
0	4	6	8	12	12	12	12	12	12	12	13	13	13	141	225.6
0	4	6	8	12	12	12	12	12	12	13	13	13	13	142	227.2
0	4	6	8	12	12	12	12	12	13	13	13	13	13	143	228.8
0	4	6	8	12	12	12	12	13	13	13	13	13	13	144	230.4
0	4	6	8	12	12	12	13	13	13	13	13	13	13	145	232.0
0	4	6	8	12	12	13	13	13	13	13	13	13	13	146	233.6
0	4	6	8	12	13	13	13	13	13	13	13	13	13	147	235.2
0	4	6	8	13	13	13	13	13	13	13	13	13	13	148	236.8
0	4	6	9	13	13	13	13	13	13	13	13	13	13	149	238.4
0	4	6	9	13	13	13	13	13	13	13	13	13	14	150	240.0
0	4	6	9	13	13	13	13	13	13	13	13	14	14	151	241.6
0	4	6	9	13	13	13	13	13	13	13	14	14	14	152	243.2
0	4	6	9	13	13	13	13	13	13	14	14	14	14	153	244.8
0	4	6	9	13	13	13	13	13	14	14	14	14	14	154	246.4
0	4	6	9	13	13	13	13	14	14	14	14	14	14	155	248.0
0	4	6	9	13	13	13	14	14	14	14	14	14	14	156	249.6
0	4	6	9	13	13	14	14	14	14	14	14	14	14	157	251.2
0	4	6	9	13	14	14	14	14	14	14	14	14	14	158	252.8
0	4	6	9	14	14	14	14	14	14	14	14	14	14	159	254.4
0	4	6	10	14	14	14	14	14	14	14	14	14	14	160	256.0
0	4	7	10	14	14	14	14	14	14	14	14	14	14	161	257.6
0	4	7	10	14	14	14	14	14	14	14	14	14	15	162	259.2
0	4	7	10	14	14	14	14	14	14	14	14	15	15	163	260.8
0	4	7	10	14	14	14	14	14	14	14	15	15	15	164	262.4
0	4	7	10	14	14	14	14	14	14	15	15	15	15	165	264.0
0	4	7	10	14	14	14	14	14	15	15	15	15	15	166	265.6
0	4	7	10	14	14	14	14	15	15	15	15	15	15	167	267.2
0	4	7	10	14	14	14	15	15	15	15	15	15	15	168	268.8
0	4	7	10	14	14	15	15	15	15	15	15	15	15	169	270.4
0	4	7	10	14	15	15	15	15	15	15	15	15	15	170	272.0
0	4	7	10	15	15	15	15	15	15	15	15	15	15	171	273.6
0	4	7	11	15	15	15	15	15	15	15	15	15	15	172	275.2
0	4	8	11	15	15	15	15	15	15	15	15	15	15	173	276.8
0	4	8	11	15	15	15	15	15	15	15	15	15	16	174	278.4
0	4	8	11	15	15	15	15	15	15	15	15	16	16	175	280.0
0	4	8	11	15	15	15	15	15	15	15	15	16	16	176	281.6
0	4	8	11	15	15	15	15	15	15	16	16	16	16	177	283.2
0	4	8	11	15	15	15	15	15	16	16	16	16	16	178	284.8
0	4	8	11	15	15	15	16	16	16	16	16	16	16	179	286.4
0	4	8	11	15	15	16	16	16	16	16	16	16	16	180	288.0
0	4	8	11	15	16	16	16	16	16	16	16	16	16	181	289.6
0	4	8	11	16	16	16	16	16	16	16	16	16	16	182	291.2
0	4	8	11	16	16	16	16	16	16	16	16	16	16	183	292.8
0	4	8	12	16	16	16	16	16	16	16	16	16	16	184	294.4
0	4	8	12	16	16	16	16	16	16	16	16	16	17	185	296.0
0	4	8	12	16	16	16	16	16	16	16	16	17	17	186	297.6
0	4	8	12	16	16	16	16	16	16	16	17	17	17	187	299.2
0	4	8	12	16	16	16	16	16	16	17	17	17	17	188	300.8

SPILLWAY BAY (FLOW per BAY - kcfs) (assumes JDA pool of 264.0 ft)														TSW	TSW	TOTAL FLOW (kcfs)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
0.0	4.8	3.2	1.6													9.6
0.0	4.8	3.2	3.2													11.2
0.0	4.8	4.8	3.2													12.8
0.0	4.8	4.8	3.2	1.6												14.4
0.0	4.8	4.8	3.2	3.2												16.0
0.0	4.8	4.8	3.2	3.2	1.6											17.6
0.0	4.8	4.8	3.2	3.2	3.2											19.2
0.0	4.8	4.8	3.2	3.2	3.2	1.6										20.8
0.0	4.8	4.8	3.2	3.2	3.2	3.2										22.4
0.0	4.8	4.8	3.2	3.2	3.2	3.2	1.6									24.0
0.0	4.8	4.8	4.8	3.2	3.2	3.2	1.6									25.6
0.0	4.8	4.8	4.8	3.2	3.2	3.2	3.2									27.2
0.0	4.8	4.8	4.8	3.2	3.2	3.2	3.2	1.6								28.8
0.0	4.8	4.8	4.8	4.8	3.2	3.2	3.2	1.6								30.4
0.0	4.8	4.8	4.8	4.8	4.8	3.2	3.2	1.6								32.0
0.0	4.8	4.8	4.8	4.8	4.8	3.2	3.2	3.2								33.6
0.0	4.8	4.8	4.8	4.8	4.8	3.2	3.2	3.2	1.6							35.2
0.0	4.8	4.8	4.8	4.8	4.8	3.2	3.2	3.2	3.2							36.8
0.0	4.8	4.8	4.8	4.8	4.8	3.2	3.2	3.2	3.2	1.6						38.4
0.0	4.8	4.8	4.8	4.8	4.8	3.2	3.2	3.2	3.2	3.2						40.0
0.0	4.8	4.8	4.8	4.8	4.8	3.2	3.2	3.2	3.2	3.2	1.6					41.6
0.0	4.8	4.8	4.8	4.8	4.8	3.2	3.2	3.2	3.2	3.2	3.2					43.2
0.0	4.8	4.8	4.8	4.8	4.8	4.8	3.2	3.2	3.2	3.2	3.2	1.6				44.8
0.0	4.8	4.8	4.8	4.8	4.8	4.8	3.2	3.2	3.2	3.2	3.2	1.6				46.4
0.0	4.8	4.8	4.8	4.8	4.8	4.8	3.2	3.2	3.2	3.2	3.2	3.2	1.6			48.0
0.0	4.8	4.8	4.8	4.8	4.8	4.8	4.8	3.2	3.2	3.2	3.2	3.2	1.6			49.6
0.0	4.8	4.8	4.8	4.8	4.8	4.8	4.8	3.2	3.2	3.2	3.2	3.2	1.6			51.2
0.0	4.8	4.8	4.8	4.8	4.8	4.8	4.8	3.2	3.2	3.2	3.2	3.2	3.2			52.8
0.0	4.8	4.8	4.8	4.8	4.8	4.8	4.8	3.2	3.2	3.2	3.2	3.2	3.2			52.8
0.0	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	3.2	3.2	3.2	3.2	3.2			54.4
0.0	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	3.2	3.2	3.2	3.2			56.0
0.0	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	3.2	3.2	3.2			57.6
0.0	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	3.2	3.2			59.2
0.0	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	3.2			60.8
0.0	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8			62.4
0.0	6.4	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8			64.0
0.0	6.4	6.4	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8			65.6
0.0	6.4	6.4	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	6.4		67.2
0.0	6.4	6.4	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	6.4	6.4	68.8
0.0	6.4	6.4	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	6.4	6.4	70.4
0.0	6.4	6.4	6.4	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	6.4	6.4	72.0
0.0	6.4	6.4	6.4	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	6.4	6.4	73.6
0.0	6.4	6.4	6.4	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	6.4	6.4	75.2
0.0	6.4	6.4	6.4	6.4	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	6.4	6.4	76.8
0.0	6.4	6.4	6.4	6.4	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	6.4	6.4	78.4
0.0	6.4	6.4	6.4	6.4	6.4	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	6.4	6.4	80.0
0.0	6.4	6.4	6.4	6.4	6.4	6.4	4.8	4.8	4.8	4.8	4.8	4.8	4.8	6.4	6.4	81.6
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	4.8	4.8	4.8	4.8	4.8	4.8	6.4	6.4	83.2
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	4.8	4.8	4.8	4.8	4.8	6.4	6.4	84.8
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	4.8	4.8	4.8	4.8	6.4	6.4	86.4
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	4.8	4.8	4.8	6.4	6.4	88.0
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	4.8	4.8	6.4	6.4	89.6
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	4.8	6.4	6.4	91.2
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	92.8
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	94.4
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	96.0
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	97.6
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	99.2
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	100.8
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	102.4
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	104.0
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	105.6
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	107.2
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	108.8
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	110.4
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	112.0
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	113.6
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	115.2
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	116.8
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	118.4
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	120.0
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	121.6
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	123.2
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	124.8
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	126.4
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	128.0
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	129.6
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	131.2
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	132.8
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	134.4
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	136.0
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	137.6
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	139.2
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	140.8
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	142.4
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	144.0
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	145.6
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	147.2
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	148.8
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	150.4
0.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	152.0
0.0	6.4	6.4	6.4													

0.0	6.4	9.6	12.8	16.0	16.0	16.0	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	200.0
0.0	6.4	9.6	12.8	16.0	16.0	16.0	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	201.6
0.0	6.4	9.6	12.8	16.0	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	203.2
0.0	6.4	9.6	12.8	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	204.8
0.0	6.4	9.6	12.8	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	19.2	206.4
0.0	6.4	9.6	12.8	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	19.2	208.0
0.0	6.4	9.6	12.8	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	19.2	209.6
0.0	6.4	9.6	12.8	17.6	17.6	17.6	17.6	17.6	17.6	19.2	19.2	19.2	19.2	19.2	211.2
0.0	6.4	9.6	12.8	17.6	17.6	17.6	17.6	17.6	19.2	19.2	19.2	19.2	19.2	19.2	212.8
0.0	6.4	9.6	12.8	17.6	17.6	17.6	17.6	19.2	19.2	19.2	19.2	19.2	19.2	19.2	214.4
0.0	6.4	9.6	12.8	17.6	17.6	17.6	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	216.0
0.0	6.4	9.6	12.8	17.6	17.6	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	217.6
0.0	6.4	9.6	12.8	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	219.2
0.0	6.4	9.6	12.8	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	220.8
0.0	6.4	9.6	12.8	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	222.4
0.0	6.4	9.6	12.8	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	20.8	224.0
0.0	6.4	9.6	12.8	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	20.8	225.6
0.0	6.4	9.6	12.8	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	20.8	227.2
0.0	6.4	9.6	12.8	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	20.8	228.8
0.0	6.4	9.6	12.8	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	20.8	230.4
0.0	6.4	9.6	12.8	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	20.8	232.0
0.0	6.4	9.6	12.8	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	20.8	233.6
0.0	6.4	9.6	12.8	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	20.8	235.2
0.0	6.4	9.6	12.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	236.8
0.0	6.4	9.6	14.4	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	238.4
0.0	6.4	9.6	14.4	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	22.4	240.0
0.0	6.4	9.6	14.4	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	22.4	241.6
0.0	6.4	9.6	14.4	20.8	20.8	20.8	20.8	20.8	20.8	20.8	22.4	22.4	22.4	22.4	243.2
0.0	6.4	9.6	14.4	20.8	20.8	20.8	20.8	20.8	20.8	20.8	22.4	22.4	22.4	22.4	244.8
0.0	6.4	9.6	14.4	20.8	20.8	20.8	20.8	20.8	20.8	20.8	22.4	22.4	22.4	22.4	246.4
0.0	6.4	9.6	14.4	20.8	20.8	20.8	20.8	22.4	22.4	22.4	22.4	22.4	22.4	22.4	248.0
0.0	6.4	9.6	14.4	20.8	20.8	20.8	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	249.6
0.0	6.4	9.6	14.4	20.8	20.8	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	251.2
0.0	6.4	9.6	14.4	20.8	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	252.8
0.0	6.4	9.6	14.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	254.4
0.0	6.4	9.6	16.0	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	256.0
0.0	6.4	11.2	16.0	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	257.6
0.0	6.4	11.2	16.0	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	24.0	259.2
0.0	6.4	11.2	16.0	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4	24.0	24.0	260.8
0.0	6.4	11.2	16.0	22.4	22.4	22.4	22.4	22.4	22.4	22.4	24.0	24.0	24.0	24.0	262.4
0.0	6.4	11.2	16.0	22.4	22.4	22.4	22.4	22.4	22.4	24.0	24.0	24.0	24.0	24.0	264.0
0.0	6.4	11.2	16.0	22.4	22.4	22.4	22.4	22.4	24.0	24.0	24.0	24.0	24.0	24.0	265.6
0.0	6.4	11.2	16.0	22.4	22.4	22.4	22.4	24.0	24.0	24.0	24.0	24.0	24.0	24.0	267.2
0.0	6.4	11.2	16.0	22.4	22.4	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	268.8
0.0	6.4	11.2	16.0	22.4	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	270.4
0.0	6.4	11.2	16.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	272.0
0.0	6.4	11.2	16.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	273.6
0.0	6.4	11.2	17.6	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	275.2
0.0	6.4	12.8	17.6	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	276.8
0.0	6.4	12.8	17.6	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	25.6	278.4
0.0	6.4	12.8	17.6	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	25.6	25.6	25.6	280.0
0.0	6.4	12.8	17.6	24.0	24.0	24.0	24.0	24.0	24.0	24.0	25.6	25.6	25.6	25.6	281.6
0.0	6.4	12.8	17.6	24.0	24.0	24.0	24.0	24.0	24.0	25.6	25.6	25.6	25.6	25.6	283.2
0.0	6.4	12.8	17.6	24.0	24.0	24.0	24.0	24.0	25.6	25.6	25.6	25.6	25.6	25.6	284.8
0.0	6.4	12.8	17.6	24.0	24.0	24.0	24.0	25.6	25.6	25.6	25.6	25.6	25.6	25.6	286.4
0.0	6.4	12.8	17.6	24.0	24.0	24.0	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	288.0
0.0	6.4	12.8	17.6	24.0	24.0	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	289.6
0.0	6.4	12.8	17.6	24.0	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	291.2
0.0	6.4	12.8	17.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	292.8
0.0	6.4	12.8	19.2	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	294.4
0.0	6.4	12.8	19.2	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	27.2	296.0
0.0	6.4	12.8	19.2	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	27.2	27.2	27.2	297.6
0.0	6.4	12.8	19.2	25.6	25.6	25.6	25.6	25.6	25.6	25.6	27.2	27.2	27.2	27.2	299.2
0.0	6.4	12.8	19.2	25.6	25.6	25.6	25.6	25.6	25.6	27.2	27.2	27.2	27.2	27.2	300.8

COLUMBIA RIVER REGIONAL FORUM

TECHNICAL MANAGEMENT TEAM

April 9, 2008 Meeting

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Robin Gumpert

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.

Official Minutes/Facilitator Notes

A comment made to the 2/27 facilitator notes made by Paul Wagner, NOAA, at the March 26 meeting will be incorporated by Jim Adams, COE, and sent to TMT to show they have been finalized.

The 4/2 conference call Minutes were posted to the web. TMT members did not have comments on the notes, so they were determined to be final as of today.

Announcements

Kyle Dittmer, CRITFC, reported that a long term agreement between three of the four CRITFC Tribes and the Action Agencies has been reached, the details of which are still being discussed. Additional information about this agreement can be found on CRITFC's website or salmonrecovery.org. Kyle also suggested that CRITFC's Public Information Officer can be reached at 503-238-0667. One aspect of this agreement under discussion is the role of CRITFC at the Regional Forum. Kyle will share relevant information at future TMT meetings.

Priest Rapids Operations

Russell Langshaw, Grant County PUD, reported that rearing protection flows began on 3/29, and that mean daily discharges ranged from 59-108 kcfs. Flow bands ranged from 20-30 kcfs. One exceedance occurred during the weekend of April 5 due to lower flows than estimated. Russell suggested that the PUD plans to make improvements for the rest of this year's operation, and are 100% committed to the program. Vernita Bar minimums were set at 55 kcfs this year.

Action/Next Steps: Langshaw will provide an update at the 4/23 TMT meeting.

Water Management Plan Spring/Summer Update

Scott Boyd, COE, reported that the spring/summer update had been posted and is open for comments. It included April final water supply forecasts and the COE will update it with flood control elevations.

Action: The COE sent the draft in word following today's meeting. Comments should be sent in ASAP and the COE will look to finalize the Update during the 4/23 TMT meeting.

Spring Creek Hatchery Release

Dave Wills, USFWS, reported that in anticipation of the start of spill, the Spring Creek Hatchery fish will be released during the morning of April 10. USFWS, COE and BPA have been in discussions about operating the PH2 at Bonneville to the low end of 1% for 4-8 days starting on 4/11. As of today, the COE planned to implement that operation, and BPA added that they would support 4 days as a hard constraint and an additional four days (for a total of 8) as a soft constraint. The USFWS believed that 4 days would be sufficient for total fish passage but did appreciate the additional days as cushion for the fish.

Action: All TMT members present (Idaho, Montana, NOAA, BOR) were in support of the USFWS (Dave Wills), COE (Jim Adams and Cathy Hlebechuk) and BPA (Tony Norris) coordinating the details of this operation over the course of the 4-8 days, based on fish passage and other conditions. They will check in with TMT at the April 16 meeting. It was noted that gatewall work expected to begin on or near April 16 may pose a potential conflict, so it is hoped that regular operations could resume by then.

Dworshak Operations

Cathy Hlebechuk, COE, referred TMT to the ESP plots, box whiskers, comparison with volume forecast and flow augmentation volume graphics linked to the agenda. She reported that the operation has been 15 kcfs outflows to make space for expected runoff and TDG has been at around 107%. The COE planned to maintain this operation as long as necessary to create enough space in the reservoir to meet flood control targets at the end of April – given forecasts, they anticipated the 15 kcfs to continue through the month.

The salmon managers reiterated their preference to hold water for later in April, and suggested a 10 kcfs release now with an increase later in the month to coincide with the fish migration, expected to be on the later side given this year's particular conditions. They also acknowledged that the COE needs to make its decision based on several factors.

Cathy also reported that the end of April flood control target increased to 1493.7 feet (up from the previous 1463.7 feet), and explained that the previously assumed inflows came from STP while the current elevation is based on assumed average inflows (which change throughout the month). The current flood control elevation reflects a 95% confidence of refill, and the COE will evaluate this elevation daily.

Action: TMT will discuss Dworshak operations during a 4/16 TMT conference call.

Update: Cathy Hlebechuk, COE, sent an email on 4/10 notifying TMT that outflows would be reduced to 10.8 kcfs that evening.

Transportation Operations

Dan Feil, COE, followed up from the 3/26 TMT meeting on transportation operations to note that Walla Walla District will need a three-day advanced notification to get barges in place and implement start of transportation (which will begin sometime between April 20 and May 1). Paul Wagner, on behalf of the salmon managers, reiterated that they will likely recommend a later start for transportation given the later migration, cool water conditions and anticipated higher flows.

Action: This issue will be added to the 4/16 and 4/23 TMT meeting agendas.

Spring Spill Operations

Ice Harbor: The COE sent its plan of action for spill at Ice Harbor based on needed RSW repair requiring a modification to spill operations in the FOP. (This was coordinated during a TMT call on 4/2). It was anticipated that dives would finish today (4/9) and the RSW would be back in place and ready for operation on Friday. At that time, normal FOP spill operations would resume.

John Day: Spill was scheduled to begin this evening at midnight. Patterns were developed through coordination between various regional technical groups, and included patterns with and without use of TSWs. Testing was scheduled to begin on 4/26 or 4/27, with a 30% vs. 40% test that would include TSWs. Paul Wagner, NOAA, shared that more discussion is needed on when to begin the 30% spill test, that perhaps it would begin sooner. This issue will be vetted through FPOM. It was also noted that the FPP operating priority (attached to today's agenda) will be used during the test.

Action: TMT will discuss this item further at the 4/16 TMT conference call.

Bonneville Operations

BGS: Dennis Schwartz, COE, shared a BGS program status update, noting the intent of the structure is to increase guidance of yearling and subyearlings to the B2 corner collector. Acoustics need to be added to allow tests of guidance and behavior, which will require an outage at the project to install them –this work was delayed due to delays in delivery of the acoustics. The COE requested that the corner collector be closed for one day and proposed 4/16 from 7am to 6pm to do this work. There was some follow up discussion about the need for flexibility around the specific day, and whether TMT could agree to a number of hours in the event the work would need to be split between two days.

- CRITFC: Our biggest concern is numbers of fish passing the project. We are supportive of no more than a one-day outage on 4/16, unless a large number of fish are passing the project, and we would want to re-evaluate. CRITFC suggested that if more than one day would be needed, the COE scale back the number of acoustics they install in order to keep the outage to one day.
- NOAA: Agree with CRITFC, supportive of one-day outage and balance with providing the best possible passage conditions.
- USFWS: Agree with CRITFC and NOAA comments. Ok moving forward.
- BOR: Ok with the proposal.
- Montana: Ok with the proposal.

- Idaho: Wants information from the BGS and the best passage conditions possible for the fish. Suggest FPOM discuss the details and will support their decision and recommendation for moving forward.
- Oregon: Not comfortable with the operation but will not block it from moving forward.
- Washington: Not present.

Action: Dennis will contact Cindy LeFleur, Washington, to discuss the proposal and get feedback. He will vet the issue through FPOM (scheduled to meet on 4/10) and work on details of the outage. If either Washington or FPOM raised issues or concerns, the issue will be brought back to TMT via a conference call on Friday, 4/11, at 1:00 pm. Otherwise, the COE will proceed based on feedback at FPOM and report back to TMT during the 4/16 conference call. They and others will continue to monitor passage as a key factor in timing for the work.

Chum: 100 kcfs spill at Bonneville began today, 4/9. The COE noted that given the amount of water in the system, they are unable to provide both 100 kcfs and depth compensation levels for chum, which could result in elevated TDG levels above the 105% criteria for chum. The COE requested feedback from the salmon managers on how to proceed in the near term given the conditions.

Paul Wagner, NOAA, reported that while seining monitoring was not available this year, Batelle provided temperature condition measures to provide best professional judgment about if and where the chum had emerged. This information combined with known low numbers of chum this year and past years' data signaled that chum emergence has ended. Therefore, the salmon managers agreed that depth compensation constraints could be lifted and that there should be no change to spill. However, the salmon managers recommended BPA hold the tailwater at 11.5 feet minimum as a soft constraint to provide egress conditions to support fish moving through the area.

Action: Paul Wagner and Tony Norris will discuss off-line the need to provide 11.5' tailwater, and Paul will share the supporting data/rationale with Tony. In the meantime, the project will be operated as a soft constraint to 11.5 feet minimum tailwater, and 100kcfs spill will continue. Results of their discussion (and any change to the operation) will be communicated through Jim Adams, COE, to the TMT. This item will be added as an update to the 4/16 TMT conference call agenda.

TMT Guidelines

TMT members agreed to review the draft guidelines and send comments prior to the 4/23 TMT meeting, so they can be finalized at the meeting.

Emergency Action List

Tony Norris, BPA, provided an updated emergency actions list that was proposed to be added to BPA's Generating Emergency Actions Plan, and the WMP Emergency Protocols.

Action: As several questions were raised around the new list, Tony will join the next FPAC call to discuss the list with the salmon managers. TMT will revisit the list at the 4/16 conference call. It was noted that this is a living document that will be updated throughout the season.

Operations Review

Reservoirs: Grand Coulee was at elevation 1246.2' and planned to hit its target elevation of 1244.5 feet on 4/10, followed by a draft to April 30 flood control target (which would be set this week). Hungry Horse elevation was 3505.2' with 2.7 kcfs out and anticipated increase to 4.5 kcfs. Libby was at 2395.5' with 2-3 kcfs in and 4 kcfs out. Based on the April final forecast, the end of April flood control elevation was 2402.2'. Dworshak was at elevation 1496.0'. The 7-day average flows at Lower Granite were 43.7 kcfs, 130.9 kcfs at McNary and 142.8 kcfs at Bonneville. John Roache, BOR, also reported that Upper Snake flow augmentation estimates were projected to be at least 427 kaf and possibly up to 487 kaf. John Day was operating at minimum elevation for irrigation, at 262.5-264'.

Fish: Paul Wagner, NOAA, reported that daily passage of yearling chinook at McNary was 56,000 and 500 steelhead at Lower Granite. Adults at Bonneville were about 100 per day. It was noted that a pinniped report (review and updates) has been posted to the TMT home page.

Power system – Nothing to report.

Water quality – Spill over the past week has produced no TDG issues. The gas cap at Lower Monumental was increased to 35.5 kcfs. Spill was scheduled to begin on the Lower Columbia at midnight on 4/9.

Other – The COE received a request to open the TSW at McNary earlier than midnight (which would normally have happened to coincide with start of spill at the project). The COE, USFWS, NOAA and others agreed to have offline discussions about this and bring any issues back to TMT for discussion as needed.

Next TMT Meeting: April 16th CONFERENCE CALL, 9am

Agenda Items include:

- Dworshak Operations Discussion
- John Day Spill Operations
- Spring Creek Hatchery Release
- Transportation Operations
- Bonneville Operations: BGS and Other
- Emergency Actions List

**Columbia River Regional Forum
Technical Management Team Meeting
April 9, 2008**

1. Introduction

Today's TMT meeting was chaired by Jim Adams (COE) and facilitated by Robin Gumpert (D.S. Consulting), with representatives of BOR, USFWS, BPA, NOAA, COE, FPC, CRITFC, Nez Perce, Oregon, Montana, Idaho and others attending in person or by phone. 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

Official minutes for the unscheduled TMT call on April 2 regarding repairs to the RSW at Ice Harbor Dam have been posted. There were no comments on these notes in today's meeting.

(The following day, Russ Kiefer corrected the following statement in the notes, "The planned operation [at Ice Harbor] was to spill, with the spill alternating between 3% spill and 45 kcfs spill during the day and to the gas cap at night." In 2007, the dam was operated to alternate between 30% spill and BiOp spill amounts for a study, but otherwise spilled to BiOp amounts, Kiefer explained in his April 10 email. This year, the project will again alternate between 30% spill and BiOp spill amounts while the study is being conducted; otherwise, spill will be to BiOp levels.)

Regarding the February 27 TMT official meeting minutes, Jim Adams is incorporating Paul Wagner's edits to language regarding NOAA's extension of the transportation permit for this year's operation.

3. Priest Rapids Update

Chum rearing protection flows began Saturday, March 29, Russell Langshaw (Grant Co. PUD) reported. Mean daily discharges have ranged from 59-108 kcfs, with a 56 kcfs minimum and 123 kcfs maximum. Daily flow bands ranged from 20-30 kcfs; the daily delta ranged from 11.6-52.1 kcfs.

Last weekend (April 6) brought an exceedance which was the result of combined factors including lack of water. Oregon flows were 22.4 kcfs less than the weekend estimates, so Grant Co. PUD drafted until noon on Sunday, when no more water could be drafted without draining the reservoirs and flows dropped to 56 kcfs. Low flows continued into Monday, April 7. This week, flow bands are expected to be in the 20-30 kcfs range, similar to last week. Grant Co. PUD is

studying this past weekend's operations to learn how to improve future operations and remains committed to chum spawning protection. Langshaw will continue to check in at regularly scheduled TMT meetings.

4. 2008 Final Water Management Plan – Spring/Summer Update

Scott Boyd (COE) will email copies in Word of the updated version with April final forecast information to people who want to comment. (The spring/summer update is currently posted online in .pdf format.) Boyd asked people to get their comments to him in the next two weeks. The fall/winter update was finalized today. TMT will revisit this issue at its next meeting.

5. Spring Creek Hatchery Release

In anticipation of BiOp spill on April 10, the hatchery is planning the next release the morning of April 10, Dave Wills (USFWS) said. Planning for that has been discussed with the COE and BPA. The request is for the Bonneville 2nd powerhouse to operate at the low to mid level of the 1% range for 4-8 days beginning the morning of April 11, depending on passage duration.

As long as all other managers are in agreement, the COE is willing to provide that operation as it did for the March release, Dan Feil said. Scott Bettin (BPA) requested that the operation be for 4 days as a hard constraint and as a soft constraint for the remaining 4 days. This time, there will be only one release, not two like there were in March. If additional generation is needed, the turbines would be operated at the low end of 1% at the 2nd powerhouse while the 1st powerhouse is fully loaded, then the units in the 2nd powerhouse would resume operating.

This request involves a change from the Fish Passage Plan, so it requires consensus from TMT. The COE, USFWS, and BPA had previously agreed to this operation before today's meeting. NOAA, BOR, and Idaho voiced no objections in today's meeting. Montana gave an okay, with provision to check in on the operation later. The operation was planned to begin at 6 a.m. on April 11.

Adams asked Wills for specific criteria regarding passage numbers (percentage of the run) at which the operation could be suspended. The juvenile facility at Bonneville will be able to provide reliable estimates of how many fish have passed based on passage index samples. USFWS expects that 4 days will be enough, as it usually is for this run. The March release arrived at the project later than anticipated, and when the operation went off the low end of 1% after 4 days, mortalities increased. When the operation returned to the low end of 1% for 3 days, the mortalities decreased.

There was discussion of whether normal operations can be expected to resume on April 16. The Bonneville 2nd powerhouse corner collector is scheduled

to close that day, Bettin noted. TMT agreed to let the COE, BPA and USFWS coordinate the technical conditions for the release offline. TMT will review the results on its next conference call April 16.

6. Dworshak Operations

There has been kudos from TMT members and others for the new TMT web page interface and archiving link that allows access to the COE's ESP hydrographs and box whiskers plots of water supply forecasts, Harkless noted.

The April 8 ESP forecast for Dworshak shows inflows peaking at 70 kcfs inflows in late May, Cathy Hlebechuk (COE) said. Jim Litchfield noted that "discharges" on this graph actually mean "inflows"; Hlebechuk agreed that needs to be changed. Box whiskers charts refer to the same water as "inflows". The COE will fix this labeling discrepancy. Hlebechuk reminded everyone that the first 10 days of the ESP plots are deterministic and are based on National Weather Service forecasted temperature and precipitation, while the remainder of the month is based on historical temperatures and precipitation. The range of Weather Service forecasts tend to be somewhat higher than the COE's water supply forecasts.

The resulting operation at Dworshak has been 15 kcfs outflow, making space for the impending runoff, with TDG levels of around 107%. The current plan is to maintain 15 kcfs outflows until further notice to make space for the coming runoff and snowmelt. FPAC discussed Dworshak operations yesterday and voiced a preference to shape the water later in April if possible, with outflows kept at 10 kcfs now and increased later. The COE acknowledged the Salmon Managers' wishes.

The Dworshak end of April flood control elevation has been changed from 1,463.7 feet to 1,493.7 feet. Hlebechuk explained the reason for the lowered elevation target. The COE bases the April 30 target elevation on the higher of either the standard flood control elevation (in this case, 1,445 feet) or the flood control refill curve elevation, which is based on 95% confidence of refill. The initial end of April elevation of 1,463.7 feet at Dworshak assumed inflows from STP, resulting in a lower elevation. The target of 1,493.7 feet elevation assumed average inflows into the project. However, technical experts discussed the current situation and felt it was more appropriate to use the higher inflows into the project for determining the end of month elevation target. The higher elevation target then resulted in a higher reservoir level.

The current Dworshak reservoir elevation is 1,495.3 feet; the current planned operation is to maintain 15 kcfs outflows through the end of April. The COE will continue to monitor this moving target daily and is open to ongoing discussion. TMT planned a follow-up conference call April 16 primarily to address Dworshak operations.

7. Transport Operations

TMT briefly touched on this issue in its last meeting: The FOP says that if average flows at Lower Granite are projected to be above 70 kcfs from April 3 through June 20, TMT will initiate transport sometime after April 20 and before May 1. Current STP forecasts indicate that average flows at Lower Granite are 95.2 kcfs, well above the 70 kcfs trigger.

Dan Feil (COE) led a discussion of how TMT will decide on a start date for transporation. The contractor needs 3 days' notice to get barges onsite. Next week's TMT call on April 16 would be sufficient notice if TMT should decide to initiate transport on the earliest possible date, April 20. This issue will join Dworshak operations as a focal point of next week's call.

Scott Bettin wondered whether the schedule is somewhat flexible after transportation starts; Paul Wagner said yes, FPAC will track migration and river conditions before making a recommendation. At this point, the migration and runoff seem to be occurring later than usual. Transporation will therefore probably start later than April 20.

8. Spring Spill Operations

A. Ice Harbor Spill. Currently, the COE is implementing modified spill operations at Ice Harbor that depart from what's in the Fish Operations Plan. As noted earlier, there was an unscheduled conference call last week to discuss the modified operations needed at Ice Harbor to fix the seals on the RSW before passage season starts. The repairs are proceeding well, Feil reported, and it looks like FOP-specified operations at Ice Harbor will resume on Friday, April 11.

B. John Day Spill. John Day Dam as well as the other Columbia River projects will begin spilling tonight at midnight. John Day was among the last of the projects for which spill patterns were developed. The spill patterns with and without the TSWs that the Federal Facilities Design Work Group developed at ERDC last week are linked to today's TMT agenda. This includes an updated unit operating priority and spill patterns for use with and without the TSWs, following a zero daytime/60% nighttime spill regime that will start tonight and continue through April 27 when TSW testing begins. BPA, NOAA, and COE representatives worked together to develop the spill patterns.

All representatives of technical groups have received the spill patterns, Feil said. The schedule has slipped from April 21 to April 26 as a start date for the 30% to 40% treatment test that includes operating both TSWs. So far, it looks like the survival rate for the bays with TSWs is excellent, around 99% as compared to almost 100% for a regular bay. The link also includes unit operating priority. John Day spill will be on the agenda for next week's conference call.

9. Bonneville Operations

A. Bonneville 2nd Powerhouse Corner Collector Outage. The 720-foot-long, 10-foot-deep behavioral guidance structure (BGS) installation in the Bonneville forebay was completed on March 29, Dennis Schwartz (COE) reported. The intent of the BGS is to increase guidance of yearling and subyearling Chinook away from a corner eddy where they were getting stuck and into the Bonneville 2nd powerhouse corner collector for safe passage. Historical guidance rates for many years before installation of the BGS were 33% for yearlings; 39% for subyearlings; and 77% for steelhead.

The next step is installing acoustic nodes along the BGS to monitor fish passage, Schwartz said. A corner collector closure of 1 day only on April 16 is required to install the nodes on the back of the BGS. The COE requested the right to extend the date to April 17 if necessary, while emphasizing that it would be a 1-day outage only. A bulkhead crane will be on site to open and close the corner collector at 7 am and 6 pm respectively, keeping the corner collector closed during nighttime passage. Any fish in the area will be bypassed in the evening. Because this operation deviates from the Fish Operations Plan, it needs complete concurrence from TMT to move forward.

CRITFC supported a 1-day outage to obtain observations of whether the BGS is effective. BPA supported a 12-hour window possibly spanning 2 days, but not an outage of 2 full days. Likewise, NOAA and CRITFC supported an outage of 1 day only. Idaho preferred to let FPOM discuss how best to collect the needed information and provide the planned passage conditions; NOAA supported the idea that FPOM is a good forum to discuss this. BPA, BOR and Montana agreed to this operation. USFWS also assented with the same caveats mentioned by NOAA and CRITFC regarding FPOM's role. There will be more offline coordination of this issue. In summary, all TMT members (except Washington) assented to a 1-day outage in support of the BGS evaluation, while expressing equal support for fish passage conditions. Schwartz will contact the Washington representative to obtain her input on the proposed outage, then follow up with the COE internally. If Washington accepts the outage, it will proceed as planned.

A tentative call was scheduled for April 11, at 1 pm after FPOM has had an opportunity to discuss the outage and the Washington representative's vote is on record. (The call did not take place.)

B. Chum Protection Flows. Spill of 100 kcfs for 24 hours a day begins at Bonneville today at midnight. There is also a tailwater restriction below Bonneville to protect the chum redds. Spilling 100 kcfs will produce some gas, and based on the amount of water available, the COE probably won't be able to provide depth compensation, Feil said. Adams added that TDG levels at

Warrandale gage will probably be around 118%, which is approximately 13% above the state water quality criteria of 110% total dissolved gas. This would require a minimum tailwater elevation at Tanner Creek of 15.5-16.5 feet in order to provide sufficient depth compensation to meet Oregon TDG criteria for redds at the 11.5 foot elevation, and there are not enough water available to accommodate that.

TMT discussed the options, including backing off on spill from 100 kcfs to a minimum of 50 kcfs which would produce less gas and meet the needed tailwater levels. Based on NOAA's emergence data from Battelle Laboratories, emergence should be well done by now, Paul Wagner said. He showed TMT relevant data on the Fish Passage Center website which identifies December 29-February 21 as a range for the beginning and end of spawning. The summary report of this information hasn't been produced yet, Wagner said. That's where more formal analysis is needed.

NOAA's recommendation is that the tailwater restriction be lifted because chum emergence is complete. However, NOAA recommended maintaining a minimum tailwater elevation of 11.5 feet for migrating fish in other areas. Oregon did not object to the operation for this year because emergence apparently is done, and depth compensation is no longer needed. Oregon concurred with NOAA's request for a minimum tailwater elevation of 11.5 feet.

BPA expressed reservations about having an 11.5-foot minimum tailwater restriction in place at night when power production drops, and requested that the restriction be dropped if emergence is complete. NOAA and BPA representatives will communicate offline regarding the potential for stranding and egress issues if flows decline.

Beginning April 1, there's a 4-foot daily limit and an hourly 1-foot limit to fluctuations in effect until the end of September to smooth water elevations below Bonneville Dam, Rudd Turner pointed out. Stranding issues might be resolved by that. TMT agreed to a soft constraint until more offline discussion happens. In the meantime, the planned operation is to begin spilling up to 100 kcfs of spill to the spill cap at Bonneville Dam. The chum have emerged, but a soft constraint of minimum 11.5 foot tailwater remains in effect until TMT hears otherwise. Montana, Idaho and BOR concurred with this operation.

10. TMT Guidelines

The original TMT guidelines were approved in 2003. Recognizing they are out of date, last March several TMT members discussed the guidelines outside of TMT. They crafted language regarding the role of the Water Management Plan and System Operational Requests, but TMT hasn't had an opportunity to finalize the language. A draft version of the guidelines is linked to today's agenda showing language changes and an updated TMT member list. TMT members

agreed to review the changes to the guidelines and the member list in time to discuss these documents at their April 23 meeting.

11. Emergency Action List

Tony Norris distributed hard copies of BPA's emergency action list, dated 31 March 08, which prioritizes actions that would be taken in the event of a power emergency. The list is an appendix to BPA's emergency protocols and generation emergency action plan, as well as to the COE's Water Management Plan. Norris asked TMT to review the list and the Salmon Managers in particular to focus on changed priorities relative to the TSWs that were recently installed at McNary and John Day dams.

FPAC has discussed this and wondered what other steps prior to this had been taken before declaring a NERC alert, Wagner said. He noted that the current request to operate turbines at Bonneville at the low end of 1% efficiency is inconsistent with priorities on this list. Kruger expressed a similar reluctance to finalize and post the list. Norris and Wagner agreed to coordinate with FPAC and report back to TMT on the April 16 conference call. This list will need to be updated many times per season, Bettin noted.

12. Operations Review

a. Reservoirs. Grand Coulee is at 1,246.2 feet elevation, on track to meet the objective of 1,244.5 feet tomorrow, April 10. Then it will start drafting toward the April 30 flood control target elevation, which is now 1,229 feet based on the March forecast. The April forecast will probably change the target elevation slightly.

Hungry Horse is at elevation 3,505.2 feet, discharging 2.7 kcfs to meet the Columbia Falls minimum. Discharges will be increased to around 4.5 kcfs starting on April 10th. The final April water supply forecast predicts an April to July volume of 2,082 kaf, which is 104% of normal.

Libby is at elevation 2,395 feet, with inflows ranging from 2-3.4 kcfs over the past few days. Outflows are being maintained at 4.0 kcfs. The end of April flood control elevation is 2,402.2 feet.

John Day is starting MOP operations at elevations ranging from 262.5-264 feet.

Dworshak (already discussed at length) is at elevation 1,496 feet with outflows of 15 kcfs and inflows of 3 kcfs.

The 7-day average for inflows at Lower Granite is 43.7 kcfs. The 7-day average for inflows at McNary is 130.9 kcfs. The 7-day average for inflows at Bonneville is 142.8 kcfs.

b. Fish. Juveniles have begun to migrate into the Snake system, Wagner reported. Counts at Imnaha are 6,000 fish per day, possibly due to a hatchery release. Grande Ronde counts are 500 fish per day. McNary counts are 56,000 fish per day due to a hatchery release. Steelhead passage at Lower Granite is averaging 500 fish per day. Subyearling passage has trailed off to a trickle, while adult passage is not yet fully in motion.

c. Power System. There was nothing to report.

d. Water Quality. Spill on the Snake has been happening for a week, but flows are too low to create gas problems, Adams reported. The spill cap for Lower Granite was 41 kcfs to start; for Little Goose, 32 kcfs; for Lower Monumental, 27 kcfs; and for Ice Harbor, 95 kcfs.

On Sunday, the COE increased the spill cap to 32 kcfs at Lower Monumental in anticipation of gas from spill, but apparently wind has been stripping the gas from the water. The COE will raise the gas cap at Lower Monumental to 35.5 kcfs today. Meanwhile, spill begins tonight on the Lower Columbia River. Spill caps will start at 145 kcfs for McNary, 120 kcfs for John Day, 125 kcfs for The Dalles, and 100 kcfs for Bonneville.

There was brief discussion of whether spill should start at midnight or during the afternoon on the lower Columbia. Representatives of BOR and Idaho deferred to NOAA, BPA and the COE on this issue. It appears that providing the training spill this operation would require could be a problem. NOAA, COE, BPA and USFWS will work out the details and notify TMT of the resulting operation via email.

7. Next Meeting

TMT scheduled an April 16 TMT conference call with a full agenda – a follow-up on Dworshak operations, transportation operations planning, John Day spill patterns, the Bonneville minimum tailwater elevation, and the BPA emergency actions list. The next regular TMT meeting will be on April 23; that agenda will include the TMT guidelines and the WMP spring/summer update. This summary prepared by consultant and writer Pat Vivian.

Name	Affiliation
Tony Norris	BPA
Paul Wagner	NOAA
Jim Adams	COE
John Roache	BOR

Tina Lundell	COE
Randy Wortman	COE
Cathy Hlebechuk	COE
Bob Buchholz	COE
Scott Boyd	COE
Tim Heizenrader	Cascade
Laura Hamilton	COE
Shane Scott	PPC
Russ George	WMC
Scott Bettin	BPA
Jason Sweet	BPA
Dan Spear	BPA
Rudd Turner	COE
Dan Feil	COE
Jim Litchfield	Montana
Dennis Schwartz	COE
Bob Diaz	PPM

Phone:

Dave Wills	USFWS
Russ Kiefer	Idaho
Barry Espensen	CBB
Margaret Filardo	FPC
Richelle Beck	DRA
Russell Langshaw	Grant Co. PUD
Glen Trager	Shell Energy
Ruth Burris	PGE
Bruce McKay	Consultant
Tom Le	Puget Sound Energy
Rick Kruger	Oregon
Brian Marotz	Montana
Tom Lorz	CRITFC

TECHNICAL MANAGEMENT TEAM

BOR : John Roache / Mary Mellema / Pat McGrane

BPA : Robyn MacKay / Tony Norris / Scott Bettin

NOAA-F: Paul Wagner / Richard Dominique

USFWS : David Wills / Steve Haeseker

OR : Rick Kruger / Ron Boyce

ID : Russ Kiefer

WDFW : Cindy LeFleur

MT : Jim Litchfield / Brian Marotz

COE: Jim Adams / Cathy Hlebechuk / Bob Buchholz

TMT CONFERENCE CALL

Wednesday April 16, 2008 9:00 a.m.

CONFERENCE PHONE LINE

Conference call line: 203-310-2162; PASS CODE = 4703150

**We have had disruptions on the phone because people are not hitting 'mute' after dial in.
Please MUTE your Phone**

*All members are encouraged to call Robin Gumpert with any issues or concerns they would like to see addressed.
Please e-mail her at robin76@cnnw.net or call her at (503) 248-4703.*

AGENDA

1. Welcome and Introductions
2. Dworshak Operations Discussion - Cathy Hlebechuk, USACE
3. John Day Spill Operations - Dan Feil, USACE

[\[2008 JDA TSW Spill Patterns\]](#) 

4. Spring Creek Hatchery Release - Dave Wills, USFWS
5. B2CC Outage - Dan Feil, USACE
6. Transportation Operations - Dan Feil, USACE
7. McNary Navigation Issue - Jim Adams, USACE
- 8.

Other

- a. Set agenda for next meeting - **April 23, 2008**

[\[Calendar 2008\]](#) 

Questions about the meeting may be referred to:

[Jim Adams](#) at (503) 808-3938, or

[Cathy Hlebechuk](#) at (503) 808-3942, or

[Bob Buchholz](#) at (503) 808-3945.

SPILLWAY FLOW per BAY (kcfs)
(assumes JDA pool of 264.0 ft)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	TSW 15	TSW 16	17	18	19	20	TOTAL Q
														9.7	9.7					19.4
														9.7	9.7	1.6				21.0
														9.7	9.7	1.6	1.6			22.6
														9.7	9.7	3.2	1.6			24.2
														9.7	9.7	4.0	1.6			25.0
	1.6													9.7	9.7	4.0	1.6			26.6
	1.6	1.6												9.7	9.7	4.0	1.6			28.2
	2.4	1.6												9.7	9.7	4.0	1.6			29.0
	2.4	2.4												9.7	9.7	4.0	1.6			29.8
	2.4	2.4											1.6	9.7	9.7	4.0	1.6			31.4
	2.4	2.4									1.6	1.6	1.6	9.7	9.7	4.0	1.6			33.0
	2.4	2.4								1.6	1.6	1.6	1.6	9.7	9.7	4.0	1.6			34.6
	2.4	2.4								1.6	1.6	1.6	1.6	9.7	9.7	4.0	1.6			36.2
0.0	2.4	2.4	0.0	0.0	0.0	0.0	0.0	0.0	1.6	1.6	1.6	1.6	1.6	9.7	9.7	4.0	1.6	0.0	0.0	37.8
	2.4	2.4						1.6	1.6	1.6	1.6	1.6	1.6	9.7	9.7	4.0	1.6			39.4
	2.4	2.4					1.6	1.6	1.6	1.6	1.6	1.6	1.6	9.7	9.7	4.0	1.6			41.0
	2.4	2.4					1.6	1.6	1.6	1.6	1.6	1.6	1.6	9.7	9.7	4.0	1.6			42.6
	2.4	1.6	1.6				1.6	1.6	1.6	1.6	1.6	1.6	1.6	9.7	9.7	4.0	1.6			43.4
0.0	2.4	1.6	1.6	1.6	0.0		1.6	1.6	1.6	1.6	1.6	1.6	1.6	9.7	9.7	4.0	1.6	0.0	0.0	45.0
	2.4	2.4	1.6	1.6			1.6	1.6	1.6	1.6	1.6	1.6	1.6	9.7	9.7	4.0	1.6			45.8
	2.4	2.4	1.6	1.6			1.6	1.6	1.6	1.6	1.6	1.6	1.6	9.7	9.7	4.8	1.6			46.6
	2.4	2.4	1.6	1.6			1.6	1.6	1.6	1.6	1.6	1.6	1.6	9.7	9.7	4.8	2.4			47.4
	2.4	2.4	1.6	1.6			1.6	1.6	1.6	1.6	1.6	1.6	1.6	9.7	9.7	5.6	2.4			48.2
	2.4	2.4	1.6	1.6			1.6	1.6	1.6	1.6	1.6	1.6	1.6	9.7	9.7	5.6	3.2			49.0
	2.4	2.4	1.6	1.6			1.6	1.6	1.6	1.6	1.6	1.6	1.6	9.7	9.7	5.6	4.0			49.8
0.0	2.4	2.4	1.6	1.6	0.0		1.6	1.6	1.6	1.6	1.6	1.6	1.6	9.7	9.7	5.6	4.8	0.0	0.0	50.6
0.0	2.4	2.4	1.6	1.6	1.6		1.6	1.6	1.6	1.6	1.6	1.6	1.6	9.7	9.7	5.6	4.8	0.0	0.0	52.2
	2.4	2.4	1.6	1.6	1.6		1.6	1.6	1.6	1.6	1.6	1.6	1.6	9.7	9.7	5.6	5.6			53.0
	3.2	2.4	1.6	1.6	1.6		1.6	1.6	1.6	1.6	1.6	1.6	1.6	9.7	9.7	5.6	5.6			53.8
	3.2	2.4	1.6	1.6	1.6		1.6	1.6	1.6	1.6	1.6	1.6	2.4	9.7	9.7	5.6	5.6			54.6
	3.2	2.4	1.6	1.6	1.6		1.6	1.6	1.6	1.6	1.6	2.4	2.4	9.7	9.7	5.6	5.6			55.4
	3.2	2.4	1.6	1.6	1.6		2.4	1.6	1.6	1.6	1.6	2.4	2.4	9.7	9.7	5.6	5.6			56.2
	3.2	2.4	1.6	1.6	1.6		2.4	2.4	1.6	2.4	1.6	2.4	2.4	9.7	9.7	5.6	5.6			57.0
	3.2	2.4	1.6	1.6	1.6		2.4	2.4	1.6	2.4	1.6	2.4	2.4	9.7	9.7	5.6	5.6			57.8
	3.2	2.4	1.6	1.6	1.6		2.4	2.4	1.6	2.4	2.4	2.4	2.4	9.7	9.7	5.6	5.6			58.6
	3.2	2.4	1.6	2.4	1.6		2.4	2.4	1.6	2.4	1.6	2.4	2.4	9.7	9.7	5.6	5.6			59.4
0.0	3.2	2.4	1.6	2.4	2.4		2.4	2.4	1.6	2.4	2.4	2.4	2.4	9.7	9.7	5.6	5.6	0.0	0.0	60.2
	3.2	2.4	1.6	2.4	2.4		2.4	2.4	1.6	2.4	2.4	2.4	2.4	9.7	9.7	6.4	5.6			61.0
	3.2	2.4	1.6	2.4	2.4		2.4	2.4	1.6	2.4	2.4	2.4	2.4	9.7	9.7	6.4	6.4			61.8
	4.0	2.4	1.6	2.4	2.4		2.4	2.4	1.6	2.4	2.4	2.4	2.4	9.7	9.7	6.4	6.4			62.6
	4.0	2.4	1.6	2.4	2.4		2.4	2.4	1.6	2.4	2.4	2.4	3.2	9.7	9.7	6.4	6.4			63.4
	4.0	2.4	1.6	2.4	2.4		2.4	2.4	1.6	2.4	2.4	1.6	3.2	9.7	9.7	6.4	6.4			64.2
	4.0	2.4	1.6	2.4	2.4		2.4	3.2	1.6	2.4	2.4	1.6	3.2	9.7	9.7	6.4	6.4			65.0
	4.0	2.4	1.6	2.4	2.4		2.4	3.2	1.6	2.4	2.4	2.4	3.2	9.7	9.7	6.4	6.4			65.8
	4.0	2.4	1.6	2.4	2.4		2.4	3.2	1.6	3.2	2.4	2.4	3.2	9.7	9.7	6.4	6.4			66.6
0.0	4.0	2.4	1.6	2.4	2.4		2.4	3.2	2.4	3.2	2.4	2.4	3.2	9.7	9.7	6.4	6.4	0.0	0.0	67.4
	4.8	2.4	1.6	2.4	2.4		2.4	3.2	2.4	3.2	2.4	2.4	3.2	9.7	9.7	6.4	6.4			68.2
	4.8	2.4	1.6	2.4	2.4		2.4	3.2	2.4	3.2	2.4	2.4	3.2	4.0	9.7	9.7	6.4	6.4		69.0
	4.8	2.4	1.6	2.4	2.4		2.4	3.2	2.4	3.2	2.4	2.4	4.0	9.7	9.7	6.4	6.4			69.8
	4.8	3.2	1.6	2.4	2.4		2.4	3.2	2.4	3.2	2.4	2.4	4.0	9.7	9.7	6.4	6.4			70.6
	4.8	3.2	1.6	2.4	2.4		2.4	3.2	2.4	3.2	2.4	3.2	4.0	9.7	9.7	6.4	6.4			71.4
	4.8	3.2	1.6	2.4	2.4		3.2	3.2	2.4	3.2	2.4	3.2	4.0	9.7	9.7	6.4	6.4			72.2
	4.8	3.2	1.6	2.4	2.4		3.2	3.2	2.4	3.2	3.2	3.2	4.0	9.7	9.7	6.4	6.4			73.0
	4.8	3.2	1.6	2.4	2.4		3.2	3.2	3.2	3.2	3.2	3.2	4.0	9.7	9.7	6.4	6.4			73.8
	4.8	3.2	1.6	2.4	3.2		3.2	3.2	3.2	3.2	3.2	3.2	4.0	9.7	9.7	6.4	6.4			74.6

SPILLWAY FLOW per BAY (kcfs)

(assumes JDA pool of 264.0 ft)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	TSW	TSW	17	18	19	20	TOTAL Q
0.0	4.8	3.2	1.6	2.4	3.2	3.2	3.2	3.2	3.2	3.2	3.2	4.0	4.8	9.7	9.7	6.4	6.4	0.0	0.0	75.4
	4.8	4.8	1.6	2.4	3.2	2.4	3.2	2.4	3.2	3.2	3.2	4.0	5.6	9.7	9.7	6.4	6.4			76.2
	4.8	4.8	1.6	2.4	3.2	2.4	3.2	2.4	3.2	3.2	3.2	4.8	5.6	9.7	9.7	6.4	6.4			77.0
	4.8	4.8	1.6	2.4	3.2	2.4	3.2	2.4	3.2	3.2	4.0	4.8	5.6	9.7	9.7	6.4	6.4			77.8
	4.8	4.8	1.6	2.4	3.2	2.4	3.2	2.4	3.2	4.0	4.0	4.8	5.6	9.7	9.7	6.4	6.4			78.6
	4.8	4.8	1.6	3.2	3.2	2.4	3.2	2.4	3.2	4.0	4.0	4.8	5.6	9.7	9.7	6.4	6.4			79.4
0.0	4.8	4.8	2.4	3.2	3.2	2.4	3.2	2.4	3.2	4.0	4.0	4.8	5.6	9.7	9.7	6.4	6.4	0.0	0.0	80.2
	4.8	4.8	1.6	3.2	3.2	4.0	3.2	2.4	3.2	4.0	4.0	4.8	5.6	9.7	9.7	6.4	6.4			81.0
	4.8	4.8	1.6	3.2	3.2	4.0	3.2	3.2	3.2	4.0	4.0	4.8	5.6	9.7	9.7	6.4	6.4			81.8
0.0	4.8	4.0	1.6	3.2	3.2	4.0	4.0	3.2	4.0	4.0	4.0	4.8	5.6	9.7	9.7	6.4	6.4	0.0	0.0	82.6
	4.8	4.0	1.6	3.2	3.2	4.0	4.0	3.2	4.0	4.0	4.0	4.8	5.6	9.7	9.7	7.2	6.4			83.4
	4.8	4.0	1.6	3.2	3.2	4.0	4.0	3.2	4.0	4.0	4.0	4.8	5.6	9.7	9.7	7.2	7.2			84.2
	4.8	4.8	1.6	3.2	3.2	4.0	4.0	3.2	4.0	4.0	4.0	4.8	5.6	9.7	9.7	7.2	7.2			85.0
	4.8	4.8	1.6	3.2	3.2	4.8	4.0	3.2	4.0	4.0	4.0	4.8	5.6	9.7	9.7	7.2	7.2			85.8
	4.8	4.8	1.6	3.2	3.2	4.8	4.0	4.0	4.0	4.0	4.0	4.8	5.6	9.7	9.7	7.2	7.2			86.6
	4.8	4.8	1.6	3.2	4.0	4.8	4.0	4.0	4.0	4.0	4.0	4.8	5.6	9.7	9.7	7.2	7.2			87.4
	4.8	4.8	1.6	3.2	4.0	4.8	4.0	4.0	4.0	4.0	4.0	4.8	4.8	9.7	9.7	7.2	7.2	1.6		88.2
	4.8	4.8	1.6	3.2	4.0	4.8	4.0	4.0	4.0	4.0	4.0	4.8	4.8	9.7	9.7	7.2	7.2	2.4		89.0
0.0	4.8	4.8	1.6	3.2	4.0	4.8	4.0	4.0	4.0	4.0	4.0	4.8	4.8	9.7	9.7	7.2	7.2	3.2	0.0	89.8
	5.6	4.8	1.6	3.2	4.0	4.8	4.0	4.0	4.0	4.0	4.0	4.8	4.8	9.7	9.7	7.2	7.2	3.2		90.6
	5.6	5.6	1.6	3.2	4.0	4.8	4.0	4.0	4.0	4.0	4.0	4.8	4.8	9.7	9.7	7.2	7.2	3.2		91.4
	5.6	5.6	1.6	3.2	4.0	4.8	4.8	4.0	4.0	4.0	4.0	4.8	4.8	9.7	9.7	7.2	7.2	3.2		92.2
	5.6	5.6	1.6	3.2	4.0	4.8	4.8	4.0	4.8	4.0	4.0	4.8	4.8	9.7	9.7	7.2	7.2	3.2		93.0
	5.6	5.6	1.6	3.2	4.0	4.8	4.8	4.8	4.8	4.0	4.0	4.8	4.8	9.7	9.7	7.2	7.2	3.2		93.8
	5.6	5.6	1.6	4.0	4.0	4.8	4.8	4.8	4.8	4.0	4.0	4.8	4.8	9.7	9.7	7.2	7.2	3.2		94.6
	5.6	5.6	2.4	4.0	4.0	4.8	4.8	4.8	4.8	4.0	4.0	4.8	4.8	9.7	9.7	7.2	7.2	3.2		95.4
	5.6	5.6	2.4	4.0	4.0	4.8	4.8	4.8	4.8	4.0	4.0	4.8	4.8	9.7	9.7	7.2	7.2	4.0		96.2
	5.6	5.6	3.2	4.0	4.0	4.8	4.8	4.8	4.8	4.0	4.0	4.8	4.8	9.7	9.7	7.2	7.2	4.0		97.0
0.0	5.6	5.6	3.2	4.0	4.0	4.8	4.8	4.8	4.8	4.0	4.0	4.8	4.8	9.7	9.7	7.2	7.2	4.8	0.0	97.8
	5.6	5.6	3.2	4.0	4.0	4.8	4.8	4.8	4.8	4.0	4.0	5.6	6.4	9.7	9.7	7.2	7.2	3.2		98.6
	5.6	5.6	4.0	4.0	4.0	4.8	4.8	4.8	4.8	4.0	4.0	5.6	6.4	9.7	9.7	7.2	7.2	3.2		99.4
0.0	5.6	5.6	4.0	4.8	4.0	4.8	4.8	4.8	4.8	4.0	4.0	5.6	6.4	9.7	9.7	7.2	7.2	3.2	0.0	100.2
	5.6	5.6	4.0	4.8	4.0	4.8	4.8	4.8	4.8	4.0	4.0	5.6	5.6	9.7	9.7	8.0	8.0	3.2		101.0
	5.6	5.6	3.2	4.8	4.0	4.8	4.8	4.8	4.8	4.0	4.0	5.6	5.6	9.7	9.7	8.0	8.0	4.8		101.8
	5.6	5.6	3.2	4.8	4.8	4.8	4.8	4.8	4.8	4.0	4.0	5.6	5.6	9.7	9.7	8.0	8.0	4.8		102.6
	5.6	4.8	1.6	4.8	4.8	4.8	4.8	4.8	5.6	4.8	4.8	5.6	5.6	9.7	9.7	8.0	8.0	5.6		103.4
	5.6	4.8	1.6	4.8	4.8	4.8	4.8	4.8	5.6	4.8	4.8	5.6	5.6	9.7	9.7	8.0	8.0	6.4		104.2
0.0	5.6	4.8	1.6	4.8	4.8	4.8	4.8	4.8	5.6	4.8	4.8	5.6	5.6	9.7	9.7	8.0	8.0	7.2	0.0	105.0
	6.4	4.8	1.6	4.8	4.8	4.8	4.8	4.8	5.6	4.8	4.8	6.4	6.4	9.7	9.7	8.0	8.0	5.6		105.8
	6.4	5.6	2.4	4.8	4.8	4.8	4.8	4.8	5.6	4.8	4.8	6.4	6.4	9.7	9.7	8.0	8.0	4.8		106.6
	6.4	5.6	3.2	4.8	4.8	4.8	5.6	4.8	5.6	4.8	5.6	6.4	6.4	9.7	9.7	8.0	8.0	3.2		107.4
	6.4	5.6	3.2	4.8	4.8	5.6	5.6	4.8	5.6	5.6	5.6	6.4	6.4	9.7	9.7	8.0	8.0	2.4		108.2
	6.4	5.6	3.2	4.8	4.8	5.6	5.6	5.6	5.6	5.6	5.6	6.4	6.4	9.7	9.7	8.0	8.0	2.4		109.0
0.0	6.4	5.6	4.0	4.8	4.8	5.6	5.6	5.6	5.6	5.6	5.6	6.4	6.4	9.7	9.7	8.0	8.0	2.4	0.0	109.8
	6.4	5.6	4.0	4.8	4.8	5.6	5.6	5.6	5.6	5.6	5.6	6.4	7.2	9.7	9.7	8.0	8.0	2.4		110.6
	6.4	6.4	4.0	4.8	4.8	5.6	5.6	5.6	5.6	5.6	5.6	6.4	7.2	9.7	9.7	8.0	8.0	2.4		111.4
	6.4	6.4	4.0	4.8	4.8	5.6	5.6	5.6	5.6	5.6	5.6	6.4	7.2	9.7	9.7	8.0	8.0	3.2		112.2
	6.4	6.4	4.0	4.8	4.8	5.6	6.4	5.6	5.6	5.6	5.6	6.4	7.2	9.7	9.7	8.0	8.0	3.2		113.0
	6.4	6.4	4.0	4.8	4.8	6.4	6.4	5.6	5.6	5.6	5.6	6.4	7.2	9.7	9.7	8.0	8.0	3.2		113.8
	6.4	6.4	4.0	4.8	4.8	6.4	6.4	6.4	5.6	5.6	5.6	6.4	7.2	9.7	9.7	8.0	8.0	3.2		114.6
	6.4	6.4	4.0	5.6	4.8	6.4	6.4	6.4	5.6	5.6	5.6	6.4	7.2	9.7	9.7	8.0	8.0	3.2		115.4
	6.4	6.4	4.0	5.6	4.8	6.4	6.4	6.4	6.4	5.6	5.6	6.4	7.2	9.7	9.7	8.0	8.0	4.8		117.0
	6.4	6.4	4.0	5.6	5.6	6.4	6.4	6.4	6.4	5.6	5.6	6.4	7.2	9.7	9.7	8.0	8.0	4.8		117.8
	6.4	6.4	4.8	5.6	5.6	6.4	6.4	6.4	6.4	5.6	5.6	6.4	7.2	9.7	9.7	8.0	8.0	4.8		118.6
	6.4	6.4	4.8	5.6	6.4	6.4	6.4	6.4	6.4	5.6	5.6	6.4	7.2	9.7	9.7	8.0	8.0	4.8		119.4
0.0	6.4	6.4	4.8	5.6	6.4	6.4	6.4	6.4	5.6	5.6	5.6	6.4	7.2	9.7	9.7	8.0	8.0	5.6	0.0	120.2

SPILLWAY FLOW per BAY (kcfs)
(assumes JDA pool of 264.0 ft)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	TSW 15	TSW 16	17	18	19	20	TOTAL Q
	7.2	9.6	9.6	8.0	8.0	8.8	8.8	8.0	8.8	8.0	8.8	8.8	8.8	9.7	9.7	9.6	8.8	9.6	8.0	166.6
	7.2	9.6	9.6	8.0	8.0	8.8	8.8	8.0	8.8	8.8	8.8	8.8	8.8	9.7	9.7	9.6	8.8	9.6	8.0	167.4
	7.2	9.6	9.6	8.0	8.0	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	9.7	9.7	9.6	8.8	9.6	8.0	168.2
	7.2	9.6	9.6	8.8	8.0	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	9.7	9.7	9.6	8.8	9.6	8.0	169.0
	7.2	9.6	9.6	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	9.7	9.7	9.6	8.8	9.6	8.0	169.8
	7.2	9.6	9.6	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	9.7	9.7	9.6	8.8	9.6	8.8	170.6
	7.2	9.6	9.6	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	9.7	9.7	9.6	9.6	9.6	8.8	171.4
	7.2	9.6	9.6	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	9.6	9.7	9.7	9.6	9.6	9.6	8.8	172.2
	7.2	9.6	9.6	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	9.6	9.6	9.7	9.7	9.6	9.6	8.8	173.0
	7.2	9.6	9.6	8.8	8.8	8.8	9.6	8.8	8.8	8.8	8.8	8.8	9.6	9.6	9.7	9.7	9.6	9.6	8.8	173.8
	7.2	9.6	9.6	8.8	8.8	8.8	9.6	8.8	8.8	8.8	9.6	8.8	9.6	9.6	9.7	9.7	9.6	9.6	8.8	174.6
	7.2	9.6	9.6	8.8	8.8	8.8	9.6	8.8	8.8	9.6	8.8	9.6	9.6	9.7	9.7	9.6	9.6	9.6	8.8	175.4
	7.2	9.6	9.6	8.8	8.8	8.8	9.6	8.8	8.8	9.6	8.8	9.6	9.6	9.7	9.7	9.6	9.6	9.6	8.8	176.2
	7.2	9.6	9.6	8.8	8.8	8.8	9.6	9.6	8.8	9.6	9.6	9.6	9.6	9.7	9.7	9.6	9.6	9.6	8.8	177.0
	7.2	9.6	9.6	8.8	8.8	9.6	9.6	9.6	8.8	9.6	9.6	9.6	9.6	9.7	9.7	9.6	9.6	9.6	8.8	177.8
	7.2	9.6	9.6	9.6	8.8	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.7	9.7	9.6	9.6	9.6	8.8	178.6
	7.2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.7	9.7	9.6	9.6	9.6	8.8	179.4
	7.2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.7	9.7	9.6	9.6	9.6	9.6	180.2
	7.2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.7	9.7	11.2	9.6	9.6	9.6	181.8
	7.2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.7	9.7	11.2	11.2	9.6	9.6	183.4
	7.2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	11.2	9.7	9.7	11.2	11.2	9.6	185.0
	7.2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	11.2	11.2	9.7	9.7	11.2	11.2	9.6	9.6	186.6
	7.2	9.6	9.6	9.6	9.6	9.6	11.2	9.6	9.6	9.6	9.6	11.2	11.2	9.7	9.7	11.2	11.2	9.6	9.6	188.2
	7.2	9.6	9.6	9.6	9.6	9.6	11.2	9.6	9.6	9.6	11.2	11.2	11.2	9.7	9.7	11.2	11.2	9.6	9.6	189.8
	7.2	9.6	9.6	9.6	9.6	9.6	11.2	9.6	11.2	9.6	11.2	11.2	11.2	9.7	9.7	11.2	11.2	9.6	9.6	191.4
	7.2	9.6	9.6	9.6	9.6	11.2	11.2	9.6	11.2	9.6	11.2	11.2	11.2	9.7	9.7	11.2	11.2	9.6	9.6	193.0
	7.2	9.6	9.6	9.6	9.6	11.2	11.2	9.6	11.2	11.2	11.2	11.2	11.2	9.7	9.7	11.2	11.2	9.6	9.6	194.6
	7.2	9.6	9.6	9.6	9.6	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	9.7	9.7	11.2	11.2	9.6	9.6	196.2
	7.2	9.6	9.6	11.2	9.6	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	9.7	9.7	11.2	11.2	9.6	9.6	197.8
	7.2	9.6	9.6	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	9.7	9.7	11.2	11.2	9.6	9.6	199.4
	7.2	9.6	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	9.7	9.7	11.2	11.2	9.6	9.6	201.0
	7.2	9.6	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	9.7	9.7	11.2	11.2	11.2	9.6	202.6
	7.2	9.6	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	9.7	9.7	11.2	11.2	11.2	11.2	204.2
	7.2	9.6	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	9.7	9.7	12.8	11.2	11.2	11.2	205.8
	7.2	9.6	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	9.7	9.7	12.8	12.8	11.2	11.2	207.4
	7.2	9.6	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	12.8	9.7	9.7	12.8	12.8	11.2	11.2	209.0
	7.2	9.6	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	12.8	12.8	9.7	9.7	12.8	12.8	11.2	11.2	210.6
	7.2	9.6	11.2	11.2	11.2	11.2	12.8	11.2	11.2	11.2	11.2	12.8	12.8	9.7	9.7	12.8	12.8	11.2	11.2	212.2
	7.2	9.6	11.2	11.2	11.2	11.2	12.8	11.2	11.2	12.8	12.8	12.8	12.8	9.7	9.7	12.8	12.8	11.2	11.2	213.8
	7.2	9.6	11.2	11.2	11.2	11.2	12.8	12.8	11.2	12.8	12.8	12.8	12.8	9.7	9.7	12.8	12.8	11.2	11.2	215.4
	7.2	9.6	11.2	11.2	11.2	12.8	12.8	11.2	12.8	12.8	12.8	12.8	12.8	9.7	9.7	12.8	12.8	11.2	11.2	217.0
	7.2	9.6	11.2	11.2	11.2	12.8	12.8	11.2	12.8	12.8	12.8	12.8	12.8	9.7	9.7	12.8	12.8	11.2	11.2	218.6
	7.2	9.6	11.2	11.2	11.2	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	9.7	9.7	12.8	12.8	11.2	11.2	220.2
	7.2	9.6	11.2	12.8	11.2	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	9.7	9.7	12.8	12.8	11.2	11.2	221.8
	7.2	9.6	11.2	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	9.7	9.7	12.8	12.8	11.2	11.2	223.4
	7.2	9.6	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	9.7	9.7	12.8	12.8	11.2	11.2	225.0
	7.2	9.6	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	9.7	9.7	12.8	12.8	12.8	11.2	226.6
	7.2	9.6	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	9.7	9.7	12.8	12.8	12.8	12.8	228.2
	7.2	9.6	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	9.7	9.7	14.4	12.8	12.8	12.8	229.8
	7.2	9.6	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	9.7	9.7	14.4	14.4	12.8	12.8	231.4
	7.2	9.6	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	14.4	9.7	9.7	14.4	14.4	12.8	12.8	233.0
	7.2	9.6	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	14.4	14.4	9.7	9.7	14.4	14.4	12.8	12.8	234.6
	7.2	9.6	12.8	12.8	12.8	12.8	14.4	12.8	12.8	12.8	12.8	14.4	14.4	9.7	9.7	14.4	14.4	12.8	12.8	236.2
	7.2	9.6	12.8	12.8	12.8	12.8	14.4	12.8	12.8	12.8	14.4	14.4	14.4	9.7	9.7	14.4	14.4	12.8	12.8	237.8
	7.2	9.6	12.8	12.8	12.8	12.8	14.4	12.8	14.4	12.8	14.4	14.4	14.4	9.7	9.7	14.4	14.4	12.8	12.8	239.4
	7.2	9.6	12.8	12.8	12.8	14.4	14.4	12.8	14.4	12.8	14.4	14.4	14.4	9.7	9.7	14.4	14.4	12.8	12.8	241.0

SPILLWAY FLOW per BAY (kcfs)
(assumes JDA pool of 264.0 ft)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	TSW 15	TSW 16	17	18	19	20	TOTAL Q
	7.2	9.6	16.0	19.2	19.2	19.2	20.8	19.2	20.8	19.2	20.8	20.8	20.8	9.7	9.7	20.8	20.8	19.2	19.2	332.2
	7.2	9.6	16.0	19.2	19.2	20.8	20.8	19.2	20.8	19.2	20.8	20.8	20.8	9.7	9.7	20.8	20.8	19.2	19.2	333.8
	7.2	9.6	16.0	19.2	19.2	20.8	20.8	19.2	20.8	20.8	20.8	20.8	20.8	9.7	9.7	20.8	20.8	19.2	19.2	335.4
	7.2	9.6	16.0	19.2	19.2	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	9.7	9.7	20.8	20.8	19.2	19.2	337.0
	7.2	9.6	16.0	20.8	19.2	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	9.7	9.7	20.8	20.8	19.2	19.2	338.6
	7.2	9.6	16.0	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	9.7	9.7	20.8	20.8	19.2	19.2	340.2

COLUMBIA RIVER REGIONAL FORUM

TECHNICAL MANAGEMENT TEAM

April 16, 2008 Conference Call

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Robin Gumpert

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.

Dworshak Operations Discussion

Cathy Hlebechuk, COE, reported that Dworshak was currently at elevation 1487.4 feet, below the flood control elevation of 1493.7 feet. The project was operating at full load and she requested input from the salmon managers on how to proceed from here. Paul Wagner, NOAA, on behalf of the salmon managers recommended that the COE continue operating with the current full powerhouse operation and check in again next week to determine next steps. He suggested that the likely recommendation will be to keep the flows high until the freshet arrives. Cathy said the COE will provide an analysis to determine the feasibility of operating with that assumption.

Action: The COE will continue operating Dworshak at current full powerhouse outflows and TMT will revisit the issue at their 4/23 TMT meeting.

John Day Spill Operations

Dan Feil, COE, reminded everyone that, due to a delay in delivery of equipment, the original start date for the John Day TSW test on 4/21 would be delayed until 4/26 or 4/27. The COE's current plan was to maintain the pre-test condition of 0 daytime/60% nighttime spill until the test start, and then move to 24-hour spill at 30%. He noted that the Fish Operations Plan states that the test will start on or near 4/20 to begin the research. This issue had been discussed at the last TMT meeting and Paul Wagner suggested the issue be revisited due to questions about the start date for 30% spill.

Paul Wagner, NOAA, shared that since the FOP was written, folks reviewed modeled test patterns and all agreed that a 30% pattern with TSWs would provide better fish passage conditions than 0/60%. He expressed some frustration on behalf of the fisheries managers with the delay in the start of the test, and shared their desire to start spilling at 30% on 4/21.

BPA responded that the Fish Operations Plan describes John Day operations to continue at 0/60 until the start of the test, and that the test should start when significant numbers of fish are passing (historically on or near 4/20). Given that the proposed start date of 4/21 would be a deviation from the FOP, he asked for biological information that would support this deviation, particularly what passage numbers and types of fish were currently in the river. Paul responded that the migration had begun and that, historically, the first

10% of the fish pass during the week of 4/20; he noted that these were an important part of the run. Specifically, yearling chinook counts at Bonneville were 3,300 and numbers at John Day were 14,000. Dave Wills, USFWS, offered that the discrepancy in the two numbers was due to releases from several hatcheries.

Mike Langsley, Portland District COE, shared information from past TSW studies that, with 30% spill, yearling chinook passage ranged from 56-47% and steelhead ranged from 55-54%. He noted that the fish run does appear to be ramping up, and as part of the group that reviewed spill pattern modeling, he suggested that 30% spill would provide better egress for passage. He reported that a balloon tag test was conducted earlier this month and its results indicated that safe passage is anticipated with the TSW.

Finally, it was clarified that the change to the FOP was being recommended based on new available information that came out after the FOP was written. (Spill patterns had not been developed until February), so this change would be under the purview of in-season adaptive management.

TMT members present during today's meeting offered their responses:

- Idaho: Support the proposed operation and appreciate BPA's willingness to move forward with the proposal. Russ Kiefer also noted that FPOM had discussed this issue and all the fisheries managers agreed that a 30% start date on 4/21 was acceptable and that there would be concerns with delaying that spill pattern, given the new information from the models.
- USFWS: Support the recommendation and appreciate the discussion.
- NOAA: Support the recommendation and appreciate the change.
- BOR: No objection to starting 30% spill on 4/21.
- BPA: Will not object, and noted a preference to initiate the change when significant numbers of fish arrive at the project.
- COE: Support the proposed operation and noted that this recommendation would likely reduce TDG levels in the river, as an added benefit. The COE will be able to implement as follows:
 - On the morning of 4/21 (Monday), open the TSW and arrive at 30% spill by 6:00 pm.

Action: Jim Adams, COE, will contact TMT members that were not present during the meeting (Montana, Oregon and Washington) to get confirmation of support/no objection to move forward. Jim will email TMT to notify of their confirmations. The COE will need to prepare a memo for their attorneys describing the operation and biological rationale. Paul Wagner will provide input on the rationale, in writing.

Spring Creek Hatchery Release

Dave Wills, USFWS, reported that on 4/10, 4 million fish were released from the Spring Creek Hatchery to coincide with start of spill. Per agreement with BPA and the COE, Powerhouse 2 at Bonneville was operated to the lower end of 1% to support passage. 95% passage occurred and the lower end of 1% constraint was lifted. The COE was scheduled to install acoustics equipment at the project today (see next agenda item) so

would continue running only two units, and would resume normal operations after today. The next hatchery release was scheduled for May. Dave suggested that the USFWS would likely make the same request for operating at the lower end of 1% for that release, and would have discussions about this off line with the COE and BPA.

Action: Dave will share resulting information from the release with TMT at the 4/23 meeting.

B2CC Outage

Dan Feil, COE, followed up from the last TMT meeting and reported that full concurrence was reached at FPOM to allow a one day corner collector outage to install acoustics in the forebay at Bonneville. As such, the COE planned to operate units 14 and 18 during installation. It was clarified that FPOM agreed to a 12 hour window for completion of the installation, in the event that an issue came up requiring some of the work to be split into two days. Still, the COE planned to complete the work by 6:00 pm today, 4/16, then would resume corner collector and B2 turbine unit operations. Dan added that gateway testing would be occurring as well.

Action: Dan will talk with Dennis Schwartz, COE, to get feedback on the study and add this to the Spring Creek Hatchery release agenda during the 4/23 TMT meeting.

Transportation Operations

Dan Feil also reminded TMT that the COE needs a three day notice to begin transportation operations and would like to know the planned date sooner than later. Paul Wagner responded that the planning date from the salmon managers at this time is May 1, and that if conditions change and prompt an earlier recommended start date, they would give direct notice to Dan via email.

Action: TMT will check in on this item at the 4/23 TMT meeting.

McNary Navigation Issue

Jim Adams, COE, reported that an email had been sent to TMT members notifying them that a modified spill pattern had been sent to McNary to address navigational safety issues. The Walla Walla District COE worked with Towboaters and NOAA to develop an acceptable pattern, which was similar to the pattern used last year to address the same issue. Operators were given the new spill pattern and told to employ it as requested for 15-30 minutes to allow safe passage of boats. The operation was implemented and Jim Adams was notified that the first towboat to use the modified spill pattern reported that it worked well. The Towboaters thanked all who were involved for their good work pulling the spill pattern together as quickly as they did.

Next TMT Meeting: April 23rd 9am

Agenda Items include:

- Priest Rapids Update
- Dworshak Operations
- Spring Creek Hatchery Release

- Transportation Operations
- Little Goose Nighttime Spill Operations
- TMT Guidelines
- Water Management Plan Spring/Summer Update
- Operations Review

**Columbia River Regional Forum
Technical Management Team Conference Call
April 16, 2008**

1. Introduction

Today's TMT call was chaired by Jim Adams (COE) and facilitated by Robin Gumpert (D.S. Consulting). Representatives of BPA, COE, NOAA, USFWS, BOR, Idaho and others were on the line. 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. Dworshak Operations

The project is currently running at full load, with an elevation of 1,477.4 feet and an end-of-month flood control target of 1493.7 feet. Cathy Hlebechuk (COE) asked the Salmon Managers what type of operation they would recommend at this point. The consensus at FPAC yesterday was to maintain the current discharge at full powerhouse capacity and check in next week to see if flows need to be changed, Paul Wagner (NOAA) said. Fish are beginning to move, and the long-term plan is to maintain high flows until the freshet hits. The COE needs to analyze how long outflows can be kept at around 10 kcfs, Hlebechuk said. For now, the operation will continue at around 10 kcfs outflows (actually 10.9 kcfs at present) for the next week until TMT meets again April 23.

3. John Day Spill Operations

This item was added to today's agenda at the request of Paul Wagner (NOAA) on behalf of the Salmon Managers. The Fish Operations Plan states that research at John Day to evaluate the newly installed TSWs will begin on or around April 20; however, equipment and installation delays have moved that date back to April 26, Dan Feil (COE) reported. The COE had initially planned to continue the zero daytime/60% nighttime spill regime until testing begins. Recently the technical team reached a solid consensus recommendation on 30% spill round the clock beginning April 21 as it provided the best egress conditions in the model, Wagner explained. This recommendation was the result of several modeling trips to Mississippi to address eddies that formed at 60% spill, which would cause egress to take twice as long at 60% spill than at 30% spill. Wagner requested that 30% spill begin April 21 as the COE had initially planned.

Tony Norris (BPA) asked about the size and timing of this year's anticipated migration. Wagner and Mike Langeslay (COE) both noted that approximately 10% of the yearling, Chinook and subyearling runs historically pass John Day during the last week of April. Norris asked what percentage of fish would use the spillway route at 30% spill vs. 60% spill. Historical rates indicate

that 47-56% of Chinook and around 55% of steelhead used the spillway at 30% spill, Mike Langeslay (COE) said. In the past, 30% spill for 24 hours a day didn't necessarily increase spillway passage, perhaps due in part to the reluctance of steelhead to pass at 30% spill.

Rudd Turner (COE) asked about biological safety of the TSWs if they are going to be operated prior to testing. A balloon tag test in early April found that the TSWs are equivalent to a standard spill bay, with 99% survival for both, Langeslay said. While the TSWs are believed to be very safe, the effect of the new spill pattern on fish is not yet known. The spill pattern was developed after the Fish Operations Plan was written, so the request to deviate from specifications in the FOP is the result of new information.

Norris asked about fish survival rates at 30% spill compared to 60% spill. We don't have any direct data to indicate that one is better than the other because neither operation has been tested with its respective spill pattern, Feil replied. Rudd Turner asked whether the Salmon Managers expected any 40% spill; Wagner said no, the request is for 30% spill only. Norris requested the consideration that with such unusually low fish numbers at this time that the decision to begin be triggered on when we see an upturn in the actual fish numbers, given that temperatures this year have been unusually cold. Langeslay said the smolt index is largely driven by hatchery releases, making it consistent from year to year despite temperature changes. It will take project staff most of a day to get the TSWs open and running, Feil said, which makes short-term planning difficult. Project staff needs 1-2 days' advance notice to plan for opening the TSW, Turner said.

The COE proposed to operate John Day Dam at 30% spill for 24 hours a day beginning April 21 at 6 PM through 6 am on April 26 when the actual test begins. Because this operation is a departure from the FOP, it requires TMT consensus. Representatives from Oregon, Washington and Montana were not present on today's call. Adams will contact them and send an email to TMT stating each of their positions on the proposed operation. TMT members present today voted as follows:

- BPA supported the proposed operation but noted that this was an expensive operation especially considering that fish were not passing in significant numbers.
- BOR did not object.
- Idaho favored the proposed operation and voiced appreciation for BPA's willingness to compromise.
- USFWS supported the change and expressed appreciation for BPA's consideration.
- NOAA and the COE also supported the 30% spill operation.

Barring an objection by any of the missing state representatives today, John Day operation will proceed as follows: 60% spill from 6 pm on April 20 to 6 am on April 21, then zero spill while project crews work to have the TSW bays open and operating at 6 pm on April 21 using the new 30% spill pattern, which will continue until 6 am April 26.

{Note: Subsequent to the conference call, Dan Feil contacted Jim Litchfield (Montana), Rick Kruger (Oregon), Cindy LeFleur (Washington), and Tom Lorz (CRITFC) regarding the proposed operation. All four supported the proposed operation and gave the Corps the go-ahead to initiate the 30% operation at 6:00 pm on Monday April 21st}

4. Spring Creek Hatchery Release

On April 10, Spring Creek Hatchery released a little over 4 million fish, Dave Wills (USFWS) reported. To accommodate their passage through the Bonneville 2nd powerhouse, the turbine units were operated toward the low end of the 1% range. Based on combined passage counts, it appears that 95% of these fish have now passed Bonneville Dam, so today the COE is installing equipment in the forebay on the Bonneville 2nd powerhouse and running only two units, 14 and 18, at the low end of 1%. When installation is complete this afternoon, the project will resume normal operations outlined in the fish passage plan.

The last 2008 Spring Creek Hatchery release of approximately 3.5 million fish will occur in early May. There will probably be a request to operate the turbines at the low end of 1% efficiency for that release as well, Wills said, subject to further discussion between BPA and the COE. There will be more opportunities at that time to discuss the size of fish, a major reason for requesting the low end of 1% operation. TMT added this issue to its agenda for next week, when Dave Wills will present information on fish sizes and the Corps will present the results from the recent gate well study.

5. Bonneville 2nd Powerhouse Corner Collector Outage

The corner collector outage is in progress today for installation of hydrophones along the BGS, as agreed to at last week's TMT meeting, Dan Feil said. The current outage is scheduled to run through 6 pm this evening. If something goes wrong today, some of the hours might be postponed until tomorrow, Scott Bettin (BPA) added. As noted above, only units 14 and 18 are running in the 2nd powerhouse. In addition, gatewell testing is occurring in unit 14 and will continue until April 19 or 20.

6. Transport Operations

Dan Feil reminded TMT that the Walla Walla District needs 3 days of lead time from the date when transportation is to begin. The start of transportation has been a continuing subject of discussion at FPAC, with transportation likely to begin on May 1 this year, Wagner said. If the Salmon Managers anticipate an earlier start date than that, Wagner will let the COE know.

7. McNary Navigation Issue

On Friday, April 11, the COE heard from John Piggot of the Towboaters' Association expressing concern over navigation problems at the McNary lock due to spill patterns, Adams reported. A modified spill pattern similar to that used last summer when similar problems arose was developed and has been used successfully to alleviate navigation problems. Tow boaters have expressed appreciation to the COE, TMT and FPOM for pulling this pattern together.

8. Next Meeting

The next regular TMT meeting will be on April 23. Dworshak operations, the Spring Creek Hatchery May release, transportation planning, Hanford reach, comments on the WMP spring/summer update, nighttime spill at Little Goose, and finalizing the TMT guidelines will be on the agenda. This summary prepared by consultant and writer Pat Vivian.

Name	Affiliation
Tony Norris	BPA
Paul Wagner	NOAA
Jim Adams	COE
Scott Bettin	BPA
Dave Wills	USFWS
Russ Kiefer	Idaho
John Roache	BOR
Richelle Beck	DRA
Rudd Turner	COE
Dan Spear	BPA
Dan Feil	COE
Tim Heizenrader	Centaurus
Jennifer Miller	Susquehanna
Holli Krebs	Bear Stearns
Scott Boyd	COE
Laura Hamilton	COE
Bob Buchholz	COE
Cathy Hlebechuk	COE
Don Faulkner	COE
Tina Lundell	COE
Mike Butchko	Powerex
Shane Scott	PPC

Bob Diaz
Tom Le
Dave Benner
Bryce Bodacker
Glen Trager
Mike Langeslay

PPM
Puget Sound Energy
FPC
Highland Energy
Shell Energy
COE

TECHNICAL MANAGEMENT TEAM

BOR : John Roache / Mary Mellema / Pat McGrane

BPA : Robyn MacKay / Tony Norris / Scott Bettin

NOAA-F: Paul Wagner / Richard Dominique

USFWS : David Wills / Steve Haeseker

OR : Rick Kruger / Ron Boyce

ID : Russ Kiefer

WDFW : Cindy LeFleur

MT : Jim Litchfield / Brian Marotz

COE: Jim Adams / Cathy Hlebechuk / Bob Buchholz

TMT MEETING

Wednesday April 23, 2008 09:00 - 12:00

1125 N.W. Couch Street, Suite 4A34

Portland, Oregon 97209-4142

Map Quest [\[Directions\]](#)

CONFERENCE PHONE LINE

Conference call line: 203-310-2162; PASS CODE = 4703150

To check into the building, take the elevator to the 5th floor and the guard will issue you an ID badge if you need one and will take you down to the meeting room on the 4th floor. If you have NOT attended a TMT meeting in the past you will need to call ahead and let Jim Adams (503) 808-3938, Cathy Hlebechuk (503) 808-3942, or Bob Buchholz (503) 808-3945 know, so you can be added to the TMT Visitor List and issued an ID badge. This badge may be used indefinitely. If you have attended TMT in the past you may re-use your ID badge indefinitely. If you are a federal employee you will also need to have an ID badge issued to you which can be used indefinitely.

We have had disruptions on the phone because people are not hitting 'mute' after dial in.

Please MUTE your Phone

All members are encouraged to call Robin Gumpert with any issues or concerns they would like to see addressed.

Please e-mail her at robin76@cnnw.net or call her at (503) 248-4703.

AGENDA

1. Welcome and Introductions
2. Review [\[Meeting Minutes\]](#) 
3. Priest Rapids Update - Russell Langshaw, Grant County PUD
[\[Priest Rapids Operations\]](#) 
4. 3-D Cam Update and 1% Improvements - Don Faulkner, Dan Ramirez, USACE
[\[3-D Cam\]](#) 
5. Dworshak Operations - Cathy Hlebechuk, USACE
[\[DWR Refill Scenarios\]](#) 
6. Spring Creek Hatchery Release - Dave Wills, USWS
[\[Hatchery Release\]](#) 
7. Transportation Operations - Dan Feil

8. Little Goose 14-Day Nighttime Spill to Cap Operations - *Dan Feil, USACE*
9. Water Management Spring/Summer Update - *Scott Boyd, USACE*
10. TMT Guidelines - *All*
11. Operations Review
 - a. Reservoirs
 - b. Fish
 - c. Power System
 - d. Water Quality

[\[Spill Information 2008\]](#)
12. Other
 - a. Set agenda for next meeting - **May 7, 2008**
[\[Calendar 2008\]](#) 

Questions about the meeting may be referred to:

*[Jim Adams](#) at (503) 808-3938, or
[Cathy Hlebechuk](#) at (503) 808-3942, or
[Bob Buchholz](#) at (503) 808-3945.*

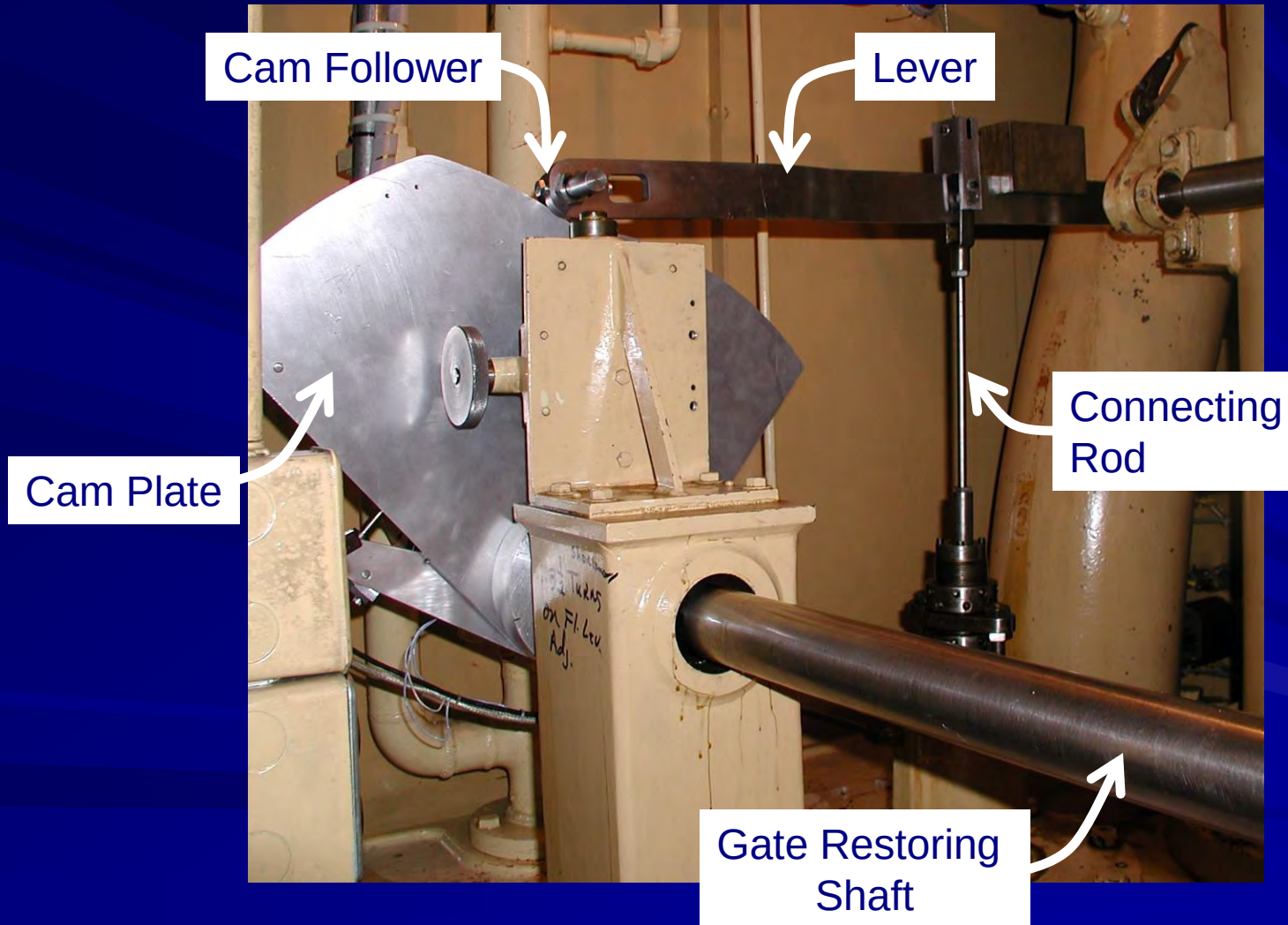
3D Cam Controllers

BACKGROUND:

■ Mechanical Governors

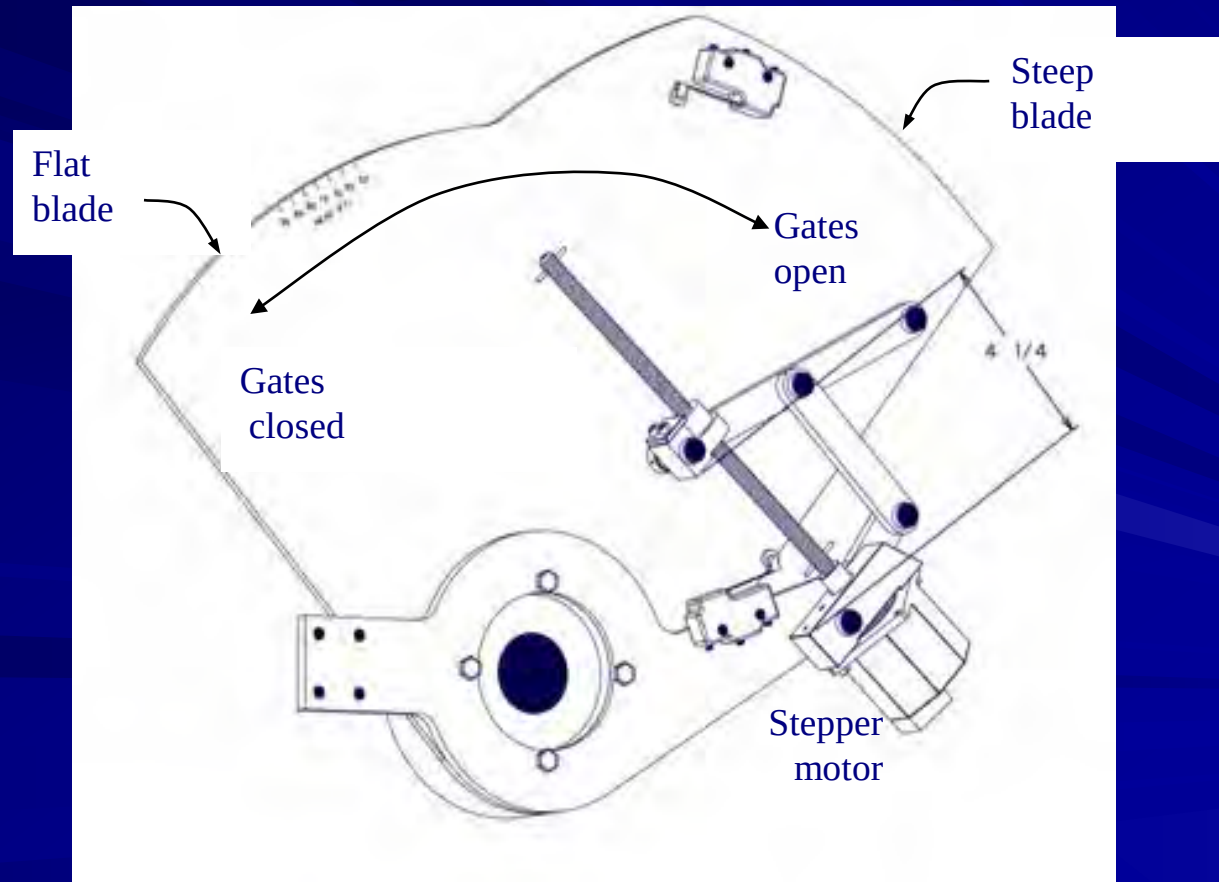
- Original equipment installed 1950s (McN) - 1980s (B2)
- Blade position follows gate position
 - Based on shape of hard cam (cam plate)
 - Hard cam valid only for single head
 - Blade position dependent on gate position

Mechanical Governor

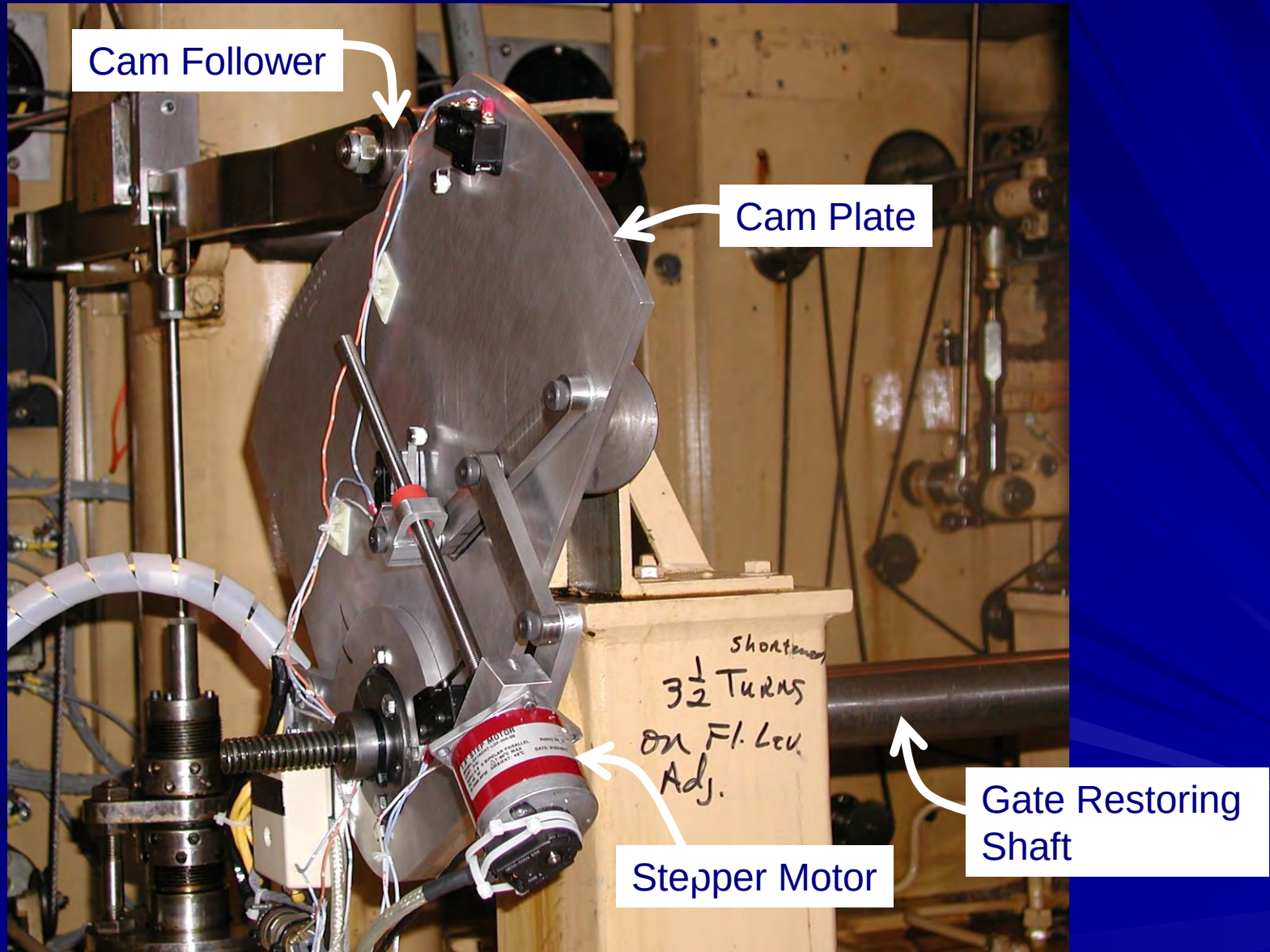


3D Cam Controllers

- Add-on retrofitted to existing Mechanical Governors
 - Originally installed late '80s - early 90's. Newer version installed 2001 to ~2006 (NWW).
 - Stepper Motor used to rotate cam plate & “fine tune” blade position
 - Provides limited range of blade positioning independent of gate



3D Cam Controllers



3D Cam Controllers

- Target Blade position a “look-up” value from Cam Table
 - Based head & gate position
 - Cam Table covers all operating heads
 - Cam Table developed from Index Testing
- Index Testing one unit of every family (Lower Columbia & Lower Snake) to develop:
 - Cam table (optimum gate - blade relationships)
 - 1 % Operating limits
 - Discharge Tables
- Testing begun in FY00, completed FY06.
- Latest tables installed at all projects & GDACS

3D Cam Controllers

- As of 2006
 - New versions of 3D cam controllers in-place (NWW)
 - Updated Tables in-place (all Projects)
- Are 3D cams functioning as intended?
 - Operational Surveys conducted annually (beginning in '05)
 - “Snapshot” surveys
 - Limited number of issues identified
 - Expanded Surveys conducted Fall '07 & Mar '08
 - Archived GDACS data used to better evaluate 3D cam operation
 - Identified frequency that 3D Cam Controllers were non-functional (unit by unit evaluation)

3D Cam Controller Survey Results

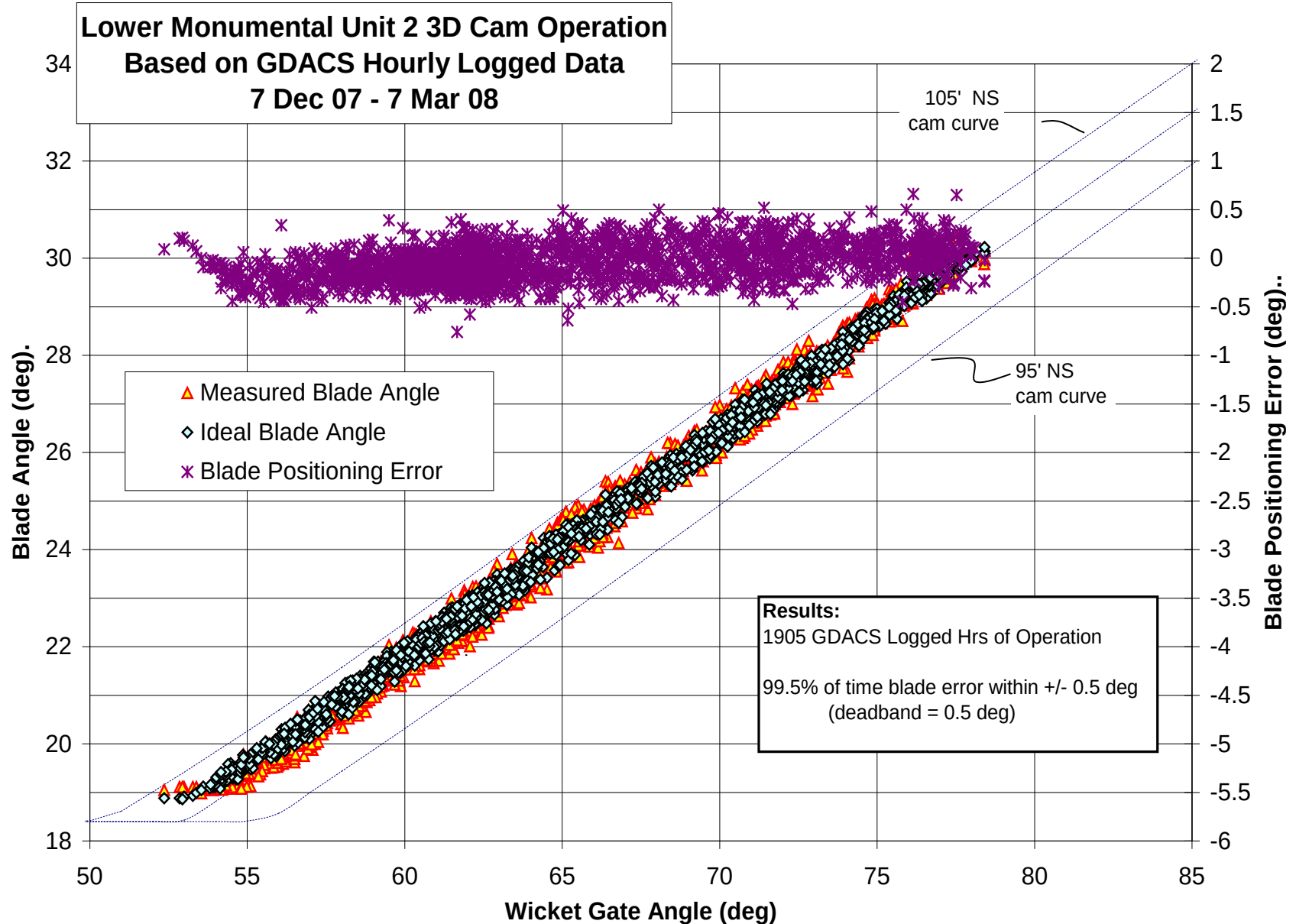
■ LMN and LWG:

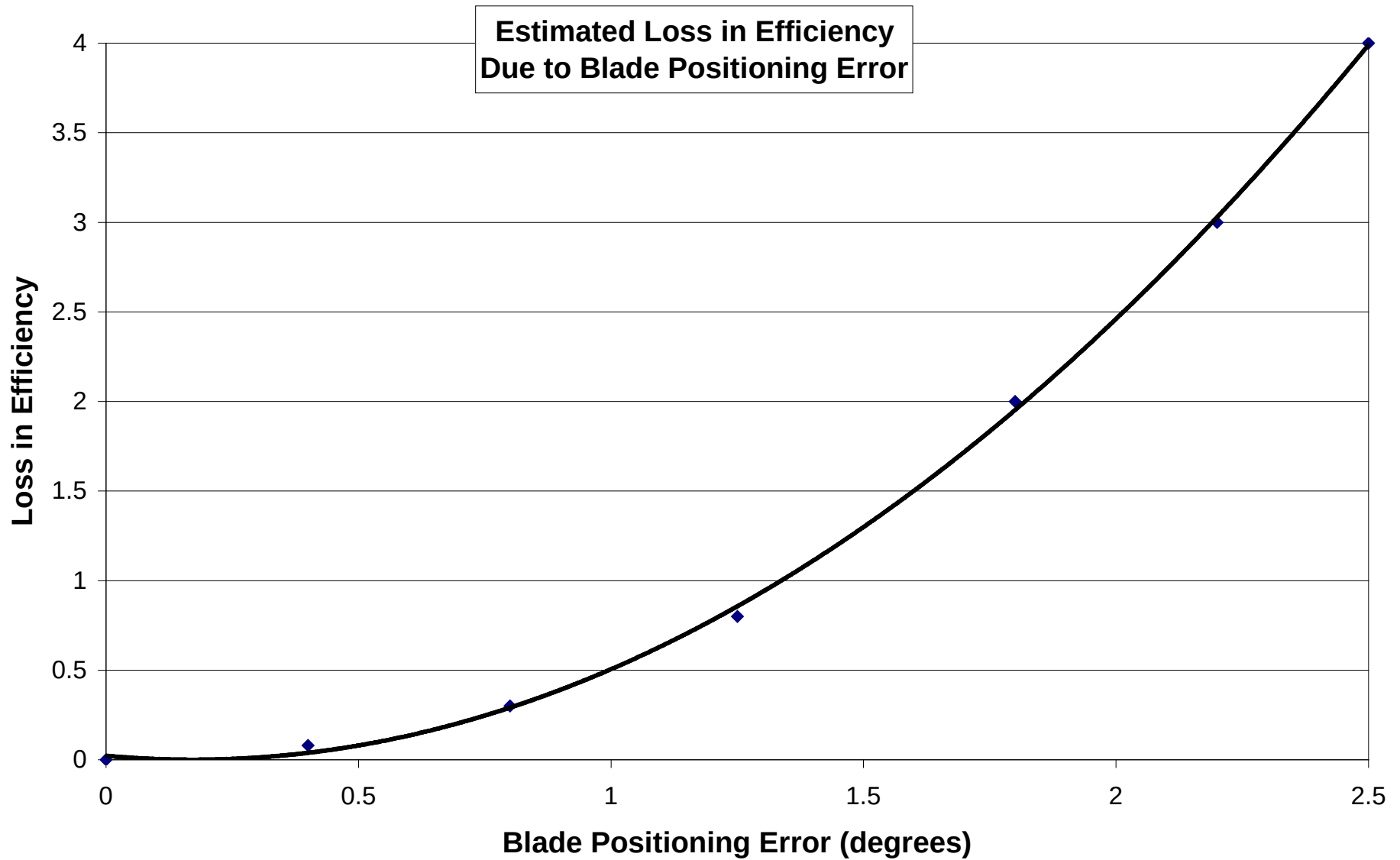
- 3D cam controller functioning as intended vast majority of time (± 0.5 deg blade positioning error)

	Lower Monumental		Lower Granite	
	Sept '07	Mar '08	Sept '07	Mar '08
Unit 1	n/a	n/a	98.9%	94.8%
Unit 2	62.5%	99.5%	OOS	OOS
Unit 3	99.7%	99.5%	100.0%	92.0%
Unit 4	100.0%	98.9%	100.0%	98.8%
Unit 5	99.7%	99.8%	97.3%	99.1%
Unit 6	100.0%	100.0%	100.0%	97.3%

NOTE: LMN U2 low percentages Sept 07 due to stepper motor assembly binding (assembly since replaced)

3D Cam Controller Survey Results





3D Cam Controller Survey Results

■ McN:

– Varied
results

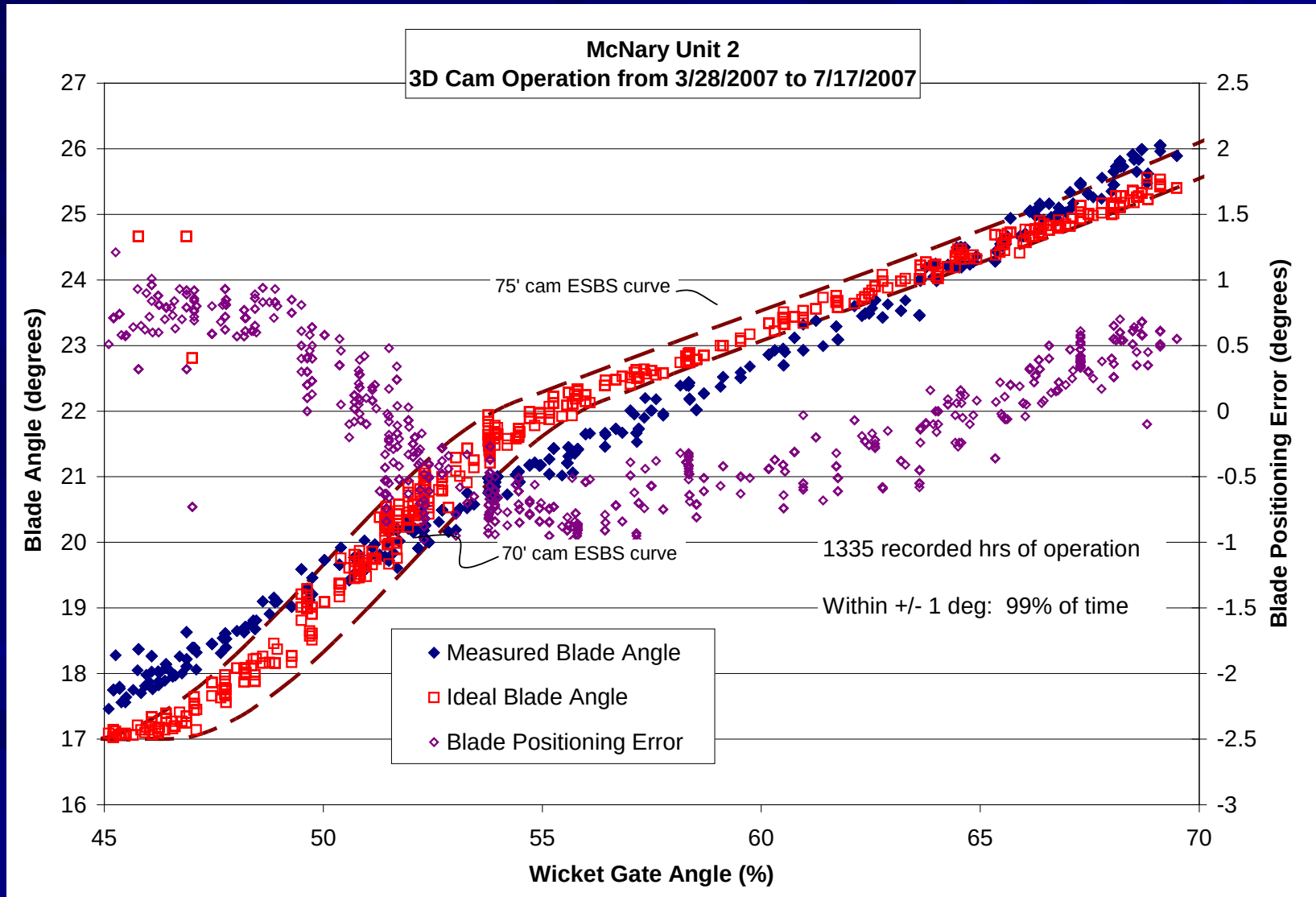
	Aug '08		Mar '08 (prelim)	
	+/- 0.5 deg	+/- 1.0 deg	+/- 0.5 deg	+/- 1.0 deg
Unit 1	99%	100%	86%	99%
Unit 2	41%	99%	92%	96%
Unit 3	51%	100%	82%	99%
Unit 4	89%	93%	82%	94%
Unit 5	60%	98%	93%	97%
Unit 6	60%	94%	89%	98%
Unit 7	60%	99%	75%	88%
Unit 8	51%	100%	93%	99%
Unit 9	93%	95%	83%	90%
Unit 10	51%	100%	86%	96%
Unit 11	40%	70%	93%	99%
Unit 12	41%	66%	92%	98%
Unit 13	30%	60%	75%	98%
Unit 14	35%	60%	86%	94%

3D Cam Controller Survey Results

- McN Aug 08 Surveys identified 3 areas affecting 3D cam operation:
 - Excessive deadbands on Units 2,3, 5-8, 10-14
 - Faulty head indication to Units 11-14
 - Binding of string mechanisms causing blade transducer faults

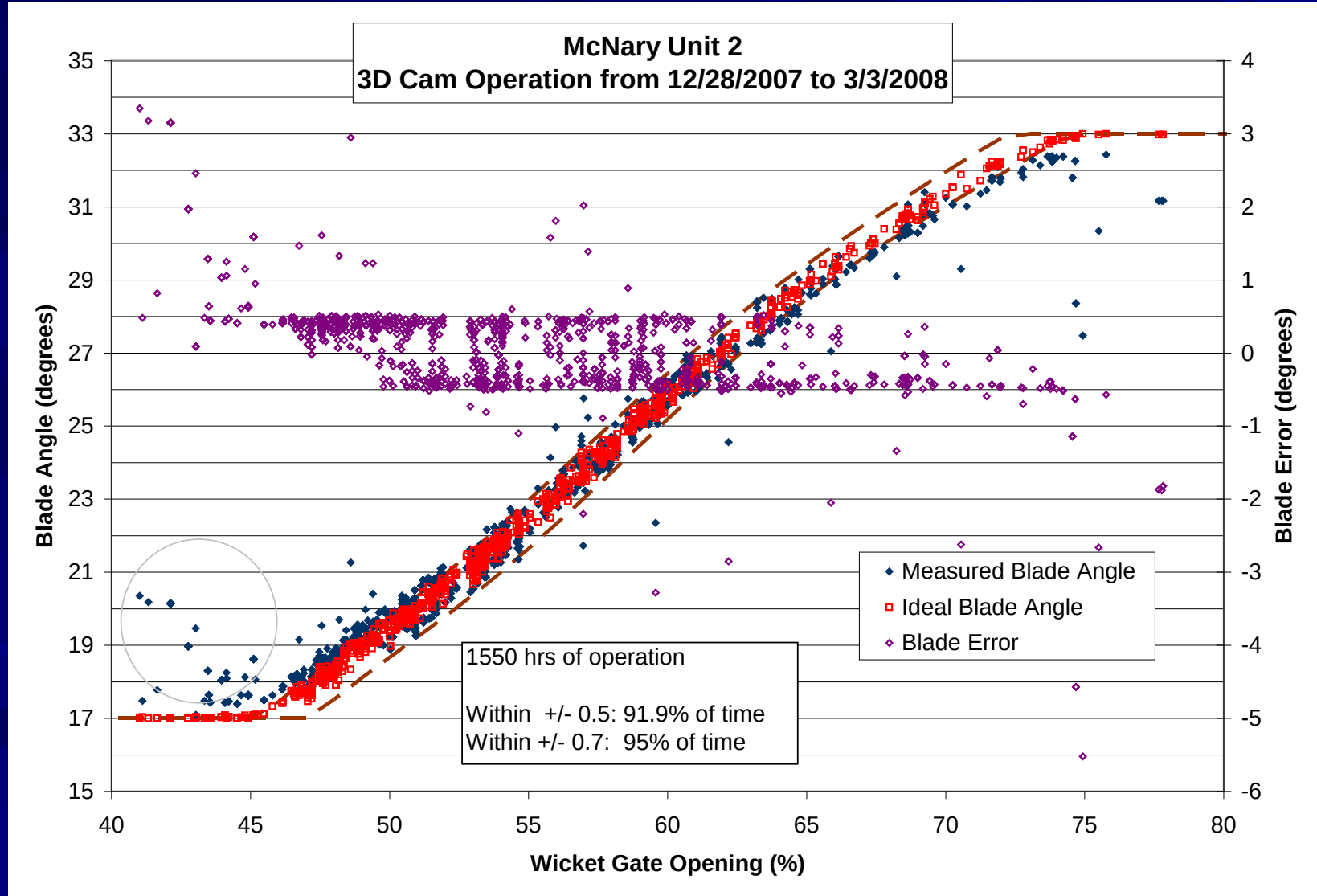
3D Cam Controller Survey Results

■ McN: Excessive deadband (+/- 1 deg)



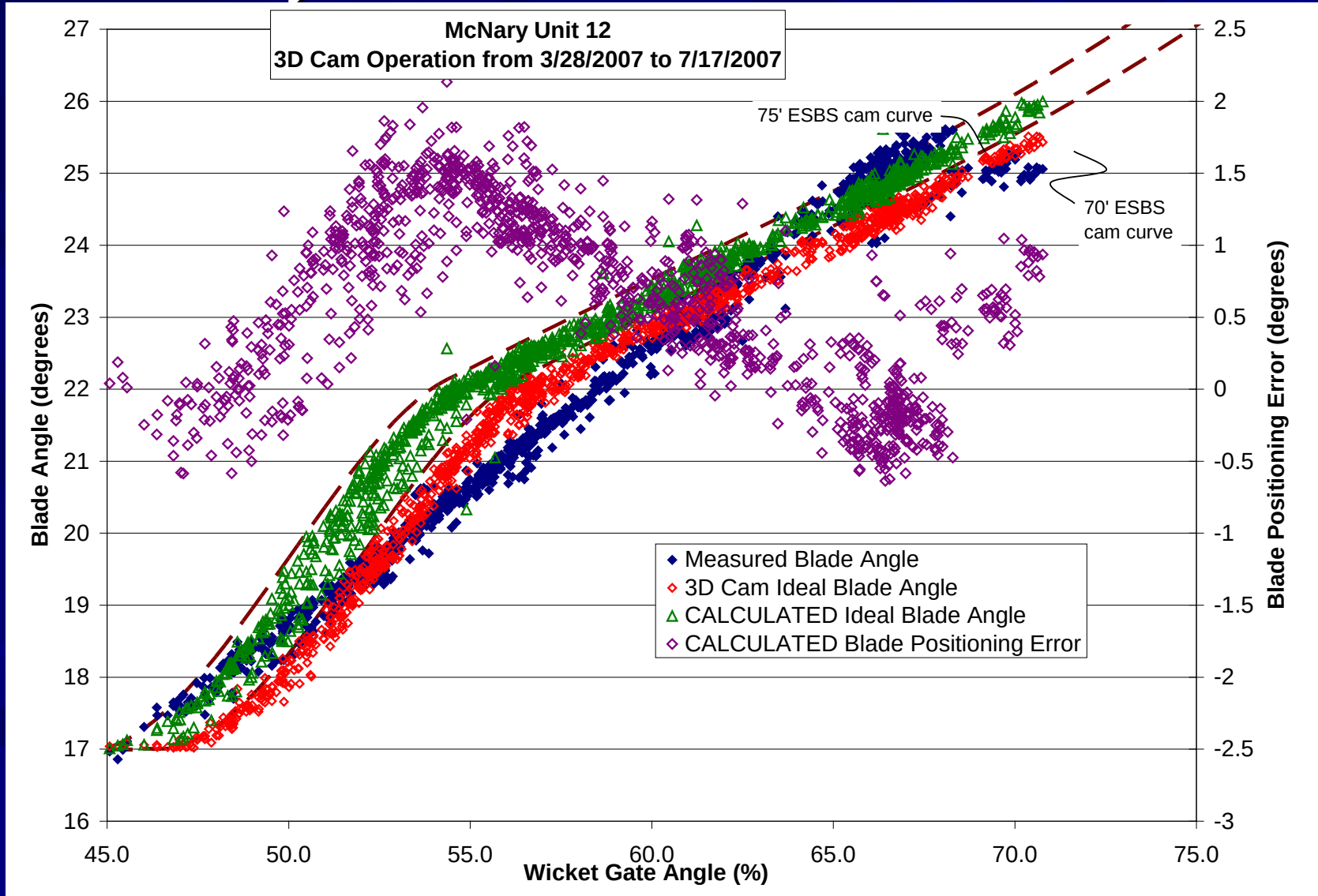
3D Cam Controller Survey Results

■ McN: Deadband reduced (± 0.5 deg)



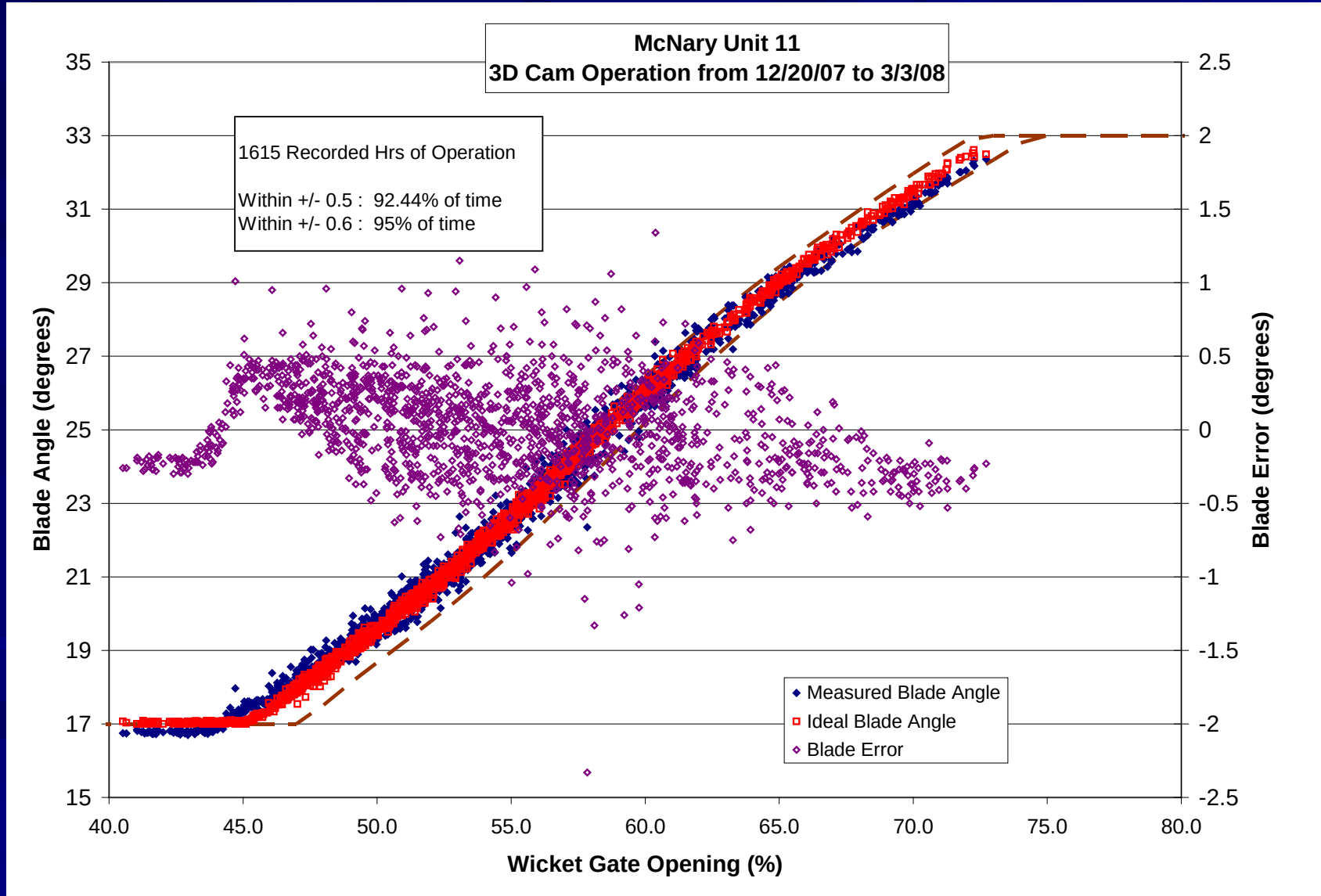
3D Cam Controller Survey Results

■ McN: Faulty head indication Units 11-14



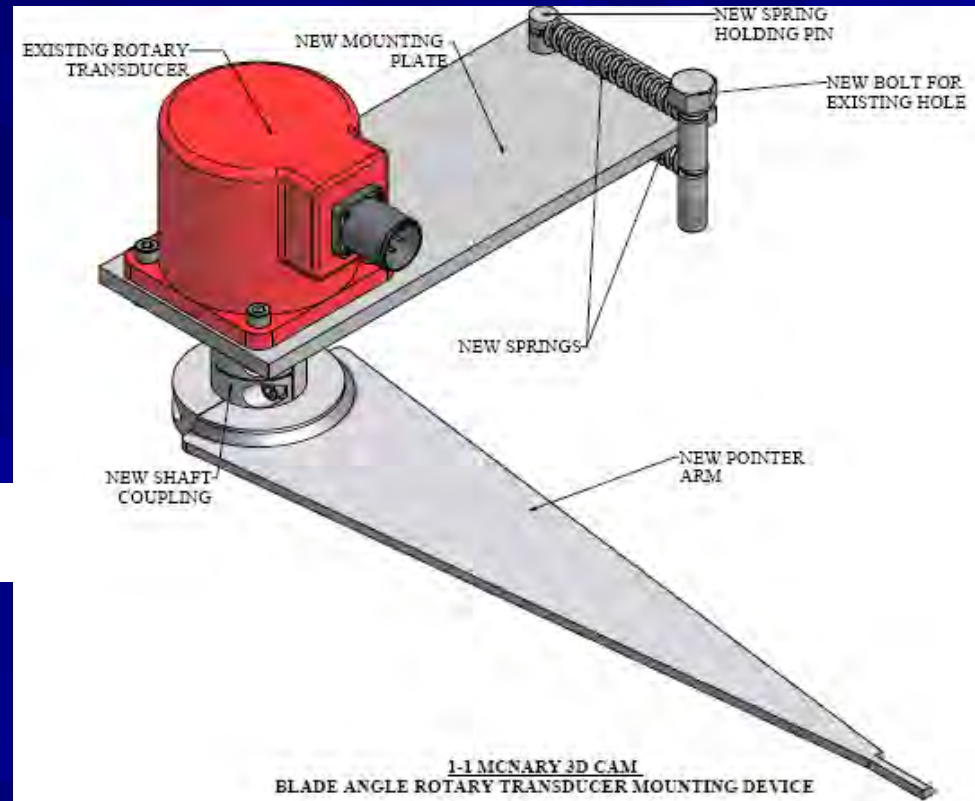
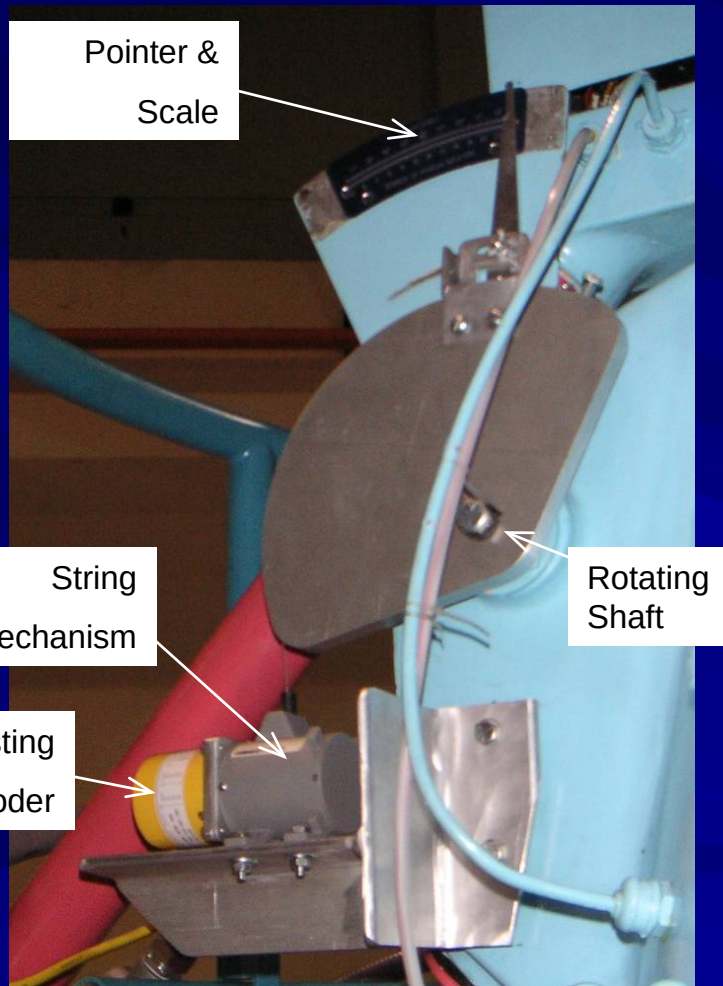
3D Cam Controller Survey Results

- McN: Failed pressure x-ducer replaced by Project personnel



3D Cam Controller Survey Results

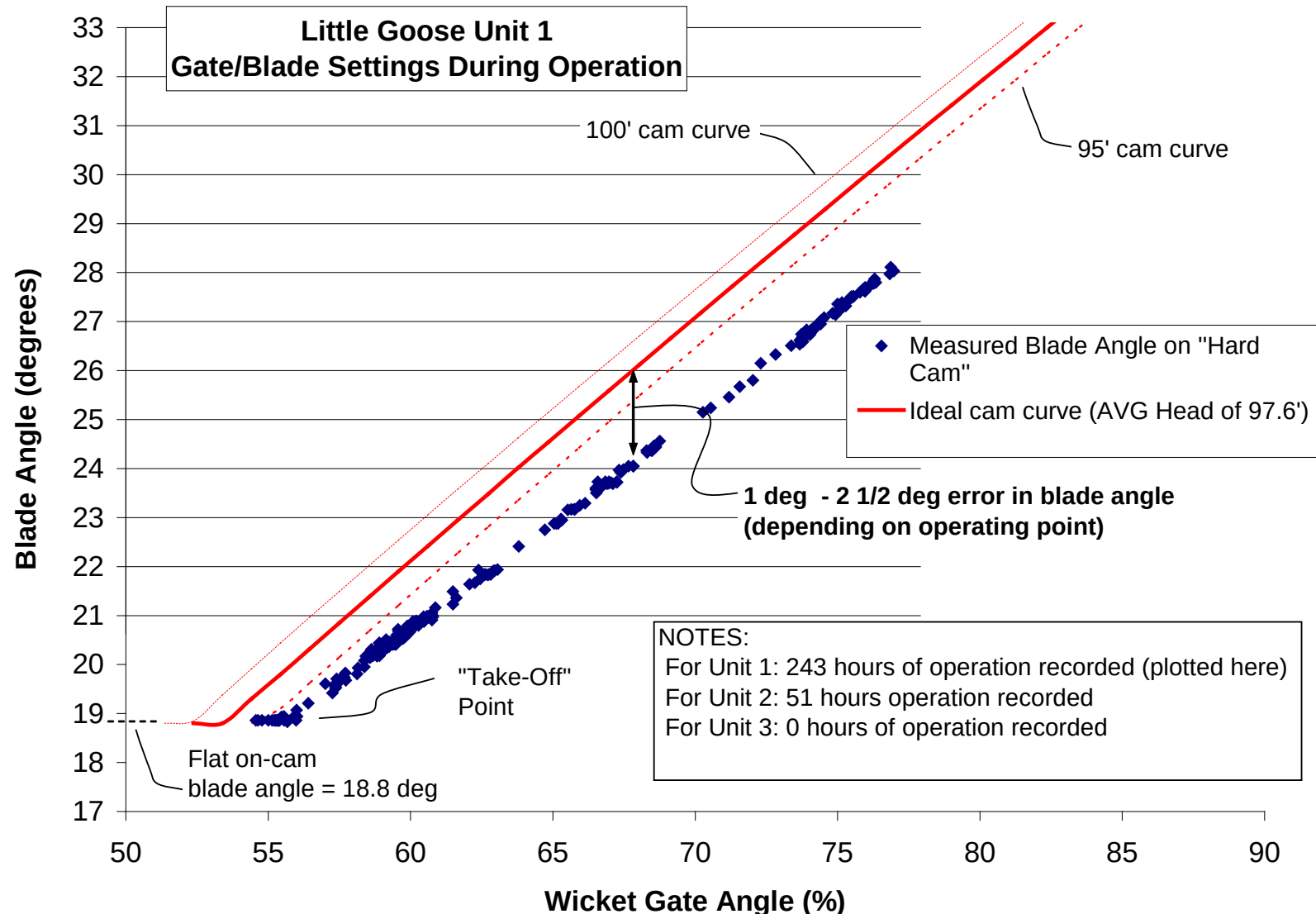
- McN: Design for OH transducer mounting modification sent to Project 21 Feb



3D Cam Controller Survey Results

■ LGO Sept 07 Survey: Limited data available.

Extended operation without 3D cam functional – operation on hard cam



3D Cam Controller Survey Results

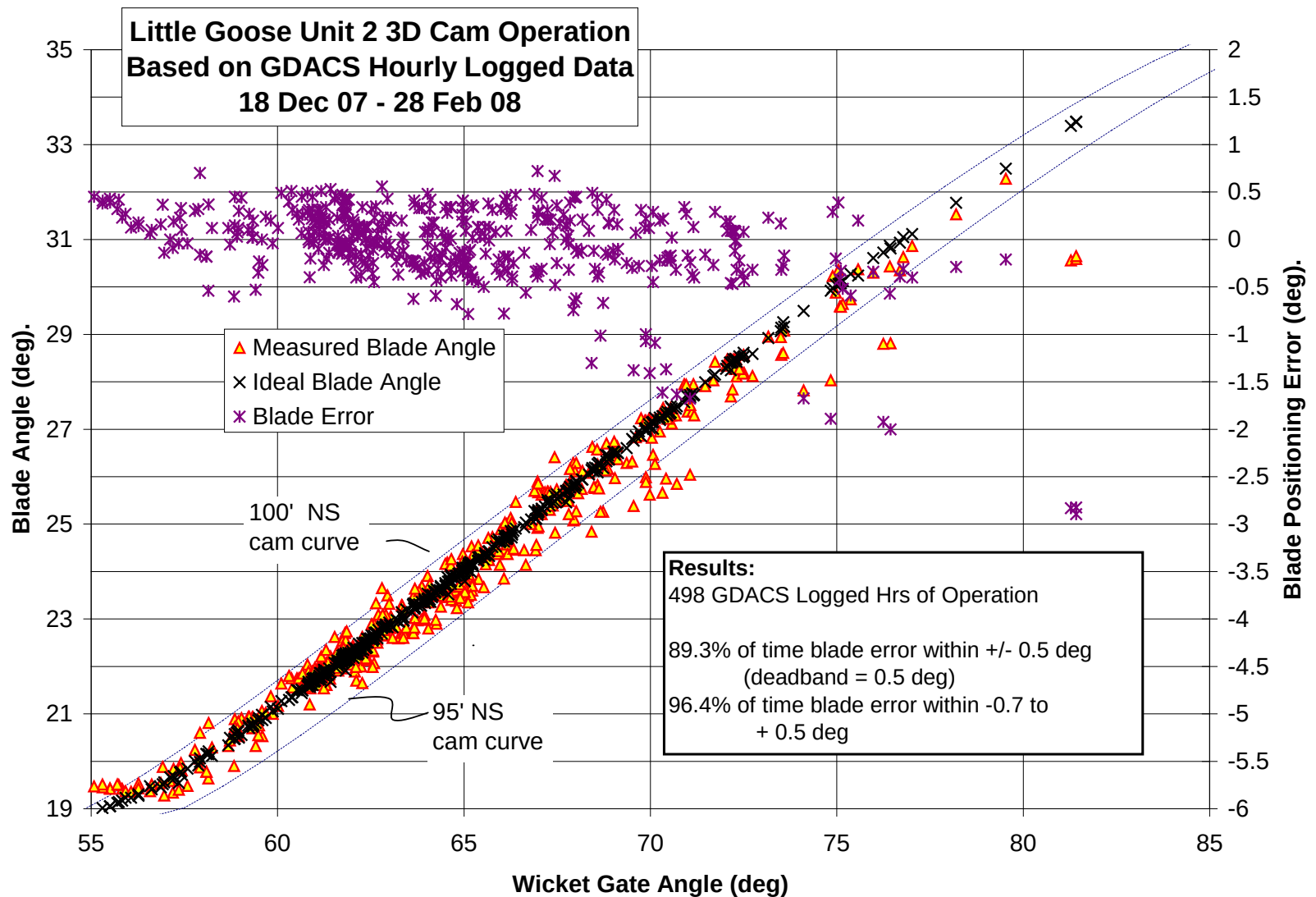
■ LGO:

- GMT travelled to site 17 Dec 3D cam programming restored.

	Mar '08
	+/- 0.5 deg
Unit 1	62%
Unit 2	89%
Unit 3	82%
Unit 4	96%
Unit 5	97%
Unit 6	OOS

3D Cam Controller Survey Results

■ LGO Mar 08 Survey:



3D Cam Controller Survey Results

■ IH:

- Dec '07 Survey indicated frequent faults.
- Project has been troubleshooting. Potential hardware modifications implemented.

	Mar '08
	+/- 0.5 deg
Unit 1	90%
Unit 2	n/a
Unit 3	n/a
Unit 4	93%
Unit 5	77%
Unit 6	OOS

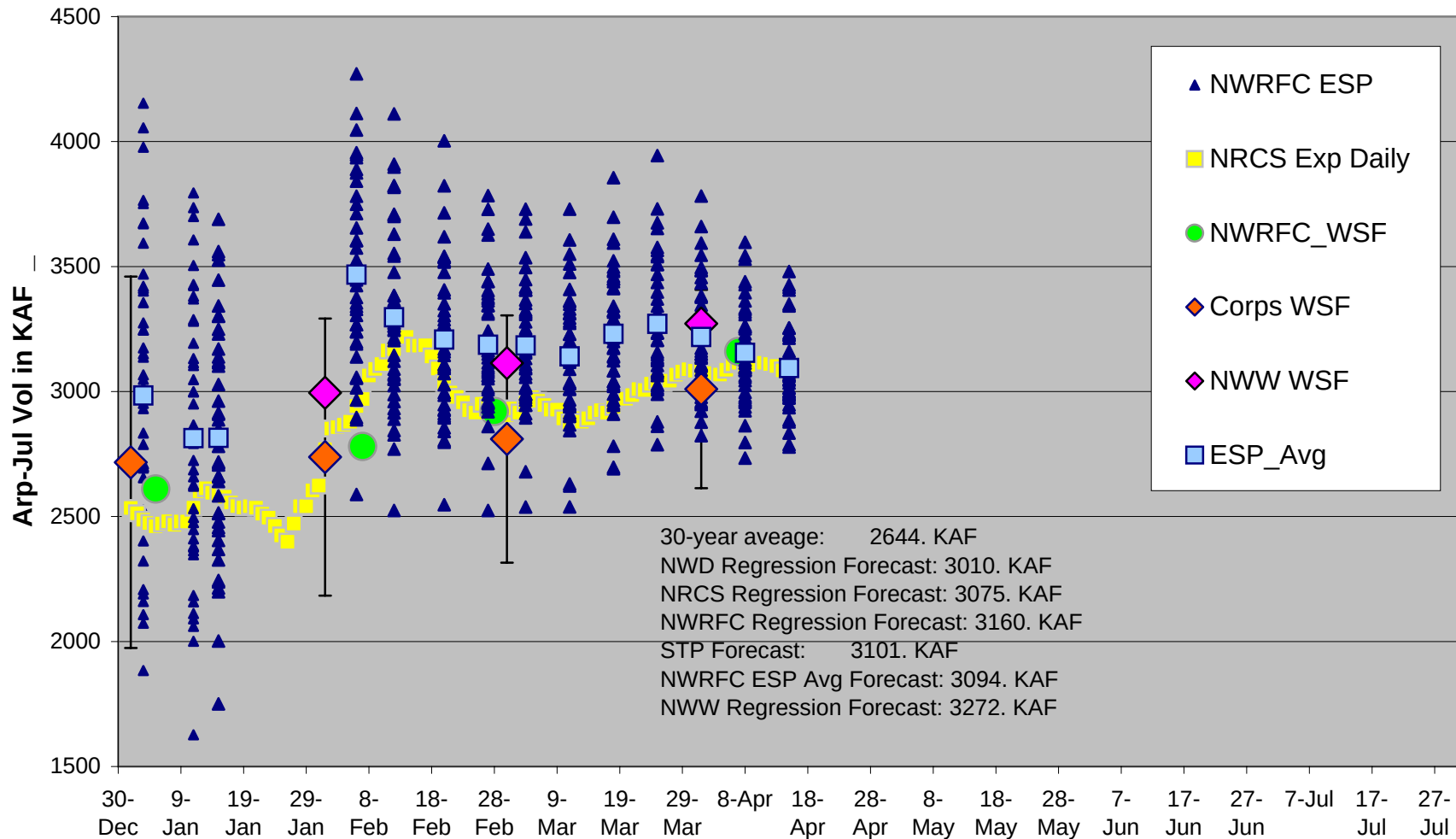
3D Cam controllers

- NWW Surveys to be repeated mid-summer
- What about NWP?
 - 3D cams info not logged into GDACS
 - Cannot perform similar evaluation of operation
 - Annual surveys limited to “snap shot”
 - Surveys have not identified any significant issues

3D Cam Controllers

- Considerable Improvement from Fall '07
- Continue to work on improving reliability
- Continue surveys to ensure we don't veer off track

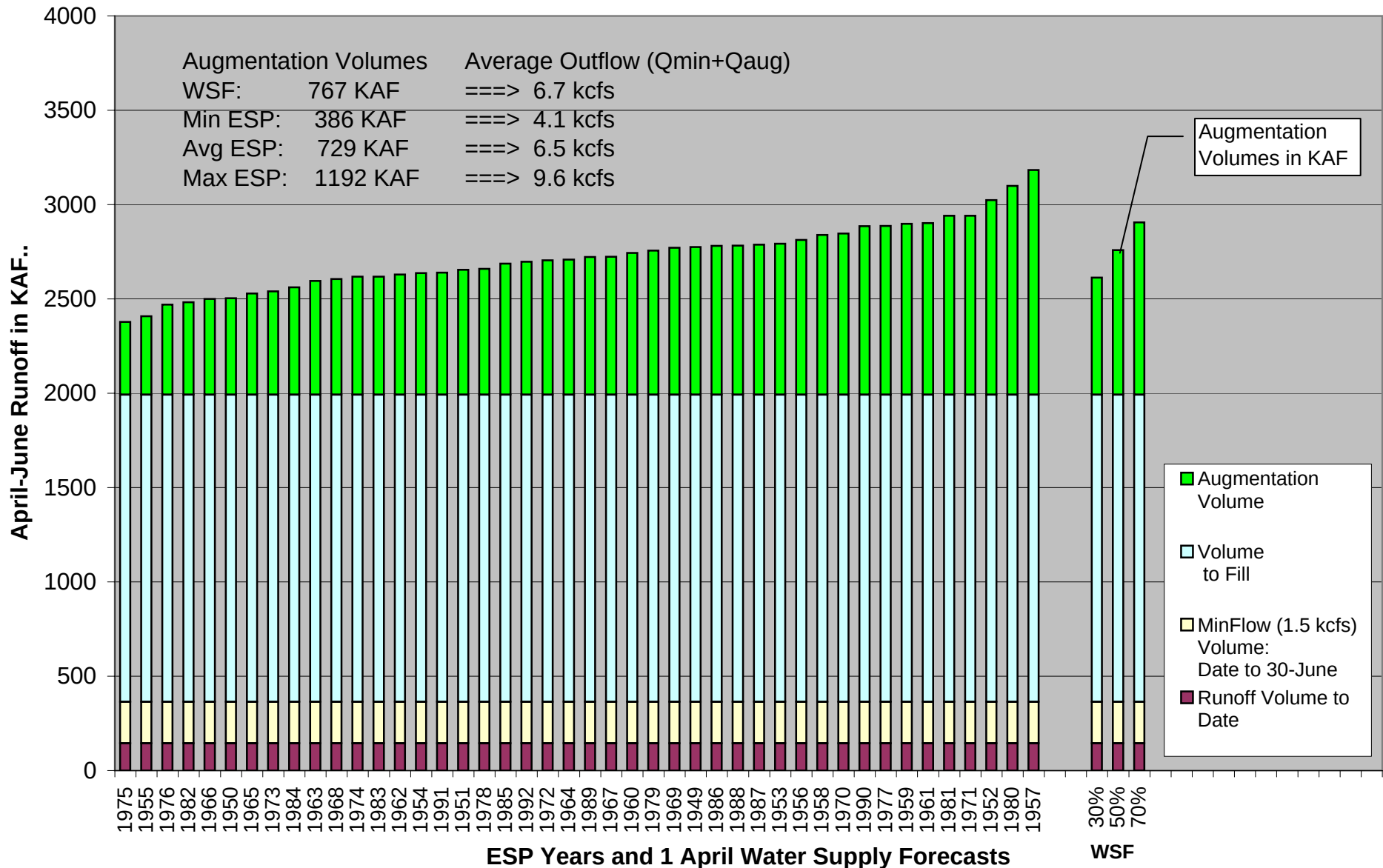
Dworshak, ID April-July Inflow Volume Forecast Comparison through 14-April 2008



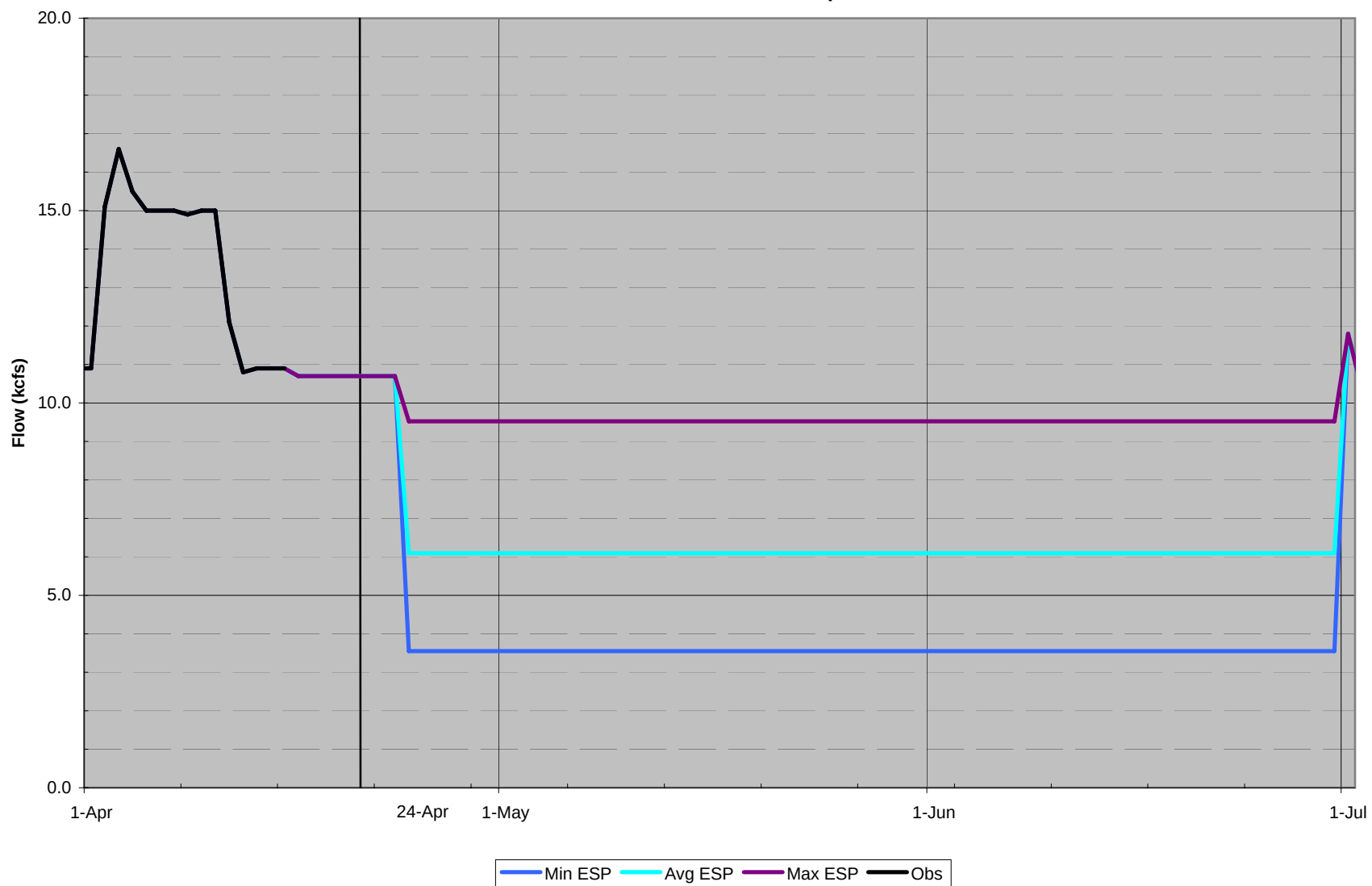
Dworshak Augmentation Volumes

ESP inflows and 01-Apr Water Supply Forecast

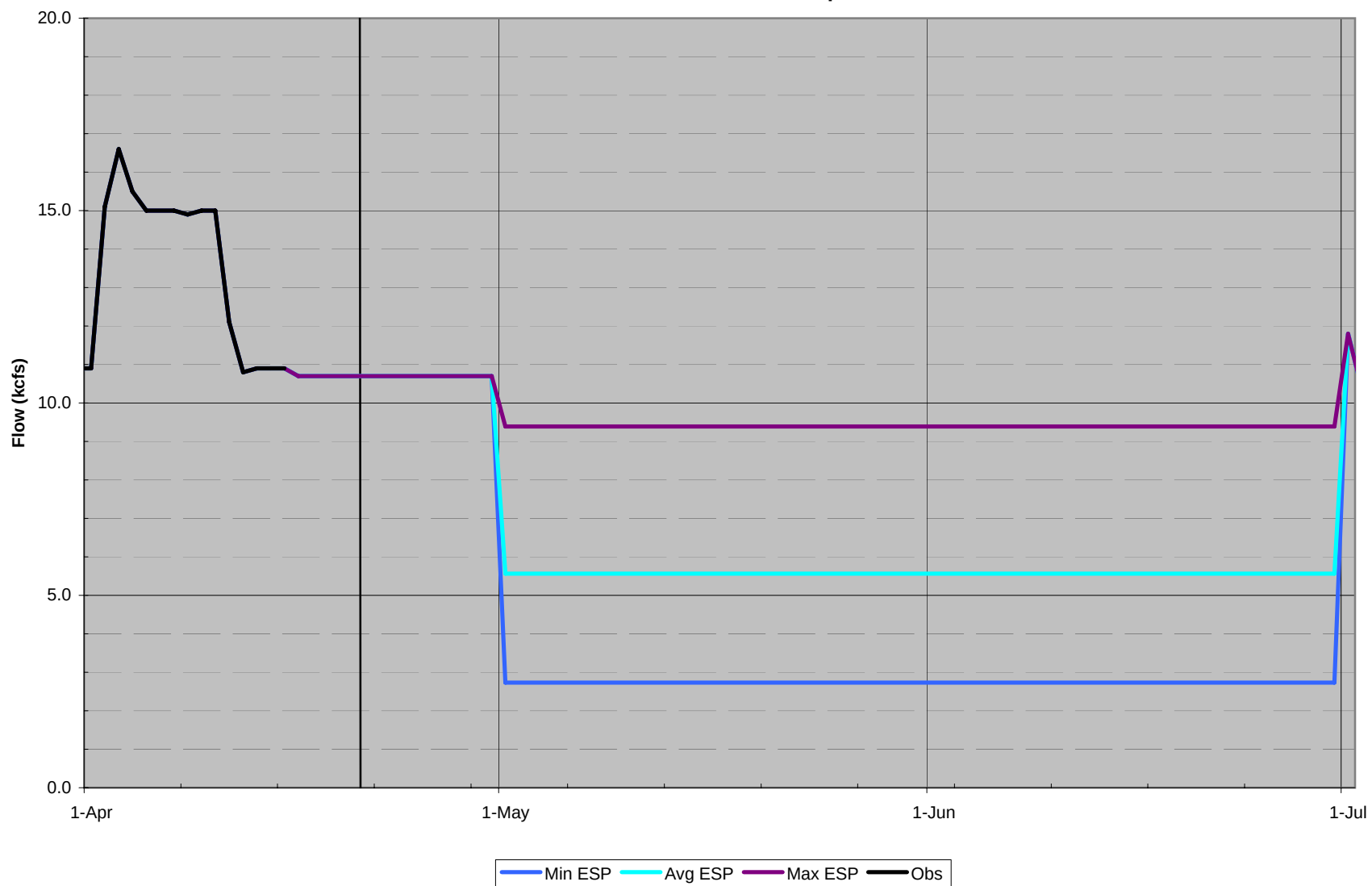
Observed data through **17-Apr-2008**



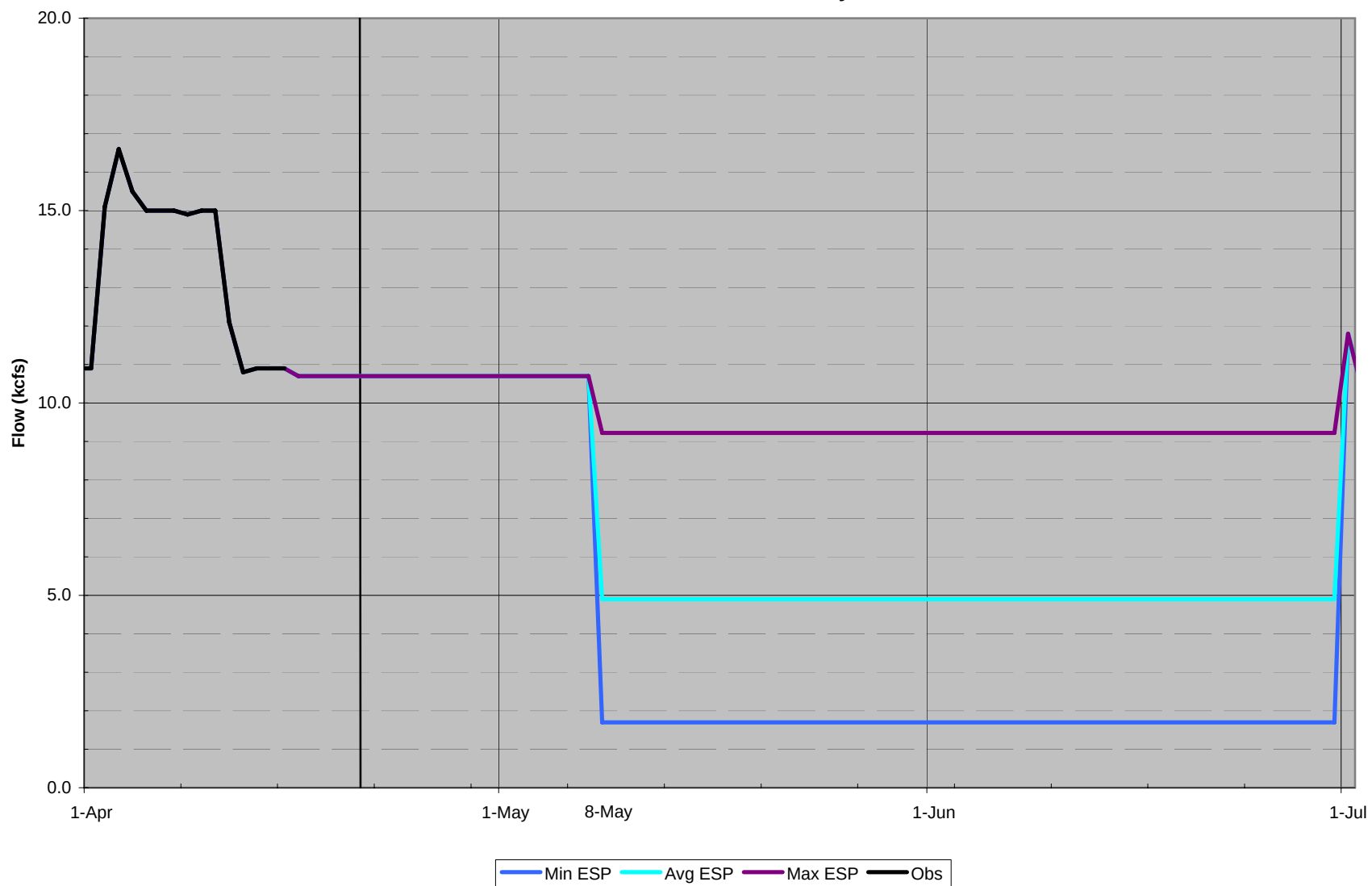
Average Outflow (Qmin+Qaug) to Refill by June 30th
Based on 15 April 2008 ESP
Scenerio 1 Full load thru 23-April



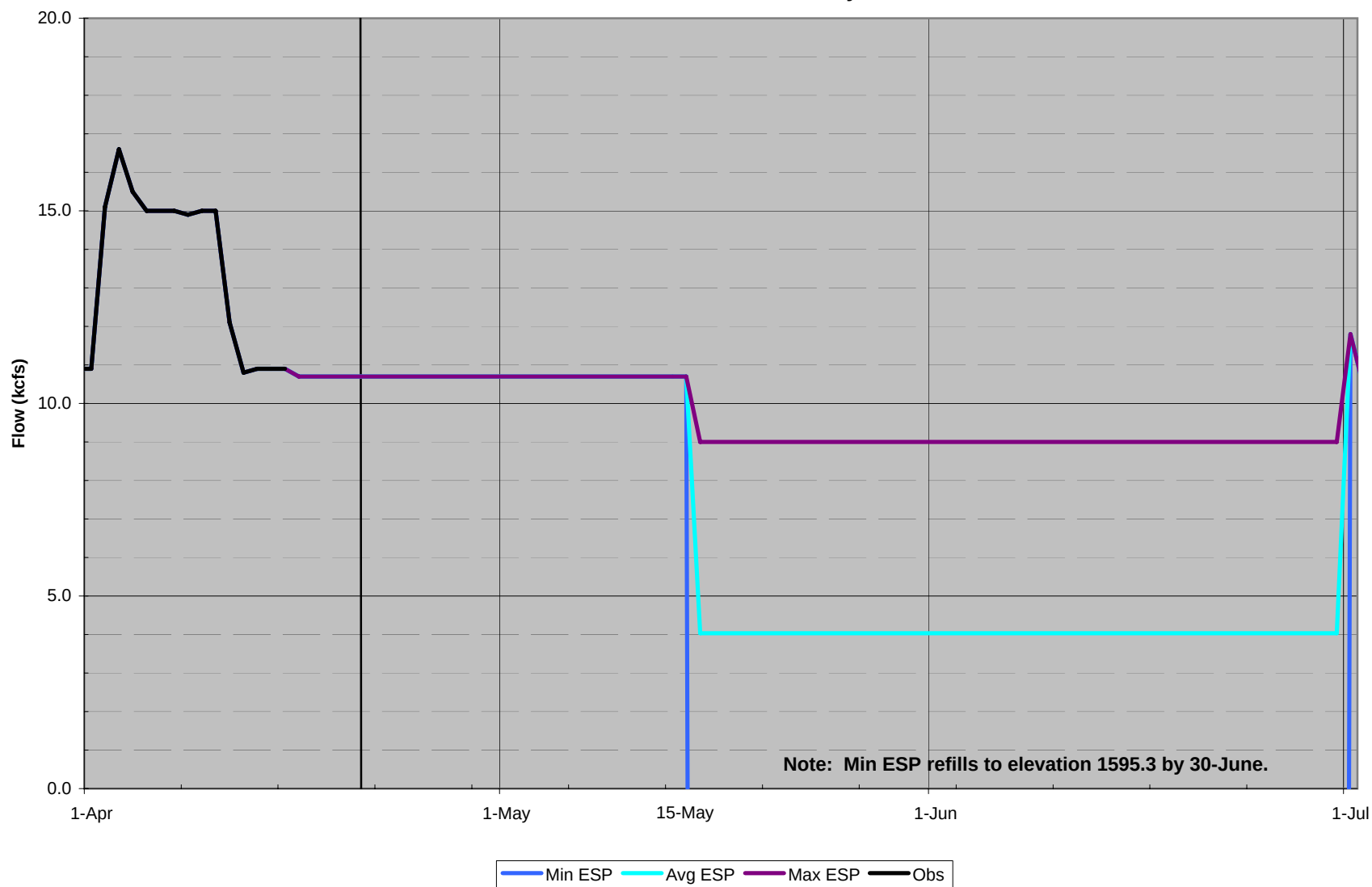
Average Outflow (Qmin+Qaug) to Refill by June 30th
Based on 15 April 2008 ESP
Scenerio 2 Full load thru 30-April



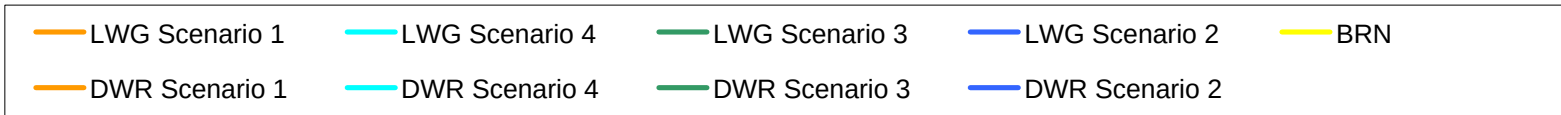
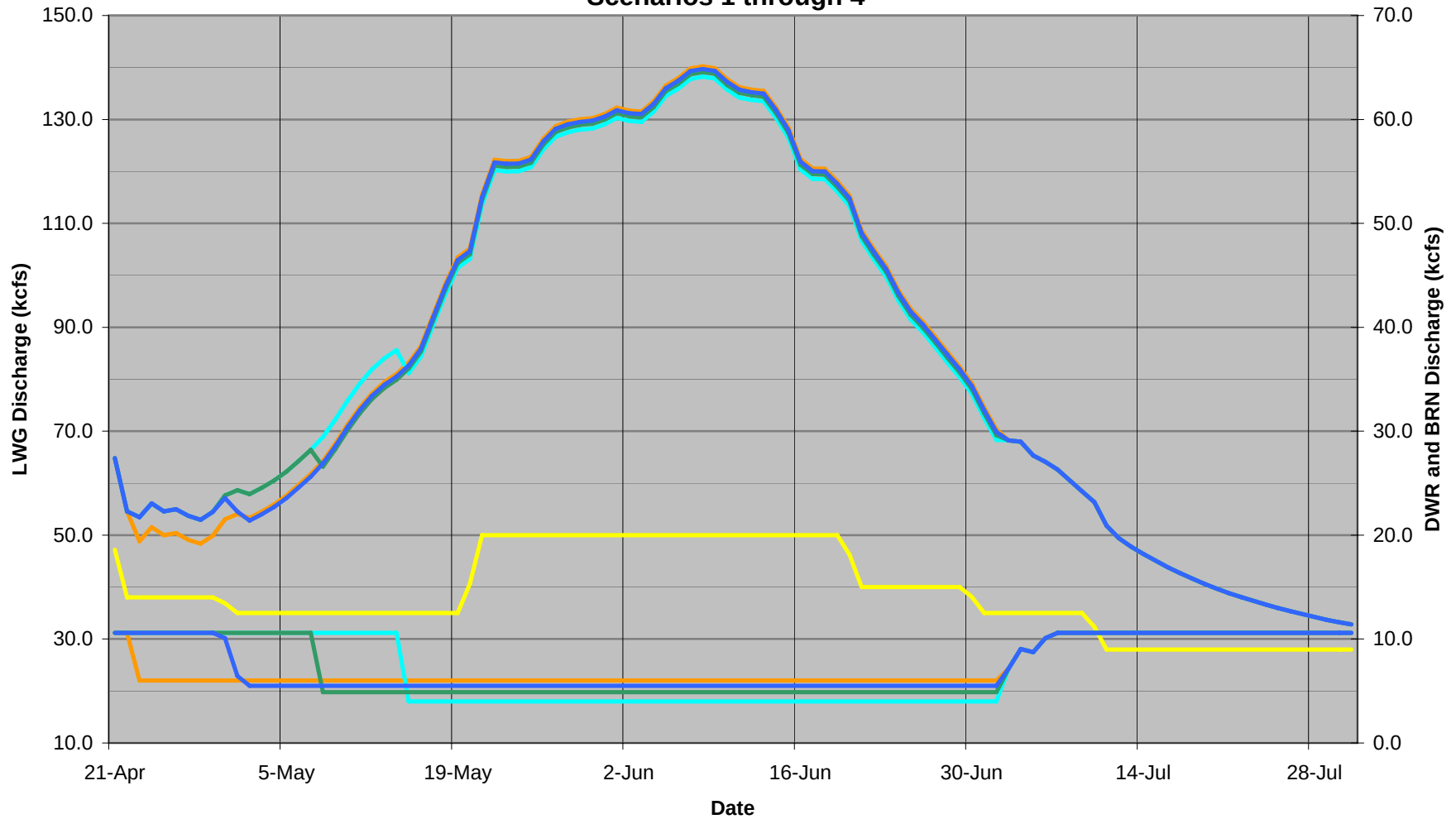
Average Outflow (Qmin+Qaug) to Refill by June 30th
Based on 15 April 2008 ESP
Scenerio 3 Full load thru 7-May



Average Outflow (Qmin+Qaug) to Refill by June 30th
Based on 15 April 2008 ESP
Scenerio 4 Full load thru 14-May



Lower Granite 22-Apr STP Flows
Scenarios 1 through 4



COLUMBIA RIVER REGIONAL FORUM

TECHNICAL MANAGEMENT TEAM

April 23, 2008 Meeting

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Robin Gumpert

Notes: Erin Halton

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.

Official Minutes/Facilitator Notes

The 4/16 conference call facilitator notes and official minutes were posted to the web. TMT members did not have any additional comments on the notes and they were determined to be final as of today.

Priest Rapids Operations

Russell Langshaw, Grant County PUD, reported on rearing protection flows: mean daily discharges ranged from 67-104 kcfs. Langshaw said constraint bands were between 20-30 kcfs. Temperature units reached 800 on 4/17, triggering weekend protection flow bands (weekly minimum flow bands calculated as the mean of the previous Monday-Thursday) that will continue for four weekends.

Action/Next Steps: Langshaw will provide an update at the 5/7 TMT meeting.

3D Cam Update

Don Faulkner and Dan Ramirez, COE, referred TMT to a power point presentation that the COE planned to attach as a link to the TMT agenda by the end of the day. Ramirez said that the COE has performed annual surveys of 3-D cams and governors since 2005, making improvements as needed. Ramirez brought a small physical example of the blade, which allow for fine tuning and regulation of turbine operations and help with 1% peak efficiency. During inspections that took place in the fall of 2007, improved evaluation methods for the 3-D cams were employed. COE developed a way to track the cams' operation via the GDACS computer system at some Corps plants. COE surveyors evaluated three months of operation and found that 3-D cam reliability varied by plant:

- Lower Monumental / Lower Granite are both operating in the high 90% consistency range. (Ramirez noted that the goal is to stay within +/- -0.5 degrees accuracy and efficiency at all projects.)
- McNary: There is quite a bit of variation, 60% to a high of 90%. Efforts have been made to reduce dead band, and there is a new design for transducer monitoring modification.
- Little Goose: Limited data available, efforts have been made to restore consistent programming.
- Ice Harbor: There are frequent faults. There is a potential need for hardware modifications.

Action/Next Steps: More surveys are planned for this summer and the COE will continue to address issues and improve reliability. The COE has identified the need for logging into GDACS software, to support consistent monitoring of efficiency across the projects. The COE will post the power point presentation as a link to the agenda on the TMT website.

Dworshak Operations

Steve Hall, COE, reported on analysis of four operational scenarios for Dworshak, posted as a link to the TMT agenda. He shared the latest ESP forecasts and a range of potential volumes. Hall reviewed the four posted scenarios, noting the uncertainty of flows out of Brownlee. The final graph displayed STP average traces and their impact on flows at Lower Granite. Paul Wagner, speaking on behalf of the salmon managers, commended the display of analysis. It was observed said that based on the current level of snow accumulation, conditions will not likely be at the low end of flow ranges, and there is uncertainty of future precipitation. Wagner said that the Salmon Manager recommendation was to stay with current operations until the middle of next week, when updated forecasts can be discussed.

Action/Next Steps: The COE offered to continue to generate weekly scenarios in a similar fashion, posting them as links to the TMT website, under Document/ESP forecasts. The COE planned to continue operating Dworshak at full power house. This item will be discussed during a TMT conference call on 4/30.

Spring Creek Hatchery Release

Dave Wills, USFWS, provided a summary of 2008 Hatchery releases, posted as a link to the agenda as follow up from the 4/16 TMT conference call. Wills noted the size discrepancy between May 2007 and May 2008 fish, likely attributed to new fish feed. Wills said that continuing studies at the gateway will be conducted this week and next, to evaluate impacts to the hatchery fish at the upper and middle range of turbine operation. He suggested further TMT discussion of the new data on 4/30 to discuss any recommended operational adjustments to the scheduled May 2 release. Dan Feil, COE, noted that the project hydraulic capacity for generation was approximately 176 kcfs when operating at the lower quarter of the 1% range. With the 100 kcfs spill called for in the 2008 FOP, maximum total river flow while operating at the low end of the 1% range would be approximately 276 kcfs. Feil added that if total river flows were to exceed about 280 kcfs, the project would need to move upward in the 1% range. This would be done prior to the need for any involuntary spill.

Action/Next Steps: The COE planned to operate Bonneville at the lower end of 1% for four days under a hard constraint to support the 5/2 Spring Creek Hatchery Release. If river flows exceed 280 kcfs, the project would begin generation above the lower quarter of the 1% range until the upper end of the 1% range is reached. This item will be on the agenda for the 4/30 TMT conference call.

Transportation Operations

Dan Feil, COE, reported that start of transportation was planned for 5/1 at Lower Granite, per the Salmon Manager recommendation. Paul Wagner, speaking on behalf of the

Salmon Managers, acknowledged the start date and noted that 50,000/day were the latest daily passage numbers. This operation is court-ordered and is expected to provide data that will help inform future decisions.

Margaret Filardo and Jerry McCann, Fish Passage Center, reported that results from 4/15 surveys indicated that gas bubble trauma was up to 25% in smolts, adding that this week's data was expected later in the day. Jim Adams noted that TDG and flow levels at Lower Granite and Little Goose had been relatively low for this time of year.

Little Goose Spill Operations

Dan Feil, COE, reported that 14 days of night spill will commence at 1800 hours on 4/25, and will likely conclude by 5/15, per the Salmon Manager's recommendation. Jim Adams, COE, said that the current Little Goose gas cap is 30 kcfs and gave TMT members head's up that the Lower Monumental gas cap may shift as a result of this operation. The spill cap at Lower Monumental was at 27 kcfs on 4/23. BPA noted that a four day lead time was preferable and that two days notice is the minimum amount of time needed for operational shifts.

Water Management Plan Spring/Summer Update

Jim Adams, COE, reported that comments on the Water Management Plan spring/summer update had been received from BOR, NOAA and MT. Comments were expected to be posted on the TMT website within the next day or two.

Action/Next Steps: TMT members should send their comments on the draft to the COE by 4/25. TMT will finalize the document at a future meeting, and this item will be on the agenda for the 5/7 TMT meeting.

TMT Guidelines

Facilitator Robin Gumpert asked if TMT members had any suggested changes to the TMT Guidelines and clarified that the updated version will be included as an appendix to the 2008 Water Management Plan. No edits/changes were offered during the meeting.

Action/Next Steps:

- Paul Wagner, NOAA, said that he would send his changes via email to DS Consulting.
- WA, ID, and MT said they would review the document and send any changes to DS Consulting by 4/30.
- DSC will send the revised document out for final review prior to the 5/7 meeting, and TMT will look to finalize the document at the 5/7 meeting.
- TMT members suggested that the Guidelines should be revisited regularly and that August or September may be appropriate timeframes for review.

Operations Review

Reservoirs: Libby was at 2395.6' with 4 kcfs out and an end of April flood control target elevation of 2402.2'. Albeni Falls was at 2055.6', with inflows of 22.2 kcfs and operating within the range of 2055-2056' through the end of April. Dworshak was at elevation 1481.2' with inflows ranging between 5-6 kcfs and outflows of 10.7 kcfs. The 7-day average flows at Lower Granite were 64.2 kcfs, 159 kcfs at McNary and 175 kcfs at Bonneville. Grand Coulee was at elevation 1237.4' with an end of April flood control elevation target of 1228.8'. Hungry Horse was at 3501.56' with 4.6 kcfs out.

Updates: The COE reported that Lower Granite units 1 and 2 were out of service, and likely would be for some time; FPOM discussion of this and any resulting recommendations may be brought up at the next TMT meeting. A 4-unit outage at John Day was scheduled for 4/24. Three gates were closed at Ice Harbor; this issue which was being vetted through FPOM. The COE said the project would be back in compliance with FPP by the end of the week.

Fish: Paul Wagner, NOAA, reported that Spring Chinook passage over Bonneville had increased, in the range of 1500-2500 passing per day for the past few days, and numbers were expected to continue to climb; Cindy LeFleur, WA, said to expect a peak in early May. Steelhead numbers were improving, approaching 50,000/day passage at Lower Granite. Yearling Chinook were passing Bonneville at rates of 25,000/day, nearly 5,000/day at McNary and approaching 15,000/day at John Day. Sampling efforts were underway at Little Goose and Lower Monumental.

Power system – Nothing to report.

Water quality – Jim Adams, COE, referred TMT to the TDG chart linked to the TMT website. He noted that the spill cap at Lower Monumental was set to 29 kcfs on Sunday which resulted in an exceedance at the tailwater gauge. As a result, the spill cap will be lowered to 27 kcfs. Most projects were generally staying below spill caps.

Next TMT Meeting: a conference call scheduled for 4/30 at 9am

Agenda Items include:

- Dworshak Operations
- Spring Creek Hatchery Release

5/7 TMT meeting

Agenda Items include:

- Priest Rapids Operations
- Spring Spill Operations
- TMT Guidelines
- Water Management Plan spring/summer update
- Operations Review

**Columbia River Regional Forum
Technical Management Team Meeting
April 23, 2008**

1. Introduction

Today's TMT meeting was chaired by Jim Adams (COE) and facilitated by Robin Gumpert (D.S. Consulting), with representatives of BOR, USFWS, BPA, NOAA, COE, FPC, CRITFC, Montana, Idaho, Washington and others attending in person or by phone. 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

TMT finalized the facilitator notes and official minutes for the April 16 conference call.

3. Priest Rapids Update

Over the past two weeks, daily flows at Priest Rapids Dam have ranged from 67-104 kcfs, with a 64.4 kcfs minimum and 112 kcfs maximum, Russell Langshaw (Grant Co. PUD) reported. Daily deltas ranged from 2.9-9.2 kcfs. On Saturday, April 18, 800 temperature units accumulated, which triggered weekend protection flows for chum. They will start this coming weekend for four consecutive weekends, meaning minimum flows will be equal to the mean minimum flow for Monday through Thursday of the previous week. Langshaw will continue to check in at regularly scheduled TMT meetings, the next on May 7.

4. Update on 3-D Cam and 1% Operation Improvements

Don Faulkner and Dan Ramirez (COE) gave an update on installation of equipment to improve the 1% operation for fish at dam turbines.

The COE's Hydroelectric Design Center (HDC) does an annual survey of 3-D cams, governors, and other equipment the Walla Walla district has installed to improve operations at 1% of turbine efficiency. All COE plants in the Columbia and Snake river systems use original mechanical governors that were installed sometime during the 1950s through the 1980s. The mechanical governors are supposed to position the turbine blade and gate in an optimal relationship for peak 1% efficiency; they position other turbine equipment as well.

Some of the original cam blades work in 5- to 10-foot head increments, which can be 5-7 feet off in terms of optimal positioning, Ramirez explained. In

the early 1990s, in an effort to solve this problem, the COE developed a 3-D cam controller that electronically fine-tunes turbine blade and gate positioning.

Walla Walla District; In 2005-06, the Walla Walla District tested all the flood units of every 3-D cam in its service territory and developed cam tables which were included in today's presentation (subsequently linked to today's TMT agenda). In 2004-05, the COE performed "snapshot" surveys consisting of 1-2 days' onsite evaluation. These short-term reviews of the cam controllers did not reveal any problems. However, that changed last fall when the district was able to access GDACS information regarding 3-D cam operation. For the first time, the district was able to do a historical analysis of how well the 3-D cams are working. Results were varied – some good, some not so good. Ramirez focused on specific projects.

Lower Monumental and Lower Granite dams. The 3-D cams are operating as well as can be expected, based on approximately 3 months of historical data.

McNary Dam. Surveys were done in August 2007 and again in March 2008. Based on approximately 3 months of data, three issues were found to be affecting 3-D cam operation at McNary. These problems were addressed, including a new design now being installed. The changes are expected to reduce blade positioning errors.

Lower Granite Dam. The 3-D cam malfunctioned for the entire month of September 2007 because of software problems, resulting in blade errors of up to 2.5 degrees. Programming was restored in December; Ramirez presented subsequent monitoring results for 3 months as of March 2008. Large blade errors such as those occurring at Lower Granite in September 2007 indicate lost turbine efficiency. This is a good example of why it's important to monitor 3-D cam operation closely and fix any problems quickly.

Ice Harbor Dam. There was not much information available on 3-D cam operation at this project. A March 2008 survey indicated problems with unit 5 which are now being addressed. The survey will be repeated this summer as part of the district's overall drive to improve the reliability of 3-D cam operations.

Portland District. Values for 3-D cam operations in the Portland district aren't logged (as they are in the Walla Walla District) because digital 3-D cam governors have not yet been installed in these dam turbines. Limited surveys have identified no significant 3-D cam issues in recent months.

There were significant problems in the fall of 2007, but these were addressed, and spring 2008 surveys showed significant improvement. The COE will continue to do surveys of its 3-D cams and institute changes as part of a goal to have all 3-D cams operate at peak efficiency 99% of the time (which Lower

Monumental does now). There appears to be no reason this goal isn't achievable. This presentation on 3-D cam operation will soon be available online, linked to today's TMT agenda.

5. Dworshak Operations

Steve Hall (COE) presented four operational scenarios based on ESP forecasts. (They are: Dworshak runoff volume already passed; volume required to meet minimum flows; volume required to refill the project; and flows that could be shaped as the reservoir refills). The four scenarios are linked to today's agenda. To find them on the TMT web page, go to Documents, then ESP Forecast, then Volume Forecast. Hall discussed each scenario.

- Scenario 1 (base case). Leave full powerhouse flows immediately and drop to the lower ESP average outflow. This operation would result in flows of approximately 6 kcfs through refill at the end of June, with upper and lower bounds of 9.5-3.5 kcfs.
- Scenario 2. Run full powerhouse through the end of April and see how that affects refill. Under this scenario, the average outflow appears to drop to 5.5 kcfs, with a maximum outflow of around 9.5 kcfs and a minimum of less than 3 kcfs.
- Scenario 3. Extend full powerhouse into the first weekend of May. This scenario essentially brings the average outflow down to just under 5 kcfs, with a minimum of approximately 2 kcfs and a maximum of 9 kcfs.
- Scenario 4. Extend full powerhouse operations through mid-May. Under this scenario, the average flow drops to 4 kcfs and maximum flow drops to 9 kcfs, with no need to meet minimum flows. Dworshak reservoir would be about 5 feet from full by the end of June. While that doesn't mean the reservoir couldn't refill in July, it does mean the reservoir would not meet its target of refilling by the end of June.

Hall presented another slide showing expected impacts to Lower Granite flows that would result from each of the scenarios. There was discussion of the fact that outflows from Brownlee Dam are impossible to predict, not under TMT's control, and can amount to four times the volume of flows released from Dworshak. While the varying flow amounts in the above scenarios appear to shift flow volumes by about 2 days between May 5-19, in reality, flow volumes could shift by up to 5 days from where they appear in the STP traces, Robyn MacKay (BPA) said. Others agreed the forecasts are limited. It's unlikely at this point that snowpack in 2008 will turn out to be below average, Wagner and Hall agreed.

After discussion at FPAC, the Salmon Managers recommended continuing the current operation at Dworshak of full powerhouse (10.8 kcfs outflows)

through next week, Wagner said. The Salmon Managers will check in after the May 1 forecast is released. TMT planned to revisit this issue on its April 30 conference call. Meanwhile, the COE will continue to produce these graphs as updated forecasts become available. They are very useful, Wagner said.

6. Spring Creek Hatchery Release

Dave Wills (USFWS) presented new information on the size of fish that will be released from the hatchery on Friday, May 2. Apparently, the switch to new fish feed is resulting in larger fish this year than last year's May release. Wills showed TMT online data and noted that subyearlings were exceptionally small in 2004. The hatchery calculates average size per pound for the release to account for variation among samples, he explained.

Wills said he'd contacted the researcher doing gateway studies at Bonneville to address the question of how turbines should be operated for this release. USFWS requested the low end of 1% operation for the May release, pending any updated information.

Because slightly higher mortality rates have been observed at the upper end of 1% vs. the lower end, the COE is willing to provide an operation at the lower end of 1% for this release, Dan Feil (COE) said. That means the Bonneville 2nd powerhouse capacity will be about 80 kcfs, with capacity at the 1st powerhouse of 96 kcfs. Currently, Bonneville is spilling approximately 100 kcfs, equivalent to a 276 kcfs river flow. Therefore, the caveat is: if flows exceed the 270-280 kcfs range, the COE will have to start ramping up units at the Bonneville 2nd powerhouse in order to maintain the spill level specified in the Fish Operations Plan. Uncontrolled spill above 100 kcfs would be likely to impact adult passage. TMT will revisit this issue during its April 30 conference call.

7. Transportation Operations

The COE plans to initiate transportation on May 1 at Lower Granite, unless the Salmon Managers change that request today, Feil said. (Next week's call would be too late to give project staff the necessary 3 days' lead time.) FPAC discussed this yesterday and chose to stick with the May 1 start date, Wagner said. The court-ordered operation differs from what was proposed in the draft BiOp. The point (in any study) of providing a different operation for comparison with the specified operation is to test the true effect of the specified operation, he explained. That's why people want to provide a different operation this year – to evaluate the effect of starting transportation after dates specified in the BiOp. Transportation will thus begin on May 1 this year.

There was discussion of gas bubble trauma problems that have recently been reported at Little Goose. Margaret Filardo and Jerry McCann (FPC) together explained that reported rates of around 25% for some samples are not

the result of errors in reporting methodology in recognizing symptoms of GBT. Given that gas levels in the river have been low recently (110% at Lower Granite gate, 106% in the Little Goose forebay), there is no obvious explanation for these findings. FPC staff will continue to monitor this problem closely and will notify TMT if adverse findings continue.

8. Little Goose 14-Day Nighttime Spill to Cap Operations

It's time again for the Salmon Managers to decide when to request spill for 14 days to the nighttime gas cap (currently 30 kcfs) at Little Goose beginning sometime after April 22, Feil said.

The Salmon Managers have discussed this and want it to start at 6 p.m. Friday night, April 25, and continue for 14 consecutive nights until further notice, Wagner said.

Adams commented that the increase in gas production at Goose is likely to influence gas caps farther downstream. The Lower Monumental gas cap is currently 27 kcfs and could be lowered as a result of this spill.

It would be possible to break up this operation and not run it for 14 consecutive days within the specified window as long as this spill provision is completed by May 15, Feil said. BPA would like at least 2 days' notice, 4 days preferably, if the nighttime spill is to be stopped and started again, Norris said. That means nighttime spill at Little Goose could be stopped and started once during the specified window (April 22-May 15).

9. Water Management Spring/Summer Update

The COE has received WMP comments from BOR, NOAA, and the state of Montana, Jim Adams reported. These comments will be posted to the TMT webpage within the next few days. USFWS plans to comment by the end of this week, April 25. There will be a status report on this topic May 7, with a goal of finalizing the WMP spring/summer update at that meeting.

10. TMT Guidelines

Robin Gumpert polled TMT members on whether they will have comments to the TMT guidelines, which were revised last March but never finalized. NOAA will send a few comments, but they're not substantive. BPA and BOR will probably not comment this year; BPA advocated annual reviews of the TMT guidelines. BOR had no comments today. Washington, Idaho and Montana had not yet reviewed the document. Gumpert requested that comments be sent to the facilitation team by April 30 so the guidelines can be finalized on May 7.

11. Operations Review

a. Reservoirs.

Libby is at elevation 2,395.6 feet, with an end of April flood control elevation target of 2,402.2 feet. The April final water supply forecast is 101% of normal. Libby is still passing minimum flows of 4 kcfs.

Albeni Falls is still operating within a 1-foot range through the end of April, maintaining an elevation of 2,055-2056 feet. Inflows are 22.2 kcfs.

Dworshak (discussed at length) is at elevation 1,481.2 feet, with inflows of 5-6 kcfs and outflows at full powerhouse (10.7 kcfs).

The 7-day average for inflows at Lower Granite is 64.2 kcfs. Units 1 and 2 will be out of service for a couple months, meaning Lower Granite is down to units 3-6, Don Faulkner reported. FPOM will look at unit priorities for Lower Granite and alert TMT if there are any recommended changes.

John Day units 13-16 will be out of service the afternoon of April 24. The navigation lock will be operated using a floating bulkhead, which could happen again over the next several months. This outage, a departure from the Fish Passage Plan, has already been discussed at FPOM and nobody objected, Feil noted.

The 7-day average for inflows at McNary is 159 kcfs. The 7-day average for inflows at Bonneville is 175 kcfs.

Grand Coulee is at elevation 1,237.4 feet, with an April 30 flood control elevation target of 1,228.8 feet.

Hungry Horse is at elevation 3,501.56 feet, discharging 4.6 kcfs. No changes in outflows are anticipated, pending the May forecast.

b. Fish. Spring Chinook are showing up in more significant numbers of 1,500-2,500/day at Bonneville Dam over the past few days, Wagner said. These numbers are expected to peak in early May. Lower Granite Dam is passing yearling Chinook smolts at the rate of nearly 50,000 per day. McNary Dam is passing 5,000 per day; John Day Dam, 13,000 per day, just in time for the 24-hour spill previously planned. Bonneville Dam is passing nearly 25,000 yearling Chinook per day.

Steelhead passage at Lower Granite Dam is approaching 50,000 per day, similar to yearling Chinook. Many of these are hatchery fish. The traditional split is 80% hatchery fish vs. 20% wild fish; this run is closer to 85% hatchery fish vs. 15% wild fish. Moving downriver, McNary is passing 3,500 steelhead per day; John Day, 1,800 steelhead per day; Bonneville, less than 1,000 per day.

c. Power System. There was nothing to report today.

d. Water Quality. There have been a few exceedances in the past week, but all projects are currently operating under water quality criteria, Adams said. TDG levels are currently low. Only Lower Monumental is approaching its spill cap. The spill cap at Little Goose was raised from 27 kcfs to 29 kcfs last Sunday, which immediately produced a tailwater exceedance at Lower Monumental. It looks like the threshold for tailwater exceedances at Lower Monumental is about 27 kcfs. Temperatures are still too low for exceedances in the Ice Harbor forebay. Bonneville Dam is spilling the full 100 kcfs allotted, while The Dalles, John Day and McNary are spilling 40%, 30% and 40% respectively, as specified in the 2008 Fish Operations Plan (2008 FOP). Flows are too low at Ice Harbor to spill to the spill cap at night, but IHR is spilling 45 kcfs during most daytime hours.

7. Next Meeting

The next TMT meeting will be an April 30 conference call to review Dworshak operations and conditions for the Spring Creek Hatchery release. The next regular TMT meeting will be on May 7. This summary prepared by consultant and writer Pat Vivian.

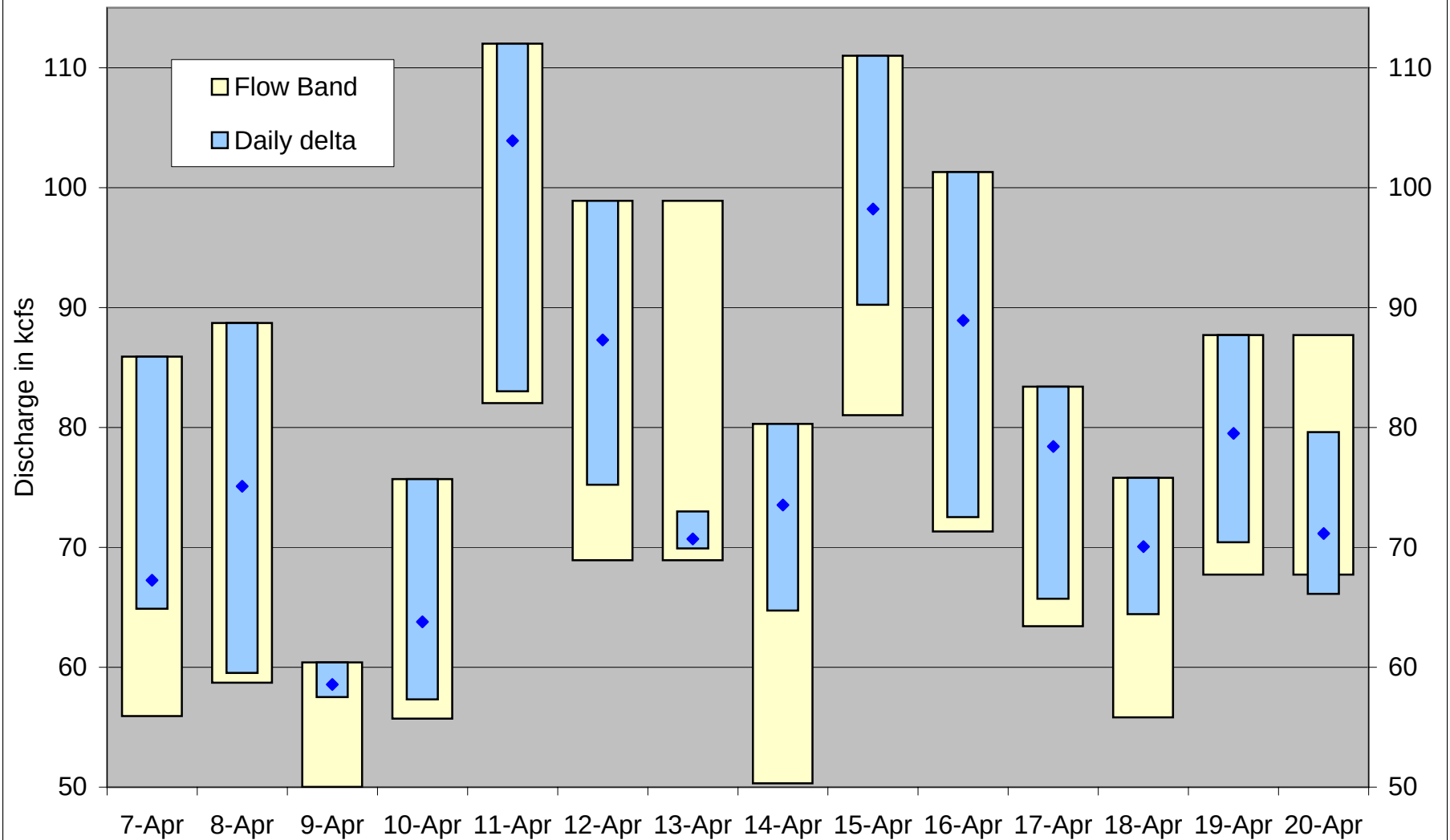
Name	Affiliation
John Roache	BOR
Tony Norris	BPA
Dave Wills	USFWS
Paul Wagner	NOAA
Jim Adams	COE
Tina Lundell	COE
Dan Feil	COE
Kyle Dittmer	CRITFC
Dan Spear	BPA
Robyn MacKay	BPA
Peggy Miller	BPA
Bob Diaz	PPM
Holli Krebs	Bear Stearns
Jennifer Miller	Susquehanna
Carl Cann	COE
Steven Hall	COE
Bob Buchholz	COE
Cathy Hlebechuk	COE
Dan Ramirez	COE
Rudd Turner	COE
Don Faulkner	COE
Laura Hamilton	COE

Phone:

Jim Litchfield	Montana
Russ Kiefer	Idaho
Scott Bettin	BPA
Katrina Starr	EWEB
Barry Espensen	CBB
Lynn Melder	COE Seattle
Russ George	WMC
Tim Heizenrader	Centaurus
Margaret Filardo	FPC
Cindy LeFleur	Washington
Glen Trager	Shell Energy
Russell Langshaw	Grant Co. PUD
Jay Rubenstein	Morgan Stanley
Tom Le	Puget Sound Energy
Bruce Bodecker	Highland Energy
Richelle Beck	DRA

Priest Rapids Operations 2008

Number of exceedances: 1



Summary of 2008 Releases from Spring Creek NFH

<u>Release</u> <u>Date</u>	<u>Number</u> <u>Released</u>	<u>Avg. Size</u> <u>(No./lb)</u>	<u>Avg. Length</u> <u>(mm)</u>	<u>Pond</u> <u>Temp (°F)</u>	<u>River</u> <u>Temp (°F)</u>	<u>Avg. River</u> <u>Flow (kcfs) ⁽¹⁾</u>
March 5	3,722,505	145.0	72	43.0	47.0	154.4
March 6	3,693,551	142.5	72	43.5	47.0	146.7
April 10	4,013,900	93.4	83	48.3	47.5	147.2
May 2 ⁽²⁾	3,500,000	55-60	106-103	49.0	50.0	213.9

Total: 14,929,956

⁽¹⁾ Six day average flow at Bonneville Dam, beginning with release date.

⁽²⁾ May 2 is the planned release date. Hatchery data is projected as of April 21.

River flow data is from Corps' April 21 STP.

Summary of 2007 Releases from Spring Creek NFH

<u>Release</u> <u>Date</u>	<u>Number</u> <u>Released</u>	<u>Avg. Size</u> <u>(No./lb)</u>	<u>Avg. Length</u> <u>(mm)</u>	<u>Pond</u> <u>Temp (°F)</u>	<u>River</u> <u>Temp (°F)</u>	<u>Avg. River</u> <u>Flow (kcfs) ⁽¹⁾</u>
March 5	6,598,443	149.3	71	47.3	43.0	155.7
March 9	1,168,812	128.1	75	47.8	44.0	154.8
April 12	4,210,573	88.6	85	48.1	47.0	235.5
May 1	3,494,735	74.2	90	48.4	53.0	275.2

Total: 15,472,563

⁽¹⁾ Six day average flow at Bonneville Dam, beginning with release date.

Counihan et al. (2004 and 2005) Run-of-River Average Forklength (mm) at Bonneville Dam

<u>Year</u>	<u>Yr-Chin</u>	<u>Dates</u>	<u>Steelhead</u>	<u>Dates</u>	<u>Sub-yr Chin</u>	<u>Dates</u>
2004	148	4/29-6/3	211	4/29-6/3	94	6/21-7/22
2005	151	5/1-6-1	208	5/6-6-7	96	6/17-7/18

TECHNICAL MANAGEMENT TEAM

BOR : John Roache / Mary Mellema / Pat McGrane

BPA : Robyn MacKay / Tony Norris / Scott Bettin

NOAA-F: Paul Wagner / Richard Dominique

USFWS : David Wills / Steve Haeseker

OR : Rick Kruger / Ron Boyce

ID : Russ Kiefer

WDFW : Cindy LeFleur

MT : Jim Litchfield / Brian Marotz

COE: Jim Adams / Cathy Hlebechuk / Bob Buchholz

TMT CONFERENCE CALL

Friday April 25, 2008 1:30 p.m.

CONFERENCE PHONE LINE

Conference call line: 203-310-2162; PASS CODE = 4703150

**We have had disruptions on the phone because people are not hitting 'mute' after dial in.
Please MUTE your Phone**

*All members are encouraged to call Robin Gumpert with any issues or concerns they would like to see addressed.
Please e-mail her at robin76@cnnw.net or call her at (503) 248-4703.*

AGENDA

1. Welcome and Introductions
2. Little Goose Operations
3. Chief Joseph Spill Test
[\[2008 Spill Test Plan\]](#) 
4. Gasoline Spill at Bonneville
5. Other

- a. Set agenda for next meeting - **April 30, 2008**
[\[Calendar 2008\]](#) 

Questions about the meeting may be referred to:

[Jim Adams](#) at (503) 808-3938, or

[Cathy Hlebechuk](#) at (503) 808-3942, or

[Bob Buchholz](#) at (503) 808-3945.



DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 3755
SEATTLE, WASHINGTON 98124-3755

CENWS-EC

16 April, 2008

MEMORANDUM FOR Commander, US Army Corps of Engineers, Seattle District,
ATTN: CENWS-EC (Mr. Mark Ohlstrom), 4735 East Marginal Way S., Seattle, WA 98134

Subject: Plan of Study for 2008 Prototype Spill Test Uplift Investigation at Chief Joseph Dam

1. Introduction.

Historical field measurements of foundation uplift pressures in several monoliths at Chief Joseph Dam have shown significant increases during spill. Previous and recent stability analyses (Design Memorandum No. 42, Supplement 5, dated 1996 and Charlwood, 2006) have determined that the uplift pressures in these monoliths are at or near the limits of dam safety criteria for both rotational and overturning stability. A detailed investigation of the possible causes of the observed uplift increases during spill suggested the most likely mechanism was transmission of high surface hydrodynamic pressures to the rock foundation through the spillway monolith joints, which are centered on the spillway bays. Visual inspection of the surface elastomeric V-shaped chamfer seal and core samples of the underlying bituminous cement seal in the monolith joints indicated the existing seal system at the dam is in poor condition. In addition, underwater inspection of the spillway, stilling basin surface, and monolith joints indicated that significant erosion has occurred at and near the toe of the ogee in the monoliths where the highest uplift increases were recorded. As a result of these inspections, Seattle District determined an extensive monolith joint repair project was required to prevent the transmission of high surface pressures through the joints to the foundation. An upgraded seal system was designed in 2006, consisting of an injection grout seal under the existing bituminous cement seal and a new elastomeric surface seal. Installation of the seal upgrades is currently under way.

In August 2006, Seattle District, Corps of Engineers initiated a multi-year project that significantly modifies the spillway and has the potential to change the uplift pressure environment at the dam. The Corps is constructing spillway deflectors on all 19 spillway bays to improve dissolved gas levels in the Columbia River downstream of the Project during spill. The installation of deflectors changes the hydrodynamic pressure distribution on the spillway by shifting the location of the high pressure region away from the toe of the spillway to the deflector and spillway face upstream of the deflector. The Corps recommended that a spill test be performed at an early stage in construction to investigate how changes to the spillway hydrodynamic pressure distribution due to the installation of deflectors and an upgraded seal system would affect uplift pressures at the dam. A spill test was conducted in 2007 to confirm that the partially completed new seal system in the monolith joints and spillway deflector were functioning to prevent the transmission of high surface hydrodynamic pressures to the rock foundation and to provide some initial data on the total dissolved gas exchange properties in the stilling basin and tailrace to evaluate the spillway deflector performance. This document describes a second field investigation of uplift pressures in Monoliths 16, 17, and 18 (under spillway bays 12 and 13) after the installation of spillway deflectors and completion of the injection grout seal system, but prior to the complete installation of the primary elastomeric surface seal, for a range of spill conditions.

2. Historical Information/Background.

Significant uplift increases in several monoliths were first noticed in 1997 when involuntary spill was required during a period of high spring runoff flows. The Corps suspected that the poor condition of the seals in the spillway contraction joints of these monoliths may have been partially responsible for the observed increases. As a result, the surface elastomeric seals under gates 10-14 (monoliths joints 14/15, 15/16, 16/17, 17/18) were repaired from the tainter gate sill beam (elevation 899 feet) to approximately elevation 820 feet and a short spill test over these gates was conducted following the 1997 flood event.

The 1997 spill test verified uplift pressures were at the limits of dam stability criteria and demonstrated that seal repairs in the upper zones of the spillway did not measurably improve uplift pressures in the problem monoliths. There were no conditions observed that exceeded global stability criteria for the relatively small discharges studied, and there was no further investigation at that time. Increases in uplift were not observed in all monoliths, however not all monoliths have uplift pressure instruments distributed across the foundation beyond the ones installed beneath the drainage and grouting gallery.

As a result of the planned installation of the spillway deflectors, a renewed investigation into the uplift issue was initiated and it was determined that a detailed independent technical review (ITR) of the issue and new stability analysis were required to analyze the effect of the installation of deflectors on uplift at the dam.

3. Justification of Need.

There are limited prototype data available about uplift response during spill with or without deflectors, primarily because of the lack of instrumentation to measure uplift pressures in most dams. Chief Joseph Dam is unique in that a series of piezometers were installed in Monoliths 7, 9, 11, 13, and 16-23 when the temporary sluiceways were plugged in the late 1970's as part of the pool raising structural modifications contract. Spill from the dam is infrequent in comparison to other dams on the Columbia River System because of the dam's large powerhouse capacity. Spill only occurs when river flows exceeds power demand and/or when there are high flood flows on the river. Therefore, there have been limited opportunities to gather uplift pressure data during high discharges and study the problem. In 2007, a prototype spill test was conducted following the construction of the first few spillway deflectors. The 2007 spill test data indicated that uplift pressures had been reduced by approximately 10-15 feet over the 1997 values and that the presence of the deflectors did not exacerbate the uplift pressure problem. However, the injection grout seals and the surface elastomeric seals were only partially completed in spill bays 12 and 13 prior to the spill test. Therefore, the functionality of these seal systems was not fully tested. Additionally, due to the short duration of spill increments, uplift pressures at many locations did not stabilize. The 2008 prototype spill test described herein will decrease the number of spill increments, but increase the duration of each increment to allow for uplift stabilization and test the effectiveness of the completed injection grout seal system.

The Corps needs a method to evaluate the combined effect of the monolith joint seal improvements and changes in pressure distribution due to the installation of the deflectors on uplift pressures. A program to confirm the design and execution of the injection grouting program using concrete coring along the sealed joints was planned, but the cost of this coring program and the limited coverage that would be obtained have made it a less desirable and comprehensive method of testing the seals than a spill test. At present, the injection grouting at bays 12 and 13 is complete, but the surface elastomeric seal has not been placed. This second

prototype spill test will confirm whether the injection grout seal system is effective at limiting the transmission of high surface hydrodynamic pressures to the rock foundation for the modified spillway. Testing of the new spillway deflectors and seal system on Bays 12 and 13, over the monoliths where some of the highest uplift pressures have been recorded, offers an opportunity to collect information to validate design assumptions and solutions before the construction process is complete.

A second prototype spill test provides a method to:

- 1) Evaluate the effectiveness of the injection grout seal system in monolith joints that have previously shown high uplift pressures.
- 2) Ensure that the transmission of the high surface hydrodynamic pressure is prevented from reaching the foundation in these monoliths
- 3) Ensure that these monoliths will meet dam safety criteria during spill.

4. Summary of Stability Analysis and Subsequent Seal Investigations at Chief Joseph Dam.

A structural ITR and a stability analysis, prepared by Robin Charlwood and Associates, PLLC (April 2006 and September 2006, respectively) concluded that:

- 1) The most likely mechanism for the observed uplift pressure increases during spill was transmission of high surface hydrodynamic pressures through the spillway monolith joints to the rock foundation;
- 2) The existing seal system in the spillway monolith joints, consisting of a 24-inch deep bituminous cement seal and an elastomeric surface chamfer seal was unusual (most dams have waterstops on the downstream face of the overflow sections) and inconsistent with current design practices;
- 3) The lack of a drain system in the apron and at the spillway toe to relieve uplift pressures was inconsistent with current design practices;
- 4) Uplift pressures would exceed dam stability criteria during spill with or without deflectors if surface hydrodynamic pressures were transmitted to the rock foundation from the upper zones of the spillway (above EL 810 ft.);
- 5) The transmission of high surface hydrodynamic pressures on the deflector and in a short zone just upstream of the deflector would exceed uplift dam stability criteria even at very low spillway discharges.

Subsequent visual inspections of the surface seal determined the existing surface seal was missing or damaged in most of the monoliths joints except for in Gates 10-14 where the seal was repaired prior to the 1997 spill test. There was also concern regarding the ability of the surface seals to remain in place and functional under high discharge conditions. Interviews with former Project personnel indicated the surface seals were not part of the initial design for the dam construction, but were subsequently installed to tailwater level in the early 1960's and repaired again in the 1970's. There is no elastomeric surface chamfer seal below the tailwater level.

Core samples of the 50-yr old bituminous cement seals demonstrated the seal had significantly deteriorated and likely could not be relied upon to prevent transmission of surface hydrodynamic pressures to the foundation. An underwater survey conducted in September 2005 indicated there was significant damage to the spillway and stilling basin surface and monolith joints at the toe of the spillway in Monoliths 17-20. The stability analysis recommended either a new sub-horizontal drain at EL 774 ft or new redundant seal system along the entire length of the spillway monolith joint from the deflector to the spillway tainter gate sill be installed as soon as possible to address the potential source of the uplift. The stability analysis also recommended a prototype spill test be conducted to assure the performance of the upgraded seal system.

5. Design of the Seal System.

Consistent with the recommendations of the stability analysis, Seattle District has designed a new redundant seal system both in the deflector and in the spillway monolith joints. The new deflectors have a double waterstop and drain. The monolith joint seal system will consist of an injection grout seal which will be installed below the existing bituminous cement seal, and an elastomeric surface chamfer seal. A number of seal and drain systems were evaluated but it was determined that this design is the most feasible and the least cost alternative given the CJD spillway environment. The existing bituminous cement seal contains an asbestos filler and massive excavation of concrete or drilling would be difficult, risky, expensive and may, unless constructed perfectly, create new leakage paths. The materials for the elastomeric and injection grout seal were carefully chosen to assure that they would withstand the high velocities and high pressure environment that they will be subjected to on the spillway face. It is recognized that careful placement of the injection grout seal and elastomeric seal are critical to the effectiveness of the new seal system and appropriate quality control procedures need to be implemented. This was to include coring and water pressure testing of the injection seal to provide assurance of its effectiveness. Chief Joseph Project personnel and the spillway deflector Contractor are currently at work on the installation of the new seal system at the Project (see Figure 1 for expected status of the joint seals in each monolith joint at the time of the spill test).

6. Condition of Spillway in Monoliths 16, 17, and 18 under Gates 12 and 13.

Similar to the 2007 spill test, the 2008 spill test will be conducted through Bays 12 and 13 over completed deflectors on Monolith 16, 17, and 18, where some of the highest uplift pressures were observed during the 1997 spill test. In contrast to the 2007 test, the injection grout seal has been completed; however, the elastomeric surface seal is only partially complete. Below is a summary of the current condition of the spillway and monolith joints in Bays 12 and 13 (monolith joints 16/17 and 17/18).

a. Core samples of the bituminous cement seal from monoliths 16 and 17 showed the seal material was heavily compressed, flaky, and not bonded to both sides of the contraction joint. The new injection grout seal in monolith joints 16/17 and 17/18 has been completed from the deflector (elevation 779.1 feet) to the tainter gate sill beam (elevation 899 feet).

b. The elastomeric surface chamfer seals under Gates 10-14 were replaced prior to the 1997 spill test and appeared to function in monoliths 16, 17 and 18 at that time. However, they are only present from approximately EL 820 ft to the spillway tainter gate sill (elevation 899 feet)

c. The full seal system in the new deflectors (two waterstops and a drain) has been installed.

d. A new surface elastomeric seal is in place from the top of the deflector (elevation 779.1 feet) to elevation 783.7 ft in spill bay 12. The corresponding seal in bay 13 was eroded away during the 2007 spill test.

e. There is no elastomeric surface chamfer seal along the joints between elevation 783.7 and 795 feet.

f. The spillway ogee surface below EL 770 ft has eroded approximately 6-18 inches. Significant erosion has also occurred along the monolith joints and transverse construction joint near the toe.

7. Objectives.

The 2008 field test will seek to quantify uplift pressures in Monoliths 16, 17, and 18 during spillway releases at Chief Joseph Dam over the completed spillway flow deflectors with a completed grout injection seal system on spill bays 12 and 13 in order to:

- 1) evaluate the performance of the new and existing seal system (both in the deflector and in the repaired spillway monolith joints);
- 2) gather additional data on uplift pressure behavior during discharge for the modified spillway; and
- 3) confirm that uplift pressures are within dam safety criteria for the modified spillway condition.

The results of the field investigation will seek to confirm that: 1) uplift pressures are within criteria and will likely remain in criteria up to the Probable Maximum Flood (PMF) in these monoliths and 2) the existing and new seal system in the deflector and upstream of the deflector is effectively limiting the transmission of hydrodynamic surface pressures to the foundation. The results of this study will be compared to the uplift data collected in the same monoliths during the 1997 and 2007 spill tests.

Uplift response involves a number of complex and interconnecting factors such as location of ruptured seals, connectivity to hydraulic pathways, presence and location of relief pathways, size of the reservoir, etc. that cannot be replicated outside of the dam. This data cannot be obtained through mathematical or physical modeling as evidenced by the fact that uplift response during spill is not observed in all monoliths. Field data collection is the only way to confirm the potential source of the uplift and to ensure the required pressure relief is obtained. This investigation will provide useful additional data to assess the leading theory for the source of the uplift increases and assist in confirming that the uplift problem at CJD can be addressed through changing the spillway pressure distribution and seal improvements. If uplift pressures do not improve over the existing condition, the prototype spill test will be essential to provide additional information to aid in the investigation of uplift at CJD.

8. Study Approach.

Uplift pressures for the spill test will be monitored using the existing piezometers under monoliths 16, 17, and 18 and new piezometers installed under monolith 17 as part of the deflector installation. Spillway discharges will be incrementally increased during the test with individual spillway discharges of 6 and 16 kcfs/bay over the new spillway deflectors in spill bays 12 and 13. The duration of each spill increment will be 10 hours to allow steady conditions to

develop and uplift pressures to stabilize. The test will be continuous, with no cessation in spill, for a total test length of 20 hours. The spill test will occur on a Sunday to minimize impacts to the dam's power operations and the spillway deflector Contractor's work schedule. The scheduled time and date for the test is 00:00 to 20:00 April 27, 2008.

Seattle District has decided to proceed with the 2008 spill test even though the full redundant seal system will not be in place in monolith joints 16/17 and 17/18 for the following reasons:

- 1) The deflector will have the full seal system (two waterstops and drain) to prevent transmission of surface hydrodynamic pressures to the foundation. The highest surface hydrodynamic pressures occur on the deflector.
- 2) The injection grout seals have been fully installed on the spillway under gates 12 and 13 from the deflector to the tainter gate sill beam, but not tested. During the 2007 spill test, the injection grout seals were only partially complete. The 2008 spill test will allow the effectiveness of the injection grout to be evaluated prior to completion of the elastomeric surface seal.
- 3) Core drilling and water pressure testing was recommended to assure the quality of the injection grout seal installation but has not yet been conducted. Results from the 2008 spill test will be used to determine if core drilling is necessary. If the spill test results show acceptable injection seal performance as indicated by a lack of uplift pressures indicative of joint leakage, then investigation coring need not be performed. If the spill test results show questionable injection seal effectiveness, then investigation coring will likely be required.
- 4). A small portion of the elastomeric surface seal was installed in the region just upstream of the deflector for the 2007 spill test that provided a redundant seal system near the areas of highest hydrodynamic surface pressures for this spill test. In spill bay 13, the surface seal near the deflector was torn out during the 2007 spill test. The elastomeric seal in Bay 12 will most likely be torn out during the 2008 spill test. Therefore, the 2008 spill test will only test the effectiveness of the injection grout seal system in bays 12 and 13.
- 5) Spill increment durations during the 2007 spill test were not sufficient to allow for uplift stabilization at several monitoring locations. The 2008 spill durations will be increased to allow for uplift pressure stabilization.
- 6) If the source of the historical leak is near the spillway toe (i.e., the ogee surface below the deflector), and no new leakage pathways have developed, there should be an improvement in uplift pressures over the 1997 and 2007 spill test data at similar flows. The only area where surface hydrodynamic pressures change significantly during spill is at the spillway toe where the jet is turned. The installation of the deflector redirects the spillway jet and diverts the high pressure region away from the spillway toe to the region on the deflector and just upstream of the deflector. The toe of the spillway will see significantly lower pressures following deflector installation.

Uplift pressures will be monitored closely during the testing and the test will be terminated immediately if uplift pressures exceed a pre-determined threshold value. The 1997 and 2007 spill tests demonstrated that uplift pressures come down quickly after the spillway gates are closed.

Uplift pressure data recorded for the modified, with-deflector spillway and completed injection grout seals will be compared with the 1997 spill test data for the without deflector spillway at

similar discharges and the 2007 spill test data without the completed injection grout seal. It is recognized that ambient conditions, such as tailwater, air, water, and joint temperatures, powerhouse discharge, spillway discharge, spillway bays operating etc., may not be the same for all tests and will likely affect the results. However, it is expected the Corps will be able to make useful conclusions about the effect of the change in the spillway pressure distribution due to deflector installation and joint seal (both existing and new) condition on the uplift response at the dam.

9. Potential Impacts and Mitigation Measures

a. Exceedance of Uplift Criteria and Dam Stability Concerns: See Supplement 2 to Emergency Action and Notification Subplan

b. Spillway Deflector Contractor's Cofferdam: See Supplement 2 to Emergency Action and Notification Subplan

c. Damage to the Surface Seal Above the Deflector: The small section of surface elastomeric seal installed by the spillway deflector contractor upstream of the deflector in Bay 13 was torn out during the 2007 spill test. The same seal will most likely be torn out of Bay 12 during the 2008 spill test. The seals will need to be replaced. Repair of the damaged seal will require re-mobilization of the cofferdam or a severe tailwater restriction (EL 778 ft or lower). Construction of a small cofferdam and the surface elastomeric seal installation are not scheduled until FY09/FY10.

d. Cavitation on the Baffle Blocks: Excessively low pressures on the baffle blocks due to inadequate tailwater and high velocity flows are expected. There is a potential for some cavitation damage to occur during the test. However, since the test is of short duration, this is not expected to be a significant problem. A baseline record of baffle block condition is available. Post-test monitoring will be conducted to assure significant damage has not occurred as a result of the test.

e. Erosion of the Spillway Toe, Stilling Basin Apron, Baffle Blocks and End Sill: The presence of any debris in or downstream of the stilling basin provides a potential source of material to erode concrete surfaces during the test. It is possible that due to the non-uniform operation of the spillway, debris could be entrained in a circulation cell near the toe of the spillway, causing significant erosion. Underwater camera surveys have indicated there is limited material in the stilling basin and downstream of the stilling basin near gates 12 and 13. It is not expected that significant debris erosion will occur during the test given the short duration and changing spill volumes, however, post-test monitoring will be conducted to assure the test has not caused significant damage to the concrete surfaces during the test.

f. Impacts to Fish and Aquatic Life: Fish were monitored for gas bubble disease during the 2007 spill test, and no symptoms were observed. Although the 2008 test calls for slightly longer duration flows at the 6 kcfs/bay and 16 kcfs/bay spill increments, impacts to fish and aquatic life are not anticipated, and monitoring during the 2008 test is not a requirement.

g. Power Loss: The spill test has been scheduled for a Sunday to help minimize the impacts to power production.

h. Inconclusive Results and Need for Further Testing: The test is being conducted without the full elastomeric surface seal system in place. If uplift pressures exceed criteria, do

not show improvement over baseline (pre-deflector/pre-joint repair) data, or are inconclusive, then an additional test and/or coring of the injection seal may be necessary.

10. Uplift Instrumentation and Monitoring.

See Supplement 2 to Emergency Action and Notification Subplan.

11. Water Quality Criteria and Fisheries Operational Considerations.

The uplift test will use per-bay discharges higher than design criteria for best effectiveness of the constructed deflectors. The upper limit of optimal deflector effectiveness occurs at discharges of less than 7.4 kcfs (which equates to a spilled flow of 140 kcfs evenly distributed across all 19 bays once all the deflectors are constructed). During the test, per-bay discharges will be as high as 16 kcfs. Furthermore, the spillway deflectors were designed for optimal performance when using all 19 bays and were not designed to use only 1 or 2 bays. The maximum TDG levels during this spill test are expected to be comparable those during the 2007 spill test. During the 2007 test, the maximum TDG level recorded at the fixed monitoring station was about 120 percent and occurred during the 16 kcfs/bay spill. However, the 2007 spill at 16 kcfs/bay had a duration of 4 hours compared to the proposed 2008 spill duration of 10 hours at 16kcfs/bay. Because of the longer spill duration for the 2008 study it is possible that the TDG saturations measured at the fixed monitoring station will exceed 120 percent due to the longer time period allowing for gas equilibration to occur.

a. The Washington Department of Ecology (WDOE) and the Colville Confederated Tribe (CCT) determine water quality criteria for the Columbia River at Chief Joseph Dam in Washington. In general, the CCT and WDOE have a similar TDG standard of not to exceed 110 percent at any point of sample collection. However, WDOE allows a special exemption of the 110 percent TDG standard to facilitate fish passage during spill season where there is an approved gas abatement plan. In February 2008, WDOE approved a TDG rule modification for Chief Joseph Dam for a period of three years (through February 2010). This modification allows the following special fish passage exemptions of the 110 percent standard at Chief Joseph Dam:

- Must not exceed an average of 115 percent as measured in the forebay of the next downstream dam
- Must not exceed an average of 120 percent as measured in the tailrace of each dam
- TDG is measured as an average of the 12 highest consecutive hourly readings in any one day, relative to atmospheric pressure; and
- A maximum TDG one-hour average of 125 percent as measured in the tailrace must not be exceeded during spillage for fish passage.

Water quality compliance monitoring at Chief Joseph Dam occurs at two WDOE approved fixed monitoring stations located in the forebay and tailrace. At the forebay station (CHJ) the water quality probe is located in Lake Rufus Woods near the left bank by the powerhouse. At the Chief Joseph Dam tailwater station (CHQW) the water quality probe is deployed along the right bank of the river, 0.75 miles downstream from the dam. During the spill test, real-time data for these two fixed monitoring stations will be checked on an hourly basis. Minimum powerhouse flows during the test have been requested to help dilute TDG levels (see below). The requested powerhouse discharges will probably keep TDG levels within water quality standards, although it is possible that the 12-hour average TDG at the tailwater station may exceed 120% if the higher spill increment is held for ten hours. This possibility will be communicated to WDOE and

the CCT prior to the spill test. During the spill test, if real-time data monitoring shows that TDG levels will exceed water quality standards, an increase in powerhouse flows will be requested.

b. Powerhouse Discharge During testing, the powerhouse discharge will be adjusted to dilute the TDG that is produced by spilling. Powerhouse flow moderates the aggregate TDG pressures discharged from the Dam through mixing and dilution. At the first spill increment of 6 kcfs/bay, the powerhouse will be operated to provide at least 50 kcfs. At the second spill increment of 16 kcfs/bay, the powerhouse will be operated to provide at least 100 kcfs. The generation flow will be run as much as possible through units at the upstream end of the powerhouse.

12. Test Schedule and Project Operations.

The spill test is planned for April 27, 2008. The test schedule below assumes a duration of 20 hours.

Date	Hour	Spill Bays Operating	Spill per bay (kcfs/bay)	Total Spillway Discharge (kcfs)	Powerhouse Discharge (kcfs)	Total River Discharge (kcfs)	Minimum Tailwater Elevation (ft)
April 27	0000-1000	12, 13	6	12	50 * (minimum)	62 or greater	No min. TW
	1000-2000	12, 13	16	32	100 * (minimum)	132 or greater	No Min. TW
*Powerhouse flow is the minimum amount requested for dilution of TDG. Higher generation amounts are permissible.							

13. Test Results and Analysis.

Uplift pressures measured during the 2008 spill test for the modified spillway will be compared to all previous measurements of the existing spillway, including the May 1997 and April 2007 spill tests. If test results indicate an increase in uplift pressures, no reduction in uplift pressures during spill, or are inconclusive as far as confirming the performance of the seal systems, then further investigation will be required based on the findings. Possible follow-up actions could include: 1) detailed examination of the ogee seals; 2) re-examination of the deflector seal and drain system; 3) investigation of alternate mechanisms; 4) re-design of the joint treatment; 5) repair of damage at the spillway toe and stilling basin; 6) future spill tests; 7) installation of a drain system in the stilling basin apron or horizontally under the deflector; 8) anchor tendons, etc.

An After-Action Report will be assembled to detail the results of the spill test and develop recommendations for future actions. The After-Action Report will be independently technically reviewed by the Contractor who did the initial structural ITR and stability analysis.

14. References

USACE. 2007. Chief Joseph Dam Uplift Evaluation, 22 April 2007, Fish Monitoring Plan of Study. Seattle District, Seattle, Washington. 3 pp.

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Robin Charlwood & Associates, PLLC. September 8, 2006. Stability Analysis of the Spillway Before and After Installation of Deflectors. Phase I Stability Analysis Report. Prepared for US Army Corps of Engineers, Seattle District. Edmonds, Washington.

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northwest hydraulic consultants, inc. April 2006. Review of Corps Proposed Plan of Study to Determine Affects of Spillway Deflectors on Monolith Uplift Pressure. Chief Joseph Dam. Prepared for US Army Corps of Engineers, Seattle District. Tukwila, Washington

as of 28-Mar-08



COLUMBIA RIVER REGIONAL FORUM

TECHNICAL MANAGEMENT TEAM

April 25, 2008 Conference Call

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Robin Gumpert

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.

Little Goose Operations

Paul Wagner, NOAA, shared a concern on behalf of the salmon managers that juvenile injury rates had appeared to have increased at Little Goose, based on a requested report from the Fish Passage Center. Samples taken on 4/8, 4/10, 4/15, 4/22 and 4/24 showed injury rates on yearling chinook and steelhead ranged from 13%-35%. Dave Hurson of Walla Walla District shared that ODFW's process for calculating and reporting injuries and de-scaling at Little Goose Dam was different than what is done at other projects, so a comparison could not be made across the projects. He and sampling staff from Oregon confirmed that the injury rates at Little Goose were normal compared to other years, and as such, the salmon managers did not recommend any change to current operations.

Action: Dave Hurson will coordinate with the state biologists at the Walla Walla District projects to standardize the process for data collection and reporting on fish conditions and disease, and to work toward consistency with the rest of the region. He will share information with the Fish Passage Center who will in turn coordinate with FPAC. The salmon managers thanked the COE for the information and clarification.

Chief Joseph Spill Patterns

Carolyn Fitzgerald, Seattle District COE, described the dam safety spill test at Chief Joseph that is scheduled to begin at 0000 hrs on 4/27. As the spill test was not included in the Fish Operations Plan, the COE's desire was to inform the region and allow an opportunity for any concerns to be raised. The test would involve use of two spill bays and a total of 20 hours of spill in two increments (16 kcfs and 32 kcfs) to measure uplift pressure response beneath the spillway monoliths. This test is related to the construction of the spillway deflectors that are currently under construction. Carolyn and Jeff Laufle noted that the test was similar to what was conducted last year, but this year the test would require a longer duration to ensure stabilization. TDG was projected to stay below 125% but could exceed 120% when spilling at the 32 kcfs level. Carolyn noted that the test may not need to conduct the 32 kcfs spill level for the entire 10 hours that are being planned. This portion of the test could be shortened if the uplift pressure data collection was completed prior to the full 10 hours of spill at this level.

Paul Wagner, NOAA, shared that NOAA Fisheries reviewed this proposal and considered its potential risk to listed fish in the area; Upper Columbia River spring

chinook and Upper Columbia River steelhead. NOAA fully supports the planned test and believes this operation poses minimal risk to these fish. The agency anticipates these fish will be exposed to gas levels at least as high as the levels the COE believes will occur from the test and for a much longer duration during their downstream passage past the lower Columbia River Dams.

All TMT representatives present: Idaho, USFWS, BPA, BOR and Nez Perce, supported the operation. The COE noted that they had coordinated individually with Washington DOE, The Colville Tribe and Montana and that no concerns had been raised. {Update: Jim Adams made multiple attempts to contact TMT representatives from the state of Oregon to solicit input regarding this operation, but was unsuccessful. Jim Adams was able to speak with Cindy LeFleur from the Washington Department of Fish and Wildlife on Monday morning April 28th and she indicated that she had no concerns regarding with performance of the spill test}.

Action: Jim Adams will send the Official Meeting Minutes from today's conference call to Jeff Laufle at Seattle District COE as soon as they are available.

Gas Spill at Bonneville

Dan Feil, COE, reported that a research boat that had gone out to evaluate the BGS at Bonneville met with a high current, ran up against the BGS and capsized. While the two researchers and boat were safely removed, about 20 gallons of gasoline had likely spilled. An incident report was submitted to the Corps by Batelle and shared through all the appropriate channels, indicating that no visible impacts to the environment had occurred. The Fish Passage Center had not at this time been notified of any resulting impacts to fish based on data collected at the Bonneville smolt monitoring facility.

Action: Per suggestion from TMT, this issue will be shared with FPOM and a request was made to clarify protocols, aside from reporting, that are taken for an event like this. (It was thought that the statement of work might include specific language on spill response protocols.)

Next TMT Conference Call: April 30th

Agenda Items include:

- Dworshak Operations
- Spring Creek Hatchery Release

**Columbia River Regional Forum
Technical Management Team Conference Call
April 25, 2008**

1. Introduction

Today's unscheduled TMT call was chaired by Jim Adams (COE) and facilitated by Robin Gumpert (D.S. Consulting), with representatives of COE, ODFW, USFWS, NOAA, BPA, BOR, CRITFC, Idaho, the Nez Perce Tribe and others on the line. 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. Little Goose Operations

Today's meeting was called at the request of FPAC in response to reports of injury rates running 20-25% for each of several samples taken at Little Goose Dam so far in April, Paul Wagner (NOAA) said. Jerry McCann (FPC) gave recent injury rates.

April 8:

- of 14 yearling Chinook, 35% were injured
- of 76 steelhead, 25% were injured

April 10:

- of 43 yearling Chinook, 30% were injured
- of 111 steelhead, 22% were injured

April 15:

- of 125 yearling Chinook, 33% were injured
- of 382 steelhead, 29% were injured

April 22:

- of 93 yearling Chinook, 19% were injured
- of 373 steelhead, 13% were injured

April 24:

- of 104 yearling Chinook, 21% were injured
- of 119 steelhead, 20% were injured

The apparently high rate of injuries at Goose is due to discrepancies among the projects in the way fish sampling results are reported, Dave Hurson (COE Walla Walla) explained. The majority of injuries being reported at Little Goose consist of de-scaling in the 5-20% range, which other projects, such as Lower Granite, don't report as injuries. Annie Dowdie (ODFW), who has been involved in the sampling effort, agreed that most of the reported injuries are minor de-scaling. Hurson suggested adding a category for de-scaling of less than 20% of the body to allow for valid data comparisons among projects. Hurson and John Bailey (COE Walla Walla) offered to work on parallel reporting procedures

and present their recommendations to Fish Passage Center staff, who will share the information with the Salmon Managers.

3. Chief Joseph Spill Test

Because this test is not called for in the Fish Operations Plan, it needs full consensus of TMT; Adams solicited comments today. Carolyn Fitzgerald and Jeff Laufle (COE Seattle) explained the operation. A spill test of the deflectors at Chief Joseph Dam will be conducted for dam safety purposes on Sunday, April 28, using only 2 of the 19 spill bays at Chief Joseph. The test, similar to one conducted last year, will measure uplift pressure on the spillway and is required for a spillway monolith sealing project.

The test involves spilling for a total of 20 hours in two increments, 6 kcfs per bay and 16 kcfs per bay, the same amounts used in last year's test. What's different about this year, Fitzgerald said, is that the specified levels will need to spill for longer, 10 hours per bay this year as compared to 4 hours per bay last year. To minimize the impact on fish migration, the COE will increase powerhouse flows to at least 50 kcfs during the first spill increment and at least 100 kcfs for the second. If uplift pressures stabilize while the test is in progress, the testing will stop. Last year's TDG levels ranged from 117% to just over 120% during the test. This year's test could increase TDG levels up to 120% but not higher than 125%.

The Salmon Managers don't have a problem with this, Paul Wagner said. The duration of the test is acceptable. Species of significant concern to be affected are upper Columbia steelhead and spring Chinook. Nevertheless, the test should proceed because getting deflectors safely installed and operating at Chief Joseph is a high priority. The COE has been coordinating this work for some time with NOAA, USFWS, the Colville Tribe and the Washington Department of Ecology, Laufle noted.

All TMT members present on today's call accepted the Chief Joseph operation. Representatives of BPA, BOR, NOAA, USFWS, Idaho and the Nez Perce Tribe voiced no objections. In addition, Laufle has discussed the project with representatives of the Colville Tribe and they did not object. The Washington Department of Fish and Wildlife was contacted regarding this operation but hasn't yet given a response. Adams will send the official minutes of this meeting to Laughley as documentation of concurrence among TMT members present.

4. Gasoline Spill at Bonneville

In the process of installing hydrophones to monitor fish passage in the Bonneville 2nd powerhouse forebay with the Behavioral Guidance Structure in place, a boat capsized and spilled approximately 20 gallons of gasoline into the water. No one was hurt, and the boat was retrieved from the river, Dan Feil said.

The COE reported the incident to the National Response Center, the Oregon Emergency Response System, and Washington Emergency Management as a follow-up protocol for spills at the project. In addition, Columbia River Keepers and CRITFC have been contacted, Rudd Turner (COE) said. The spill was small, but Paul Wagner wondered whether a larger spill would call for emergency procedures beyond simple notification. This topic would be a good addition to the FPOM agenda, he and Turner agreed. The Fish Passage Center has not received any reports of fish injuries as a result of the gasoline spill, Margaret Filardo reported.

5. Next Meeting

The next TMT meeting will be an April 30 conference call. The next regular TMT meeting is on May 7. This summary prepared by consultant and writer Pat Vivian.

<i>Name</i>	<i>Affiliation</i>
Jim Adams	COE
Annie Dowdie	ODFW
Dave Wills	USFWS
Paul Wagner	NOAA
Russ Kiefer	Idaho
Greg Haller	Nez Perce
John Roache	BOR
Tony Norris	BPA
Scott Bettin	BPA
Dan Spear	BPA
Kyle Dittmer	CRITFC
Margaret Filardo	FPC
Brandon Schafley	FPC
Jerry McCann`	FPC
Tom Lorz	CRITFC
Bob Buchholz	COE
Rudd Turner	COE
Scott Boyd	COE
Dan Feil	COE
Don Faulkner	COE
Greg Bauer	COE
Richelle Beck	DRA
Tim Dykstra	COE Walla Walla
Dave Hurson	COE Walla Walla
John Bailey	COE Walla Walla
Carolyn Fitzgerald	COE Seattle
Jeff Laufle	COE Seattle

TECHNICAL MANAGEMENT TEAM

BOR : John Roache / Mary Mellema / Pat McGrane

BPA : Robyn MacKay / Tony Norris / Scott Bettin

NOAA-F: Paul Wagner / Richard Dominique

USFWS : David Wills / Steve Haeseker

OR : Rick Kruger / Ron Boyce

ID : Russ Kiefer

WDFW : Cindy LeFleur

MT : Jim Litchfield / Brian Marotz

COE: Jim Adams / Cathy Hlebechuk / Bob Buchholz

TMT CONFERENCE CALL

Wednesday April 30, 2008 09:00 - 12:00

CONFERENCE PHONE LINE

Conference call line: 203-310-2162; PASS CODE = 4703150

We have had disruptions on the phone because people are not hitting 'mute' after dial in.

Please MUTE your Phone

All members are encouraged to call Robin Gumpert with any issues or concerns they would like to see addressed.

Please e-mail her at robin76@cnnw.net or call her at (503) 248-4703.

AGENDA

1. Welcome and Introductions
2. Review [\[Meeting Minutes\]](#) 
3. Chief Joseph Spill Test Update - Carolyn Fitzgerald, USACE
[\[27-Apr-2008 Spill Test\]](#) 
4. Spring Creek Hatchery Release - David Wills, USWS
5. Dworshak Operations - Steven Hall, USACE

[\[WY 2008 Columbia River Basin ESP Plots\]](#) 

6. Grand Coulee/Libby Operations - Cathy Hlebechuk, USACE
[\[SOR #2008-2\]](#) [\[Libby 2006 Snow\]](#) [\[Libby 2008 Snow\]](#)
7. Operations Review
 - a. Reservoirs
 - b. Fish
 - c. Power System
 - d. Water Quality
[\[Spill Information 2008\]](#)
8. Other
 - a. Set agenda for next meeting - **May 7, 2008**
[\[Calendar 2008\]](#) 

Questions about the meeting may be referred to:

[Jim Adams](#) at (503) 808-3938, or

[Cathy Hlebechuk](#) at (503) 808-3942, or
[Bob Buchholz](#) at (503) 808-3945.

Chief Joseph Dam – 27 April 2008 Spill Test

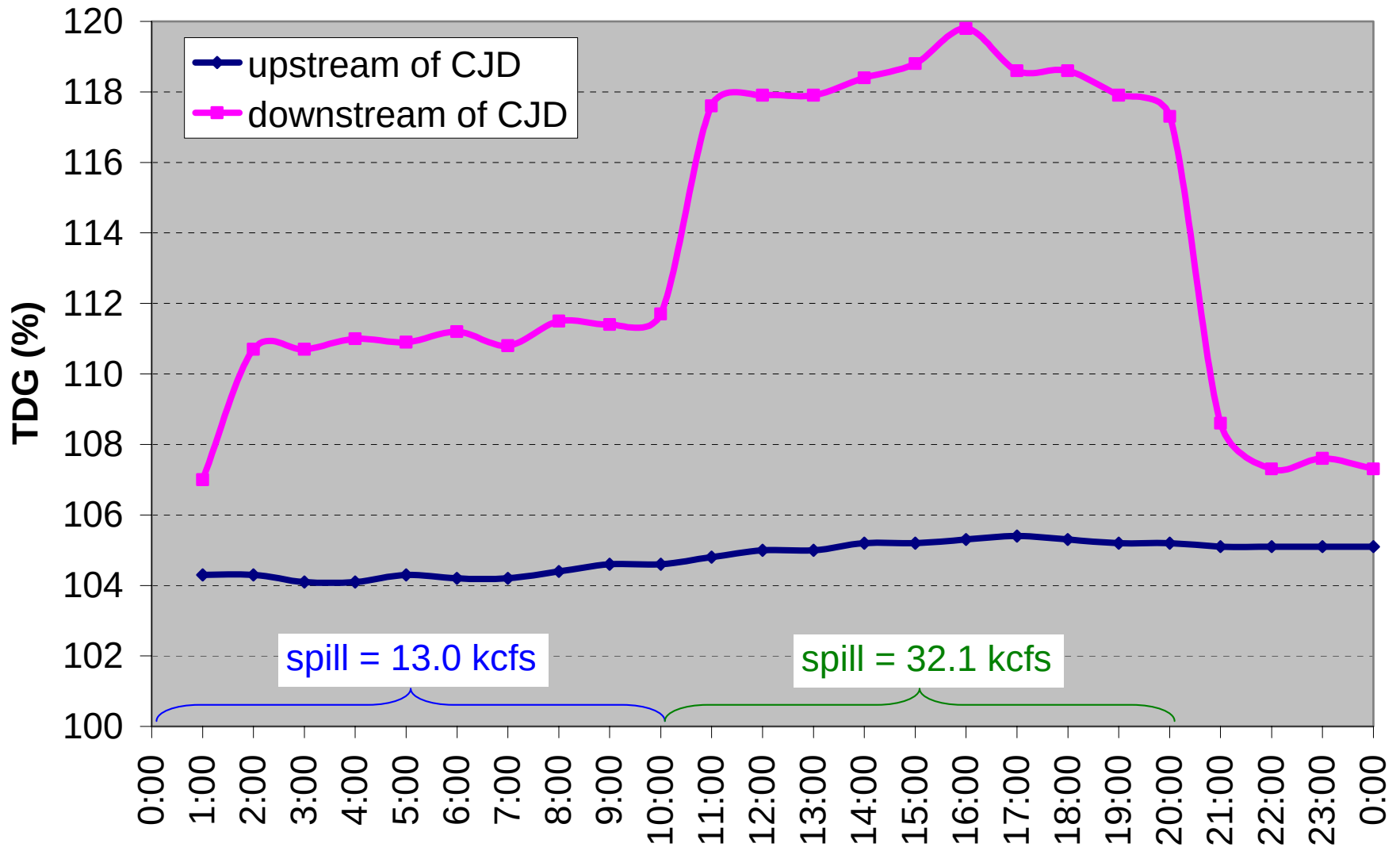
- Spill test lasted 20 consecutive hours. Used two spill bays.
- First ten hours of test (0001-1000 hrs)
 - o Avg spill = 13.0 kcfs
 - o Powerhouse flow: 51-117 kcfs
 - o downstream hourly TDG (at fixed monitoring station): 107% - 111.7%
- Second ten hours (1000-2000 hrs)
 - o Avg spill = 32.1 kcfs
 - o Powerhouse flow: 125-151 kcfs
 - o downstream hourly TDG (at fixed monitoring station): 117.3% - 119.8%

Daily high consecutive 12-hour average TDG = **117.2%**
Peak hourly TDG = **119.8%**

Preliminary data (<http://www.nwd-wc.usace.army.mil/report/tdg.htm>)

CHIEF JOSEPH DAM SPILL TEST (27 April 2008)

preliminary TDG levels from <http://www.nwd-wc.usace.army.mil/report/tdg.htm>



	<u>2007 spill test</u>	<u>2008 spill test</u>
Duration	20 hours	20 hours
time	0600 22 April 2007 – 0200 23 April 2007	0001 27 April 2008 – 2000 27 April 2008
Spillway flow	4 hrs @ 4 kcfs 4 hrs @ 8.4 kcfs 4 hrs @ 13 kcfs 4 hrs @ 22 kcfs 4 hrs @ 31.5 kcfs	10 hrs @ 13 kcfs 10 hrs @ 32.1 kcfs
Powerhouse flow during max spill	73-80 kcfs	125-151 kcfs
CHJ Forebay TDG level	108% - 109%	104% - 105%
Peak Hourly TDG	April 22: 120.1% @ 2400 hrs April 23: 120.1% @ 0100 hrs	April 27: 119.8% @ 1600 hrs
Daily High Consecutive 12-Hour Avg. TDG	April 22: 114.6% @ 2400 hrs April 23: 116.6% @ 0300 hrs	April 27: 117.2% @ 2000 hrs

COLUMBIA RIVER REGIONAL FORUM

TECHNICAL MANAGEMENT TEAM

April 30, 2008 Conference Call

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Robin Gumpert

Notes: Erin Halton

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.

Chief Joseph Spill Test Update

Carolyn Fitzgerald, COE Seattle District, reported on the 4/27 spill test at Chief Joseph and referred TMT to results posted as a link to the TMT agenda. The test lasted 20 consecutive hours, with 13 kcfs spill, generation flows in the 51-117 kcfs range and hourly TDG readings in the range of 107-112% for the first ten hours of the test. During the second ten hours, spill was up to 32 kcfs, with generation flows in the 125 - 151 kcfs range and hourly TDG readings in the range of 117 – 119.8%. The Daily High Consecutive 12-Hour Average TDG (based on the new State of Washington daily TDG criteria) was 117.2%. Fitzgerald noted that gas levels were lower this year and that more powerhouse flow led to effective dilution and lower TDG levels. Fish monitoring during the test showed no signs of gas bubble trauma. NOAA commented that they were pleased to hear of the test's success.

Action/Next Steps: The COE said they plan to review the test data further and will share further insights as appropriate with TMT.

Spring Creek Hatchery Release

Dave Wills, USFWS, reported that plans were on track for the scheduled 5/2 Spring Creek Hatchery release. The COE planned to operate toward the low end of 1% as a hard constraint for the first four days following the test. USFWS stated a preference to hold this for the first four days, at a minimum, and asked the COE as to the flexibility around that if flows peak above powerhouse capacity release. After four days, the Corps planned to operate at the low end of 1% as a soft constraint for an additional four days. However, the Corps indicated that if flows increased up above approximately 280 kcfs, then the project would begin to move to higher levels within the 1% of peak efficiency. USFWS stated a preference to hold this for the first four days and asked the COE as to the flexibility around that, considering the threshold for negatively affecting the adult fish might be near the 100 kcfs spill range. Tom Lorz, CRITFC, noted that the spill pattern has been modified for this year. Paul Wagner, NOAA, suggested that TMT may need to revisit this item after the release, adding that 1-2 hours of spill above 100 kcfs would not likely negatively impact adult passage.

Action/ Next Steps: BPA will contact USFWS and NOAA if they see any issue arising over the weekend. Also, this will be on the agenda for the next TMT meeting, scheduled for 5/7.

Dworshak Operations

Steve Hall, COE, reported on the latest operational scenarios posted as links to the TMT agenda. Scenarios were based on the 4/29 ESP runs, and Hall noted they showed anticipated effects on Lower Granite as well. He also said that regarding snow pack, it was still too early to tell whether there is an increased or decreased risk of an inability to refill. Paul Wagner said that the consensus at the FPAC meeting on 4/29 was to stay with the current operation and maintain flows to provide best passage for fish. TMT members expressed hope that the freshet would provide an increase in flows and acknowledged the difficult balance in mitigating resources with a high level of uncertainty for what flows may be in the coming weeks. While concerns were raised by Montana and Nez Perce, no objections were raised to maintaining the current Dworshak operations for another week.

Action/Next Steps:

- The COE will track flows closely and provide updated scenarios by a.m. on 5/6.
- Paul Wagner, on behalf of the Salmon Managers, offered to call ID Power and make a recommendation to refill Brownlee later rather than sooner this year, as drafting at Lower Granite is impacted by Brownlee refill.
- Dworshak Operations will be on the agenda for the TMT meeting on 5/7.

Little Goose Operations

Jim Adams, COE, reported on the 4/29 testing of three Little Goose spill patterns: bulk, modified bulk and a uniform pattern. Paul Wagner, on behalf of the Salmon Managers, said that as the uniform pattern produces the least amount of TDG, FPAC prefers that option for nighttime operations. Wagner said there is some concern for the potential effects on adult passage, but recognized that they would likely be minimal. Wagner clarified that OR, WA, ID, CRITFC, Nez Perce, and USFWS supported the uniform pattern per the FPAC discussion. Dan Feil, COE, said that he spoke with the Walla Walla District staff, who agreed on support for the uniform pattern, as it may provide possible benefit to juveniles as well.

Action/Next Steps: The COE will send a teletype to Little Goose operators to use the “uniform spill” pattern at night for the remainder of the 14-day nighttime gas cap spill operation (1800 – 0600 hrs) unless otherwise notified.

Grand Coulee Operations – SOR 2008-2

Paul Wagner, on behalf of several of the Salmon Managers, presented SOR 2008-2, posted as a link to the TMT agenda. The request included a recommendation to meet flow objectives at McNary through augmentation from Albeni Falls, Grand Coulee and Libby dams. He noted that the 180 kcfs weekly flow objective was chosen as representative of average weekly flows at McNary and that directional migration cues and timing of passage are influenced by management of projects and this SOR is an effort to create the best possible passage conditions. Jim Litchfield, MT, asked if COMPASS modeling could shed any light on what Coulee flows would be with vs. without implementing the SOR. Wagner said that as conditions this year have little representation in past years, modeling results would not likely help inform this specific

request. John Roache, BOR, clarified that 1228.8' remains the end of April flood control elevation. Margaret Filardo, Fish Passage Center reported that PIT tag study results indicate that the steady flows requested in the SOR would impact both Snake River and Mid-Columbia stocks.

Cathy Hlebechuk, COE, referred TMT to graphs linked to the TMT agenda showing potential impacts to Libby from the requested operation. The COE's Seattle District noted the unique conditions for this year and that the COE reviews as many information sources as possible as it generates ESP analyses. A round of feedback on the proposed SOR generated the following bulleted summary of the discussion:

- COE: Recommend operations in accordance with the proposed SOR, including passing inflows at Albeni Falls and increasing Libby outflows up to 9 kcfs, until the freshet arrives, then shifting to VARQ flows. Recommended that TMT re-evaluate operations on a weekly basis. Recognize that inflows and the potential for Coulee draft are still uncertain.
- BOR: support the proposed SOR, and recommend minimizing draft of Grand Coulee to the extent possible. Suggest meeting the objectives in the SOR and with augmentation from Libby. Recognize that inflows and the potential for Coulee draft are still uncertain.
- BPA: anticipate that the need to implement the proposed actions in the SOR, in order to maintain average flows of 180 kcfs, will be short-term. Recognize that inflows and the potential for Coulee draft are still uncertain.
- MT: expressed concerns about the flood control elevations at Libby/Hungry Horse and impacts to fish above and below the projects, including temperature effects. Acknowledge that the timing of the sturgeon pulse will be an issue in the future. Willing to support the proposed SOR, utilizing Libby and Hungry Horse runoff now, and hoped that this support could also foster consensus on a commitment to implement the Montana requirements in the new BiOp for this summer operations at Libby and Hungry Horse. Planned to submit an alternative SOR to that effect.
- NOAA: support implementation of the SOR to the extent possible. Support the Montana request from a technical basis, and would require consensus of the region to move forward.
- USFWS: technically support SOR 2008-2 as written, to the extent possible.
- Colville Tribe: has concerns with the proposed SOR, specifically the use of Grand Coulee to meet flows at McNary, given later migration timing, cultural resource concerns and potential navigation impacts to the ferry system. Requested that the decision be made when more parties were available.

- NOTE: Greg Hoffman, COE, made a request to have an opportunity for technical discussion amongst the Sturgeon Recovery Team of any anticipated impacts of the proposed SOR on sturgeon.

The COE suggested further discussion and feedback from members of the Sturgeon Recovery Team, and the specific alternative recommendation from Montana be brought back for further discussion at TMT. A short-term operating plan was developed in the interim and a conference call was convened for Friday, May 2, at 1:00. The planned operation between Wednesday April 30 and Friday May 2 was as follows, with the purpose of meeting the SOR 2008-2 request:

- Albeni Falls inflows will be passed rather than refilling the project. Outflows may be reduced on a short term basis for local flood control.
- Grand Coulee will be drafted to the extent necessary to meet the remaining 180 kcfs weekly average flows at McNary requested in the SOR
- Libby will continue maintaining 4 kcfs minimum flows
- The action agencies will closely monitor the operation and coordinate with affected stakeholders any resulting impacts such as disruptions to ferry transportation.

At that time, TMT members recognized the possibility that the discussion may result in the need to elevate the issue to IT, and notified their respective IT representatives that a call may be convened as soon as Monday, May 5 to discuss the SORs.

Next TMT Meeting: a conference call scheduled for 5/2 at 1 p.m.

Agenda Items include:

- SOR 2008-2
- MT SOR

5/7 TMT meeting

Agenda Items include:

- Priest Rapids Operations
- Spring Creek Operations
- TMT Guidelines
- Water Management Plan spring/summer update
- Operations Review

**Columbia River Regional Forum
Technical Management Team Conference Call
April 30, 2008**

1. Introduction

Today's TMT call was chaired by Jim Adams (COE) and facilitated by Robin Gumpert (D.S. Consulting), with representatives of BOR, USFWS, BPA, NOAA, COE, FPC, CRITFC, Montana, Idaho, Washington and others attending in person or by phone. 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

Discussion of meeting minutes (as well as the standard operations review) was deferred until next week.

3. Chief Joseph Spill Test Update

The four-day spill test for adult passage began April 27, Carolyn Fitzgerald (COE Seattle) reported. There was a possibility of TDG levels above 120% but actual TDG readings came in below that. The test, lasting 20 consecutive hours, consisted of small spill increments totaling 13 kcfs for the first 10 hours, then 32 kcfs through 2 of 19 spill bays for the second 10 hours. Powerhouse flows were 117 kcfs during the first 10 hours and 125-151 kcfs during the second 10 hours. The TDG readings at a downstream monitoring station were 107-112% for the first 10 hours, and 118-19% for the second 10 hours. The daily average TDG reading was 117% and the highest reading was 119.8% TDG.

Though flows this year were similar to last year's, the gas levels were lower this year. Forebay TDG levels were 104-105% this year, compared to 108-19% last year. The COE will need to investigate the uplift phenomenon further; at this point, there is nothing conclusive to report. Fish monitoring done during the testing has found no symptoms of GBT.

4. Spring Creek Hatchery Release

The release is scheduled for the morning of May 2. The COE will begin operating the Bonneville turbines at the lower end of 1% on the morning of May 3 when the fish arrive. Last week, the COE said that river flows above 280 kcfs might mean going off the low end of 1% in lieu of involuntary spill, which would impact adult passage.

Dave Wills (USFWS) asked whether the COE and BPA would commit to maintaining the low end of 1% for the first 4 days of the May release, followed by an evaluation of whether such flows could continue without impacting adults. Intermittent hourly peak flows of over 100 kcfs won't have much of an impact on adults. The spill pattern has changed since fish were being delayed at 105 kcfs, Tom Lorz (CRITFC) added.

It doesn't look like flows are going to be high anytime soon, Wagner said. NOAA recommended checking in later on this issue. USFWS recommended maintaining the low end of 1% and spilling over 100 kcfs for short periods, if necessary. BPA has been trying to stay within the 1% operation and doesn't have any intention of spilling, Robyn MacKay said. BPA will contact USFWS and NOAA if any issues arise over the weekend. And TMT will revisit river conditions for the hatchery release at its May 7 meeting.

5. Dworshak Operations

Steve Hall (COE) presented operational scenarios for April 29 based on ESP forecasts, similar to last week's scenarios.

Scenario 1. Full powerhouse operations through April 30. The maximum flow under that scenario is 8.5 kcfs, the average around 5 kcfs, and the minimum around 2 kcfs.

Scenario 2. Full powerhouse operations through May 7, which would result in maximum flows of around 7 kcfs, and average flows around 4 kcfs. The minimum flow does not refill Dworshak reservoir by June 30 under this scenario, reaching an elevation of 1,598 feet.

Scenario 3. Full powerhouse operations through May 14, which would result in a maximum flow of 6 kcfs, and an average flow of around 2 kcfs. The minimum flow would take Dworshak reservoir to elevation 1,590 feet on June 30.

Lower Granite STP Flows: Shows the effect of each of the above scenarios on Lower Granite flows. Curtailing full powerhouse now would create a drop in flows at Lower Granite this coming weekend. Continuing full powerhouse flows now would mitigate that effect somewhat, but would also raise concerns about refill.

Snowpack at Dworshak is at abnormally low elevations this year – a condition that is not well represented in the historical flows on which these scenarios are based. In addition, Brownlee operations are a wild card. NOAA has recommended that Idaho Power not refill but has no jurisdiction over what they do. Minimum outflow from Dworshak is 1.3 kcfs through May. These plots are based on STP runs that come out Tuesday afternoons, so weekly updates will

generally be available online by close of business Tuesday. COE intends to continue providing these analytical tools for TMT's use.

Yesterday FPAC discussed the current situation and agreed to recommend that current operations be maintained for at least another week, Wagner reported. The Salmon Managers are aware that projects are now 20 feet below their flood control elevations. Nevertheless, flows are needed to support migration of the large numbers of fish in the Snake at Lower Granite Dam.

Jim Litchfield (Montana) asked about the effects on juvenile steelhead and Chinook of migrating at only 4 kcfs flows while the reservoir is refilling under scenario 2, the one closest to the FPAC recommendation. Dave Statler (NPT) requested flows of 5 kcfs or higher (scenario 1) during the refill period.

The scenarios linked to today's agenda are based on more recent River Forecast Center information than FPAC had yesterday, Hall said. Early bird forecasts are trending lower. The new scenarios show lesser volumes by about 1 kcfs per scenario, Wagner said. The situation amounts to less than optimal operations for fish passage – flows in the mainstem Columbia have been 55 kcfs when they should be around 85 kcfs.

TMT members gave their views of the FPAC recommendation:

The Nez Perce Tribe did not object to continuing the current Dworshak operation for another week. However, all possible steps should be taken to avoid negative impacts on fish as a result of this operation.

USFWS did not object to continuing the current operation on the basis that there is a 50% chance of good results.

BPA and BOR also did not object.

Wagner reported that Idaho and Washington, while not present on today's call, participated in yesterday's consensus at FPAC. Oregon did not participate in either yesterday's FPAC call or the TMT call today.

6. Little Goose Operations

The current operation at Little Goose is rotation of three different spill patterns in random block design for a spill test of adult passage – the uniform, bulk, and modified bulk spill patterns, Jim Adams reported. Today is 4 days into the special operation of spilling to the cap during nighttime hours for 14 days.

Wagner suggested a modification that came up during yesterday's FPAC discussion. Of the three spill patterns, bulk spill produces the highest TDG, modified bulk produces less, and uniform (or flat) spill produces the least.

Because the intent of nighttime gas-cap spill is to pass as many juveniles as possible for 14 days, FPAC suggested using the uniform spill pattern at night for the next 14 days. There was concern regarding effects on the adult study being conducted, but FPAC decided the effects of using the uniform pattern during the nighttime hours on adults should be minimal. At the FPAC meeting, Washington, Oregon, CRITFC, Nez Perce Tribe, NOAA Fisheries, and the USFWS all supported this change in operation.

The COE agreed this request will not impact the adult study, and will implement the recommendation. There were no objections to the change. Spill in the flat pattern will begin at 6 p.m. tonight at Goose and will continue nightly for the entire 12 hours of nighttime gas cap spill until the 14-day operation ends.

7. Grand Coulee/Libby Operations – SOR-2008-2

Paul Wagner presented SOR-2008-2 on behalf of the Salmon Managers. The SOR calls for a minimum of 180 kcfs weekly flows at McNary Dam, to be provided by using Albeni Falls, Grand Coulee and Libby reservoir volumes. Under the SOR, Coulee would continue drafting, and Libby volume would be used for flow augmentation; Albeni Falls would simply stop refilling and pass inflows. Flows of 180 kcfs were chosen for McNary because that represents average flows this year, Wagner explained. There is plenty of snow in the basin, but cold temperatures have kept it from melting in time for peak migration. The SOR would provide better biological conditions until the spring freshet occurs, improving survival in the lower river. Minimum flows can induce fish to swim upstream, which delays their migration and exposes them to predation.

Litchfield expressed interest in seeing COMPASS modeling of biological effects in the lower river that would occur as a result of implementing this SOR. Despite the cold, fish migration in the lower river has not been delayed as expected, Wagner said. The Fish Passage Center's PIT tag data show that mid-Columbia as well as Snake River fish have been passing McNary Dam, Margaret Filardo reported.

The Colville Tribe representative stated that fish migration in the Okanogan is way behind schedule, 20% of what it normally would be this time of year. Lower flows at Grand Coulee represent lost generation income for the tribe.

The COE is willing to pass inflows at Albeni Falls until the freshet starts, and to increase inflows into Grand Coulee rather than refilling, Hlebechuk said. The current elevation of Libby reservoir is 7 feet below flood control. Libby is releasing outflows of approximately 4 kcfs per day, which would increase by an additional 5 kcfs per day if the SOR is implemented. The COE is willing to increase flows at Libby, based on ESP analysis (linked to today's agenda) that shows a fill-and-spill situation in 7 out of 44 years under the operation the SOR requests.

Litchfield asked why the COE would draft for more space if the reservoir is already below its flood control elevation. Amy Reese (COE Seattle) addressed the role of VARQ flows and presented data linked to today's agenda. The 44 weekly ESP traces indicate that this is an 80% flow year. Obviously, with the large amounts of snowpack in the basin, 2008 won't turn out to have 80% of historic flow volume. To establish VARQ (or minimum) flows in this situation, the COE considers ESP traces, river forecast volumes, COE forecasts, remote sensing information, and all other forms of analysis available. The COE has not decided whether to go off VARQ flows, but is considering it. In 50% of the years on record, there would be no impact of refilling Grand Coulee an average of 1 foot, while in the other years, refilling would provide flood control benefits.

The COE's recommendation is to increase flows in accordance with SOR 2008-2 up to 9 kcfs and use one additional unit, followed by VARQ flows until the freshet starts. The COE won't commit to providing the extra flows until the freshet starts because it could be delayed until June.

At this point, Litchfield presented an alternative proposal: In exchange for Montana's agreement to draft Libby now and support downstream flows, the region would agree to implement the BiOp requirements for operating Libby and Hungry Horse in July and August. This request arose from Montana's desire not to repeat the 2007 drawdowns of Libby and Hungry Horse as part of the court-ordered 2007 operations rollover this year. While Montana's preferred operation is recommended by the BiOp and ISAB review, and NOAA has supported it for years, implementation requires regional consensus which hasn't been achieved.

The parties stated their positions on SOR-2008-2.

NOAA – Wants the SOR implemented to the best of the COE's ability. Supports the Montana plan for summer operations of Libby and Hungry Horse, but would need consensus to implement it.

COE – Has concerns about peak flows and the possibility of a double peak between salmon and sturgeon flows. Willing to hold off on refilling Albeni Falls while continuing to draft at Grand Coulee, and will monitor the situation at Albeni Falls closely. It may be necessary to decrease Albeni Falls outflows for local flood control purposes. The Corps will also increase Libby outflows to 9 kcfs as requested by the SOR. *{Supplemental Note: Libby outflows increased to 9 kcfs at 1800 hours on May 2nd}*

USFWS – Can't commit to SOR-2008-2 until the impact on sturgeon has been addressed. In terms of meeting minimum flows specified in the BiOp, it makes sense to move ahead with this SOR.

BPA – It's possible to reach 180 kcfs flows at McNary through operation of other reservoirs. However, if inflows are uncertain, the question is: how deep should Grand Coulee be drafted?

BOR – Would like to minimize the draft at Grand Coulee, especially in light of navigation concerns voiced by the Colville Tribe. Accepts the need for flow augmentation for fish migration. Believes 180 kcfs is a reasonable weekly average flow objective at McNary. Agreed with BPA that inflows are a wild card.

Between now and next Friday's TMT call, Libby operations will remain at at minimum outflows of 4 kcfs. Grand Coulee will be operated to support flows of 180 kcfs at McNary downstream. Litchfield said he will prepare a statement of Montana's position for possible IT review if Friday's meeting doesn't lead to a resolution.

8. Next Meetings

TMT scheduled a conference call at 1 pm Friday, May 2, to address SOR-2008-2 after the sturgeon recovery team has had time to confer on the impact to sturgeon. TMT also scheduled a tentative IT meeting the following Monday if the Friday call doesn't lead to a consensus on Libby operations. The next regular TMT meeting will be in person on May 7. This summary prepared by consultant and writer Pat Vivian.

<i>Name</i>	<i>Affiliation</i>
Paul Wagner	NOAA
Dave Wills	USFWS
John Roache	BOR
Robyn MacKay	BPA
Tom Le	Puget Sound Energy
Jim Adams	COE
Dan Feil	COE
Rudd Turner	COE
Lynn Melder	COE Seattle
Steven Hall	COE
Scott Boyd	COE
Jim Litchfield	Montana
Cathy Hlebechuk	COE
Carolyn Fitzgerald	COE
Dave Benner	FPC
Richelle Beck	DRA
Holli Krebs	Bear Energy
Jennifer Miller	Susquehanna
Amy Reese	COE Seattle
Sharon Fitzgerald	COE Seattle
Brian Marotz	Montana

Ivy Netter	Puget Sound Energy
Bryce Bodecker	Highland Energy
Jeff Laufle	COE
Margaret Filardo	FPC
Deanna Tevlich??	Spokane Tribe
Tom Lorz	CRITFC
Dave Statler	NPT
Shane Scott	PPC
Greg Hoffman	COE Libby Dam
Sherry XX	Colville Tribe
Brian Clark	Colville Tribe
Kyle Dittmer	CRITFC

TECHNICAL MANAGEMENT TEAM

BOR : John Roache / Mary Mellema / Pat McGrane

BPA : Robyn MacKay / Tony Norris / Scott Bettin

NOAA-F: Paul Wagner / Richard Dominique

USFWS : David Wills / Steve Haeseker

OR : Rick Kruger / Ron Boyce

ID : Russ Kiefer

WDFW : Cindy LeFleur

MT : Jim Litchfield / Brian Marotz

COE: Jim Adams / Cathy Hlebechuk / Bob Buchholz

TMT CONFERENCE CALL

Friday May 2, 2008 1:00 - 3:00

CONFERENCE PHONE LINE

Conference call line: 203-310-2162; PASS CODE = 4703150

We have had disruptions on the phone because people are not hitting 'mute' after dial in.

Please MUTE your Phone

All members are encouraged to call Robin Gumpert with any issues or concerns they would like to see addressed.

Please e-mail her at robin76@cnnw.net or call her at (503) 248-4703.

AGENDA

1. Welcome and Introductions
2. 2008 Spring Treaty Fishery - Kyle Dittmer, CRITFC
 - a. [\[SOR 2008-C1\]](#)
3. Grand Coulee/Libby Operations - Cathy Hlebechuk, USACE
 - a. [\[SOR #2008-2\]](#)
 - b. [\[SOR #2008-MT-1\]](#)
 - c. SOR Analysis - Cathy Hlebechuk
 - a. [\[SOR Analysis\]](#)
 - b. [\[SOR Additional Unit Analysis\]](#)
 - c. [\[SOR Analysis Specific Years\]](#)
 - d. [\[SOR Analysis Specific Years2\]](#)
 - e. [\[SOR Analysis Specific Years3\]](#)
 - d. Other
 - a. Set agenda for next meeting - **May 7, 2008**
[\[Calendar 2008\]](#) 

Questions about the meeting may be referred to:

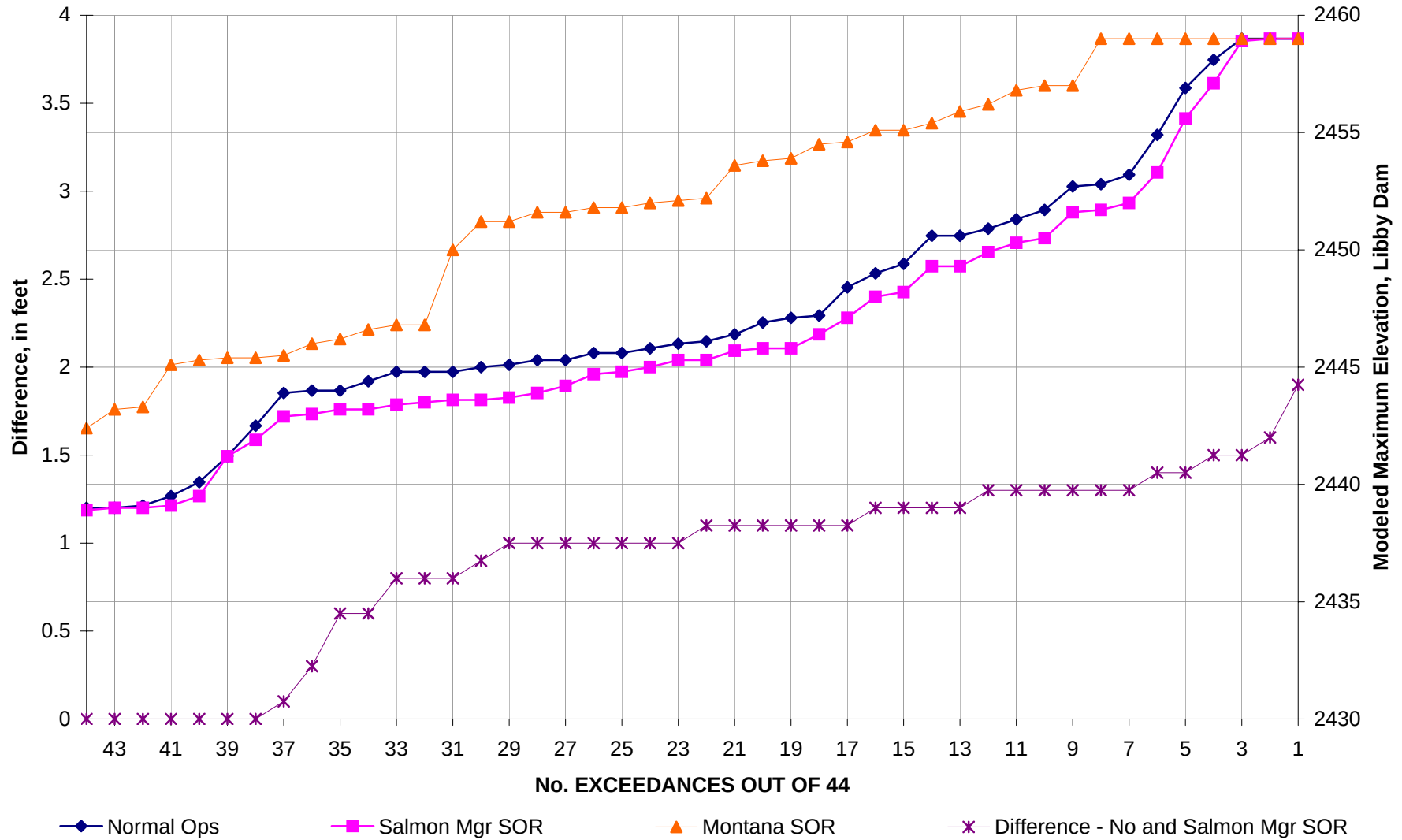
[Jim Adams](#) at (503) 808-3938, or

[Cathy Hlebechuk](#) at (503) 808-3942, or

[Bob Buchholz](#) at (503) 808-3945.

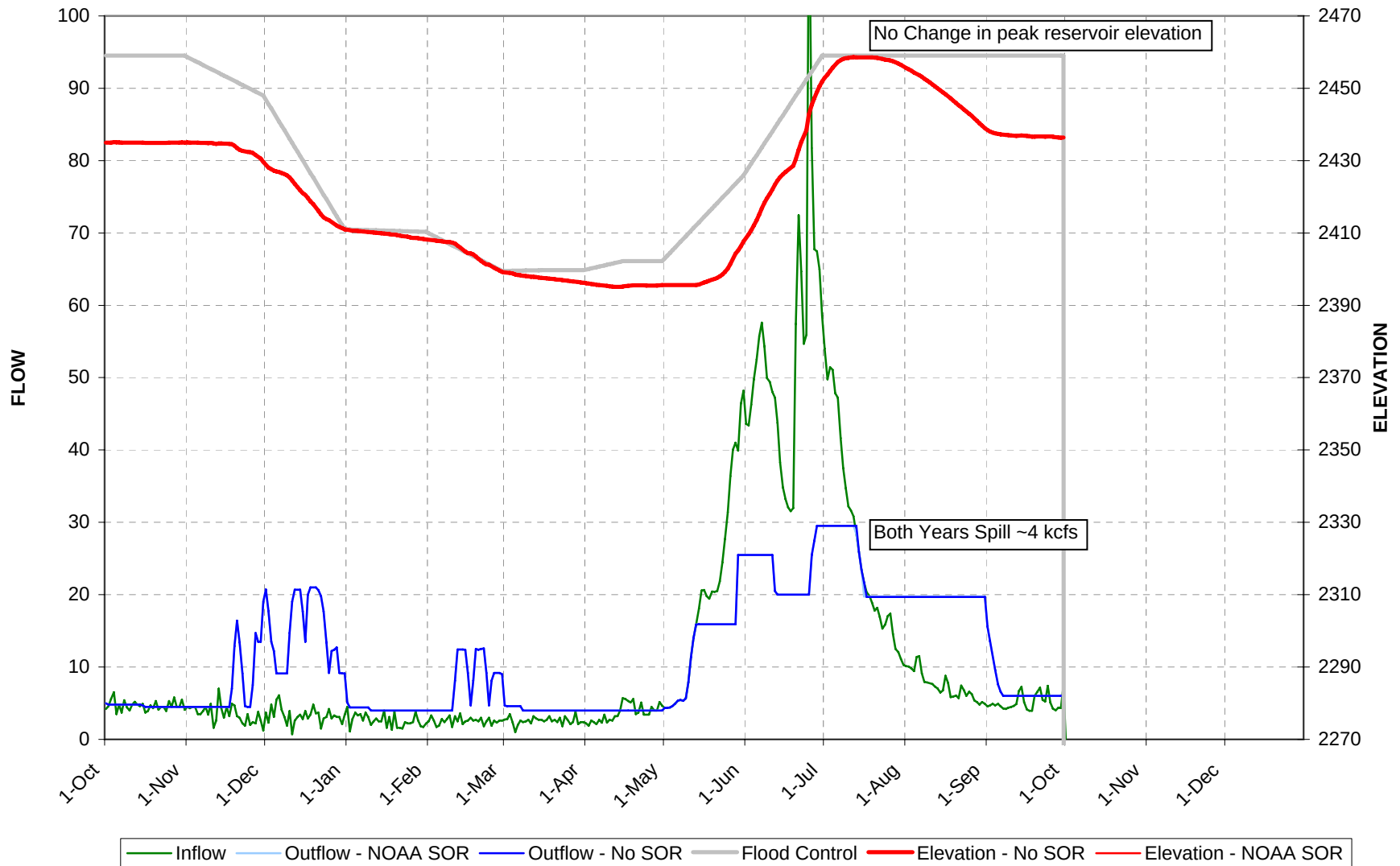
Stage Frequency Analysis April 28 ESP Traces

3 traces Fill and Spill in all three scenarios



Example Trace - No Change

Apr - Aug Volume: 6.746
Start of VARQ: 1-May Start of Pulse: 28-May

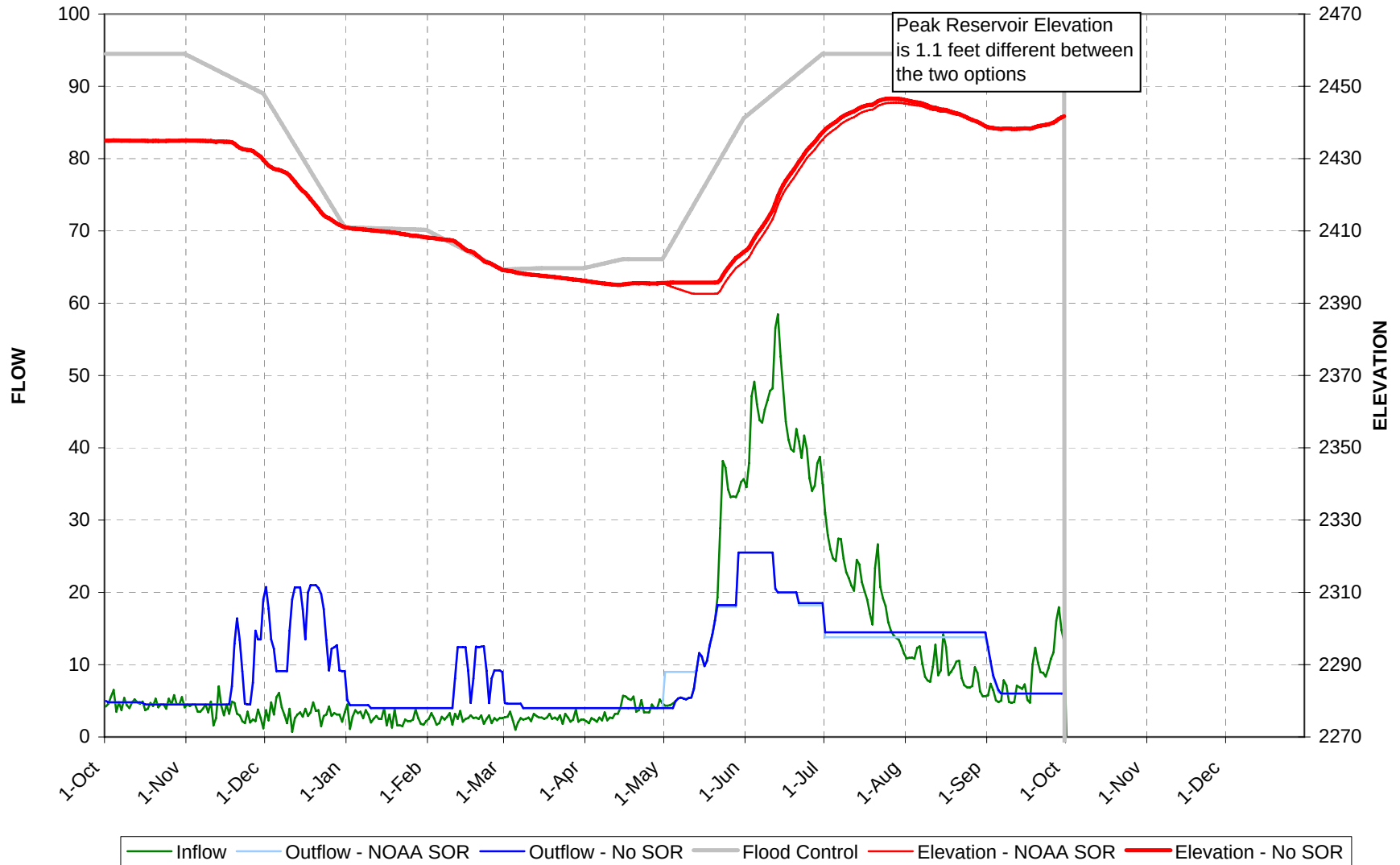


Example Trace - Average Change

Apr - Aug Volume: 5.653

Start of VARQ: 5-May

Start of Pulse: 28-May

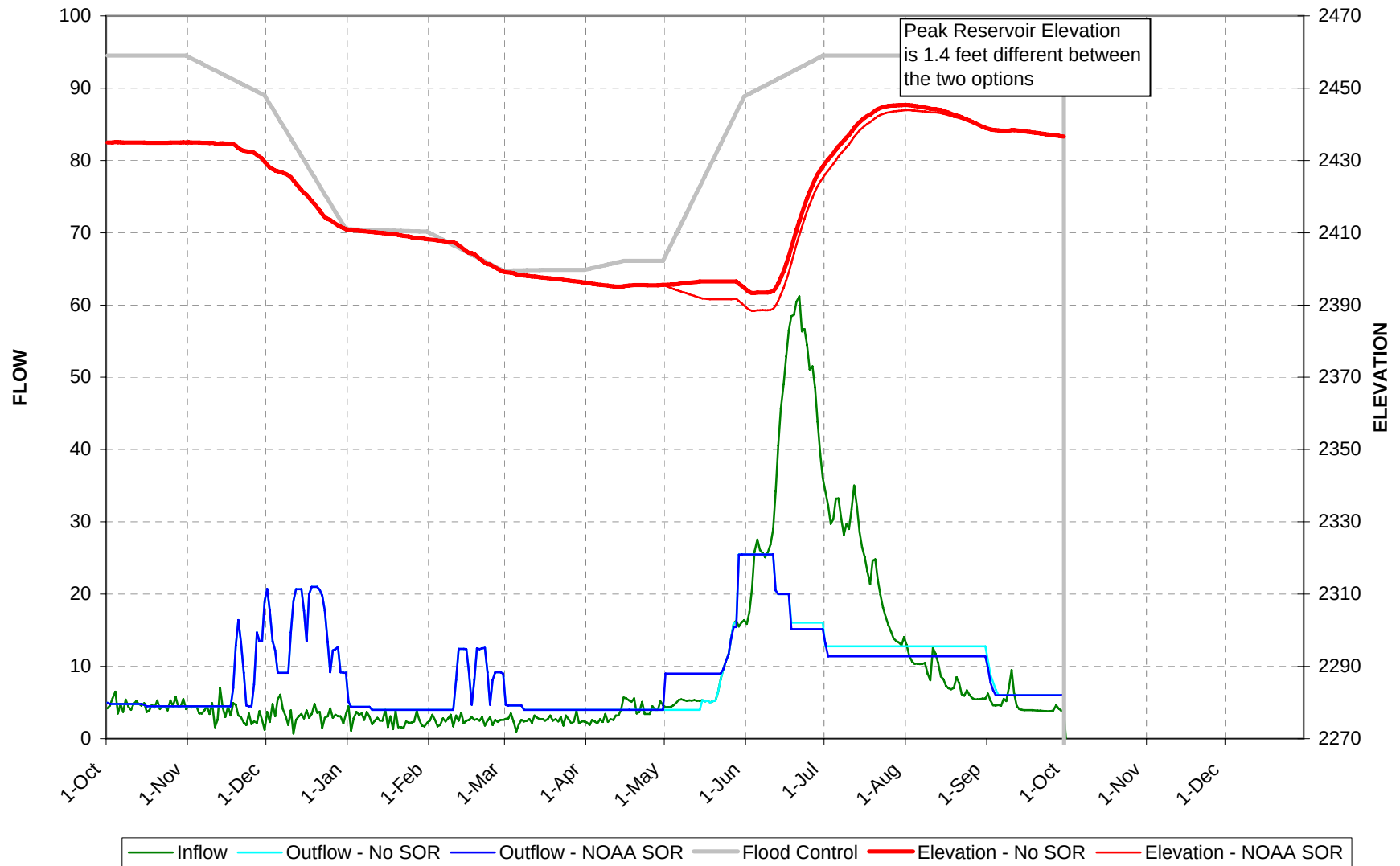


Example Trace - Large Change

Apr - Aug Volume: **5.133**

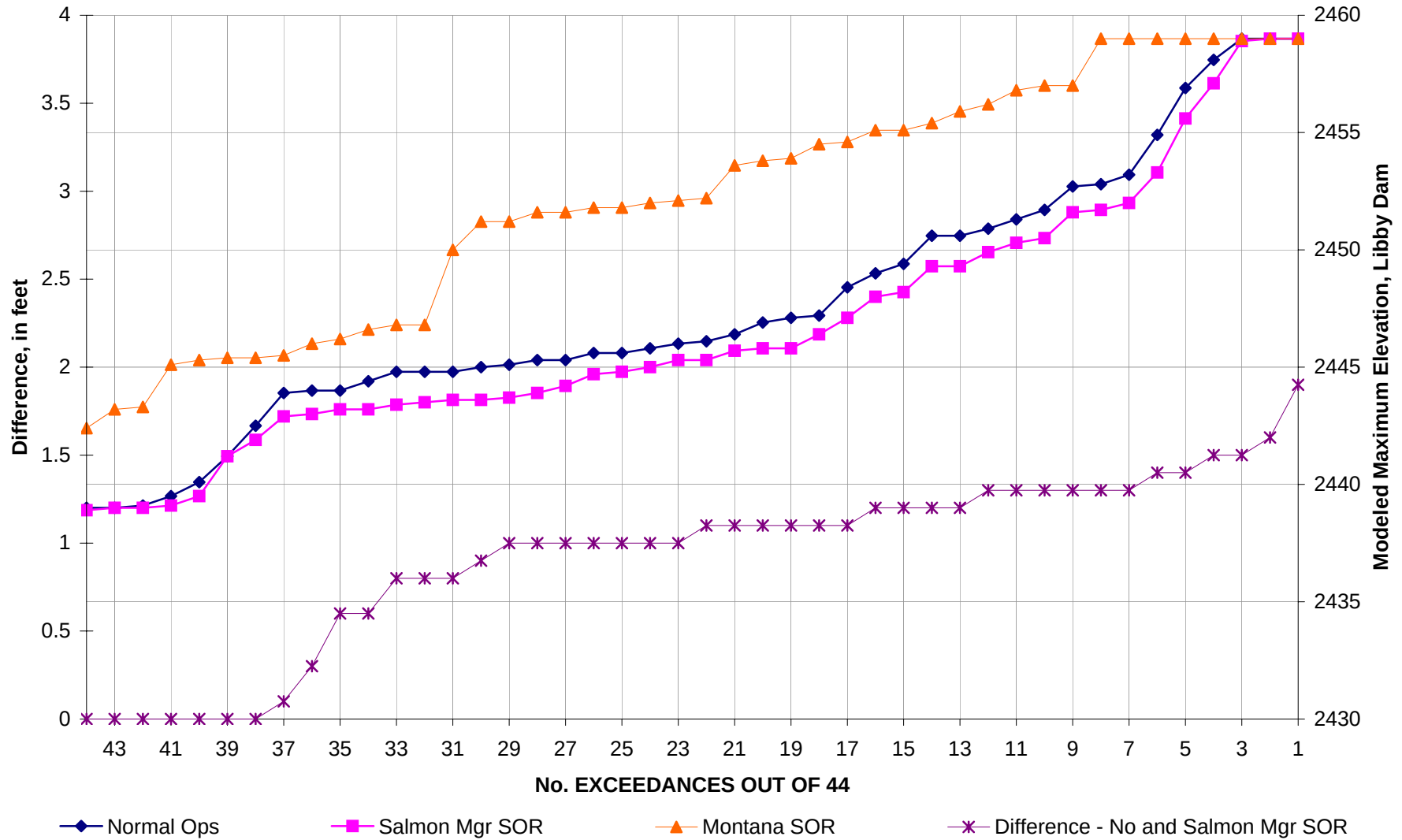
Start of VARQ: **15-May**

Start of Pulse: **28-May**



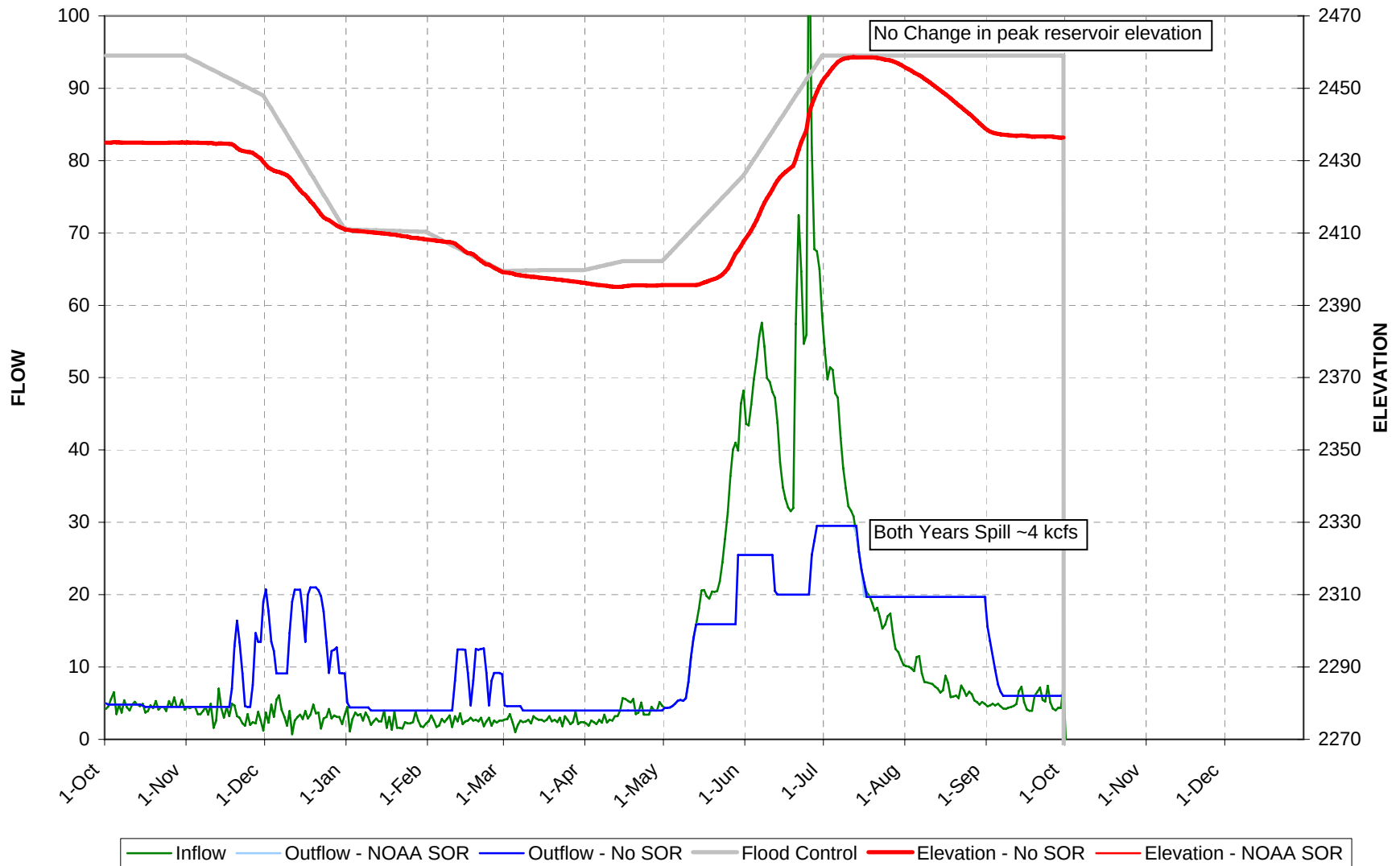
Stage Frequency Analysis April 28 ESP Traces

3 traces Fill and Spill in all three scenarios



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Apr - Aug Volume: 6.746
Start of VARQ: 1-May Start of Pulse: 28-May

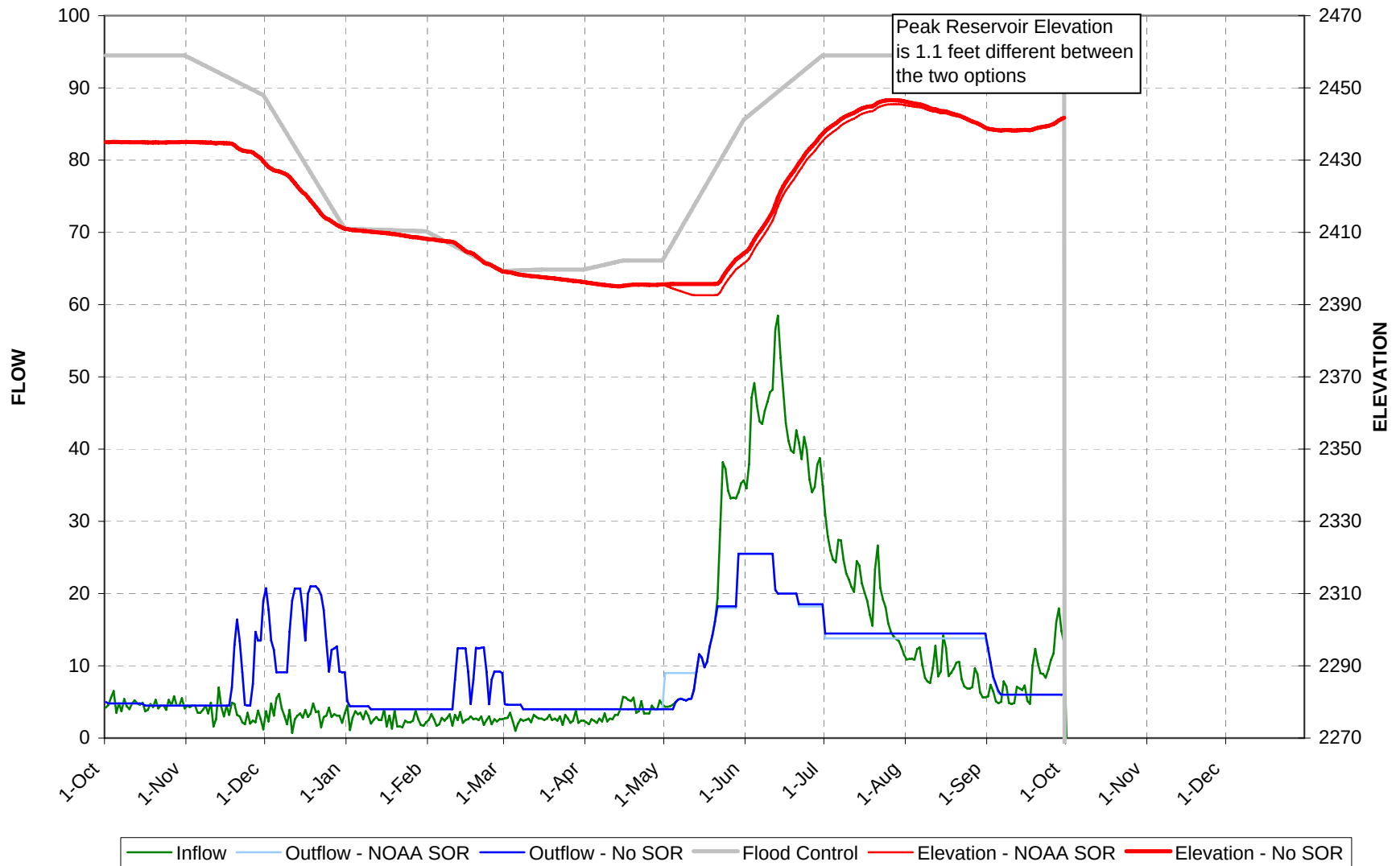


Example Trace - Average Change

Apr - Aug Volume: 5.653

Start of VARQ: 5-May

Start of Pulse: 28-May

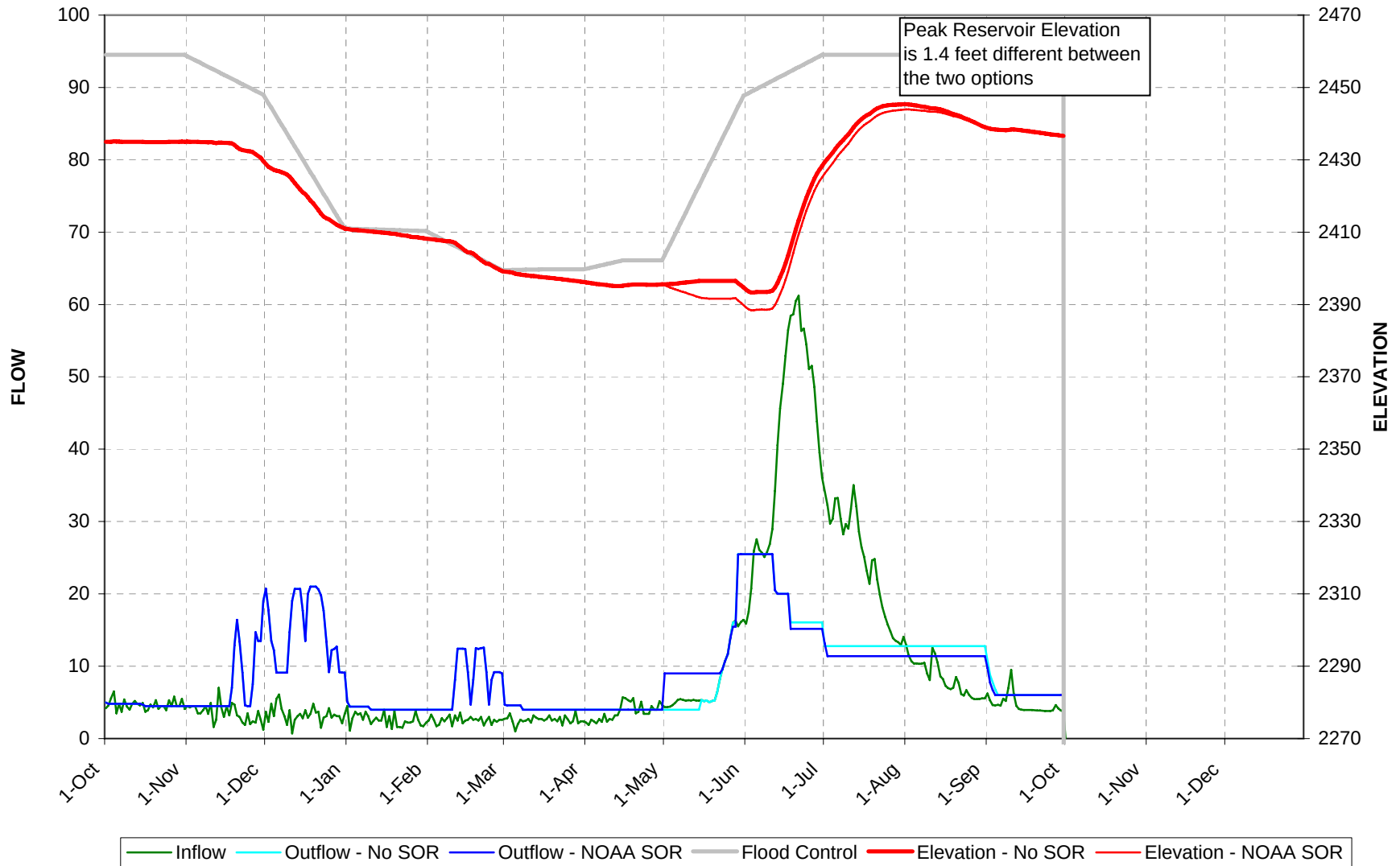


Example Trace - Large Change

Apr - Aug Volume: 5.133

Start of VARQ: 15-May

Start of Pulse: 28-May



COLUMBIA RIVER REGIONAL FORUM

TECHNICAL MANAGEMENT TEAM

May 2, 2008 Conference Call

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Robin Gumpert

Notes: Erin Halton

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.

SOR 2008-C1

Kyle Dittmer, CRITFC, reported on SOR 2008-C1, requesting a one foot operating pool as a hard constraint at Bonneville, The Dalles and John Day dams for May 5-8th to support spring treaty fishing. He clarified that there may or may not be more than one week of treaty fishing and that net flight surveys were planned for 5/6. The COE said they planned to operate the projects as they have in previous years: with a 1' soft constraint (75.5 ft - 76.5 ft) and a 1.5' hard constraint (75.0 ft - 76.5 ft) at Bonneville, a 1.5' foot constraint (262.5 ft - 264 ft) at John Day and a 3' constraint (157 to 160 ft range) at The Dalles.

Action/Next Steps: Bob Heinith, CRITFC, suggested that further discussion with the COE was needed off line to address operations, particularly at The Dalles. He also said CRITFC would communicate any decisions made at a scheduled Tribal meeting on 5/9.

SOR 2008-2

As follow up from the 4/30 TMT conference call, the following information was shared regarding current operations and conditions:

- Grand Coulee was at elevation 1229.3' with a flood control elevation limit of 1228.8' beginning May 4. The project was operating as needed to meet average weekly flows at McNary of 180 kcfs.
- Albeni Falls was passing inflows, about 28 kcfs.
- Libby was operating at a minimum 4 kcfs and was 7 feet below flood control.
- McNary flows ranged from 170-200 kcfs, so the 180 kcfs weekly average objective was being met.

In addition, Jason Flory, USFWS, shared that some members of the Kootenai Sturgeon Recovery Team had discussed the SOR. Though not speaking on behalf of Sturgeon Recovery Team, Jason expressed no immediate concerns with either proposal (2008-2 or the more recently submitted Montana SOR) but he did express concern for temperature management for the sturgeon. Concerns were also raised regarding fluctuating flows out of Libby; preference was for steady flows.

Migration numbers were shared: Rock Island yearling chinook numbers had increased to 648 on May 1 (up from 40-50 the previous week); not as big an increase in steelhead numbers but still an increase, up to the mid-30s. McNary numbers had increased as well – 6,000 counted on 4/28 and 11,000 counted on 5/1. Jerry Marco, Colville Tribe, shared that the estimates were much lower than the historical, that signs of the pending freshet were seen in some of the tributaries, e.g. Spokane flows had increased to 3500 cfs. Again, the flows compared to historic were low.

Jim Litchfield presented an SOR on behalf of Montana that coupled the current recommendation with Montana's traditional recommendation for summer operations at Libby and Hungry Horse. This was included in the draft 2008 BiOp and Montana's hope was to move the issue to agreement at the Regional Forum this year (despite the court order to rollover operations from 2007) – an agreement Montana believed would allow the operation to be implemented this year as it likely will be implemented in the future. He offered the SOR as a start to the discussion.

Finally, a series of graphs were shared from Seattle District COE to show potential impacts to increasing flows at Libby to 9 kcfs. The take away message was that an increase in flows could lead to a 0-2 foot difference in peak elevation; no impact to sturgeon pulse operations; and up to a 2-day delay in average cresting of the peak elevation.

TMT members weighed in on the proposed operations:

- Colville Tribe: Actively object to SOR 2008-2, particularly the use of Grand Coulee to meet flows at McNary, and elevated the issue to IT (see separate memo for specific concerns).
- Oregon: With not enough technical information to be able to inform a good decision on summer operations, not comfortable coupling the two proposed operations. Support moving forward with SOR 2008-2; consider Montana proposal at TMT when more is known.
- Idaho: Support implementing SOR 2008-2; signed MOA to support the Montana operation but agree with Oregon to consider the two operations separately at this point.
- Washington: Fish migrations numbers are increasing and will only go up from here. It appears that implementation of SOR 2008-2 would have minimal effect overall on Grand Coulee elevations, so support implementation. Do not see the connection between the Montana proposal and this SOR, and feel it is important for TMT to commit to discussing the separate proposal in a timely manner.
- Montana: Appreciate Washington's comments. Feels the new BiOp should supercede all other operations for this year – and because of the judge's ruling to roll over 2007 operations, recognize that uncertainty exists. Accept Washington's suggestion to move forward with SOR 2008-2 and discuss the Montana proposal in late May or early June. Does believe that making a decision now on this could work. Noted a high level of frustration that the issue still is not resolved after years of effort, and may decide to take the issue to IT for discussion in the near future.

- NOAA: Support implementing SOR 2008-2; understand and share Montana's frustration and reason for putting the proposal forward. Implementation would be inconsistent with NOAA's commitment to the court to roll over 2007 operations – *and* if agreement is reached amongst the regional parties, would support implementation. Did not hear that the region is willing to go there today.
- USFWS: Our species of concern would not be impacted by either SOR. Given the responses from other TMT members, would like to defer discussion of Montana's proposed summer operations to another time. Support moving forward with SOR 2008-2.
- COE: Supports SOR 2008-2 and is prepared to increase flows at Libby to 9 kcfs, continue passing inflows at Albeni Falls, and will need to revisit the operation weekly.
- BOR: Recognize the difficulty weighing local impacts with other needs. Will support SOR 2008-2 to draft Grand Coulee to the extent needed to meet average weekly flows at McNary of 180 kcfs in support of ESA listed fish migrating in the system. Given flows from Albeni Falls and Libby, and the pending low snow pack runoff, believe the draft will be minimal if at all, and short term. Will need to monitor the system closely, and revisit as needed.
- BPA: Support SOR 2008-2 and recognize the many trade offs involved.

Action/Next Steps:

The Colville Tribe will work with the facilitation team to draft a memo to IT framing the policy question, and send it to TMT members and IT members on Monday morning, 5/5.

- An IT call was set for 1:00 pm on Monday, 5/5.
- **UPDATE:** During the 5/5 IT call, the issue was discussed and an agreement was reached to try to meet the flow objectives at McNary without drafting Coulee below an elevation that would adversely affect the navigation of the ferry at Lake Roosevelt. This operation will be further discussed at the 5/7 TMT meeting.

**Columbia River Regional Forum
Technical Management Team Conference Call
May 2, 2008**

1. Introduction

Today's TMT call was chaired by Jim Adams (COE) and facilitated by Robin Gumpert (D.S. Consulting), with representatives of NOAA, COE, USFWS, BPA, BOR, CRITFC, Idaho, Montana, Oregon, Washington, the Spokane and Colville tribes, and others attending in person or by phone. 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. 2008 Spring Treaty Fishery – SOR 2008-C-1

Kyle Dittmer (CRITFC) presented this SOR for the spring tribal fishery, requesting that the pools above Bonneville, The Dalles and John Day dams be operated within a 1-foot flow band as a hard system constraint from 6 am Monday, May 6, through 6 pm Thursday, May 8. It's possible that CRITFC will request additional treaty fisheries in May, and will notify the COE of specific times as soon as possible. Spring is the most critical time for tribal fishers to exercise their treaty rights, Dittmer explained. CRITFC sponsors a series of net flights to supply COE-RCC staff with aerial photographs showing the locations of tribal fishers' platforms and nets. Fluctuations in the river level beyond 1 foot create difficult conditions for fishing.

The COE plans to operate as it has for previous fishery requests, Jim Adams said. The Bonneville pool will be operated to a 1.5-foot band (75.0 – 76.5 feet) as a hard constraint, and within a 1-foot band as a soft constraint (75.5 - 76.5 feet elevation). The Dalles pool will be operated within its normal 3-foot range (157 – 160 feet). The John Day pool will operate within its normal 1.5-foot band (262.5 - 264 feet) as a hard constraint. CRITFC and COE representatives agreed to have offline discussions regarding operations during Treaty Fisheries, via the recently-signed MOU process.

3. Grand Coulee/Libby Operations – SOR 2008-2 and SOR 2008-MT-1

SOR 2008-2. A TMT conference call two days ago focused on SOR 2008-2, a recommendation by the Salmon Managers to meet a 180 kcfs weekly average flow objective at McNary Dam through augmentation from Albeni Falls, Grand Coulee and Libby reservoirs.

Today's call focused on three aspects of this request on which more information was needed: (1) flows that would result from the operation SOR-2008-2 recommends; (2) possible impacts to sturgeon from this operation; and

(3) an alternative request, SOR 2008-MT-1, which was presented today alongside the original system operation request. A fourth consideration, potential impacts of flow augmentation on ferry operations at Lake Roosevelt, was presented by members of the Colville Tribe.

Current Reservoir Conditions. The current elevation of Grand Coulee reservoir is 1,229.3 feet, with a flood control elevation of 1,228.8 feet, John Roache (BOR) said. The reservoir is being slowly drafted with the intention of maintaining weekly average flows of 180 kcfs at McNary. Albeni Falls is passing inflows, currently 28 kcfs with a slight possibility of spill, Cathy Hlebechuk (COE) said. Libby is currently 7 feet below its flood control elevation, releasing minimum flows of 4 kcfs. No particular flow volume was identified from Libby in this SOR; discussion on April 30 focused on 9 kcfs per day, with approximately 5 kcfs of additional output resulting from this SOR. Flows at McNary over the past 5 days have ranged from 170-200 kcfs, with a weekly average of 180-190 kcfs.

Kyle Dittmer asked, was there a change in meeting the flow objective due to operational changes resulting from Wednesday's discussion? The COE hasn't yet changed its operations, Hlebechuk said. There was discussion of the stipulation, made during Wednesday's call that the request called for a weekly average (not a minimum flow) of 180 kcfs. Recommending a weekly average allows flows to dip slightly below 180 kcfs on weekends, Wagner said. This adheres to prior versions of the WMP, which called for weekend flows at McNary to be no less than 80% of the weekday average.

Impacts of Flow Augmentation on Sturgeon. The sturgeon recovery team is an official USFWS recovery team, and as such provides recommendations to USFWS only, Jason Flory (USFWS) emphasized. Thus it is outside the scope of the team's function to make operational recommendations to COE or TMT. Individual members may do so, but not the team as a whole. That said, the team would not have a problem with SOR 2008-2 as long as the operation doesn't negatively impact temperature control for the sturgeon pulse, Flory explained. Special gates are installed each year at Libby to pull specific layers of colder water from the reservoir for the sturgeon flows, and extra water coming from the reservoir for this request should not be allowed to impact that operation. Hlebechuk asked whether dropping Libby outflows from a 9 kcfs rate down to 4 kcfs for initial controlled flows would negatively impact the sturgeon operation. Changes in river flows should not be problematic since the primary concern is temperature management, Flory replied. The sturgeon operation might not need to begin until 3-4 weeks from now.

Paul Wagner gave an update on overall migration status. The passage index for yearling Chinook at Rock Island rose from 523 on April 30 to 648 on May 1. Steelhead passage numbers have increased from single digits to the low teens, and are now around 35. Passage at McNary rose from 6,000 on April 28 to 11,000 on May 1, which represents mid-Columbia and Snake River fish.

While yearling Chinook numbers indeed have jumped, their passage is still estimated at only 10.5% of the run. In the past 25 years, about 25% of the run has typically passed by this time, Jerry Marko (Colville Tribe) said. Once the migration does begin to pick up, it continues to climb. Subbasin elevations upstream are on the rise, so spring runoff is coming, but taking its time.

SOR 2008-MT-1. Jim Litchfield (Montana) presented this SOR, which has two biological objectives: (1) supporting downstream migration by providing the outflows requested in SOR 2008-2, and (2) implementing the Montana operation from July through September at Libby and Hungry Horse reservoirs to provide habitat for Montana's resident fish in addition to flow augmentation.

There was discussion of what will trigger a change in operations when the freshet has begun. The initial controlled flow starts on the date the COE begins modeling what unregulated flows would be at The Dalles, Hlebechuk said. The ICF is late this year due to colder than usual temperatures and will probably begin in mid-May, Kyle Dittmer (CRITFC) said. Without something more definitive, it's unclear when the operation requested in SOR 2008-2 will change, said a Colville Tribe representative.

Impacts on Ferry Operations at Lake Roosevelt. Colville Tribe representatives presented concerns about the impact a drop in elevations would have on the operation of the Inchelium ferry that serves approximately 725 vehicles per day. The tribe requested that Grand Coulee elevation be kept at a minimum of 1,228.8 feet for navigation purposes. John Roache pointed out that elevation 1228.8 ft is the flood control elevation at Grand Coulee which is the maximum elevation until released from flood control. There is not much room for day to day operational flexibility if Grand Coulee is not allowed to draft below or fill above elevation 1228.8 feet. Pulling water volumes out of Grand Coulee to meet the 180 kcfs weekly average flow objective at McNary could cause the elevation of the lake to drop below the level at which the ferry can safely operate. There was an effort to pinpoint the exact elevation at which the ferry can no longer operate. The latest estimate places that elevation at around 1,228 feet.

Cathy Hlebechuk presented graphs (attached to today's agenda) to help TMT analyze the SORs, modeling up to 9 kcfs difference in inflows at Grand Coulee. There was discussion of the water volumes involved in implementing SOR 2008-2. The largest difference in peak reservoir elevation during any year modeled is approximately 2 feet. In 20% of the 44 years on record, implementing the SOR would cause no change in reservoir elevations.

Participants stated their views of the SORs for the record:

Oregon – Objected to combining the two requests. It's premature to make decisions now regarding operation of Montana reservoirs this summer. It's also

premature to make decisions based on the 2008 BiOp before it is released. Oregon wants to move forward with the original request for weekly average flows of 180 kcfs at McNary. A decision to implement SOR 2008-2 does not preclude discussions regarding the implementing the Montana operation when the appropriate time comes.

Idaho – Supports SOR 2008-2; echoed Oregon's discomfort with bundling spring and summer operations into one request. Also supports the Montana operation, subject to information that will become available later in the season.

Washington – Supports SOR 2008-2 on the basis that fish migration will only increase, while it appears that the recommended operation will probably have a minimal effect on Grand Coulee elevations. TMT should make a point of addressing Montana's concerns well ahead of when they would need to be implemented to avoid impacting resident fish in Montana reservoirs.

Montana – Believes the 2008 BiOp should take precedence over the court-ordered rollover of 2007 operations. Suggested scheduling TMT's discussion of the Montana operation in late May or early June – despite uncertainties regarding reservoir volumes and inflow rates – in order to avoid the last-minute decision making SOR 2008-MT-1 is trying to prevent. Montana would consider elevating the issue to IT at some point, but not today.

NOAA – Advocates SOR 2008-2 as an opportunity that shouldn't be missed. Understands Montana's frustration with summer operations; however, implementing SOR-2008-MT-1 now would be inconsistent with the court order to roll over 2007 operations. The court has left that decision up to the regional parties, requiring only that consensus be reached. Believes an augmentation volume of 180 kcfs will have minimal impact on Grand Coulee operations. Has also asked Idaho Power to pass inflows and not refill Brownlee reservoir at this time. When the freshet comes, it could be fast and furious, causing excessive TDG levels. Whatever can be done now to accelerate migration and get fish out of the river now should be done, not only to avoid exposing listed species to excessive predation and TDG levels, but to take advantage of a rare opportunity this year – good ocean conditions.

USFWS – Supports a detailed discussion of the Montana summer draft at a more appropriate time. For procedural reasons, requested that the second bullet on page 3 of SOR 2008-MT-1 be deleted, "Limit spill to avoid exceeding Montana state TDG standard of 110% when possible, and in a manner consistent with the Action Agencies' responsibilities for ESA-listed resident fish." The USFWS does not want a discussion of sturgeon operations to become dependent on the Montana SOR. Dave Wills and Jim Litchfield agreed to discuss this issue offline before TMT reconsiders the Montana operation in late May or early June.

CRITFC – Supports SOR 2008-2, but agreed with other TMT representatives that the current request should not be tied to the summer operation of Montana's reservoirs.

COE – Supports SOR 2008-2; agreed to revisit Montana's concerns in a timely way, but not at present.

BOR – Is prepared to draft Grand Coulee below its flood control elevation of 1,228.8 feet, but doesn't expect that will be needed to meet the downstream flow objective. The BOR believes that maintaining a weekly flow average of 180 kcfs at McNary is commensurate with the present level of migration activity. The BOR supports SOR 2008-2 for that reason. Shares NOAA's optimism that flows will pick up soon, and increases in Libby discharges will help alleviate the effects on Grand Coulee.

BPA – Supports SOR 2008-2 while recognizing the tradeoffs involved. BPA couldn't guarantee that a minimum elevation of 1,228.8 feet at Grand Coulee will be consistently maintained.

Colville Tribe – Concerned about the uncertainty regarding when the freshet will occur. The main issue is impacts on the Inchelium ferry operations. The Coleville Tribe requested that a minimum elevation of 1,228.8 feet be maintained. (Another state-operated ferry that serves the southeastern corner of the reservation goes out of service when the reservoir hits elevation 1,229 feet.) The Coleville Tribe also has concerns about bank erosion, exposure of archaeological sites, loss of tribal revenue from power generation, and entrainment of resident fish.

Given TMT's general support for the flow augmentation provided in SOR 2008-2, the Colville Tribe requested that this issue be elevated to IT for policy review. Tribal representatives will work with the meeting facilitator to develop a question for IT to consider; TMT representatives agreed to that process. An IT conference call was scheduled for 1 p.m. Monday, May 5.

In the interim, BOR and BPA agreed to make every attempt not to draft Grand Coulee below 1,228 feet, but couldn't guarantee that as a minimum elevation. The COE will operate the three reservoirs in the following manner: Libby outflows will increase tonight from 4 to 9 kcfs. NOAA, BOR, USFWS, BPA, and the Colville Tribes did not object to this increase. Albeni Falls will continue to pass inflows. The Grand Coulee end of April flood control draft to elevation 1,228.8 feet has been postponed from April 30 until May 4 to minimize potential impacts on ferry operations.

4. Next Meetings

An IT meeting was scheduled for 1 p.m. on May 5 to consider Grand Coulee operations. The next regular TMT meeting will be in person on May 7. This summary prepared by consultant and writer Pat Vivian.

<i>Name</i>	<i>Affiliation</i>
Jerry Marko	Colville Tribe
Paul Wagner	NOAA
Barry Espensen	CBB
Kyle Dittmer	CRITFC
Greg Hoffman	COE Libby Dam
Jason Flory	USFWS Spokane
Rick Kruger	Oregon
Cindy LeFleur	Washington
Bob Heineth	CRITFC
Dave Benner	FPC
Holli Krebs	Bear Energy
Deanna Kunkle	Spokane Tribe
Russ Kiefer	Idaho
Jim Adams	COE
Cathy Hlebechuk	COE
Dave Wills	USFWS
Dan Spear	BPA
John Roache	BOR
Robyn MacKay	BPA
John Wasach	Bear Energy
Kyle Dittmer	CRITFC
Scott Bettin	BPA
Jim Litchfield	Montana
Brian Marotz	Montana
Amy Reese	COE Seattle

TECHNICAL MANAGEMENT TEAM

BOR : John Roache / Mary Mellema / Pat McGrane **BPA :** Robyn MacKay / Tony Norris / Scott Bettin
NOAA-F: Paul Wagner / Richard Dominique **USFWS :** David Wills / Steve Haeseker
OR : Rick Kruger / Ron Boyce **ID :** Russ Kiefer
WDFW : Cindy LeFleur **MT :** Jim Litchfield / Brian Marotz
COE: Jim Adams / Cathy Hlebechuk / Bob Buchholz

TMT MEETING

Wednesday May 7, 2008 09:00 - 12:00

1125 N.W. Couch Street, Suite 4A34
Portland, Oregon 97209-4142
Map Quest [\[Directions\]](#)

CONFERENCE PHONE LINE

Conference call line: 203-310-2162; PASS CODE = 4703150

To check into the building, take the elevator to the 5th floor and the guard will issue you an ID badge if you need one and will take you down to the meeting room on the 4th floor. If you have NOT attended a TMT meeting in the past you will need to call ahead and let Jim Adams (503) 808-3938, Cathy Hlebechuk (503) 808-3942, or Bob Buchholz (503) 808-3945 know, so you can be added to the TMT Visitor List and issued an ID badge. This badge may be used indefinitely. If you have attended TMT in the past you may re-use your ID badge indefinitely. If you are a federal employee you will also need to have an ID badge issued to you which can be used indefinitely.

We have had disruptions on the phone because people are not hitting 'mute' after dial in.
Please MUTE your Phone

*All members are encouraged to call Robin Gumpert with any issues or concerns they would like to see addressed.
Please e-mail her at robin76@cnnw.net or call her at (503) 248-4703.*

AGENDA

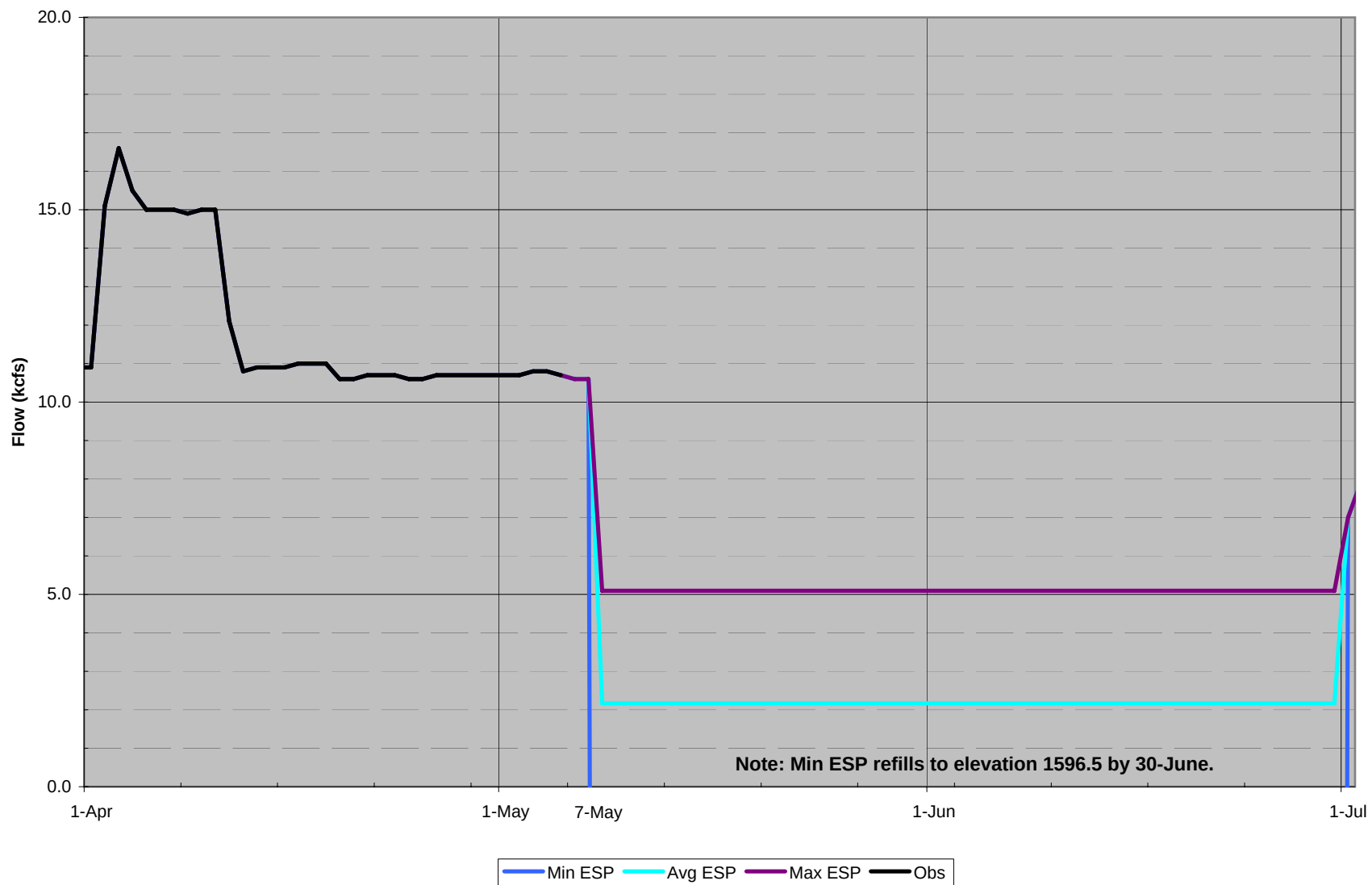
1. Welcome and Introductions
2. Review [\[Meeting Minutes\]](#) 
3. Priest Rapids Update - Russell Langshaw, Grant County PUD
4. IT Meeting: Update on SOR's 2008-2 and 2008-MT-1 - Robin Gumpert - Facilitation Team
5. Dworshak Operations - Steve Hall, USACE
[\[Operational Scenarios\]](#) 
6. Spring Creek Operations - David Wills, USFWS
7. Little Goose Fish Injury Update - Dan Feil, USACE
[\[Fish Injury Sampling Protocols\]](#) 
8. Spill Priority List - Paul Wagner, NOAA
[\[Spill Priority List\]](#) 

9. Water Management Spring/Summer Update - *Scott Boyd, USACE*
10. TMT Guidelines - *All*
[\[TMT Guidelines\]](#)
11. Operations Review
 - a. Reservoirs
 - b. Fish
 - c. Power System
 - d. Water Quality[\[Spill Information 2008\]](#)
12. Other
 - a. Set agenda for next meeting - **May 21, 2008**
[\[Calendar 2008\]](#) 

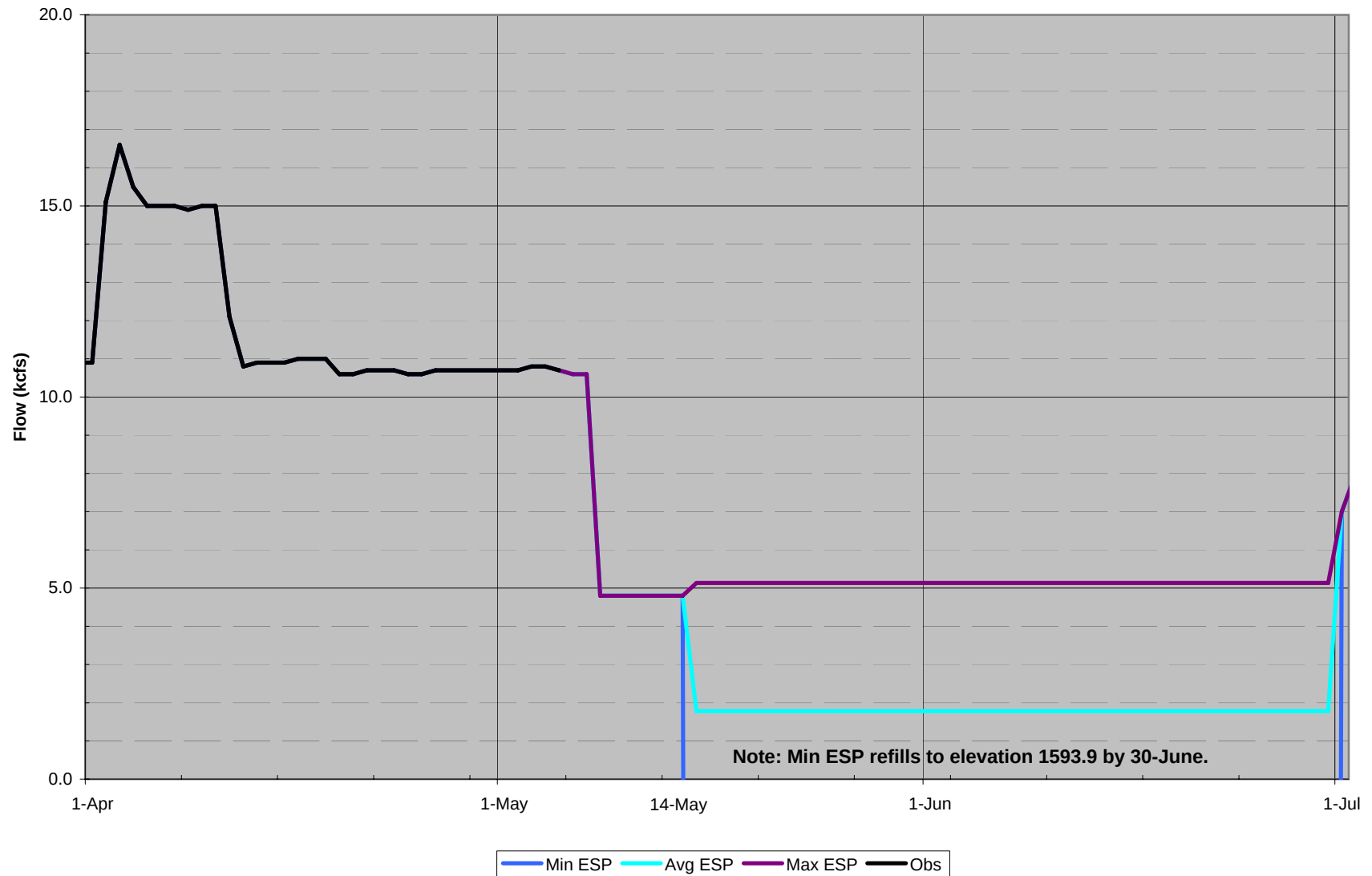
Questions about the meeting may be referred to:

*[Jim Adams](#) at (503) 808-3938, or
[Cathy Hlebechuk](#) at (503) 808-3942, or
[Bob Buchholz](#) at (503) 808-3945.*

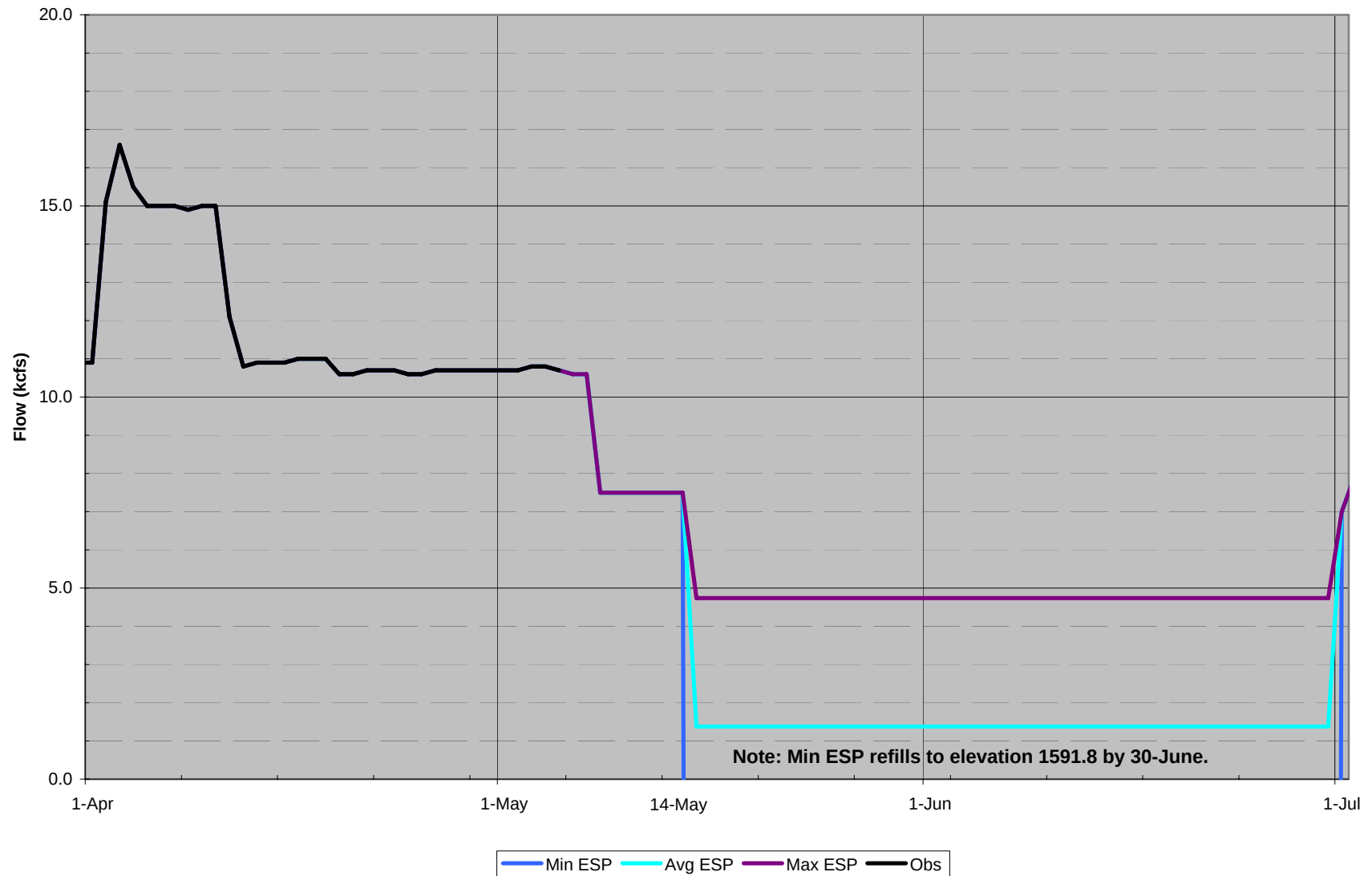
Average Outflow (Qmin+Qaug) to Refill by June 30th
Based on 6 May 2008 ESP
Scenerio 1 Full load thru 7-May



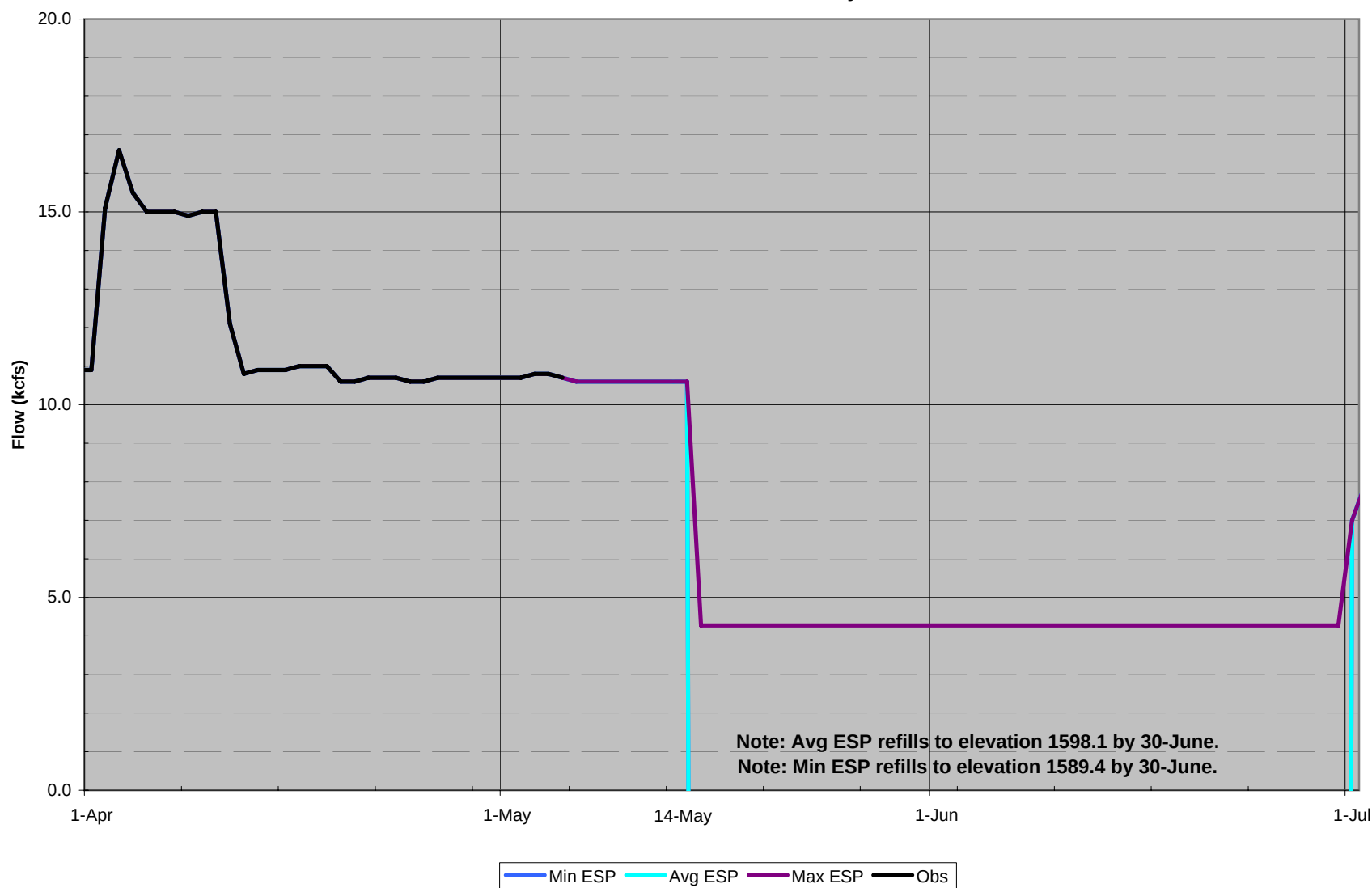
Average Outflow (Qmin+Qaug) to Refill by June 30th
Based on 6 May 2008 ESP
Scenerio 2 Full load thru 7-May, 4.8 kcfs thru 14-May



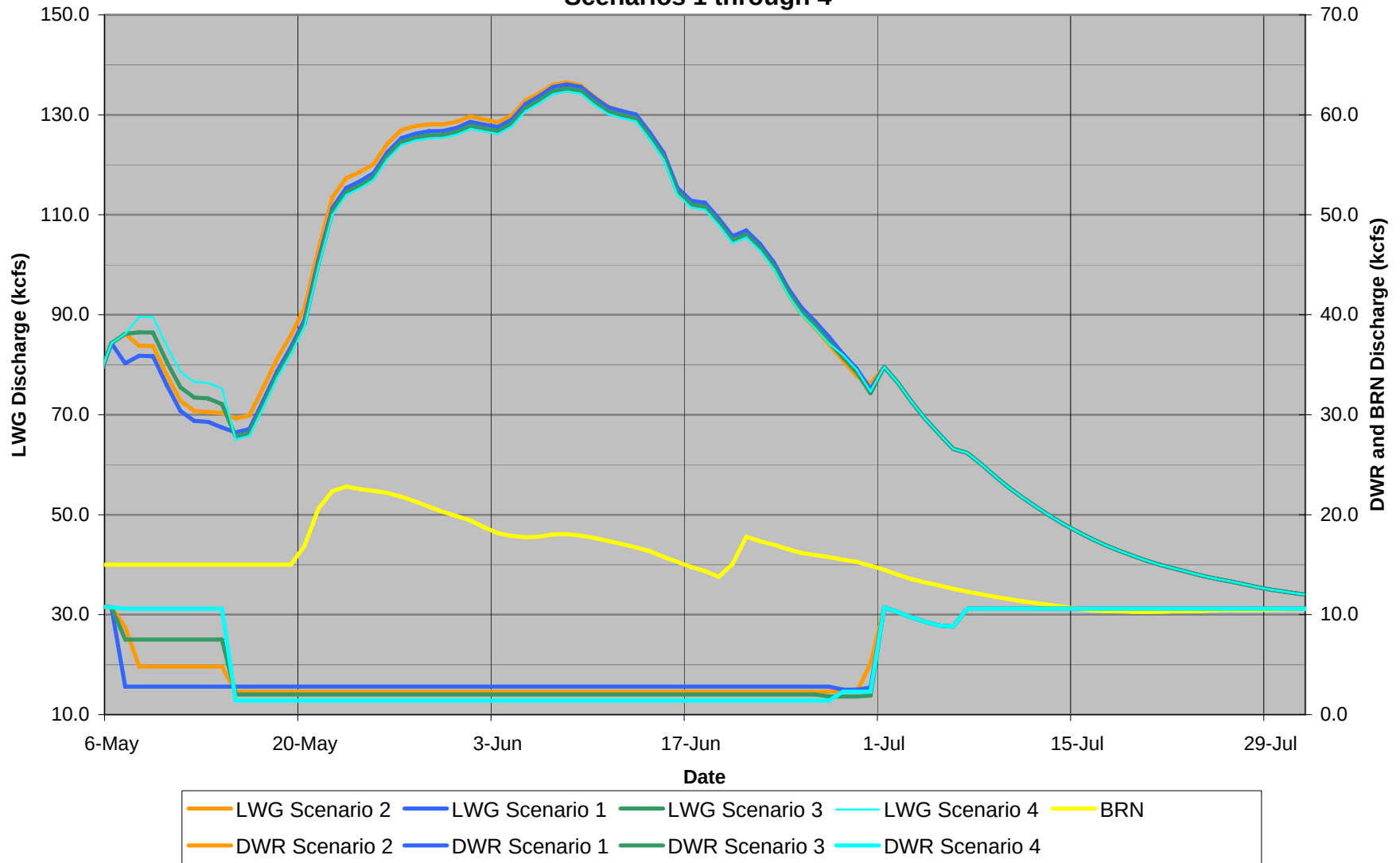
Average Outflow (Qmin+Qaug) to Refill by June 30th
Based on 6 May 2008 ESP
Scenerio 3 Full load thru 7-May, 7.5 kcfs thru 14-May



Average Outflow (Qmin+Qaug) to Refill by June 30th
Based on 6 May 2008 ESP
Scenerio 4 Full load thru 14-May



Lower Granite 6-May STP Flows
Scenarios 1 through 4



TO: Fish Passage Center

FROM: Dave Hurson and John Bailey, Walla Walla District, Corps of Engineers

SUBJECT: Review of Smolt Monitoring Program/Transport Program Fish Injury Protocols.

1. Background. The Corps contracts with PSMFC to provide biological assistance for the Juvenile Fish Transportation Program at each of the Walla Walla District transport facilities; Lower Granite, Little Goose, Lower Monumental, and McNary dams. The contract requires PSMFC to provide a biologist (transport biologist) 8 hours per day seven days per week (56 hours per week) from late March through early October or November, depending on the project. One of the contract requirements is for the transport biologists to assist biologists from the Smolt Monitoring Program (SMP biologist) in sampling fish. PSMFC subcontracts this work to WDFW for work at Lower Granite, Lower Monumental, and McNary dams and ODFW for work at Little Goose Dam. At Lower Granite and McNary dams, there are 3 state biologists working at each dam so there is always a transport biologist working alongside a SMP program biologist when the sample is done. At Little Goose and Lower Monumental dams, there are only 2 biologists working at each dam, so about 4 days per week the only biologist on duty is the transport biologist. The remaining 3 days per week, there are 2 biologists there. This staffing level though is sufficient to meet the sampling and other requirements for both programs.

2. Common Practices. Fish at each project are sampled using similar methods. All fish are anesthetized in preanesthetic chambers in the sample holding tanks. Fish are then passed via gravity flow into handling troughs in the sample rooms where they are identified by species, clipped versus unclipped, and evaluated for descaling. All projects do what we call full sample descaling examinations using the standard criteria: a fish is descaled if it has 20% or greater descaling on one side of the fish. This descaling data is reported by both the SMP and Transport Program as descaling in daily data submissions. This descaling rate is what is primarily used by the Corps for managing facility operations for debris and other requirements.

3. From this point on, what the state biologists do in terms of evaluating fish for further maladies varies considerably from dam to dam. For instance ODFW at Little Goose examines all fish

for maladies if numbers are not too great. State biologists at the other three dams examine only a subsample of fish for maladies, like 50 to 100 of each predominant species. McNary and Lower Monumental ignore all descaling that is less than the standard criteria, while Little Goose classifies less than 20% descaling as body injuries, and Lower Granite has five subcategories for various descaling levels for the subsample. Outside of descaling conditions, projects appear to be either "lumpers" or "splitters" when dealing with other maladies with the number of different categories/conditions ranging from 19 at Lower Monumental to 30 at Lower Granite. Protocols appear to have partly evolved based on what dam some person(s) in the past worked at and then adopted those protocols to the next dam they worked at. In most cases, these persons are not involved in the programs anymore but protocols have carried on. In some cases biologist at a project just started recording data on what they have observed over time.

4. There is some commonality to the types of injuries and other maladies that are recorded, and here is sort of a combined/lumped list by category so everyone can see what is recorded. Some of the projects keep track by right side versus left side, but we don't think that really matters.

Head injuries:

- Eye
- Pop eye
- Operculum damage
- Other head injuries

Body injuries:

- Body injuries - including lacerations, abrasions, punctures, and bruises
- Fin damage (other than apparent hatchery eroded fins)

Predation marks:

- Bird bites
- Fish bites
- Lamprey marks

Diseases:

- Fungus
- Columnaris
- BKD
- Parasites
- Fin hemorrhaging
- Deformity

5. Recommendations. Descaling data should continue to be gathered using the standard descaling criteria and full sample descaling evaluations. Other non-standard descaling data can be kept on the subsample examined fish, but it should be clearly labeled as other descaling data and not injuries or combined with the standard descaling data. Other maladies examined should somewhat conform to the list above, unless there are some specific reasons to add more items or break down the categories further. Again, these other maladies are not really used for the Juvenile Fish Transportation Program, but may be of interest to the Salmon Managers and the SMP.

GUIDELINES FOR TECHNICAL MANAGEMENT TEAM

-~~March~~ 2008

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I. Introduction

The National Marine Fisheries Service's (NMFS) Biological Opinion on the "Reinitiation of Consultation on Operation of the Federal Columbia River Power System (FCRPS), Including the Juvenile Fish Transportation Program, and 19 Bureau of Reclamation Projects in the Columbia Basin", dated December 21, 2000, and the U.S. Fish and Wildlife Service's (USFWS) Biological Opinion on the "Effects to Listed Species from Operations of the FCRPS", dated December 20, 2000, call for the utilization of a Technical Management Team (TMT) to advise the operating agencies on dam and reservoir operations, thus optimizing passage conditions for juvenile and adult anadromous salmonids and resident fish. These guidelines are adopted in accordance with those Opinions.

The TMT is one of several technical teams within the Columbia River Regional Forum established by the NMFS, USFWS, the U.S. Army Corps of Engineers (COE), the U.S. Bureau of Reclamation (BOR), and the Bonneville Power Administration (BPA). The Regional Forum provides for regional discussion and recommendation on the operation and configuration of the FCRPS. Its goal is to develop consensus among the various members on these recommendations. The TMT's mission is specifically to ensure broad technical participation and use of the best available technical information, and to encourage consensus in recommendations on operating the FCRPS. When consensus is not achieved, the TMT ensures that the basis for participants' recommendations and Federal decisions is fully explained and documented. In such situations, questions can be elevated to the Implementation Team (IT) for resolution if requested by a TMT member.

The TMT operates under the Guidelines and Procedures approved November 7, 2002, for the Columbia River Regional Implementation Forum. The following more specific guidelines supplement the Forum's procedures for TMT operations. As the Forum procedures are refined, these guidelines may be revised.

II. Scope

The focus of the TMT is to implement the NMFS and USFWS Biological Opinions on operation of the FCRPS while considering the provisions of (and effects on) the Northwest Power Planning Council's (NPPC) Fish and Wildlife Program, other biological opinions, State and Tribal plans and programs, and other relevant operational requirements. Specifically, the TMT should explore operational scenarios under the Biological Opinions that would serve to protect other fish and wildlife in the Columbia River Basin and promote coordination and consistency with these other objectives to the extent possible.

III. Membership

See Forum Guidelines and Procedures.

The members and alternates of the TMT are listed in Attachment 1. Initial confirmation of membership, designation of representatives, and any changes in representation should be provided in writing to the NMFS Implementation Team Chair.

IV. Roles and Responsibilities

The TMT is responsible for discussion and recommendations to the Action Agencies (COE, BOR, and BPA) on hydro system flows at designated control points and expected project operations to implement the Biological Opinions for listed salmon, steelhead, sturgeon, and bull trout species within the Columbia River basin while taking into account the needs of (and effects on) other listed and non-listed species.

The TMT is to engage in joint decision-making that works toward consensus within the recognized authorities and management jurisdictions of its participating members. Specifically, the State, Tribal and Federal salmon managers (Salmon Managers) recommend the flows at the control points that best meet the needs of salmon and steelhead. These may include specific project operations, but this does not foreclose TMT consideration of alternative means of providing the same operating condition. Other participants (e.g., Resident Fish Managers) may also make recommendations consistent with the scope of these guidelines. The vehicle for communicating a river or project condition, which will benefit salmon/steelhead/sturgeon migrations or resident fish, is a system operational request (SOR). See Section V(d). All parties submitting SORs are encouraged to coordinate with other participants to the extent possible.

The Salmon Managers are responsible for the management of anadromous and resident fish in the basin. The COE and BOR are responsible for decisions on operation of the FCRPS projects; and the COE and BPA are responsible for Treaty agreements with Canada regarding storage in Canada and other Treaty-related matters. The participation of other affected sovereign and non-sovereign entities is intended to ensure that decision-makers have the broadest possible source of information upon which to base their decisions. All parties are encouraged to succinctly present their views regarding biological or operational recommendations. Input can provide alternative options for the appropriate authority to consider when making their decisions, but authority for implementing the request remains with the appropriate agencies.

The TMT is a year-round technical body. Winter planning will consist of development of a Water Management Plan and updating the 1-year and 5-year Biological Opinion Implementation Plans. The purpose of in-season management is to implement the Biological Opinions and the Water Management Plan. Post-season review will consist of a review of the previous year's activities and performances, and updating operating procedures as needed. Throughout the year the COE, BOR, and BPA will coordinate planning and operational decisions that may affect salmon and other species, through the TMT (e.g., yearly agreement on Non-Treaty Storage Agreement spring/summer operation, the 5-year

Idaho Power Company Agreement, and the Libby/Arrow swap). The COE, BOR and BPA will specifically use the TMT as a forum for the coordination and consideration of potential effects on salmon, steelhead and other species prior to a final decision. Idaho Power Company, the Mid-Columbia Public Utility Districts, and other non-sovereign participants are also encouraged to use TMT as a forum for coordination of planning and operational decisions throughout the year.

V. Operating Procedures

a) Annual Water Management Plan

The Annual Water Management Plan is used by the action agencies as a decision-making and management tool, and includes all known or typical operations that will be implemented throughout the year based on prior years' gathered data.

Each year, the TMT will finalize an annual Water Management Plan based on the run-off forecast and other factors specific to that year. A draft Spring/Summer Update will be available for review within two weeks of the March final forecast. A draft Fall/Winter update will be available for review in October. All interested parties may participate in the plan development and will be given an opportunity to review and comment on the draft plan. In general, the Salmon Managers will provide information on salmon and salmon operational requirements to be included in the plan. Resident Fish Managers will provide information on resident fish needs. The Action Agencies will provide information on reservoir status; planned project operations (and operating constraints); flow forecasts; anticipated special operations for research and other purposes; turbine outage and maintenance plans; and operating agreements and contracts that may affect annual operations. Priorities among competing needs should be resolved within the context of the scope of these guidelines.

Deleted: By April 15 each year, the TMT will finalize an annual Water Management Plan based on the run-off forecast and other factors specific to that year. A complete draft, subject to refinement based on the April 1 forecast, should be available for review no later than March 10 each year. All interested parties may participate in the plan development and will be given an opportunity to review and comment on the draft plan. In general, the Salmon Managers will provide information on salmon and salmon operational requirements to be included in the plan. Resident Fish Managers will provide information on resident fish needs. The Action Agencies will provide information on reservoir status; planned project operations (and operating constraints); flow forecasts; anticipated special operations for research and other purposes; turbine outage and maintenance plans; and operating agreements and contracts that may affect annual operations. Priorities among competing needs should be resolved within the context of the scope of these guidelines.

b) Summary of In-season Management Key Events

Monday	Begin implementing operations based on last week's decision.
Tuesday (9 a.m.)	The COE posts or otherwise distributes flow projections to TMT members for Priest Rapids, McNary and Lower Granite, along with resulting reservoir operations and elevations, and current dissolved gas and temperature data. Salmon Managers will post or otherwise distribute biological information.
Tuesday (4 p.m.)	TMT Members (or others) submit SORs to the Reservoir Control Center (RCC) and send (fax) hard copies to TMT members and participants. The Salmon Managers will fax SORs to all project owners for which an operation is requested. The Salmon Managers will post the SOR to the Fish Passage Center web page, or an electronic version of any SOR will be simultaneously sent to the Corps so that it is available for the TMT web page as soon as possible.

Wednesday 9 a.m.	The TMT meets bi-weekly, with conference call on alternate weeks if needed, to discuss in-season management data and SORs, document operations, and recommend the following two week's operations. By the start of the meeting all SORs and the disposition will be posted to the TMT web page for use by members who can not attend the meeting. If necessary, the TMT frames the issue(s) to be raised to the IT before 12 a.m.
Thursday (3 p.m.)	In case of impasse, disputes are resolved through the IT.
Friday (noon)	In the event an issue has been raised to the IT and the IT has resolved the issue, the Action Agencies document the operation to begin on the following Monday. This decision, and rationale, should be documented before the next regularly scheduled TMT meeting and sent to the Chair of TMT, who will post it on the TMT homepage
Friday (p.m.)	The TMT draft meeting notes are posted or otherwise distributed

c) In-season Management Data

The TMT will use the National Weather Service's River Forecast Center's (RFC) streamflow forecast for the Columbia River Basin. This forecast (and the basic reservoir operations that are assumed when producing it) is the official forecast to be used for the decision-making process. The BPA forecast may be used as supplemental information. The COE will use the RFC forecast to prepare flow projections for Priest Rapids, McNary and Lower Granite. By 9 a.m. (or as early as possible after that) on Tuesday, the flow projections and resulting reservoir operations will be distributed to TMT members. The Action Agencies will also provide dissolved gas, temperature, and other physical monitoring data available for decision-making.

During the anadromous fish migration period, the Salmon Managers will provide biological information on salmon and steelhead numbers, migration timing and condition, for both the current year and historically. The USFWS, and others as appropriate, will provide relevant information on other fish and wildlife resources. These data will be posted by NMFS and USFWS each Tuesday by 4 p.m.

d) System Operational Requests

System Operational Requests (SOR) are an in-season management tool for bringing forth requests to deviate from or refine planned, existing or BiOp recommended operations. These requests should be intended to provide an operation that is biologically necessary to protect listed and other aquatic species of concern and human health and safety given in-season fluctuations of the hydro system and the status of the fish.

TMT members may provide recommendations to the TMT on hydro system flows and/or expected project operations consistent with the scope of these guidelines. Non-TMT

members may also submit recommendations for consideration. These recommendations will be in the form of system operational requests (SORs) stating the flow objective(s) sought (e.g., keep flows at a location X in a W-Z range). Expected project operations may also be added. Each SOR will include the biological basis for the recommendation. Each SOR will also indicate whether the request is to implement a NMFS or USFWS Biological Opinion, NPPC Fish and Wildlife Program, or other Federal, State or Tribal program. Non-TMT members may also submit SORs for special operating purposes for TMT consideration.

All SORs will be submitted by 4:00 p.m. on Tuesday via fax to the action agencies, or any other project owner that may be required to deliver a specified operation, provided that the flow projections were available by 9 a.m. that day. Electronic submittal through the Proposal Submission/Review form on the TMT homepage may also be used. TMT and public comments on the proposal can also be appended via the Internet form. If proposals are incomplete, or are not received in time for sufficient review, the TMT may choose to delay action, but lack of an SOR should not preclude discussion of relevant matters at the meeting.

SORs should list members of the agencies who have reviewed and support the request. The SOR will be outlined for description on the TMT SOR disposition web page. The SOR will be posted to the agenda prior to the start of the TMT meeting so that telephone participants can follow the conversation at the meeting.

When an SOR has been properly submitted, the Action Agencies (COE, BOR, BPA) should be prepared at TMT to describe the operational options and implications of meeting the request. Any decision to implement or not implement will be recorded in the official meeting materials and summarized at the end of those minutes. The meeting facilitator will clarify the decision at the meeting to assure that the record accurately reflects the disposition of the request.

e) Meetings

Between the last week of March and up to at least August 31 the TMT will meet every other Wednesday, or more often if necessary, to conduct in-season management. All meetings will be open to interested parties. A conference line will be available for those who cannot attend in person.

An agenda for each meeting will be distributed at least two business days prior to the meeting (the preceding Monday in the case of the regularly scheduled in-season meetings). The principal purpose of the meetings and standing agenda items during the migration season is to review the status of the preceding week's SOR and operations, biological data, new SORs and project operating data, and to reach informed decisions on FCRPS operations for the following week(s). As other items are brought forward for TMT consideration they will be added to the agenda for future discussion, but lack of an agenda item will not preclude discussion of relevant matters at the meeting.

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The Chair should also ensure that the support or opposition of each TMT member for an SOR and a final decision by the Action Agencies are noted in the minutes.

f) Meeting Facilitation

Meetings of the TMT will be facilitated by an impartial facilitator, who will allow all TMT members the opportunity to fully participate in discussions and to help members resolve conflicts as they arise. The meeting facilitator shall serve at the will of all members of TMT and should have skills as a meeting manager and conflict resolver. The meeting facilitator's role will include:

- Assisting the chair and TMT members in the development of meeting agendas
- Managing the meeting agenda in a balanced and even-handed fashion so that all members have an opportunity to speak and be heard
- Helping the group stay focused on the agenda and prioritize items that need action and further discussion
- Enforcing the ground rules established by the TMT (see Attachment 2)
- Helping the group reach consensus on decisions
- Helping the group resolve conflicts that may arise in the course of discussion
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- Working with members between meetings to clarify issues, resolve disputes, and seek potential solutions to impasses
- Assisting members to develop opportunities that may resolve conflicts and increase the overall satisfaction with the TMT process in the long term, and
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TMT members may give feedback directly to the facilitator or to the chair if they have concerns with the manner by which meetings are managed. The facilitator will be replaced if, after discussion with the facilitator, members believe he or she is not remaining impartial in the delivery of service.

g) In-season Decision making

On Wednesday morning the TMT will decide on operations for the following two weeks based on the available information and any pending SORs. These operating decisions will be made by consensus whenever possible. Consensus is defined as lack of a strong objection that would prompt one or more of the TMT members to elevate the issue to the IT. In the absence of consensus, the decision will be referred to the IT in accordance with the dispute resolution process described below. Objections to decisions that are not strong enough to prompt one or more TMT members to elevate the issue will be documented in the minutes of the TMT meeting.

If the recommendation is to implement the SOR or a modification of the SOR as agreed to by the TMT, then this should be documented for the minutes, and the SOR (and the Biological Opinion, Council's program or other plan on which it is based) may form the basis for the decision. If the Action Agencies do not agree to implement an SOR, they will describe for the minutes both the intended operation and the basis for that decision. The basis for the decision could include that the proposed operation is inconsistent with a Biological Opinion, that operational constraints prevent its implementation, that cost is prohibitive beyond that already included in the so-called "Fish Cap", or that the Action Agency has an alternative view of the best available biological information. If the Action Agencies believe the best available biological information supports a position that differs from that of the SOR sponsor(s), then the explanation should acknowledge this difference and should provide a clear, succinct written explanation of the data, analysis or judgment that supports the alternative view. In each case, a full explanation will be provided by the Action Agencies to the TMT and IT.

The final decision made by the COE and BOR on the following week's operation will be made at the meeting whenever possible. The TMT will try to avoid making decisions outside the established process. In-season FCRPS operating decisions made through a separate process, such as those under the Action Agencies' authority for emergency situations, will be explained and documented as soon as possible, but in any case no later than Friday following the TMT meeting.

h) Documentation

Minutes of all TMT meetings will be prepared in accordance with Regional Forum procedures and approved by the TMT. Every effort will be made to post the draft meeting notes to the TMT home page by close of business Friday afternoon following the meeting. Comments will be due by the following meeting.

The TMT meeting minutes will be used to keep track of the decision-making process. The minutes will include the substance of any SOR, the decision, the decision-maker, and the basis for the decision. The minutes will also include: (1) documentation of consensus or a listing of members objecting to an SOR or a final decision; and (2) when an SOR is not implemented, clear documentation of the reasons provided by the decision-maker.

If a decision is elevated to the IT and therefore not made at the weekly TMT meeting, documentation on the final decision reached will be provided separately in writing by the IT and will include the same information noted above. This documentation of the decision should happen before the next regularly scheduled TMT meeting and be sent to the Chair of TMT, who will post it on the TMT homepage.

Each member is responsible for reviewing the decision documentation and the meeting minutes, especially if the agency he/she represents is one of the decision-makers.

Interested parties may request copies of the minutes if they have no access to the TMT homepage.

i) Distribution of Information

Meeting notes and material will be made available to TMT participants throughout the year. These materials will be made available through the TMT home page and may be reproduced on other Internet home pages where available. They will also be faxed to members and participants that request such services. Regular mail may be used for materials when time permits.

j) Public Participation

The public may comment on an issue at the end of the discussion on that issue or at the end of the meeting, based on the discretion of the group and the facilitator. They may also comment outside the TMT process.

VI. TMT Dispute Resolution Process

In the event that the TMT is unable to reach consensus on an issue, any member may request that the item be elevated to the IT. Every effort should be made to ensure that the issue is raised at least one week in advance of the monthly IT meeting (first Thursday of the month).

If, despite all efforts to the contrary, the TMT finds at its Wednesday morning meeting that it is unable to resolve a weekly in-season management dispute, and the decision cannot await consideration at the next regularly scheduled meeting, the IT will meet by conference call at 3:00 on Thursday afternoon. In the event that such a meeting is necessary, the TMT will prepare, and agree to, a brief summary of the issue(s) and a short description of the opposing viewpoints. This document will be given to the IT members by 1:00 p.m. on Thursday afternoon.

The IT will attempt to reach consensus. If the IT is unable to reach a consensus, then a final recommendation will be made by the appropriate agency (e.g., NMFS or USFWS if the issue relates to implementation of a Biological Opinion, or NPPC if the issue relates to implementation of the Fish and Wildlife Program). The member with the authority for the action will then make the decision and explain the rationale in writing. Whether IT acts by consensus, or the member with the authority for the action makes the decision to resolve a TMT conflict, it should be documented before the next regularly scheduled TMT meeting and sent to the Chair of TMT, who will post it on the TMT homepage.

VII. Emergency Meetings

Any member of the TMT may call a meeting when an emergency situation requires action of the TMT.

ATTACHMENT 1

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TECHNICAL MANAGEMENT TEAM (TMT) MEMBERS

ORGANIZATION - REPRESENTATIVE / ALTERNATES

National Marine Fisheries Service - Paul Wagner / Richard Dominigue
U. S. Army Corps of Engineers - Jim Adams / Cathy Hlebechuk / Bob Buchholz
Bonneville Power Administration - Robyn MacKay / Tony Norris / Scott Bettin
U.S. Bureau of Reclamation - John Roache / Mary Mellema / Pat McGrane
U.S. Fish & Wildlife Service - David Wills / Steve Haeseker
State of Washington - Cindy LaFleur
State of Oregon - Rick Kruger / Ron Boyce
State of Idaho - Russ Kiefer
State of Montana - Jim Litchfield / Brian Marotz

Deleted: Chris Ross

Deleted: Cindy Henriksen / Rudd
Turner

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Deleted: John Wellschlager

Deleted: Tony Norris

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Confederated Tribes of the Colville Indian Reservation - Jerry Marco / Kirk Truscott
Shoshone-Bannock Tribes of Fort Hall - Keith Kutchins

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Reservations¶

ELIGIBLE ORGANIZATION WITH
NO OFFICIALLY DESIGNATED
MEMBER - CONTACT PERSON / ALTERNATE

Kootenai Tribe of Idaho
Confederated Tribes of the Umatilla Indian Reservation
Confederated Salish & Kootenai Tribes of the Flathead Reservation
Confederated Tribes of the Warm Springs Reservation
Yakama Indian Nation
Shoshone-Paiute Tribes of Duck Valley Reservation
Burns Paiute Tribe
Kalispel Tribe
Spokane Tribe of Indians Deanne Pavlik Chuck Lee
Nez Perce Tribe of Idaho - Dave Statler / Greg Haller
Coeur d'Alene Tribe of Idaho
State of Alaska

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ATTACHMENT 2.

MEETING GROUND-RULES & EXPECTATIONS

The following meeting ground-rules and expectations were discussed and agreed to by all members present at the _____ meeting of the TMT. They may be changed at the request of the Team.

I. Ground-Rules

Meetings will start and end on time unless members agree otherwise.

Members will treat each other with respect, which includes:

- ° Separating the people from the problem
- ° Listening to what others have to say
- ° No interruptions
- ° Monitoring your own air time
- ° No side conversations
- ° Letting the facilitator or chair know when you would like to speak
- ° Being mindful of tone when speaking directly to others
- ° Remembering that members are representing agencies, not stating individual opinions

During in-season management, each member agency/group will have one primary TMT representative who will sit at the table during meetings. Alternates or technical resource staff are welcome to attend and provide input through their primary representative, or when called on by TMT members. All are welcome to sit at the table --with preference for the primary representatives if there is a space limitation.

Any issues elevated from the TMT to the Implementation Team (IT) will be thoroughly discussed at TMT. TMT members will agree on the "issue statement" for the IT. The TMT Chair will then present the issue at the IT meeting. All TMT members will brief their agency IT representative on the issue prior to the IT meeting.

The meeting facilitator may make process comments in order to keep the group on track, focused and productive.

II. Expectations

Members are expected to come prepared to participate in the meetings. This means, they

will provide necessary input to discussions and work towards making decisions based on information they have gathered from their respective agencies between meetings.

Members are expected to keep their agencies and staff apprised of decisions or important meeting discussions.

Members are expected to attend all meetings or send an alternate. If an alternate attends the meeting, a briefing, both before and after the meeting, is expected of the primary representative. The group will not revisit information for members who were absent from or late to a meeting.

Members are expected to follow through on assignments to which they agree, or are given by other team members, on a timely basis. This includes requests for comments on information or reports from other team agencies.

The meeting facilitator is expected to keep the group on track and focused on agenda items. Additionally, the group expects the facilitator to assure equal participation, highlight any decisions that the group reaches, and maintain a sense of humor.

People who listen in on the telephone are expected to “sign-in” as they call in on the conference telephone line.

Group members may contact the facilitator at any time to make process suggestions, raise concerns or request additional assistance at or between meetings.

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PRO-----TDG%-TDG%-TDG%-TDG%-TDG%-TDG%
JECT-----110--115--120--125--130--135
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LWG-----20--30--41--90--125--200--
LGS-----10--15--37--80--150--250--
LMN-----10--15--20--95--180--250--
CHANGES
IHR-----30--45--95--125--180--240--
WAN-----10--15--20--50--100-----
WEL-----10--15--25--45--130-----
RRH-----05--10--20--30--150-----
RIS-----05--10--20--30--150-----
PRD-----20--30--40--40--40-----
MCN-----40--80--145--230--290--450--
JDA-----20--60--110--240--450--600--
TDA-----20--60--125--250--360--600--
BON-----50--65--95--150--225--270--
GCL(A)---0---5---10---20---35---55--
GCL(B)---20---25---30---75--120--170--
CHJ-----0---0---0---0---0-----

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GUIDELINES FOR TECHNICAL MANAGEMENT TEAM

~~April~~ 2008

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I. Introduction

The National Marine Fisheries Service's (NMFS) Biological Opinion on the "Reinitiation of Consultation on Operation of the Federal Columbia River Power System (FCRPS), Including the Juvenile Fish Transportation Program, and 19 Bureau of Reclamation Projects in the Columbia Basin", dated December 21, 2000, and the U.S. Fish and Wildlife Service's (USFWS) Biological Opinion on the "Effects to Listed Species from Operations of the FCRPS", dated December 20, 2000, call for the utilization of a Technical Management Team (TMT) to advise the operating agencies on dam and reservoir operations, thus optimizing passage conditions for juvenile and adult anadromous salmonids and resident fish. These guidelines are adopted in accordance with those Opinions.

The TMT is one of several technical teams within the Columbia River Regional Forum established by the NMFS, USFWS, the U.S. Army Corps of Engineers (COE), the U.S. Bureau of Reclamation (BOR), and the Bonneville Power Administration (BPA). The Regional Forum provides for regional discussion and recommendation on the operation and configuration of the FCRPS. Its goal is to develop consensus among the various members on these recommendations. The TMT's mission is specifically to ensure broad technical participation and use of the best available technical information, and to encourage consensus in recommendations on operating the FCRPS. When consensus is not achieved, the TMT ensures that the basis for participants' recommendations and Federal decisions is fully explained and documented. In such situations, questions can be elevated to the Implementation Team (IT) for resolution if requested by a TMT member.

The TMT operates under the Guidelines and Procedures approved November 7, 2002, for the Columbia River Regional Implementation Forum. The following more specific guidelines supplement the Forum's procedures for TMT operations. As the Forum procedures are refined, these guidelines may be revised.

II. Scope

The focus of the TMT is to implement the NMFS and USFWS Biological Opinions on operation of the FCRPS while considering the provisions of (and effects on) the Northwest Power Planning Council's (NPPC) Fish and Wildlife Program, other biological opinions, State and Tribal plans and programs, and other relevant operational requirements. Specifically, the TMT should explore operational scenarios under the Biological Opinions that would serve to protect other fish and wildlife in the Columbia River Basin and promote coordination and consistency with these other objectives to the extent possible.

III. Membership

See Forum Guidelines and Procedures.

The members and alternates of the TMT are listed in Attachment 1. Initial confirmation of membership, designation of representatives, and any changes in representation should be provided in writing to the NMFS Implementation Team Chair.

IV. Roles and Responsibilities

The TMT is responsible for discussion and recommendations to the Action Agencies (COE, BOR, and BPA) on hydro system flows at designated control points and expected project operations to implement the Biological Opinions for listed salmon, steelhead, sturgeon, and bull trout species within the Columbia River basin while taking into account the needs of (and effects on) other listed and non-listed species.

The TMT is to engage in joint decision-making that works toward consensus within the recognized authorities and management jurisdictions of its participating members. Specifically, the State, Tribal and Federal salmon managers (Salmon Managers) recommend the flows at the control points that best meet the needs of salmon and steelhead. These may include specific project operations, but this does not foreclose TMT consideration of alternative means of providing the same operating condition. Other participants (e.g., Resident Fish Managers) may also make recommendations consistent with the scope of these guidelines. The procedure for communicating a river or project condition, which will benefit salmon/steelhead/sturgeon migrations or resident fish, is verbally at a TMT meeting, or through a written system operational request (SOR). See Section V(d). All parties submitting SORs are encouraged to coordinate with other participants to the extent possible.

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The Salmon Managers are responsible for the management of anadromous fish and Resident Managers are responsible for resident fish in the basin. The COE and BOR are responsible for decisions on operation of the FCRPS projects; and the COE and BPA are responsible for Treaty agreements with Canada regarding storage in Canada and other Treaty-related matters. The participation of other affected sovereign and non-sovereign entities is intended to ensure that decision-makers have the broadest possible source of information upon which to base their decisions. All parties are encouraged to succinctly present their views regarding biological or operational recommendations. Input can provide alternative options for the appropriate authority to consider when making their decisions, but authority for implementing the request remains with the appropriate agencies.

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The TMT is a year-round technical body. Winter planning will consist of development of a Water Management Plan. The purpose of in-season management is to implement the Biological Opinions and the Water Management Plan. Post-season review will consist of a review of the previous year's activities and performances, and updating operating procedures as needed. Throughout the year the COE, BOR, and BPA will coordinate planning and operational decisions that may affect salmon and other species, through the TMT (e.g., yearly agreement on Non-Treaty Storage Agreement spring/summer operation, the 5-year Idaho Power Company Agreement, and the Libby/Arrow swap). The COE, BOR and BPA

will specifically use the 'TMT' as a forum for the coordination and consideration of potential effects on salmon, steelhead and other species prior to a final decision. Idaho Power Company, the Mid-Columbia Public Utility Districts, and other non-sovereign participants are also encouraged to use TMT as a forum for coordination of planning and operational decisions throughout the year.

V. Operating Procedures

a) Annual Water Management Plan

The Annual Water Management Plan is ~~developed and~~ used by the action agencies as a decision-making and management tool, and includes all known or typical operations that will be implemented throughout the year based on prior years' gathered data.

Each year, the 'TMT' will ~~discuss and make suggested updates to the~~ annual Water Management Plan based on the run-off forecast and other factors specific to that year. ~~A draft Fall/Winter Update will be available for review in October.~~ A draft Spring/Summer Update will be available for review within two weeks of the March final forecast. All interested parties may participate in the plan development and will be given an opportunity to review and comment on the draft plan. In general, the Salmon Managers will provide information on salmon and salmon operational requirements to be included in the plan. Resident Fish Managers will provide information on resident fish needs. The Action Agencies will provide information on reservoir status; planned project operations (and operating constraints); flow forecasts; anticipated special operations for research and other purposes; turbine outage and maintenance plans; and operating agreements and contracts that may affect annual operations. Priorities among competing needs should be resolved within the context of the scope of these guidelines. The Action Agencies will be responsible for finalizing the Water Management Plan.

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b) Summary of In-season Management Key Events

Monday	Begin implementing operations based on last week's decision.
Tuesday (9 a.m.)	The COE posts or otherwise distributes flow projections to TMT members for Priest Rapids, McNary and Lower Granite, along with resulting reservoir operations and elevations, and current dissolved gas and temperature data. Salmon Managers will post or otherwise distribute biological information.
Tuesday (4 p.m.)	TMT Members (or others) submit SORs to the Reservoir Control Center (RCC) and send (fax) hard copies to TMT members and participants. The Salmon Managers will fax SORs to all project owners for which an operation is requested. The Salmon Managers will post the SOR to the Fish Passage Center web page, or an electronic version of any SOR will be simultaneously sent to the Corps so that it is available for the 'TMT' web page as soon as possible.

- Wednesday 9 a.m. The TMT meets bi-weekly, with conference call on alternate weeks if needed, to discuss in-season management data and SORs, document operations, and recommend the following two week's operations. By the start of the meeting all SORs and the disposition will be posted to the TMT web page for use by members who can not attend the meeting. If necessary, the TMT frames the issue(s) to be raised to the IT before 12 a.m.
- Thursday (3 p.m.) In case of impasse, disputes are resolved through the IT.
- Friday (noon) In the event an issue has been raised to the IT and the IT has resolved the issue, the Action Agencies document the operation to begin on the following Monday. This decision, and rationale, should be documented before the next regularly scheduled TMT meeting and sent to the Chair of TMT, who will post it on the TMT homepage
- Friday (p.m.) The TMT draft meeting notes are posted or otherwise distributed

c) In-season Management Data

The TMT will use the National Weather Service's River Forecast Center's (RFC) streamflow forecast for the Columbia River Basin, the Corps' volume inflow forecast for the Libby and Dworshak projects, and the Bureau of Reclamation's inflow forecast for the Grand Coulee and Hungry Horse projects. These forecasts (and the basic reservoir operations that are assumed when producing it) are the official forecasts to be used for the decision-making process. The BPA forecast may be used as supplemental information. The COE will use the RFC forecast to prepare flow projections for Priest Rapids, McNary and Lower Granite. By 9 a.m. (or as early as possible after that) on Tuesday, the flow projections and resulting reservoir operations will be distributed to TMT members. The Action Agencies will also provide dissolved gas, temperature, and other physical monitoring data available for decision-making.

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During the anadromous fish migration period, the Salmon Managers will provide biological information on salmon and steelhead numbers, migration timing and condition, for both the current year and historically. The USFWS, and others as appropriate, will provide relevant information on other fish and wildlife resources. These data will be posted by NMFS and USFWS each Tuesday by 4 p.m.

d) System Operational Requests

System Operational Requests (SOR) are an in-season management tool for bringing forth requests to deviate from or refine planned, existing or BiOp recommended operations. These requests should be intended to provide an operation that is biologically necessary to protect listed and other aquatic species of concern and human health and safety given in-season fluctuations of the hydro system and the status of the fish.

TMT members may provide recommendations to the TMT on hydro system flows and/or

expected project operations consistent with the scope of these guidelines. Non-TMT members may also submit recommendations for consideration. These recommendations will be in the form of system operational requests (SORs) stating the flow objective(s) sought (e.g., keep flows at a location X in a W-Z range). Expected project operations may also be added. Each SOR will include the biological or operational basis for the recommendation. Each SOR will also indicate whether the request is to implement a NMFS or USFWS Biological Opinion, NPPC Fish and Wildlife Program, or other Federal, State or Tribal program. Non-TMT members may also submit SORs for special operating purposes for TMT consideration.

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e) Meetings

Between the last week of March and up to at least August 31 the TMT will meet every other Wednesday, or more often if necessary, to conduct in-season management. All meetings will be open to interested parties. A conference line will be available for those who cannot attend in person.

An agenda for each meeting will be distributed at least two business days prior to the meeting (the preceding Monday in the case of the regularly scheduled in-season meetings). The principal purpose of the meetings and standing agenda items during the migration season is to review the status of the preceding week's SOR and operations, biological data, new SORs and project operating data, and to reach informed decisions on FCRPS operations for the following week(s). As other items are brought forward for TMT consideration they will be added to the agenda for future discussion, but lack of an agenda item will not preclude discussion of relevant matters at the meeting.

The discussion of SORs at TMT meetings will include distinct segments dealing with both

biological and operational issues. Biological questions associated with an SOR will be addressed to ensure that the biological basis of the SOR is clear, and to allow the TMT to consider any additional biological information that may be made available at the meeting. The meeting will then move on to a discussion of operational alternatives to meet the SOR by the Action Agencies and members of the TMT. The Chair should ensure that adequate time is allotted to each segment of the meeting.

The Chair should also ensure that the support or opposition of each TMT member for an SOR and a final decision by the Action Agencies are noted in the minutes.

f) Meeting Facilitation

Meetings of the TMT will be facilitated by an impartial facilitator, who will allow all TMT members the opportunity to fully participate in discussions and to help members resolve conflicts as they arise. The meeting facilitator shall serve at the will of all members of TMT and should have skills as a meeting manager and conflict resolver. The meeting facilitator's role will include:

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- Managing the meeting agenda in a balanced and even-handed fashion so that all members have an opportunity to speak and be heard
- Helping the group stay focused on the agenda and prioritize items that need action and further discussion
- Enforcing the ground rules established by the TMT (see Attachment 2)
- Helping the group reach consensus on decisions
- Helping the group resolve conflicts that may arise in the course of discussion
- Highlighting any decisions the group may reach
- Working with members between meetings to clarify issues, resolve disputes, and seek potential solutions to impasses
- Assisting members to develop opportunities that may resolve conflicts and increase the overall satisfaction with the TMT process in the long term, and
- Helping the group maintain a sense of humor

TMT members may give feedback directly to the facilitator or to the chair if they have concerns with the manner by which meetings are managed. The facilitator will be replaced if, after discussion with the facilitator, members believe he or she is not remaining impartial in the delivery of service.

g) In-season Decision making

On Wednesday morning the TMT will decide on operations for the following two weeks based on the available information and any pending SORs. These operating decisions will be made by consensus whenever possible. Consensus is defined as lack of a strong objection that would prompt one or more of the TMT members to elevate the issue to the IT. In the absence of consensus, the decision will be referred to the IT in accordance with the dispute resolution process described below. Objections to decisions that are not strong enough to prompt one or more TMT members to elevate the issue will be documented in the minutes

of the TMT meeting.

If the recommendation is to implement the SOR or a modification of the SOR as agreed to by the TMT, then this should be documented for the minutes, and the SOR (and the Biological Opinion, Council's program or other plan on which it is based) may form the basis for the decision. If the Action Agencies do not agree to implement an SOR, they will describe for the minutes both the intended operation and the basis for that decision. The basis for the decision could include that the proposed operation is inconsistent with a Biological Opinion, that operational constraints prevent its implementation, that cost is prohibitive beyond that already included in the so-called "Fish Cap", or that the Action Agency has an alternative view of the best available biological information. If the Action Agencies believe the best available biological information supports a position that differs from that of the SOR sponsor(s), then the explanation should acknowledge this difference and should provide a clear, succinct written explanation of the data, analysis or judgment that supports the alternative view. In each case, a full explanation will be provided by the Action Agencies to the TMT and IT.

The final decision made by the COE and BOR on the following week's operation will be made at the meeting whenever possible. The TMT will try to avoid making decisions outside the established process. In-season FCRPS operating decisions made through a separate process, such as those under the Action Agencies' authority for emergency situations, will be explained and documented as soon as possible, but in any case no later than Friday following the TMT meeting.

h) Documentation

Minutes of all TMT meetings will be prepared in accordance with Regional Forum procedures and approved by the TMT. Every effort will be made to post the draft meeting notes to the TMT home page by close of business Friday afternoon following the meeting. Comments will be due by the following meeting.

The TMT meeting minutes will be used to keep track of the decision-making process. The minutes will include the substance of any SOR, the decision, the decision-maker, and the basis for the decision. The minutes will also include: (1) documentation of consensus or a listing of members objecting to an SOR or a final decision; and (2) when an SOR is not implemented, clear documentation of the reasons provided by the decision-maker.

If a decision is elevated to the IT and therefore not made at the weekly TMT meeting, documentation on the final decision reached will be provided separately in writing by the IT and will include the same information noted above. This documentation of the decision should happen before the next regularly scheduled TMT meeting and be sent to the Chair of TMT, who will post it on the TMT homepage.

Each member is responsible for reviewing the decision documentation and the meeting minutes, especially if the agency he/she represents is one of the decision-makers.

Interested parties may request copies of the minutes if they have no access to the TMT homepage.

i) Distribution of Information

Meeting notes and material will be made available to TMT participants throughout the year. These materials will be made available through the TMT home page and may be reproduced on other Internet home pages where available. They will also be faxed to members and participants that request such services. Regular mail may be used for materials when time permits.

j) Public Participation

The public may comment on an issue at the end of the discussion on that issue or at the end of the meeting, based on the discretion of the group and the facilitator. They may also comment outside the TMT process.

VI. TMT Dispute Resolution Process

In the event that the TMT is unable to reach consensus on an issue, any member may request that the item be elevated to the IT. Every effort should be made to ensure that the issue is raised at least one week in advance of the monthly IT meeting (first Thursday of the month).

If, despite all efforts to the contrary, the TMT finds at its Wednesday morning meeting that it is unable to resolve a weekly in-season management dispute, and the decision cannot await consideration at the next regularly scheduled meeting, the IT will meet by conference call at 3:00 on Thursday afternoon. In the event that such a meeting is necessary, the TMT will prepare, and agree to, a brief summary of the issue(s) and a short description of the opposing viewpoints. This document will be given to the IT members by 1:00 p.m. on Thursday afternoon.

The IT will attempt to reach consensus. If the IT is unable to reach a consensus, then a final recommendation will be made by the appropriate agency (e.g., NMFS or USFWS if the issue relates to implementation of a Biological Opinion, or NPPC if the issue relates to implementation of the Fish and Wildlife Program). The member with the authority for the action will then make the decision and explain the rationale in writing. Whether IT acts by consensus, or the member with the authority for the action makes the decision to resolve a TMT conflict, it should be documented before the next regularly scheduled TMT meeting and sent to the Chair of TMT, who will post it on the TMT homepage.

VII. Emergency Meetings

Any member of the TMT may call a meeting when an emergency situation requires action of the TMT.

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ATTACHMENT 1

TECHNICAL MANAGEMENT TEAM (TMT) MEMBERS

ORGANIZATION - REPRESENTATIVE / ALTERNATES

National Marine Fisheries Service - Paul Wagner / Richard Dominigue
U. S. Army Corps of Engineers - Jim Adams / Cathy Hlebechuk / Bob Buchholz
Bonneville Power Administration – Robyn MacKay / Tony Norris / Scott Bettin
U.S. Bureau of Reclamation - John Roache / Mary Mellema / Pat McGrane
U.S. Fish & Wildlife Service - David Wills / Steve Haeseker
State of Washington - Cindy LaFleur
State of Oregon – Rick Kruger / Ron Boyce
State of Idaho - Russ Kiefer
State of Montana - Jim Litchfield / Brian Marotz

Confederated Tribes of the Colville Indian Reservation - [Sheri Sears](#)
Shoshone-Bannock Tribes of Fort Hall - Keith Kutchins

Deleted: Jerry Marco / Kirk Truscott

ELIGIBLE ORGANIZATION WITH NO OFFICIALLY DESIGNATED MEMBER - CONTACT PERSON / ALTERNATE

Kootenai Tribe of Idaho
Confederated Tribes of the Umatilla Indian Reservation
Confederated Salish & Kootenai Tribes of the Flathead Reservation
Confederated Tribes of the Warm Springs Reservation
Yakama Indian Nation
Shoshone-Paiute Tribes of Duck Valley Reservation
Burns Paiute Tribe
Kalispel Tribe
Spokane Tribe of Indians - Deanne Pavlik / Chuck Lee
Nez Perce Tribe of Idaho - Dave Statler / Greg Haller
Coeur d'Alene Tribe of Idaho
State of Alaska

ATTACHMENT 2.

MEETING GROUND-RULES & EXPECTATIONS

The following meeting ground-rules and expectations were discussed and agreed to by all members present at the _____ meeting of the TMT. They may be changed at the request of the Team.

I. Ground-Rules

Meetings will start and end on time unless members agree otherwise.

Members will treat each other with respect, which includes:

- ° Separating the people from the problem
- ° Listening to what others have to say
- ° No interruptions
- ° Monitoring your own air time
- ° No side conversations
- ° Letting the facilitator or chair know when you would like to speak
- ° Being mindful of tone when speaking directly to others
- ° Remembering that members are representing agencies, not stating individual opinions

During in-season management, each member agency/group will have one primary TMT representative who will sit at the table during meetings. Alternates or technical resource staff are welcome to attend and provide input through their primary representative, or when called on by TMT members. All are welcome to sit at the table --with preference for the primary representatives if there is a space limitation.

Any issues elevated from the TMT to the Implementation Team (IT) will be thoroughly discussed at TMT. TMT members will agree on the "issue statement" for the IT. The TMT Chair will then present the issue at the IT meeting. All TMT members will brief their agency IT representative on the issue prior to the IT meeting.

The meeting facilitator may make process comments in order to keep the group on track, focused and productive.

II. Expectations

Members are expected to come prepared to participate in the meetings. This means, they will provide necessary input to discussions and work towards making decisions based on information they have gathered from their respective agencies between meetings.

Members are expected to keep their agencies and staff apprised of decisions or important meeting discussions.

Members are expected to attend all meetings or send an alternate. If an alternate attends the meeting, a briefing, both before and after the meeting, is expected of the primary representative. The group will not revisit information for members who were absent from or late to a meeting.

Members are expected to follow through on assignments to which they agree, or are given by other team members, on a timely basis. This includes requests for comments on information or reports from other team agencies.

The meeting facilitator is expected to keep the group on track and focused on agenda items. Additionally, the group expects the facilitator to assure equal participation, highlight any decisions that the group reaches, and maintain a sense of humor.

People who listen in on the telephone are expected to “sign-in” as they call in on the conference telephone line.

Group members may contact the facilitator at any time to make process suggestions, raise concerns or request additional assistance at or between meetings.

COLUMBIA RIVER REGIONAL FORUM

TECHNICAL MANAGEMENT TEAM

May 7, 2008 Meeting

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Robin Gumpert

Notes: Erin Halton

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 of Minutes/Agenda

- As edits to the 4/30 and 5/2 TMT conference call facilitator notes and official minutes were still in process, TMT will look to finalize the notes during the next TMT meeting.
- As Russell Langshaw was not available to join today's TMT meeting, a Priest Rapids update will be on the agenda for the scheduled 5/21 TMT meeting.
- TMT will look to finalize the TMT Guidelines at the 5/21 face to face meeting.

Update from 5/5/08 IT Conference Call

Paul Wagner reported on the 5/5 IT conference call, noting that the discussion centered on the Colville Tribe's concerns regarding SOR 2008-2. The primary concerns of the Tribe were those of navigation associated with the Lake Roosevelt Ferry, along with potential impacts to fisheries and cultural resources. IT members reached consensus to meet 180 kcfs average flows at McNary without adversely impacting navigation of the ferry. Wagner noted that support from increased Libby outflows and warming weather over the weekend had helped flow and elevation levels and that as of 5/7 there were no anticipated issues for the near-term. Wagner acknowledged that there is a need to develop a long term plan for balancing the multiple uses of the water supply. John Roache, BOR, added that the BOR was targeting a minimum elevation of 1228' to meet flood control targets and to support the ferry's operating range, and relayed the Tribe's note that the ferry would shut down before it became unsafe to continue operating. In addition, Brian Marotz, MT, said that, given the flow increase at Libby to 9 kcfs to support this operation, it would be biologically best to continue to operate Libby with stable or increasing flows to support sturgeon operations.

Dworshak Operations

Steve Hall, COE, reported on the latest operational scenarios for Dworshak, posted as links to the TMT agenda. He noted that the latest ESP forecast indicated a considerable drop in volume and that there was some uncertainty as to the reason for this drop. Steve added that he planned to discuss the forecast with the Weather Service following the TMT meeting, as the impact from snow pack levels on the forecast might vary. Hall said that the timing of refill is as yet uncertain and acknowledged the difficulty in anticipating conditions that the May-June time frame will bring. Rudd Turner, COE, clarified that

refill for summer was a high priority for the COE and BPA noted the need to control temperature later in the year. TMT members discussed the latest box whiskers plots for Dworshak, also linked to the TMT website. TMT members noted that the need to consider effects to the Orofino area recreation and economy, especially over the July 4th weekend. TMT members also referred to flow data from 1999 on the DART reference site and the last two weeks of passage data on the Fish Passage Center website. They considered the potential risk ahead for high flows in the Lower Snake River possibly resulting in elevated TDG levels and the need to provide good conditions for fish that may be in the peak of their passage.

Paul Wagner, on behalf of the Salmon Managers, recommended an operation in the range of 7.5 kcfs (with one big and one small unit) for one week and to discuss Dworshak operations via a TMT conference call on 5/14, when new ESP data will be available. Russ Kiefer, ID, added that as we move forward, recommendations could be tied to observed passage and acknowledged the need for multiple uses of the project. After a caucus was held, the Action Agencies proposed operating Dworshak in the range of 7.5 kcfs (one big/one small unit) until 5/12, when the project would shift to a one big unit operation and flows closer to 5 kcfs, and then plan to drop to minimums after next week – with a check in at TMT to review updated forecasts and ESP models. From the COE’s perspective, this would provide a more desirable shape of flows. No objections were raised to the Action Agencies’ proposal.

Action/Next Steps:

- The COE will operate Dworshak in the range of 7.5 kcfs (with one big and one small unit) beginning 2000 hrs on 5/7 {Supplemental Note: the actual change occurred at 2200 hrs}.
- At 2000 hrs on 5/11, the project will shift to a one big unit operation, with flows expected to drop to a 5.4 kcfs range; the COE will likely maintain this operation through 5/16 {Supplemental Note: the actual change occurred at 2200 hrs}.
- Dworshak Operations will be added to the TMT conference call agenda on 5/14.

Spring Creek Hatchery Release

Dave Wills, USFWS, reported that the 5/2 Spring Creek Hatchery release occurred as planned. He said that passage and survival were better than historic averages thus far and that operations at the low end of 1% for the first four days of the test supported the success of the release.

Action/ Next Steps: As of 5/7, the project went to operating at the lower 1% as a soft constraint. Wills will update TMT with new and relevant information at an upcoming meeting, as passage results are made available.

Little Goose Fish Injury

Dan Feil, COE, provided TMT with a follow up from an April TMT meeting and referred to a COE memo sent to the Fish Passage Center, posted as a link to the TMT agenda. Feil said that investigation of an “injury” vs. “de-scaling” de-classification led to a commitment to standardize sampling characterizations and mechanisms across projects.

Water Management Plan Spring/Summer Update

Scott Boyd, COE, reported that NOAA, USFWS and MT comments on the Water Management Plan spring/summer update were posted to the TMT website.

Action/Next Steps: A Final Draft was expected to be posted on the TMT website by 5/14. TMT members will be given at least one week for review before they look to finalize the document at the scheduled 5/21 TMT face-to-face meeting.

Operations Review

Reservoirs: Grand Coulee was at elevation 1228.9' and passing inflows to maintain the reservoir within a 2 foot operating range around the flood control elevation target of 1228.8'. Hungry Horse was at 3500.9' with outflows in the range of 4.7-4.9 kcfs and inflows in the 10 kcfs range; the May-July volume forecast is 117% of normal, at 1998 KAF. Libby was at 2396.6' with outflows of 9 kcfs and inflows increasing from 7.2 kcfs to 12 kcfs over the last few days. Albeni Falls was operating within the range of 2055-2056' and passing inflows to help maintain McNary flows and maintain the Lake Roosevelt forebay elevation target. Russ Kiefer, ID, said that there were no anticipated issues associated with Lake Pend Oreille refill for this year; flows were in the 42 kcfs range. Dworshak was at elevation 1476.2' with inflows increasing from 10.7 kcfs to 15.2 kcfs over the last few days. The 7-day average flows were 69.5 kcfs at Lower Granite, 186.2 kcfs at McNary and 198.5 kcfs at Bonneville.

Fish: Paul Wagner, NOAA, reported that adult passage numbers were still lower than anticipated, with 10,000 passing Bonneville on 5/4. He added that passage was expected to increase upon the arrival of the spring freshet.

Power System: Nothing to report.

Water Quality: Jim Adams, COE, referred TMT to the TDG chart linked to the TMT website. He noted a few TDG exceedances at Lower Monumental and Ice Harbor forebays and said that several exceedances over the weekend at Camas-Washougal were likely attributed to the warmer weather. Adams clarified that as of the evening of 5/7, Lower Monumental and Little Goose would return to two-day blocks of alternate spill patterns and that caps would be determined by the pattern.

Other/Updates: Dan Feil, COE, reported on two upcoming Bonneville outages:

- A multi-bay outage to replace a back-up gallery pump; likely a one day outage, date to be determined but likely the end of the week of 5/12. An alternate spill pattern will be used to maintain the 95% gas cap. Feil will vet the outage through FPOM and share specific operations for the outage with TMT as soon as they are available.
- A corner collector outage, to ensure safe conditions for work on the GPS hydrophone; outage likely for 6 hours and likely the end of the week of 5/12. Feil will vet the outage through FPOM and will share specific operations for the outage with TMT as soon as they are available. FPOM discussion of the corner

collector outage and any resulting recommendations will be discussed during the 5/14 TMT conference call.

Next TMT Meeting: 5/14 Conference Call, 9 a.m.

Agenda Items include:

- Dworshak Operations
- Spill Priority List
- Outages Update

5/21 TMT meeting

Agenda Items include:

- Finalize notes/minutes
- Priest Rapids Operations
- Dworshak Operations
- TMT Guidelines – final draft
- Water Management Plan Spring/Summer Update - final draft
- Operations Review

**Columbia River Regional Forum
Technical Management Team Conference Call
May 7, 2008**

1. Introduction

Today's TMT meeting was chaired by Jim Adams (COE) and facilitated by Robin Gumpert (DS Consulting) with representatives of BPA, COE, NOAA, USFWS, BOR, FPC, Idaho, Montana, Oregon, Washington and others attending in person or by phone. 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

Discussion of meeting minutes was postponed until the next TMT meeting.

3. Priest Rapids Update

This discussion was postponed until the May 21 TMT meeting.

4. IT Meeting: Update on SORs 2008-2 and 2008-MT-1

Concern about low flows has been resolved by a number of factors, mainly the Corps agreement to 5 kcfs of flow augmentation from Libby reservoir beginning Friday, May 4, and warm weekend temperatures that instigated natural runoff, Paul Wagner (NOAA) said. The IT discussion of this issue revolved around the Colville Tribe's concerns about the effect of reservoir elevations on ferry navigation. The tribe also had concerns about natural resources, fisheries and other issues. The critical minimum elevation at Grand Coulee for ferry navigation appeared to be around 1,228 feet, but more information was needed on the exact elevation at which the ferry can no longer operate.

Now that flows are up at Libby, it's better biologically if they remain stable or rising, said Brian Marotz (Montana). A flow reduction causes problems because the inundated zone becomes productive and then dries out, needing about a month and a half to reestablish even while flows are rising for VARQ releases and white sturgeon. One problem with fluctuating flows is that male sturgeon can move upstream and reverse direction, migrating downstream when their presence is needed for hatchery reproduction. Montana and BOR representatives recalled a discussion during the May 2 TMT call regarding potential sturgeon migration problems that could be triggered by declining flows.

5. Dworshak Operations

The operational scenarios attached to today's agenda should be evaluated in consideration of new information: This week's ESP runs have dropped in volume considerably and inexplicably, Steve Hall (COE) said. The COE will consult with the Weather Service for clarification. In terms of maximum volumes, last week's were 3.0 maf, now down to 2.8 maf. The official May forecast is 3 maf. So these operational scenarios are very conservative, and the COE doesn't know how accurate the volume assessments are.

Scenario 1. Shows full load through May 7, then drops to minimum flows, resulting in about 2 kcfs average, with the lowest years not refilling.

Scenario 2. Shows full load through May 7 with outflows of 4.8 kcfs, using two small units for an additional week, then transitioning to whatever operation is needed to refill Dworshak. The minimum years don't refill. Average flow is less than 2 kcfs.

Scenario 3. Shows full load through May 7, then drops to 7.5 kcfs, using one big and one small unit. This scenario results in the minimum years not refilling. The average flow is around 1.5 kcfs.

Scenario 4. Shows full load through May 14. Neither average nor minimum flows result in refilling Dworshak reservoir.

If Dworshak operations go off full powerhouse today and continue with 7.5 kcfs outflows for a week, the reservoir wouldn't refill in the minimum 3 years out of 44, according to this data, Hall said. The COE is very concerned about the increasing risk of not being able to refill if outflows of 7.5 kcfs continue beyond another week. The longer high flows are held and refilling Dworshak is delayed, the greater the risk of not refilling. There is also concern about the effect of continued high outflows on the economy at Orofino.

Wagner referred to Lower Granite data for 1999, a similar weather year, which shows a high probability of high flows. It's difficult to balance refill risks against TDG risks, he said. Rick Kruger (Oregon) asked, why are we taking action to reduce flows when we've worked to maintain them via SOR 2008-2? Temperatures are low this year, so refilling Dworshak a bit later than normal could result in a temperature benefit later, Scott Bettin (BPA) said. Dave Statler (Nez Perce) expressed concern that the risk of not refilling Dworshak increases the risk of not being able to moderate water temperatures this summer.

Over the past few days, inflows at several of the projects have been increasing. Perhaps the concern about dropping Dworshak flows and affecting flows at McNary is mute, Wagner said. The flow objective of 180 kcfs at McNary was a very conservative figure; the BiOp target is 260.

After discussion based on available information at the time, FPAC decided to recommend a discharge of 7.5 kcfs through this week. The COE is getting increasingly concerned about the risk of not refilling. However, ESP forecasts show that flows have been rising significantly within the past few days.

Wagner gave an update on smolt data. Cumulative passage of yearling Chinook to date has been 1.2 million fish, with 350,000 at Little Goose and 150,000 at Lower Monumental. The cumulative passage index to date for steelhead is 3 million fish, with 600,000 at Lower Granite and 155,000 at Little Goose. These estimates are based on an assumption of 1:1 passage efficiency between the powerhouse and bypass system, which is known to be incorrect. According to a population index report that tries to account for the discrepancy between passage index numbers and real-time populations, the index count for yearling Chinook at Goose was 160, 000 and the actual population index was 432,000. The difference is accounted for by RSW and spill efficiency at the project. For steelhead, the 1.6 million estimate is actually 4.1 million.

Even though it's a good snow year, flows and temperatures have been low, meaning there's snowmelt to come, Russ Kiefer (Idaho) said. The goal behind FPAC's recommendation is to get fish out of the river system as soon as possible while conditions are still good. With two turbines out at Lower Granite, problems with gas can be expected later in the season when spill levels are high. If the Action Agencies propose a different plan than flat 7.5 kcfs out, the Fish Managers might find it acceptable, Kiefer said. For example: outflows could be cut back now that inflows are up, and then increased again when inflows drop. In its recommendation, the Salmon Managers assumed that one big and one small unit would be used to release flows of 7.2-7.7 kcfs.

Given the discrepancy in ESP volume forecasts, and the high level of concern about refill, the COE expressed a reluctant willingness to accept 7.5 kcfs out for another week. Idaho suggested and Montana supported a proposal to feather flows down now, using two small units or one big unit to conserve water, and then bring flows back up later as needed. The Nez Perce Tribe voiced serious concerns about operating at the high end of the ESP scenarios and favored using the increase in flows now to offset water needs later.

After an internal caucus, the COE made a counter proposal: Ramp down from full powerhouse tonight to 7.5 kcfs outflows, using the big unit and one small units through the weekend. Then drop to 5.5 kcfs outflows on Sunday night, May 11th, using the big unit through next week. Check in on May 14. Continue the 5.5 kcfs operation through Friday, May 16, and then drop to minimum flows over the weekend. This proposal effectively moves 2 kcfs from the May 12-14 to May 15-16. NOAA, Nez Perce Tribe, Oregon, Idaho, and Montana representatives did not object.

Therefore, Dworshak operations will be as follows: At around 8 pm this evening, the COE will ramp down to the big and small unit, with outflows ranging from 7.2-7.5 kcfs, and will maintain that operation through 8 pm Sunday night, May 11th. At that time, operations will ramp down to a single large unit with about 5.4 kcfs outflows through the week. After checking in on the May 14th TMT conference call, this operation will continue through 8 pm, May 16.

6. Spring Creek Operations

The last release of 2008 is surviving at a better than historical average, Dave Wills (USFWS) reported. Apparently the low end of 1% operation is a big help. The low end of 1% operation will continue for another four days as a soft constraint. Wills will pass on any new information to TMT.

7. Little Goose Fish Injury Update

As follow-up to the April 25 conference call, the Walla Walla district has investigated reports of elevated injuries observed at Little Goose. It turns out the problem is due to misclassification of descaling and injury. The COE is working toward developing more uniform methods of reporting fish injuries.

8. Spill Priority List

The current priority list for spilling above 120% TDG when overgeneration or other issues take precedence is as follows: Lower Granite, Little Goose, Lower Monumental, Ice Harbor.

It should be reversed to read: Ice Harbor, Lower Monumental, Little Goose, Lower Granite, Wagner said. A decision on the order of lower river projects can wait, but the Snake project priority list needs changing now.

BPA requested a written description of the change; the current list will remain in effect until the updated list is available to BPA schedulers. If the COE changes spill caps today, they will rearrange the list and send out a teletype to BPA and project staff.

Spill at Chief Joseph is limited because of construction activities. There was discussion of the elevation needed to spill through the drum gates – 1,263 feet. Scott Bettin asked how long it will take to remove the catwalk from the project. Staff has been taking advantage of the opportunity to get work done, but the catwalk can be probably removed quickly; Roache will check with project staff. The spill priority list will be added to future TMT agendas as needed.

9. Water Management Plan – Spring/Summer Update

The COE has received comments from NOAA, USFWS and BOR, which have been posted on the TMT website, Scott Boyd said. There was no indication today that other TMT members would submit comments. Therefore the COE planned to issue an updated draft by the May 21 TMT meeting, with a goal of finalizing the WMP at that meeting.

10. TMT Guidelines

The facilitators sent the latest draft to TMT members for comments on May 5. What was posted on the TMT web page as of this meeting was not the latest version, and will be replaced in time for TMT members to review it before the May 21 TMT meeting in person. Detailed discussion of this topic was postponed until May 21.

11. Operations Review

a. Reservoirs. Grand Coulee is at elevation 1,228.9 feet until flood control restrictions are lifted.

Hungry Horse is at elevation 3,500.9 feet, steadily discharging 4.7-4.9 kcfs. The May-July volume forecast is 1,998 kaf, 117% of normal. VARQ outflow discharges are around 4.9 kcfs. Columbia Falls flows are around 18 kcfs. Inflows at Horse have definitely picked up.

Libby is at elevation 2,396 feet, with outflows continuing at 9 kcfs since the evening of May 2 in response to SOR 2008-2. Inflows at Libby are also up.

Albeni Falls is continuing to pass inflows and maintain a 1-foot elevation range. Spill at 6 kcfs began yesterday morning. Flows are increasing, with the project operating at powerhouse capacity and occasionally spilling.

Dworshak is at elevation 1,476.2 feet, with full powerhouse outflows; it will ramp down tonight to two units and approximately 7.5 kcfs outflows, as discussed earlier today. Inflows are running around 35 kcfs; yesterday's average was 34.3 kcfs. Like other projects, flows are picking up.

The 7-day average for inflows at Lower Granite is 69.5 kcfs, up from 63 kcfs a few days ago. The 7-day average for inflows at McNary is 186.2 kcfs. The 7-day average for inflows at Bonneville is 198.5 kcfs.

b. Fish. Adults are not passing Bonneville at the rate anticipated, Paul Wagner said. The forecast was in the 200,000 range; spring Chinook are at 68,000. The peak passage was 10,000 on May 4. An optimistic interpretation is that the fish are waiting for the freshet.

c. Power System. Nothing to report.

d. Water Quality. There have been exceedances at Lower Monumental and Ice Harbor forebays, Adams said. Two studies are underway involving bulk spill patterns at Little Goose and Lower Monumental. The COE is seeing increases of 4-5% in TDG production with bulk spill patterns. In a recent TMT call, the COE agreed to modify nighttime operations at Little Goose to avoid bulk spill for this reason. Bulk spill ends at Goose today. In future the COE will probably set spill caps based on blocks of bulk spill, rather than setting the caps based on 30% spill. The same phenomenon holds true at Lower Monumental.

There were TDG problems at Camas Washougal during this past sunny weekend. The peak TDG reading was 119.4%. TDG levels are declining now as a result of cooler weather.

Other Updates: There are two new operations at Bonneville, Dan Feil reported. One will be a multiple spill bay outage of bays 1-3 to replace a backup gallery pump. The spill patterns have been altered to maintain 96 kcfs outflows.

The second operation is a day-long corner collector outage which won't occur before May 15. First, the altered spill pattern for it will go through FPOM and be distributed to TMT. Installation of hydrophones in the Bonneville 2nd powerhouse forebay wasn't completed due to capsizing of the installers' boat. The purpose of installing the hydrophones is to gather detailed information on fish behavior around the BGS as well as passage data. The corner collector closure will require TMT approval because it deviates from the Fish Operations Plan.

12. Next Meeting

The next TMT conference call will be on May 14, with the spill priority list update, Bonneville corner collector closure, and Dworshak operations on the agenda. The next regular face-to-face TMT meeting is May 21, with a Priest Rapids update, finalization of the WMP, the TMT guidelines, Dworshak operations, and the usual operations review on the agenda. This summary prepared by consultant and writer Pat Vivian.

Name	Affiliation
Scott Bettin	BPA
Jim Adams	COE
Robyn MacKay	BPA
Russ Kiefer	Idaho
Jim Litchfield	Montana
Paul Wagner	NOAA
Dave Wills	USFWS
Rick Kruger	Oregon
John Roache	BOR

Steve Hall	COE
Cathy Hlebechuk	COE
Terry Weeks	PNGC
Bob Diaz	PPM
Tim Heizenrader	Centaurus
Jennifer Miller	Susquehanna
Scott Boyd	COE
Dan Feil	COE
Rudd Turner	COE

Phone:

Kyle Dittmer	CRITFC
Brian Marotz	Montana
Dave Statler	NPT
Cindy LeFleur	Washington
Margaret Filardo	FPC
Dave Benner	FPC
Russ George	WMC
Bruce Mckay	Consultant
Barry Espensen	CBB
Tom Le	Puget Sound Energy
Ruth Burris	PGE
Bill Rudolph	NW Fish Letter

Spill priority list

Ice Harbor

Lower Monumental

Little Goose

Lower Granite

Bonneville - increase night time spill to 125% TDG, increase daytime to 120 kcfs

The Dalles - spill maximum q through bays 1-6 which equates to ~126kcfs spill

John Day - change spill block to 40% if it is a 30% block period

Wanapum

Priest Rapids

Rocky Reach

Wells

Rock Island

Chief Joseph – spill through deflector equipped bays only

Grand Coulee – spill up to 120% TDG if it reduces load substantially and reduces the need to spill at downstream projects in a significant way.

The Dalles

McNary – increase turbine loading to 14 kcfs per unit to keep TDG from exceeding 125%.

McNary

John Day

Bonneville

TECHNICAL MANAGEMENT TEAM

BOR : John Roache / Mary Mellema / Pat McGrane

BPA : Robyn MacKay / Tony Norris / Scott Bettin

NOAA-F: Paul Wagner / Richard Dominique

USFWS : David Wills / Steve Haeseker

OR : Rick Kruger / Ron Boyce

ID : Russ Kiefer

WDFW : Cindy LeFleur

MT : Jim Litchfield / Brian Marotz

COE: Jim Adams / Cathy Hlebechuk / Bob Buchholz

TMT CONFERENCE CALL

Wednesday May 14, 2008 9:00 - 11:00

CONFERENCE PHONE LINE

Conference call line: 203-310-2162; PASS CODE = 4703150

We have had disruptions on the phone because people are not hitting 'mute' after dial in.

Please MUTE your Phone

All members are encouraged to call Robin Gumpert with any issues or concerns they would like to see addressed.

Please e-mail her at robin76@cnnw.net or call her at (503) 248-4703.

AGENDA

1. Welcome and Introductions
2. Review [\[Meeting Minutes\]](#) 
3. Bonneville Outage Update - Dan Feil, USACE
 - a. Spillbay
 - b. Corner Collector
4. Spill Priority List - Paul Wagner, NOAAF
[\[Spill Priority List - May 12, 2008\]](#) 
5. Dworshak Operations - Steve Hall, USACE
6. Spring/Summer Update - Scott Boyd, USACE
[\[Draft - May 12, 2008\]](#) 
7. Operations Review
 - a. Reservoirs
 - b. Fish
 - c. Power System
 - d. Water Quality[\[Spill Information 2008\]](#)
8. Other
 - a. Set agenda for next meeting - **May 21, 2008**
[\[Calendar 2008\]](#) 

Questions about the meeting may be referred to:

[Jim Adams](#) at (503) 808-3938, or

[Cathy Hlebechuk](#) at (503) 808-3942, or

COLUMBIA RIVER REGIONAL FORUM

TECHNICAL MANAGEMENT TEAM

May 14, 2008 Conference Call

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Robin Gumpert

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 of Minutes/Agenda

The May 7 Official Minutes were not yet posted, so TMT will review over the next week and finalize them at the May 21 face to face meeting. A clarification on the May 7 facilitator notes was made re: Lake Pend Oreille – the COE said they did not have concerns for refill at Lake Pend Oreille this year.

Bonneville Outages Update

Dan Feil, COE, reported that replacement of a back-up gallery pump at Bonneville requiring a multi-bay outage had been completed. Also, the corner collector went out of service on Monday, May 12 to work on the hydrophone array GPS system. Work had not been completed, but the COE planned to pursue means other than another corner collector outage to complete the work.

Spill Priority List

Paul Wagner shared an updated spill priority list on behalf of the salmon managers – the document was linked to today’s agenda. Paul walked the group through the list and explained the rationale behind the priorities. A question was asked about why Chief Joseph and Grand Coulee, traditionally at the bottom of the list, had been moved up the list. Paul suggested that the installation of spill deflectors at Chief Joseph would better address TDG management concerns, and there might be an advantage to spilling at Grand Coulee before some of the lower priority projects, which was noted as a complicated decision.

Action: Paul and the COE will work off line to clarify priorities (including those projects that are repeated on the list) and the COE will add the information to a matrix that will include associated spill levels and TDG. This matrix will be folded into the WMP and Spring/Summer Update and sent around to TMT prior to the May 21 TMT meeting. A teletype with clear instructions for BPA schedulers will also be sent out.

Dworshak Operations

Steve Hall, COE, reported on the latest operational scenarios for Dworshak, posted to the TMT home page. He noted that there was a change to the previous ESP forecast that had indicated a considerable drop in volume, and shared four flow scenarios. Based on the ESP models, the COE recommended maintaining 5 kcfs through next week and checking

in on the Dworshak operation at the May 21 TMT meeting. While FPAC did not discuss the latest ESP forecasts, the salmon managers present on the TMT call (Idaho, USFWS, NOAA, CRITFC – noting a concern for refill) and BPA did not object to the operation.

Water Management Plan Spring Summer Update

The Spring/Summer update had been posted to the TMT home page, and would be linked to today's agenda later today. TMT will review this final draft and finalize it at their May 21 meeting. It was noted that the Dworshak/Grand Coulee flood control swap needs to be filled in by the COE for folks to review.

Operations Review

Reservoirs: Libby was operating to VARQ flows (13.8 kcfs) with inflows running around 14.6 kcfs. The official ICF date was 5.16 and as a result, Brownlee had started to refill. Albeni Falls continued to pass inflows, around 45.5 kcfs; the project was near its hydraulic limit and would be filling slowly to around 2057-2060 feet by the end of May. Dworshak was at elevation 1484.4 feet and filling – 10.8 kcfs inflows and 5 kcfs outflows. McNary 7-day average flows were about 250 kcfs and the 7-day average at Lower Granite was around 90 kcfs. Grand Coulee was at elevation 1228.5 feet and passing inflow. Hungry Horse was at elevation 3504.4 feet and filling, with 8.5 kcfs in and 4.8 kcfs out. Inflows were expected to come up soon.

Fish: Paul Wagner, NOAA, reported that adult passage numbers were still lower (by about 100,000) than projected, with 86,600 total passage at Bonneville to date. Juveniles had reached peak passage, with numbers at Lower Granite peaking around May 8. Transportation had been implemented at all Lower Snake projects, with the latest start on May 12 at Lower Monumental.

Power System: Nothing to report.

Water Quality: Nothing to report.

Other

Kyle Dittmer, CRITFC, reported that there was an overturned boat accident on the Columbia River near Stevenson, with three fishermen including one CRITFC staff. The families of the lost men decided not to request that the pools at Bonneville be lowered to look for the men.

May 21 TMT Meeting

Agenda Items include:

- Finalize notes/minutes
- Priest Rapids Operations
- Dworshak Operations
- TMT Guidelines – final draft
- Water Management Plan Spring/Summer Update - final draft
- Operations Review

**Columbia River Regional Forum
Technical Management Team Conference Call
May 14, 2008**

1. Introduction

Today's TMT call was chaired by Cathy Hlebechuk (COE) and facilitated by Robin Gumpert (DS Consulting) with representatives of NOAA, USFWS, BOR, BPA, CRITFC, FPC, Idaho, and others on the line. 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

The April 30 and May 2 facilitator notes and official minutes were finalized. The May 7 notes and official minutes will be reviewed at the May 21 TMT meeting. The May 7 facilitator's notes mentioned a question regarding whether the COE is concerned about Lake Pend Oreille refill this year. There are no concerns, Hlebechuk said.

3. Bonneville Outage Update – Spill Bays and Corner Collector

Spill Bays. Bays 9, 12, and 14 went out of service on Friday, May 9, allowing project staff to replace the dewatering pump in the spill gallery. The work was completed with no problems and normal operations have resumed, Dan Feil (COE) reported.

Corner Collector. This was taken out of service Monday, May 12, allowing Battelle researchers to perform maintenance on hydrophones in the forebay. The work was not completed, but the COE is not going to request another corner collector outage and will pursue other ways to complete it. As it is, the hydrophones upstream of the BGS are not operating, which means there will be no two-dimensional information on fish behavior in the vicinity of the BGS this year. All the components needed to monitor fish passage are operating, so fish passage information for this season will be available.

4. Spill Priority List

Paul Wagner (NOAA) presented the spill priority list, which represents the Salmon Managers' priorities in terms of how the Columbia and Snake projects should be used to handle overgeneration spill.

1. Ice Harbor Dam. A fair amount of water can be spilled here without producing excessive gas, so this project is where spill should happen first.

2. Lower Monumental. Studies indicate this project provides the least transportation benefit for spring Chinook, so this is the Salmon Managers' second choice.
3. Little Goose. This project is third for similar reasons as Lower Monumental.
4. Lower Granite. Of the four Snake dams, this project provides the best benefit of transportation. With just four units operating now, Lower Granite has produced TDG levels of 120% with a flow of only 100 kcfs. For both of these reasons, Lower Granite should be the last resort for Snake River spill.
5. Bonneville. Spill here should be limited to amounts that produce TDG levels of 125% in daytime and 120% at night. This is due to concerns about adults migrating past the project.
6. The Dalles. The maximum that can be spilled through bays 1-6 at this project is equivalent to about 126 kcfs spill.
7. John Day. There's a 30% to 40% spill block study occurring at this project which is important to preserve.
8. Chief Joseph. This project can spill through deflector-equipped bays only. It is no longer last on the list, as it has been in previous years, now that it has spill deflectors. Spilling here used to mean loading up the river with gas, then struggling to control it further downstream.
9. Grand Coulee. The Salmon Managers have no desire to see spill here. However, Grand Coulee has often been at the bottom of the list and was moved up this year because the Salmon Managers believe there is something to be gained from spilling and reducing the megawatts produced. This ultimately means more water to run through turbines at the lower projects and potentially less spill downstream.
10. The Dalles. Spill is expected through all bays at this project – if it must be used. Flows moving this far downriver would have to be in the 350 kcfs range by the time this project is called into service.
11. McNary. Spill at this project is a two-step process. First, increase turbine loading to 14 kcfs per unit in order to keep TDG levels from exceeding 125%. The second step is to spill, assuming that TDG levels are 125% or higher.

John Day. This project is listed again, as second to last, because at very high flows, it could spill beyond the maximum for the first 6 bays. Bonneville is

last on the list, also listed twice. Further spill actions could be taken at both of these projects during extremely high flows (such as 375 kcfs) because predation is greatly diminished by flows of that intensity.

The next step in the process of developing the spill list is to assign expected volumes that would achieve specific TDG levels, Wagner said. There was discussion about developing a matrix that correlates the projects and their associated spill volumes; COE and NOAA agreed to work together on this.

The spill priority list is included in the WMP spring/summer update and will be updated there, possibly before the next TMT meeting on May 21. The final version will be communicated to BPA power schedulers via teletype.

5. Dworshak Operations

ESP volumes last week were very low, and these scenarios were posed late as a result, Steve Hall (COE) said. They are attached to today's agenda.

Scenario 1. Presents maximum, average and minimum volumes based on ESP runs.

Scenario 2. Shows 5 kcfs outflows for another week until May 21, then effects of that operation on maximum, average and minimum refill scenarios.

Scenario 3. Shows 5 kcfs outflows through the end of May and effects of that operation on maximum, average and minimum refill flows.

Scenario 4. Shows the effect of dropping to minimum flows for a week, then how refill is affected. Average refill flows would be about 5 kcfs for the rest of the refill period under this scenario.

The COE recommended staying at 5 kcfs outflows for another week (scenario 2) to be revisited at the next TMT meeting May 21. NOAA, Idaho, USFWS, BPA, and CRITFC did not object to this operation. CRITFC expressed concern that Dworshak reservoir be refilled before the July 4 weekend, and the COE echoed the same concern.

The operation until next week will be to maintain 5 kcfs outflows from Dworshak and revisit this at the May 21 TMT meeting.

6. WMP Spring Summer Update

The latest draft is posted on the TMT web page. It will be emailed soon to TMT members in Word and as linked to today's agenda. Scott Boyd asked for TMT's comments by Tuesday, May 20. The plan is to finalize the WMP spring/summer update at the next TMT meeting.

7. Operations Review

a. Reservoirs. Libby is filling slightly and went to VARQ outflows of 13.8 kcfs on May 10. Inflows are 14.6 kcfs. The initial controlled flow date was May 16, so Libby was supposed to start filling on May 6. However, the ICF information wasn't available until last week, so the reservoir didn't start refilling until May 10.

Albeni Falls is still passing inflows. Outflows were 45.5 kcfs yesterday. Albeni Falls is operating near its hydraulic limit, and the goal is to refill slowly. The end of May target elevation is 2,057-2,060 feet.

Dworshak is at elevation 1,484.4 feet and refilling, with 10.8 kcfs inflows and 5 kcfs outflows.

The 7-day average for inflows at Lower Granite is 90 kcfs. Since the ICF date was May 16, Brownlee is starting to refill. Outflows were 20 kcfs but have dropped quite a bit.

Grand Coulee is at elevation 1,228.5 feet, still passing inflows until refill is allowed to begin.

Hungry Horse is at elevation 3,504 feet, discharging 4.8 kcfs. With inflows of 8.5 kcfs, it is slowly filling. Inflows are expected to pick up by this weekend.

b. Fish. Adult passage at Bonneville is 86,640 to date, about 100,000 more than initial projections, Wagner reported. Counts were averaging 2,500 fish per day until May 13, when they increased to 4,600 per day. This represents the last hope for a significant increase in passage numbers resulting from the freshet. Passage counts this year have been well below levels forecasted.

The juvenile passage index at Lower Granite continues to stay high, with a peak of 271,000 fish on May 8. Yesterday's passage index was 150,000 yearling Chinook at Granite. Passage at Little Goose has been in the 100,000 range as well; at Lower Monumental, in the 30,000 range. Transportation has been occurring at all these sites. Transportation at Lower Monumental was the last to start, on May 12. McNary is passing significant numbers – an average of 100,000 fish per day for the past week. Subyearling Chinook passage is in the 30,000 range at John Day, and from 30,000-40,000 per day at Bonneville. This is peak passage time. It's a bit late this year but within the range of expectations.

c. Power System. There was nothing to report today.

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

e. Other. Last week, a tribal fishing boat overturned near Stevenson, Washington. Three tribal fishers are assumed drowned, Kyle Dittmer reported. CRITFC was going to request that the Bonneville pool be lowered to aid in the search, but the families did not want the pool lowered at this time.

8. Next Meeting

The next TMT meeting will be in person on May 21, with a Priest Rapids update, Dworshak operations, finalizing the WMP spring/summer update, the TMT guidelines, and the usual operations review on the agenda. This summary prepared by consultant and writer Pat Vivian.

Name	Affiliation
Paul Wagner	NOAA
Dave Wills	USFWS
Xx	Idaho
John Roache	BOR
Cathy Hlebechuk	COE
Kyle Dittmer	CRITFC
Glen Trager	Shell Energy
Tim Heizenrader	Centaurus
Barry Espensen	CBB
Jennifer Miller	Susquehanna
Richelle Beck	DRA
Margaret Filardo	FPC
Dave Benner	FPC
Russ George	WMC
Tom Le	Puget Sound Energy
Robyn MacKay	BPA
Dan Feil	COE
Steve Hall	COE

TECHNICAL MANAGEMENT TEAM

BOR : John Roache / Mary Mellema / Pat McGrane **BPA :** Robyn MacKay / Tony Norris / Scott Bettin
NOAA-F: Paul Wagner / Richard Dominique **USFWS :** David Wills / Steve Haeseker
OR : Rick Kruger / Ron Boyce **ID :** Russ Kiefer
WDFW : Cindy LeFleur **MT :** Jim Litchfield / Brian Marotz
COE: Jim Adams / Cathy Hlebechuk / Bob Buchholz

TMT MEETING

Wednesday May 21, 2008 09:00 - 12:00

1125 N.W. Couch Street, Suite 4A34
Portland, Oregon 97209-4142
Map Quest [\[Directions\]](#)

CONFERENCE PHONE LINE

Conference call line: 203-310-2162; PASS CODE = 4703150

To check into the building, take the elevator to the 5th floor and the guard will issue you an ID badge if you need one and will take you down to the meeting room on the 4th floor. If you have NOT attended a TMT meeting in the past you will need to call ahead and let Jim Adams (503) 808-3938, Cathy Hlebechuk (503) 808-3942, or Bob Buchholz (503) 808-3945 know, so you can be added to the TMT Visitor List and issued an ID badge. This badge may be used indefinitely. If you have attended TMT in the past you may re-use your ID badge indefinitely. If you are a federal employee you will also need to have an ID badge issued to you which can be used indefinitely.

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Please e-mail her at robin76@cnnw.net or call her at (503) 248-4703.*

AGENDA

1. Welcome and Introductions
2. Review [\[Meeting Minutes\]](#) 
3. Priest Rapids Update - Russell Langshaw, Grant County PUD
 - [\[Operations 4-May-2008\]](#) 
 - [\[Operations 20-May-2008\]](#) 
4. Water Management Spring/Summer Update - Dan Feil, USACE
[\[2008 Water Management Plan\]](#)
5. Bonneville Fish Descaling Update - Dan Feil, USACE
 - [\[SOR 2008-3\]](#) 
6. Lower Monumental Transportation Operations - Dan Feil, USACE
7. Spill Priority List - Paul Wagner, NOAA Fisheries

[\[Proposed Spill Priority 12-May-2008\]](#) 

- [\[Chief Joe for TMT 12-May-2008\]](#) 

8. Operations Review

- Reservoirs
- Fish
- Power System
- Water Quality

[\[Spill Information 2008\]](#)

9. Other

- Set agenda for next meeting - **May 28, 2008**

[\[Calendar 2008\]](#) 

Questions about the meeting may be referred to:

[Jim Adams](#) at (503) 808-3938, or

[Cathy Hlebechuk](#) at (503) 808-3942, or

[Bob Buchholz](#) at (503) 808-3945.

Chief Joseph Dam

Current conditions:

- Flow deflector construction → cofferdam remains attached to spillway face
- Project maintenance → spillway joint repairs underway (monolith uplift issue)
- 8 of 19 spillway bays are available (the other 11 are locked out)
- Available bays all have deflectors below them

Construction:

- Must pour concrete 5/21 and 5/22 to finish current construction cycle
- Deflector construction is 90% complete, only 2 more bays left
- After 5/22, high probability of suspending construction due to spill risk

Issues with spillway use:

- Cofferdam subjected to turbulent flow conditions
 - o Has withstood brief durations (<1day) of low spill (32 kcfs)
 - o Some spill can be tolerated, but magnitude and duration a concern
 - o If cofferdam is not damaged, will be finished later this summer
 - o If cofferdam is damaged, completion may be delayed as much as a year
- Spillway joint repairs have not been finished
 - o partial repair shows reduction of uplift pressures, but not elimination
 - o Intensive monitoring required during spill
 - o If monitoring shows problem, will request spill reduction

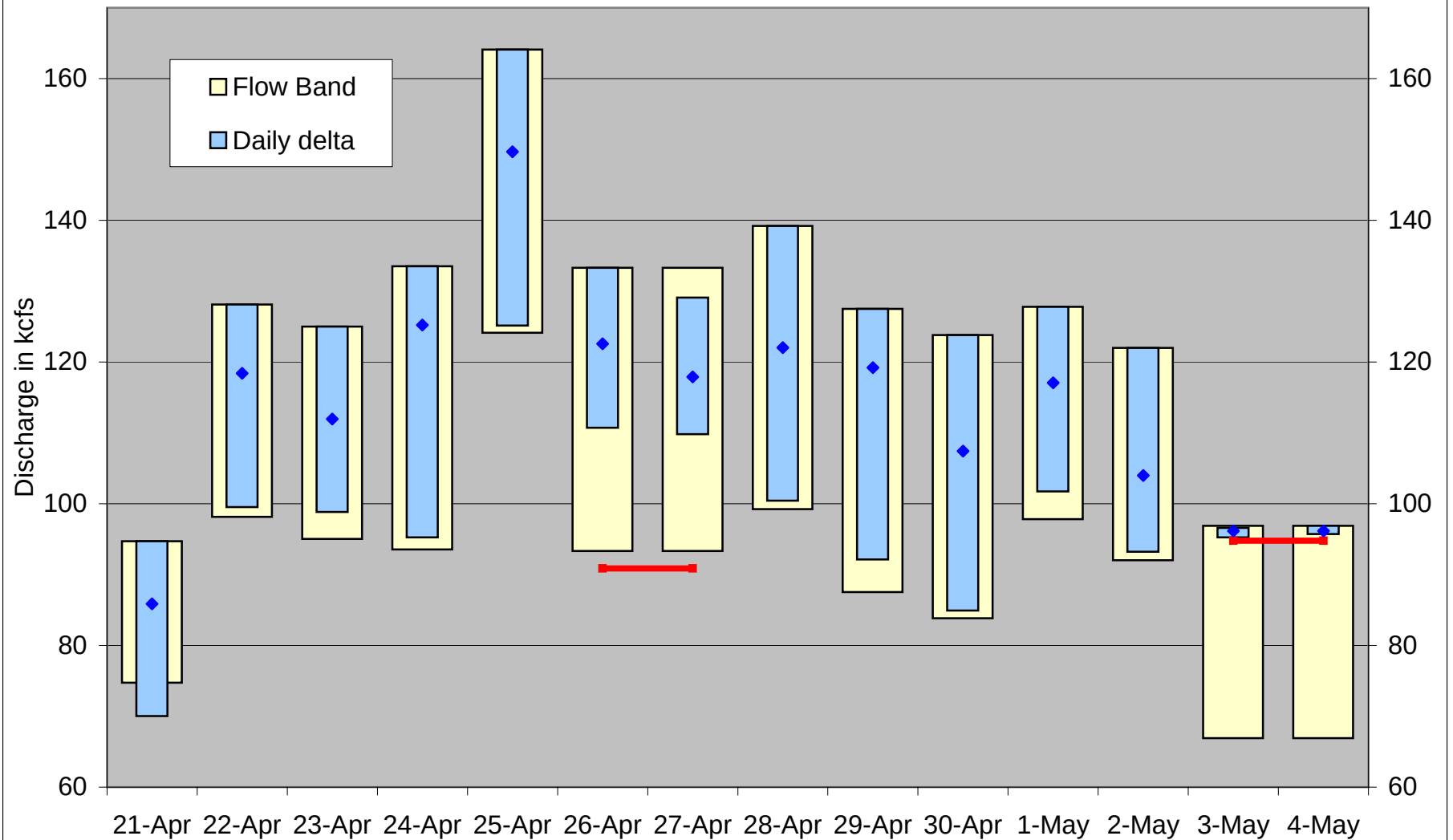
Photos:





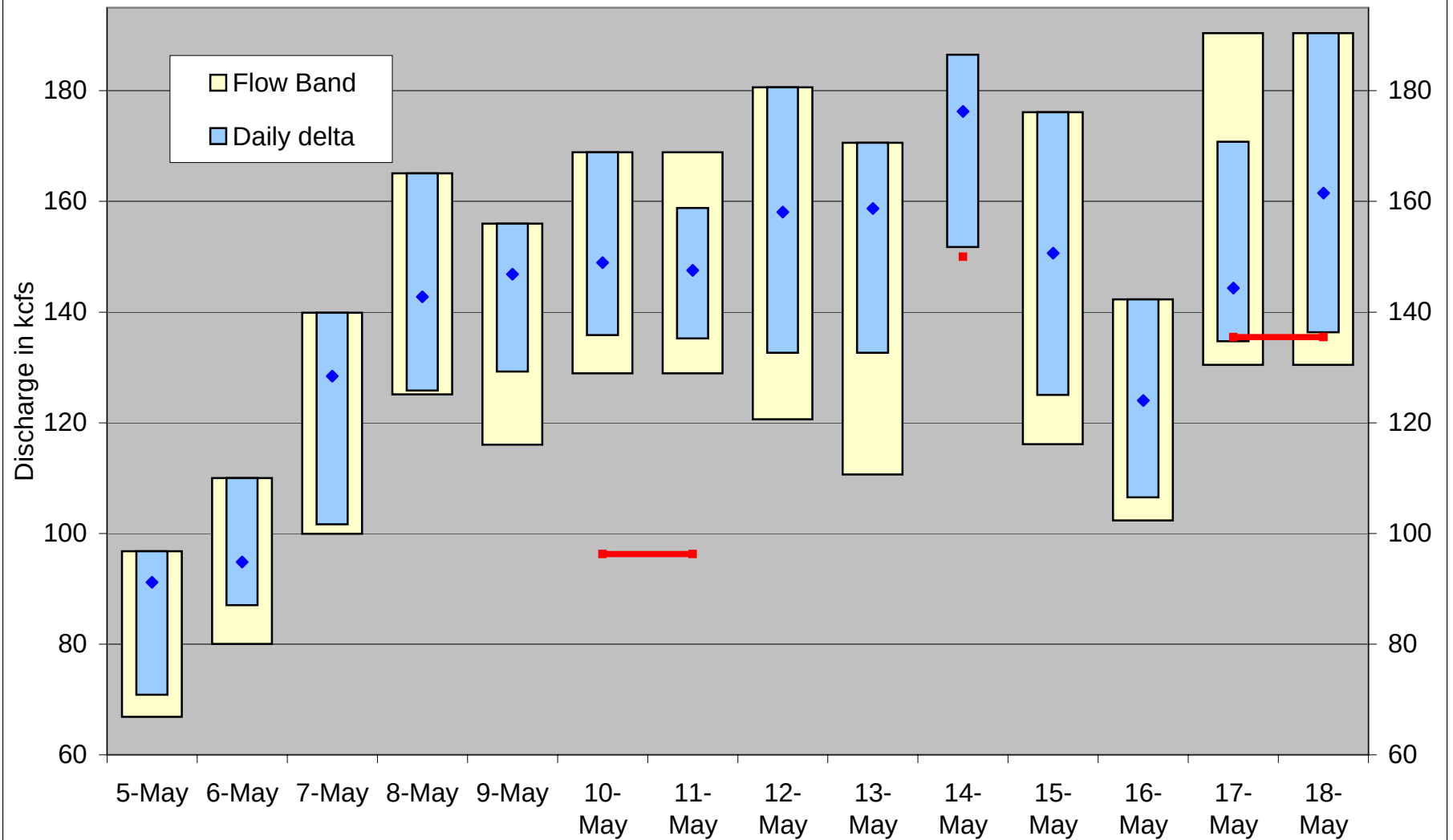
Priest Rapids Operations 2008

Number of exceedances: 0



Priest Rapids Operations 2008

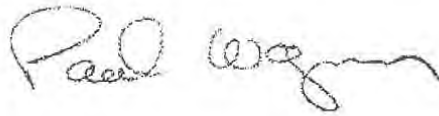
Number of exceedances: 1



SYSTEM OPERATIONAL REQUEST: #2008-3

The following State, Federal, and Tribal Salmon Managers have participated in the preparation and support this SOR: NOAA National Marine Fisheries Service, Idaho Department of Fish and Game, Oregon Department of Fish and Wildlife, Washington Department of Fish and Wildlife, the Shoshone-Bannock Tribes, the Columbia River Inter-Tribal Fish Commission, and the Nez Perce Tribe.

TO:	Colonel Steven R. Miles	COE-NWD
	James D. Barton	COE-Water Management
	Cathy Hlebechuk	COE-RCC
	Witt Anderson	COE-P
	Col. Thomas E. O'Donovan	COE-Portland District
	LTC Anthony Hofmann	COE-Walla Walla District
	J. William McDonald	USBR-Boise Regional Director
	Stephen J. Wright	BPA-Administrator
	Greg Delwiche	BPA-PG-5



FROM: Paul Wagner Chairperson, Salmon Managers

DATE: May 20, 2008

SUBJECT: Bonneville Dam Operations to Address Unacceptably High and Severe Descaling Rates

SPECIFICATIONS: Descaling in smolts at Bonneville Dam has reached 19% in yearling Chinook in the sample completed May 20, 2008. In order to reduce severe descaling and probable increased mortality, the Salmon Managers recommend the following:

- decrease total discharge in Powerhouse II at Bonneville Dam by reducing turbine operations to the lower end of the 1% efficiency range and,
- maintain spill attempting to not exceed 125% TDGS at the Cascade Island monitor.

JUSTIFICATION:

Descaling rates at Bonneville Dam over the past week have been relatively high, especially in yearling Chinook, and in many cases the descaling has been severe. Many of the descaled fish have had scales removed almost entirely from one side of the body. This level of descaling is thought to be lethal to smolts. The COE is presently cleaning the Vertical Barrier Screens (VBS) at Powerhouse II and have reported high levels of debris on the screens.

The total discharge at the powerhouse (a surrogate for efficiency rating where the higher the powerhouse flows the closer to the high end of the 1%) appears to be closely linked to the descaling levels seen in fish at the project during the past week (Figure 1).

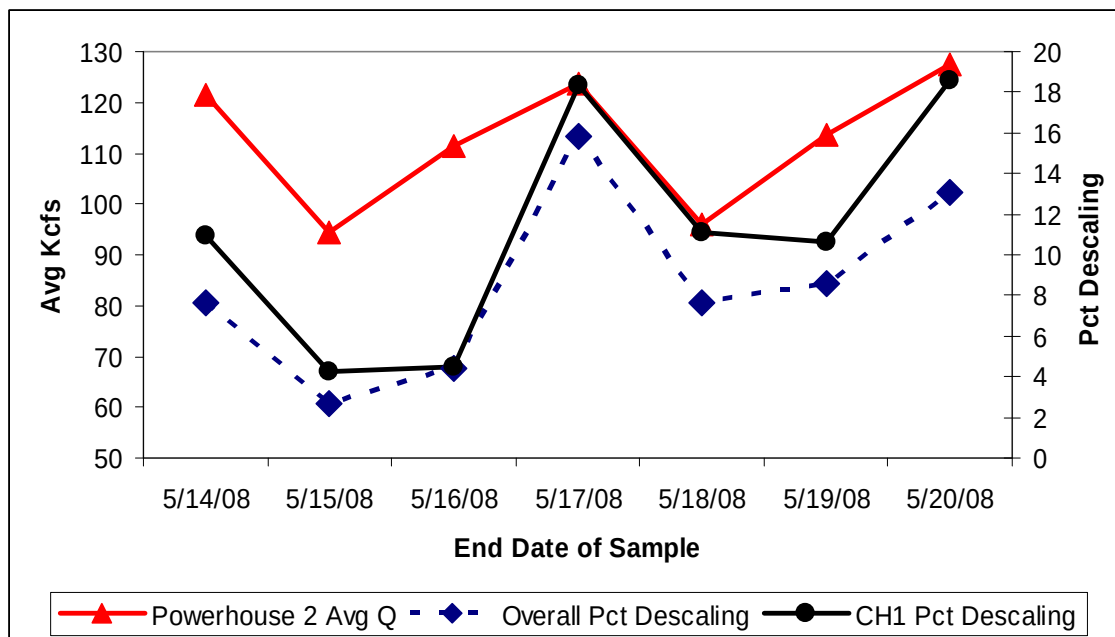


Figure 1. Descaling rates at Bonneville Dam Smolt Monitoring Facility for yearling Chinook and overall smolt descaling rate. The date in the figure represents the end date of sampling. The flows are from the previous dates 24 hour average.

Decreasing powerhouse II flows while simultaneously increasing spill would decrease the portion of fish entering into the powerhouse. Indications are that decreasing turbine loading could decrease descaling rate as suggested by the relation seen between descaling rate and powerhouse II discharge over the past several days.

Spill is generally accepted as the safest route for fish passage at the Federal Columbia River Power System (FCRPS) facilities in terms of both immediate and delayed survival effects.

One strategy that has been implemented at Bonneville Dam has been to maximize the proportion of fish that pass through non-turbine routes, as measured by maximizing Fish Passage Efficiency (FPE). “FPE and FGE are an indication of the effectiveness of measures to divert juveniles around the turbines, which are considered to have a higher mortality rate, compared to the bypass systems and spillway” (USACE 2002). Maximizing FPE has been a reported goal of the USACE.

The participants in this SOR recognize that decreasing the flow through the powerhouse by about 20 kcfs will cause an incremental increase in the level of TDG that is being generated by the project which is already approaching the 125% level. There is the potential that this level of TDG and the quantity of spill associated may pose risks to the adult salmonid population below

the project. The measure being proposed is an attempt to strike a balance between the harm observed on the juveniles passing through PH2 with the potential harm to adult salmonids.

In addition, we recommend that the Technical Management Team develop a procedure for responding to situations where spill may be the most effective response, but where Clean Water Act and Endangered Species Act requirements conflict.

Proposed Spill Priority List the Corps received from the Salmon Managers on May 12, 2008

Salmon Managers Spill priority list

Ice Harbor

Lower Monumental

Little Goose

Lower Granite

Bonneville - increase night time spill to 125% TDG, increase daytime to 120 kcfs

The Dalles - spill maximum q through bays 1-6 which equates to ~126kcfs spill

John Day - change spill block to 40% if it is a 30% block period

Wanapum

Priest Rapids

Rocky Reach

Wells

Rock Island

Chief Joseph – spill through deflector equipped bays only

Grand Coulee – spill up to 120% TDG if it reduces load substantially and reduces the need to spill at downstream projects in a significant way.

The Dalles

McNary – increase turbine loading to 14 kcfs per unit to keep TDG from exceeding 125%.

McNary

John Day

Bonneville

Draft Teletype:

BON R 052108 1330 AA

ATTENTION: COLUMBIA RIVER BASIN PROJECTS AND BPA

SUBJECT: INVOLUNTARY SPILL PRIORITY LIST
SPILL FOR OTHER THAN FISH PASSAGE

*** PROJECT SPECIFIC GUIDANCE ON INVOLUNTARY SPILL

1. THIS TELETYPE PROVIDES GUIDANCE ON PROJECT OPERATION TO PROVIDE VOLUNTARY AND INVOLUNTARY SPILL. IT ALSO PROVIDES MORE SPECIFIC GUIDANCE ON HOW TO DEAL WITH INVOLUNTARY SPILL DURING HIGH FLOW EVENTS.
2. UNTIL FURTHER NOTICE DURING PERIODS OF INVOLUNTARY SPILL PROJECTS SHOULD SPILL IN ORDER PER TABLE BELOW, STARTING WITH IHR.
3. DURING PERIODS OF INVOLUNTARY SPILL AT BONNEVILLE, INCREASE NIGHT TIME SPILL AT BONNEVILLE TO 125% TDG LEVEL, AND

INCREASE DAYTIME TO 120 KCFS.

4. DURING PERIODS OF INVOLUNTARY SPILL AT THE DALLES, INCREASE THE DALLES SPILL TO MAXIMUM AMOUNTS THROUGH BAYS 1 - 6.
5. DURING PERIODS OF INVOLUNTARY SPILL AT JOHN DAY, CHANGE SPILL BLOCKS TO 40% IF THE FISH TEST IS A 30% BLOCK PERIOD.
6. DURING PERIODS OF INVOLUNTARY SPILL AT CHIEF JOSEPH, SPILL THROUGH FLOW DEFLECTOR EQUIPPED BAYS ONLY.
7. DURING PERIODS OF INVOLUNTARY SPILL AT GRAND COULEE, SPILL UP TO 120% TDG LEVELS IF IT REDUCES LOAD SUBSTANTIALLY AND SIGNIFICANTLY REDUCES THE NEED TO SPILL AT DOWNSTREAM PROJECTS.
8. DURING PERIODS OF INVOLUNTARY SPILL AT MCNARY, INCREASE TURBINE LOADING TO 14 KCFS PER UNIT TO KEEP TDG FROM EXCEEDING 125%.
9. CURRENT SPILL CAPS FOR THE VARIOUS TDG LEVELS, SUBJECT TO PERIODIC CHANGES BASED ON REAL-TIME DATA. VOLUNTARY AND INVOLUNTARY SPILL SHOULD BE IN THE FOLLOWING ORDER.

```

-----
PRO-----TDG%-TDG%-TDG%-TDG%---TDG%--TDG%
JECT----110--115--120--125----130---135
-----
IHR-----30---45---95---125---180---240--
LMN-----10---15---26---95---180---250--
LGS-----10---15---37---80---150---250--
LWG-----20---30---41---90---125---200--
BON-----50---65---94---150**--225---270--  ** SEE NOTES
TDA-----20---60---120---250**--360---600--
JDA-----20---60---160---240**--450---600--
WAN-----10---15---20---50---100-----
PRD-----20---30---40---40---40-----
RRH-----05---10---20---30---150-----
WEL-----10---15---25---45---130-----  * CHANGES
RIS-----05---10---20---30---150-----
CHJ-----0**---0**---0**---0**---0-----
GCL(a)--0---5---10**--20---35---55--
GCL(b)--20---25---30**--75---120--170--
MCN-----40---80---145**--230---290---450--
JDA-----20---60---160---240---450---600--
BON-----50---65---94---150**--225---270--

```

10. WHEN GCL FOREBAY ELEVATION IS < 1260 FT USE GCL(a) SPILL CAPS.
WHEN GCL FOREBAY ELEVATION IS > 1260 FT, USE GC(b) SPILL CAPS.
11. IF CONSTRUCTION ON FLOW DEFLECTORS IS OCCURRING AT CHIEF JOSEPH, A TWO HOUR NOTIFICATION TO RCC IS REQUIRED TO ADDRESS SPILL NEEDS.
12. THE REVISED SPILL PRIORITY LIST WAS COORDINATED WITH EMILY CORRIGAN (BPA); JAMES TAYLOR (TDA); SCOTT GOODMAN (JDA) AND LAURA HAMILTON (RCC).

NOTE 13: IF WATER QUALITY ASSISTANCE IS NEEDED AFTER HOURS CONTACT:

[HOME](#)

CELL PHONE

1. JIM ADAMS (360) 687-8355 (503) 706-0276

2. LAURA HAMILTON (360) 573-0097 (360) 606-8541

3. TINA LUNDELL (503) 282-5769

LAURA HAMILTON CENWD-PDW/RCC

M://WATER QUALITY/TELETYPES/SPILL052108

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**Columbia River Regional Forum
Technical Management Team Meeting
May 21, 2008**

1. Introduction

Today's TMT meeting was chaired and facilitated by Jim Adams (COE) with representatives of BOR, USFWS, NOAA, BPA, CRITFC, FPC, MT, ID, OR, the Nez Perce Tribe and others attending in person or by phone. 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

There were no comments on any of the minutes prior to May 7, so these were deemed final. Minutes from the May 7 and May 14 meetings will be posted within the next few days.

3. Priest Rapids Update

Russell Langshaw (Grant Co. PUD) gave an update on Grant County PUD operations at Priest Rapids Dam over the past four weeks. Charts depicting outflows from Priest Rapids are linked to today's agenda.

April 20-May 4 – The weekend of April 26-27 brought the first flow band protections, with a minimum of 90.9 kcfs which was met. There was a minor exceedance on April 21. Other than that, all criteria were met.

May 5-18 – Flows picked up. There was another minor exceedance on May 17, when the weekend minimum was 135.5 kcfs and flows dropped 0.8 kcfs below that. Any impacts of that are imperceivable in the reach. The third weekend of protection flows occurred May 10-11, with a 96.3 kcfs minimum. Flows were well above that.

Now that all four weekends of flow protections have been completed, the standard weekend minimums will be dictated by the flow band for that weekend, based on flow forecasts, Langshaw explained. There are 360 temperature units remaining, which puts the end of emergence at sometime in mid-June.

4. WMP Spring/Summer Update

The latest draft and all of its comments are posted online. Adams asked whether anyone else would be submitting comments.

The summer operation shown in the WMP is defined by the old BiOp, not the new BiOp. This operation is not what Montana seeks, Litchfield said. Beginning at the next TMT meeting, he will work with other TMT members on finding a summer operation that is acceptable to Montana. The TMT guidelines say that TMT will work to implement the BiOp, Brian Marotz added. Many of the measures the current BiOp calls for were actually implemented in 2007.

The COE has an agreement with the court to operate spill according to the 2007 Fish Operations Plan through the end of August, Feil said. At the court hearing when 2007 operations were rolled over, the Department of Justice attorney proposed that the region resolve this issue in 2008 via the TMT process, Litchfield replied. For this reason, Montana views the FOP as not being static, and anticipates some flexibility in how Libby and Hungry Horse will be operated this summer. Litchfield expressed hope that the process won't be dependent on absolute unanimity. He emphasized that Montana is not happy with the WMP as it reads now. TMT will begin working on this issue at its next meeting May 28.

5. Bonneville Fish Descaling Update

Much of today's meeting focused on what to do about fish injury rates associated with heavy debris accumulation on fish screens at Bonneville Dam, with flows high and increasing. To address the situation, the Salmon Managers submitted SOR 2008-3 (attached to today's agenda) consisting of two recommendations for Bonneville operations:

- Decrease total discharge in powerhouse 2 by reducing turbine operations to the lower end of the 1% efficiency range.
- Maintain spill, attempting to not exceed 125% TDG at the Cascade Island monitor.

Descaling samples were taken at the project from 3:20 pm yesterday to 7 am today, Margaret Filardo (FPC) reported. Descaling rates were:

- Yearling Chinook – 51 of 402 fish (13%)
- Subyearling Chinook – 3 of 38 fish (8%)
- Steelhead – 6 of 118 fish (5%)
- Coho – 39 of 466 fish (8%)
- Sockeye – 20 of 54 fish (37%)

These results represent descaling over 20% or more of the fish's body. Fish with the highest injury rates were yearling Chinook (13%) and sockeye (37%). Later sampling has shown no improvement in these rates.

Fine, leafy debris has been entering the gatewells and plugging the vertical barrier screens (VBSs), causing open areas on the VBSs to become high velocity hot spots that are likely causing the observed increase in descaling, Dan

Feil (COE) explained. Project staff have been cleaning the VBSs continuously over the past few days. There are two types of screens. Guidance screens that guide fish from the turbine intake into the gatewell, while VBS inside the gatewell keep fish from passing from the gatewell back through the turbine unit. The cleaning process involves lifting the primary VBSs out of the slot while installing a secondary VBS in the slot downstream of the primary VBS to prevent fish from passing back through the turbine and then flushing debris from the primary VBS back into the gatewell and onto the secondary VBS.

A recent email from Tammy Mackey (COE) asked the region, via the FPOM process, to consider removing the primary VBS without using a secondary VBS then flushing debris contained in the gatewell through the unit. This would speed up the cleaning and hopefully reduce the number of injuries. The problem is, fish in the gatewell would also be flushed through the turbine unit. Survival rates through turbines at the Bonneville powerhouse 2 are well above 90%, Feil noted. Jim Litchfield (Montana) noted that if descaling rates represent future mortalities, it appears that turbine passage is a safer route than the bypass system under these high flows. The fish screens are new, and this is the first time they have had to handle such flows and heavy debris, Feil said. The lack of a TIE crane onsite compounds the problem. (TIE crane repair is included in the 2008 CRFM program budget, so that problem will get resolved.)

Dennis Schwartz (COE) pointed out that this is the first year all the FGE improvements have been in place at Bonneville Dam, and flows are extremely high. This is the first real worst case test of the bypass system. Of the seven turbine units operating, the three closest to the corner collector (units 11, 12 and 13) consistently accumulate the most debris.

Discussion turned to SOR 2008-3. There are basically two options, clean the screens or reduce the number of fish going through the powerhouse, Paul Wagner (NOAA) said. What appeared as mortalities in the tiny Spring Creek fish probably showed up in these larger fish as descaling. The SOR calls for decreased turbine loading during periods when high descaling rates were observed. The challenge is finding a balanced solution that improves juvenile passage without impeding adult migration. A desirable goal for adults would be an upper limit of 120 kcfs spill at the project. Higher levels increase the potential for fallback above ladders and subsequent survival of those fish passing upstream. The Salmon Managers recognize that implementing this SOR will cause more spill at the project, and would like to keep TDG levels in the Bonneville tailrace below 125%.

Current heavy flows are projected to increase by about 20 kcfs, Feil said. According to projections over the next few days, that will raise TDG levels at the Cascades Island gage by about 3 to 5%. The current level is around 123%, so that would put TDG levels well above 125% if turbine loading is reduced. We could probably operate the units at the mid range of 1% and stay closer to the 125% cap, Schwartz said. Based on SYSTDG model runs, an additional 40 kcfs

of spill as a result of taking this action would create TDG levels of more than 125%, Laura Hamilton (COE) said. There is no monitoring below Bonneville dam to assess the effects of increased TDG on smolts. In addition, there is no adult monitoring in place to assess the affects of increased spill at Bonneville on adult fallback, Dan Feil said.

There are two options, either pulling the screens or reducing the number of fish going through the system, Tom Lorz (CRITFC) said. The group considered a third option, partial screen removal. Pulling only the difficult screens would put the most fish through turbines, Tom Lorz said. Studies in 2000 indicated that only shutting off spill will stop fallback.

Wagner suggested that spill be limited during the day when adults are passing and increased at night, similar to recommendations in the salmon managers' spill priority list. The COE has a CWA-related regulatory issue with managing spill above TDG levels of 120% at the Cascades Island gage, Rudd Turner said. While DEQ recognizes that keeping TDG below 120% might not be possible at current rates of involuntary spill, the COE is expected not to make the situation any worse, Adams said. Feil acknowledged this is a complex dilemma. Protecting fish at the bypass by reducing loading in the Bonneville powerhouse 2 will increase spill and gas, which will affect the entire population of smolts passing Bonneville, in addition to adults. On the other hand, it's urgent to protect fish in the bypass system.

If running at mid-load and continuous cleaning doesn't curtail descaling, the next step is to pull fish screens and run the units at the high end of efficiency in order to clear out the debris and minimize spill, Schwartz said. Each time the powerhouse 2 units are shut down to pull screens, the opportunity to spill 20 kcfs through the powerhouse is lost. It takes approximately 1.5 hours to pull the screens at each unit.

If powerhouse loading and fish passage through the powerhouse is decreased, that increases passage through the spillway, which reduces risk to those fish, Wagner summarized. At current high spill levels, a 20 kcfs increase won't increase fish passage much over the spillway, Turner replied. Monitoring descaling rates over the next few days while implementing the operation recommended by the SOR is the most prudent course of action, Filardo said.

There was discussion of whether special handling of problem units is a viable option. Projected inflows at Bonneville indicate that spill will be an ongoing issue over the next several weeks. Flows are projected to be in the 440-450 kcfs range from June 3-7, Adams said. Schwartz debunked a rumor of debris building up on the BGS; only the fish screens are clogging.

Just before a brief break, TMT settled on the following round-the-clock operation at Bonneville: run units 11-13 closest to the BGS and corner collector

at the lower end of 1%, while running the other four units at the mid-range. They scheduled a TMT call for 11 am Friday to reassess the situation.

COE representatives returned from the break with bad news: Project staff had called to report the debris accumulation was overwhelming. The only remaining options, in terms of available workforce, were to pull the screens or shut down the fish ladders in order to keep up with cleaning.

As a result of this new information, the COE recommended the following operation: Pull all fish screens at Bonneville and operate the 2nd powerhouse units at the high end of 1% efficiency. The fish screens will not be repositioned until after the Memorial Day weekend. This basically means passing fish through the turbines because that appears to be a safer route than the bypass system at present, due to unmanageable debris.

NOAA, USFWS, BOR, BPA, CRITFC, the Nez Perce Tribe, Montana and Oregon did not object to this operation. **Idaho** expressed concern about pulling the screens and putting more fish through the turbines, as well as reducing adult return rates by generating high levels of TDG. Idaho cares more about long term return rates than short term mortalities. There was discussion of possible ways to clean the screens more effectively instead of pulling them. COE representatives emphasized that project staff can't keep pace with the rate at which debris is piling up, and changing the cleaning process wouldn't solve that beyond an hour or two. The difference in TDG levels produced by operating at the high and low end of 1% efficiency is expected to be about 3-5%. There was no representation by **Washington** today; COE will communicate with state representatives not present at the meeting outside of the TMT meeting. After noting the state's concerns for the record, Idaho did not object to the proposed operation.

6. Lower Monumental Transport Operations

The intensity of river flows on the Snake, especially at Lower Monumental, have made it infeasible to shut off spill there so the barge can navigate into place and pick up fish, Feil reported. The COE's solution was to suspend transportation operations for a few days until flows subside.

Transportation operations continue as planned at Lower Granite and Little Goose dams. However, Lower Granite is also receiving high flows, and transportation might have to be suspended there too if flows increase. Meanwhile, TMT might notice variations in forebay levels during the early morning hours (6:30-9:30 am) when spill is reduced for the barge loading operation.

Most TMT members had been contacted by phone regarding the transportation changes prior to today's meeting. There were no objections or extended discussion of these changes today.

7. Spill Priority list

The spill priorities recommended by the Salmon Managers are linked to today's agenda. Their list requests that excess spill occur first at Ice Harbor, Lower Monumental, Little Goose, Lower Granite, Bonneville, The Dalles, John Day, Wanapum, Priest Rapids, Rocky Reach, Wells, Rock Island, Chief Joseph, Grand Coulee, The Dalles, McNary, John Day, and Bonneville dams, in that order. If there is too much generation available, this is where the Salmon Managers want it reduced first, as opposed to too much water passing the project. SOR 2008-3, discussed today under agenda item 5 (Bonneville descaling update) represents a temporary change in the spill priority list by suggesting that nighttime spill at Bonneville be increased to 125% TDG, Wagner pointed out.

The conversation then focused on Chief Joseph Dam, whose 19 bays will all be equipped with spill deflectors soon. Carol Fitzgerald (COE-Seattle) gave an update on construction work at that project. The deflector installation is nearly finished, with deflectors in 18 of 20 spill bays. Spillway joint repairs are also underway, a high-priority project to address monolith uplift issues.

The contractor's cofferdam is still attached to the face of the spillway. As the risk of having to spill increases, the contractor has been notified to suspend work after May 22 for safety reasons. Spilling before May 22 at Chief Joseph is therefore not an option. If spill after May 22 does damage the cofferdam, it could slow completion of the project by 6 months or more. During a recent spill test through gates 12 and 13, which are several bays away from the cofferdam, the spill created rough recirculation patterns, which sent waves crashing into the cofferdam. If spill at Chief Joe becomes necessary, only 8 of the 19 gates (#8-12 and 16-19) would be available due to the need to protect the cofferdam from damage. Gates 13-15 could be pressed into service in a pinch.

Because the deflectors are designed for optimal performance when spilling across the entire spillway, project improvements won't be apparent until the installation is complete and all bays can be used simultaneously, Fitzgerald said. In an emergency spill situation, workers might not have time to remove the cofferdam from the spillway. For all of these reasons the COE prefers to keep Chief Joseph near the bottom of the spill priority list, just before Grand Coulee; NOAA did not object to this provision.

John Roache (BOR) asked what the hydraulic capacity of the Chief Joseph powerplant is – approximately 180 kcfs. BOR and COE agreed that there may be no choice but to spill at Chief Joseph, flows being what they are.

Regarding the spill priority list, Adams showed TMT a draft teletype the COE is composing to send to staff operating the projects. The COE has been

managing TDG values up to 125% based on tailwater conditions only, a standard operating procedure during high flows. The COE will send the draft teletype to TMT members for review, and will post the final teletype online after all TMT members have approved it.

8. Operations Review

a. Reservoirs. Grand Coulee is at elevation 1,242.4 feet and filling fast, about 2-3 feet per day.

Hungry Horse is at elevation 3,517.87 feet, also filling fast, with inflows in the 30 kcfs range, or 3 feet per day. Flows had to be cut back for flood control at Columbia Falls.

Libby is also filling, with current outflows of 13.8 kcfs. The operation was reduced last Friday night to two units and 8.8 kcfs outflows, due to the potential for flooding at Bonners Ferry.

Albeni Falls is on free flows at present.

Dworshak is refilling and went to minimum outflows on May 17, where it has remained since then. This operation is expected to continue for the next several days until flows on the Snake begin to recede.

Inflows at Lower Granite are 197.8 kcfs, expected to peak in the next day or so. The 7-day average for inflows at McNary is 339 kcfs. The 7-day average for inflows at Bonneville is 410 kcfs.

b. Fish. Adult fall Chinook passage at Bonneville is dropping faster than expected. Smolt passage has increased, peaking at an index of 189,000 fish at Lower Granite, 158,000 at Little Goose, and 125,000 at Lower Monumental. Steelhead passage numbers are 200,000 fish at Lower Granite and 150,000 at Little Goose.

The cumulative passage index for steelhead at McNary is so high as to suggest the beginning of a new era – 400,000 fish, when projections with the TSWs in place, improving passage efficiency, were for 250,000 fish at the most. Steelhead counts this high are unprecedented, Wagner said. It will be interesting to see how many of these fish return as adults.

c. Power System. There was nothing to report at today's meeting.

d. Water Quality. High levels of spill have correspondingly raised gas levels on the river, with exceedances at several projects. The lower Snake projects have been experiencing gas levels of 130-132% which exceeds state water quality standards, Adams reported. There were no GBT data available at

today's meeting, but impacts can unfortunately be expected from TDG levels this high, Wagner said. Conditions are quite a bit better on the Columbia, with tailwater TDG levels just over the 120% criteria at McNary. Tailwater readings at Bonneville are around 123% and forebay levels are at 117.5%, barely exceeding state water quality standards. Recently there has been a big drop in TDG levels at both the Bonneville and The Dalles forebays. Wind in the Columbia Gorge is apparently stripping gas out of the river.

12. Next Meeting

There will be a TMT conference call on May 28. The next meeting in person will be on June 4. This summary prepared by consultant and writer Pat Vivian.

<i>Name</i>	<i>Affiliation</i>
John Roache	BOR
Jim Litchfield	Montana
Dave Wills	USFWS
Paul Wagner	NOAA
Dan Feil	COE
Robyn MacKay	BPA
Tom Lorz	CRITFC
Dennis Schwartz	COE
Tim Heizenrader	Centaurus
Holli Krebs	Bear Stearns
Bob Diaz	PPM
Rudd Turner	COE
Don Faulkner	COE
 <i>Phone:</i>	
Kyle Dittmer	CRITFC
Brian Marotz	Montana
Greg Haller	Nez Perce
Margaret Filardo	FPC
Russ Kiefer	Idaho
Tina Lundell	COE
Russell Langshaw	Grant PUD
Alex Schwartz	Grant PUD
Bruce McKay	Consultant
Richelle Beck	DRA
Tom Le	Puget Sound Energy
Rick Kruger	Oregon
Carolyn Fitzgerald	COE Seattle
Tammy XXX	COE

TECHNICAL MANAGEMENT TEAM

BOR : John Roache / Mary Mellema / Pat McGrane

BPA : Robyn MacKay / Tony Norris / Scott Bettin

NOAA-F: Paul Wagner / Richard Dominique

USFWS : David Wills / Steve Haeseker

OR : Rick Kruger / Ron Boyce

ID : Russ Kiefer

WDFW : Cindy LeFleur

MT : Jim Litchfield / Brian Marotz

COE: Jim Adams / Cathy Hlebechuk / Bob Buchholz

CONFERENCE CALL

Wednesday May 28, 2008 09:00 - 12:00

1125 N.W. Couch Street, Suite 4A34

Portland, Oregon 97209-4142

Map Quest [\[Directions\]](#)

CONFERENCE PHONE LINE

Conference call line:203-310-2162; PASS CODE = 4703150

We have had disruptions on the phone because people are not hitting 'mute' after dial in.

Please MUTE your Phone

All members are encouraged to call Robin Gumpert with any issues or concerns they would like to see addressed.

Please e-mail her at robin76@cnnm.net or call her at (503) 248-4703.

AGENDA

1. Welcome and Introductions
2. Review [\[Meeting Minutes\]](#) 
3. Initiation of Libby Sturgeon Flows - Jason Flory, USFWS
[\[DRAFT SOR\]](#) - 
4. Bonneville Update - Dan Feil, USACE
[\[SOR 2008-04\]](#) -  Tom Lorz, CRITFC
5. Lower Monumental Transportation Operations - Dan Feil, USACE
6. Operations Review
 - a. Reservoirs
 - b. Fish
 - c. Power System
 - d. Water Quality[\[Spill Information 2008\]](#)
7. Other
 - a. Set agenda for next meeting - **June 4, 2008**
[\[Calendar 2008\]](#) 

Questions about the meeting may be referred to:

DRAFT SYSTEM OPERATIONAL REQUEST: # , FWS

TO:	Col. Steven R. Miles	COE-NWD
	Jim Barton	COE-Water Management
	Robert Buccholz	COE-RCC
	David Ponganis	COE-PDD
	Col. Michael McCormick	COE-Seattle District
	J. William McDonald	USBR-Boise Regional Director
	Steven Wright	BPA-Administrator
	Steve Oliver	BPA-PG-5

FROM: Susan Martin, Supervisor, U.S. Fish and Wildlife Service, Upper Columbia Fish and Wildlife Office, on behalf of the Libby BiOp Policy Group

DATE: May 28, 2008

SUBJECT: 2008 Libby Dam Releases for Sturgeon and Bull Trout Augmentation Flows

SPECIFICATIONS:

Based on the May final April-August volume runoff forecast of 6.116 million acre-feet, we are within a tier 3 operations year for Kootenai River white sturgeon as defined in the Fish and Wildlife Service's February 2006 Biological Opinion (2006 BO) on operations of Libby Dam. The minimum recommended release volume for sturgeon conservation under these circumstances is 1,041 thousand acre-feet.

The selective withdrawal gate system at Libby Dam became temporarily inoperable on 22 May, 2008. At this time, temperature control is limited to the existing arrangement of gates stacked into place – 10 of 18 rows in slots 1 through 7 (providing water to turbines 1 through 4). There are also gates placed into slots 8 and 9, but no gates in slots 10 through 14 – thus temperature control through unit 5 is non-existent (drafting through unit 5 equates to drafting the coldest water available to the selective withdrawal system).

Given this condition, and the gradually warming forebay and river water temperatures (Figure 1), the technical team recommends the following procedures to begin the sturgeon augmentation operation at Libby Dam for 2008:

1. On Sunday, June 1, increase Libby Dam outflow from 14,800 cfs to full powerhouse following 2006 BiOp ramping rates. This flow will allow necessary sediment sampling by USGS to be completed in the Bonners Ferry reach of the river, and will also allow for observation of the effects of mixing coldwater release through unit 5 (20%) with warmer water through units 1 through 4 (80%), to inform potential selective withdrawal modifications in the future.
2. After 48 hours of full powerhouse flow, decrease flow to ~ 20,000 cfs (4 units at full load) through units 1 through 4.
3. Continue flow of 20,000 cfs until selective withdrawal system functionality at Libby Dam is restored (approximately June 10).
4. Additional recommendations will be provided when the selective withdrawal gate facilities at Libby Dam are fully operational, and when the technical team is able to reassess reservoir, river and sturgeon status – estimated assessment timeline is currently approximately 10 June.

It is recognized that increasing flows by drafting water through unit 5 may result in slight cooling of the Kootenai River downstream of Libby Dam. However, the condition will be temporary, and will occur prior to intentional operations to increase release temperature from Libby Dam, and should not have a substantially negative effect on sturgeon behavior at this time. The opportunity to allow for increasing forebay temperature, and increasing river temperature during the ensuing operation (i.e. 4 units), coupled with the eventual opportunity to continue to increase river temperature through use of the selective withdrawal system, is the basis of this portion of the sturgeon augmentation operation.

JUSTIFICATION:

A continued effort is needed to provide spawning and incubation flows to meet habitat attributes for depth, velocity and temperature in the Kootenai River as defined in the 2006 BO RPA for Kootenai River white sturgeon (Table 1). USGS has performed modeling of the braided reach with the observed 2006 and 2007 flows, and based on these results, the velocity attribute and the minimum depth attribute of 16.5' intermittently in 60% of the braided reach (RM 152-157) is achievable with flows at Bonners Ferry of roughly 35,000 cfs (as per 2006 and 2007 sturgeon flow data; Figure 2); the maximum depth attribute of 23' may not be achievable without exceeding flood stage of 1,764' MSL.

Temperature is known to be very important in sturgeon spawning behavior in conjunction with flows; at the time of preparation of this SOR temperature conditions in the forebay of Koocanusa Reservoir had not developed to the extent that would warrant commencement of a sturgeon flow operation; temperature development towards appropriate conditions is approximately 3 weeks later than at this time in 2007 (Figure 1).

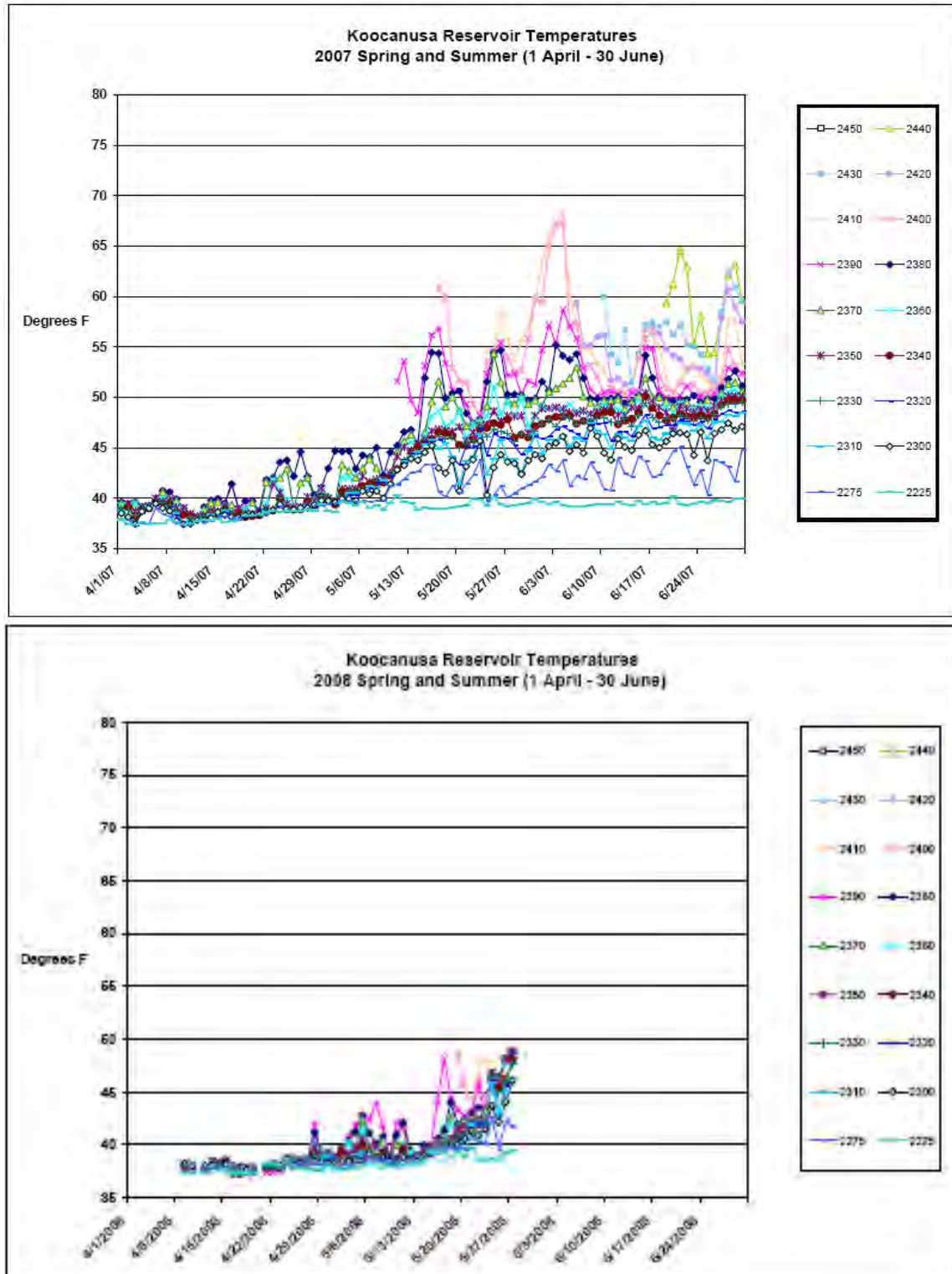


Figure 1. Koocanusa Reservoir forebay temperature in 2007 and 2008. The reservoir remained isothermic until early May in 2008; mid-column temperature reached and maintained 46.4° F(8° C) by mid-May in 2007 and did not attain this temperature in 2008 until late the last week of May.

Table 1. Kootenai Sturgeon Habitat Attributes from 2006 Libby Dam BiOp.

Attribute	Measure	Objective
Area: RM 141.4 to RM 159.7		
Timing of Augmentation Flows	May into July (triggered by sturgeon spawning condition), in all years except for Tier 1.	Provide conditions for normal migration and spawning behavior.
Duration of Peak Augmentation Flows for Adult Migration and Spawning	Maximize peak augmentation flows with available water for as many days as possible, up to 14 days during the peak of the spawning period with pulses ¹ , in all years except for Tier 1.	Through in-season management, provide peak augmentation flows that lead to a biological benefit for sturgeon to maximize migration and spawning behavior via a normalized hydrograph.
Duration of Post-Peak Augmentation Flows for Incubation and Rearing	Maximize post-peak augmentation flows with available water for as many days as possible, up to 21 days, in all years except for Tier 1.	Through in-season management, provide post-peak augmentation flows that lead to a biological benefit for sturgeon to maximize embryo/free embryo incubation and rearing via descending limb of a normalized hydrograph.
Minimum Flow Velocity ²	3.3 ft/s and greater in approximately 60% of the area of rocky substrate in the area of RM 152 to RM 157 during post-peak augmentation flows.	Provide conditions for spawning and embryo/free embryo incubation and rearing.
Temperature Fluctuation	Optimize temperature releases at Libby Dam to maintain 50 degrees F with no more than a 3.6 degree F drop.	Provide conditions for normal migration and spawning behavior via a normalized thermograph.
Depth at Spawning Sites	Intermittent depths of 16.5 to 23 ft or greater in 60% of	Provide conditions for normal migration and

¹ Kootenai sturgeon spawn on the descending limb of the hydrograph. “Pulses” refer to slight reductions in flow during this two week period to initiate spawning.

² In order to develop an agreed upon estimate and measurement of the areal extent of the velocity and depth attributes, the Action Agencies shall, together with the Service and in collaboration with other involved parties as needed, develop appropriate assessment tools (e.g., hydrologic models) of the braided reach.

	the area of rocky substrate from RM 152 to RM 157 during peak augmentation flows.	spawning behavior.
Substrate Extent/Spawning Structures	Approximately 5 miles of continuous rocky substrate; create conditions/features that improve the likelihood of recruitment success.	Provide habitat for embryo/free embryo incubation and rearing.
Minimum Frequency of Occurrence	<u>To facilitate meeting the attributes via:</u> Powerhouse plus 10,000 cfs flow test: the flow test will occur 3 or more times during the next 10 years; 3 times within the next 4 years if conditions allow, and other options are not available to meet this measure. <u>Habitat improvement projects and other options:</u> through adaptive management, as noted in RPA Action 6, implement the habitat projects and other available options no later than 2010 and continuing through the term of the proposed action.	Maximize the probability that habitat attributes necessary for successful in-river sturgeon spawning and recruitment will be provided multiple times during the term of the proposed action.

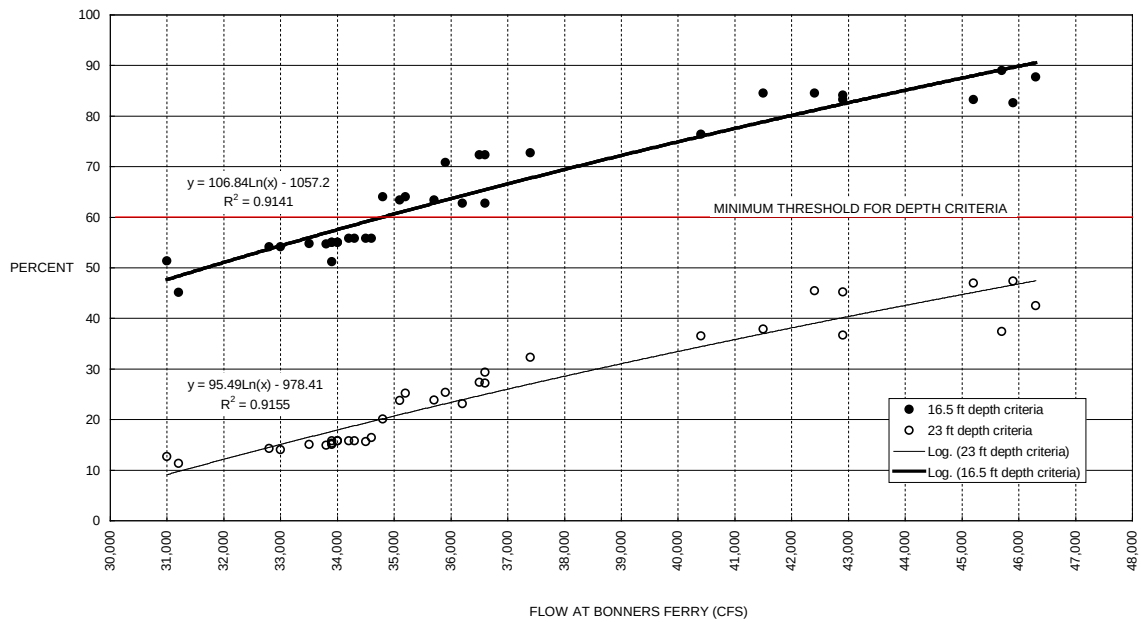


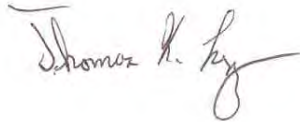
Figure 2. Kootenai River stream flow and percent of longitudinal profile between RM 152 and 157 meeting or exceeding water depths of 16.5 and 23 ft, respectively, during 2006 (May 18 to June 5) and 2007 (May 22 to June 5) white sturgeon spawning flow augmentation (combined data). To ascertain the percentage of depth attribute attained for each flow, choose a flow on the x-axis and follow the vertical gridline to the intersection of the line of fit (either the 16.5 ft or 23 ft).

Given the state of inoperability of the selective withdrawal system, and the anticipated restoration of functionality by mid-June, the operations described in this document are intended to provide the best opportunity to achieve the attributes listed in Table 1, given the water supply conditions predicted in 2008. We recognize that no firm start date is given in this request. This is due to the desire of sturgeon managers and dam operators to allow for in-season management of dam operations in response to evolving conditions. Previous years' operations have shown that conditions at Libby Dam and the Kootenai River can change rapidly. Therefore allowing for flexibility in operations should aid in achieving the sturgeon habitat attributes.

SYSTEM OPERATIONAL REQUEST: #2008-4

The following State, Federal, and Tribal Salmon Managers have participated in the preparation and support this SOR: NOAA National Marine Fisheries Service, Oregon Department of Fish and Wildlife, the Shoshone-Bannock Tribes, the Columbia River Inter-Tribal Fish Commission, and the Nez Perce Tribe.

TO:	Colonel Steven R. Miles	COE-NWD
	James D. Barton	COE-Water Management
	Cathy Hlebechuk	COE-RCC
	Witt Anderson	COE-P
	Col. Thomas E. O'Donovan	COE-Portland District
	LTC Anthony Hofmann	COE-Walla Walla District
	J. William McDonald	USBR-Boise Regional Director
	Stephen J. Wright	BPA-Administrator
	Greg Delwiche	BPA-PG-5



FROM: Tom Lorz, Vice Chairperson, Salmon Managers

DATE: May 27, 2008

SUBJECT: Bonneville Dam Juvenile Bypass System

SPECIFICATIONS: Reinstall at least one set of STS in one turbine unit

To expedite resumption of screen bypass operations at Bonneville Dam, we recommend the COE reinstall at least one submersible traveling screen (STS) set in one turbine unit to gauge the debris level and effectiveness of implementing more aggressive cleaning. To aid in the operation of the bypass system greater effort is needed to clean vertical barrier screens (VBS) and the following techniques should be employed during the process. We define the more aggressive VBS cleaning as one where the second VBS does not need to be installed while cleaning the first VBS.

1) Prior to redeploying the STS, clean the gatewell without use of the 2nd screen and attempt to remove as much debris in the gatewell as possible.

2) If debris is still a significant issue once the STSs are redeployed, proceed with more aggressive VBS cleaning on a trial basis: clean once without the second VBS and then monitor to see if the system can be maintained using the standard debris removal procedure.

3) When using the aggressive cleaning technique prior to removal of the VBS, reduce turbine loading as low as possible for approximately 1.5 hours to reduce the number of fish being guided as well as give the fish in the gatewell as much of an opportunity to egress as possible.

4) Cross check with smolt monitoring to determine if debris issues continue to affect smolt condition. Since flows appear to be dropping, turbine loading could be reduced while keeping the bypass system operating. Smolt monitoring on Friday indicated that with lower turbine loading, smolt descaling decreased dramatically. This is especially important given the number of juvenile salmon passing the Lower Snake projects over the past week. These fish will arrive shortly at Bonneville, and turbine survival for steelhead is considered poor through the turbine units (e.g. 0.8785 as used in the COMPASS modeling). All protective efforts and actions should be implemented to assure that this peak of the Snake River as well as Upper and Middle Columbia juvenile salmon runs are provided safe passage through Bonneville Dam.

COLUMBIA RIVER REGIONAL FORUM

TECHNICAL MANAGEMENT TEAM

May 28, 2008 Conference Call

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Robin Gumpert

Notes: Erin Halton

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 of Minutes/Agenda

The 5/21 Official Minutes were not yet posted, so TMT will review over the next week and finalize them at the 6/4 face to face meeting.

Initiation of Libby Sturgeon Flows/Draft USFWS SOR

Jason Flory, USFWS, referred TMT to a draft SOR posted as a link to the meeting agenda. Flory recalled an incident at Libby during the week of 5/19 that put limits on the project's ability to control temperature; he clarified details of repair work needed on the selective withdrawal gate system at Libby. Given that condition, the draft SOR is intended to set up good temperature conditions and continued testing while repair work is completed. Flory noted that warming has begun later than average this year with a current project temperature of 43°F. The recommendation in the SOR is to ramp the project up to full powerhouse (approximately 26 kcfs) on 6/1 and hold for 48 hours, then dropping flows to the range of 20 kcfs (4 units at full load) until repair work can be completed, likely on 6/10. The tail end of operations will be dependent on observed data. Flory acknowledged that there are uncertainties around fish passage, reservoir/river and weather conditions for the weeks ahead; TMT may need to be updated and make decisions outside of the scheduled meeting dates. Flory clarified that passage survey results are expected later this week and that the draft SOR was expected to be formalized and signed by 5/30.

The following parties weighed in on the proposed SOR:

- MT: No objection to SOR as it is written, with a recommendation for an update on status and further TMT discussion at the scheduled TMT meeting on 6/4 and again as we draw closer to the expected repair completion date of 6/10.
- NOAA: no objection, recommend email updates as matters progress.
- OR: no objection
- ID: no objection
- BPA: no objection
- BOR: no objection
- COE: no objection
- Nez Perce: no comment

- CRITFC: no comment

Action/ Next Steps: The COE will continue to operate Libby in the range of 14-18 kcfs until 6/1, when it will shift to full power house (approximately 26 kcfs) for 48 hours, then reduce to 4 units at full load (approximately 20 kcfs.) The COE planned to continue to conference with USFWS offline for further discussion and TMT will discuss this item at the face-to-face meeting on 6/4.

Bonneville Update

Dan Feil, COE, reported that at the TMT meeting on 5/21, debris and high flows led to the decision to remove STS guidance screens from the Bonneville second powerhouse (BII) turbine intakes. Since then, the project has experienced a continued high volume of debris and vertical barrier screens (VBSs) in gatewells at BII continue to accumulate debris, even without the STS guidance screens installed. Feil added that this year there are higher flows than experienced in recent years and that this is the first year that the "full compliment" of new VBSs have been in place at BII. Also, with the TIE crane out of service due to a cracked boom, removing and cleaning the VBSs repeatedly with the available gantry crane, as has been the case during this high debris event, has compounded the problem, since the VBSs were designed to be handled with the TIE crane; repairs to the TIE crane will be complete in advance of the 2009 juvenile fish passage season.

Tom Lorz, on behalf of the Salmon Managers, referenced TMT to SOR 2008-04 linked to the TMT agenda. Lorz said the SOR lines out a proposal to reinstall the screens one at a time, coupled with aggressive cleaning. After evaluating performance, screens could be added to bays one at a time. Lorz suggested that the operation be discussed further at FPOM and noted a particular concern for steelhead passage through turbine units. Feil noted that the COE had estimated the impact to overall dam survival of steelhead using COMPASS model inputs for steelhead and assuming that a 5% reduction in survival of steelhead passing through the screened bypass system would result due to debris and increased incidence of descaling, determined that the difference in steelhead dam survival for screens in versus screens out was less than 1/10th of a percent. The COE also estimated survival differences for yearling Chinook salmon and concluded similarly that removing the guidance screens from BII turbine intakes would have a negligible effect on yearling Chinook dam survival. Still, Tom Lorz suggested that the salmon managers would like to see the screens put back in to provide any level of benefit to the migrating fish.

The following parties weighed in on the proposed SOR:

- ID: support the SOR, although not listed as signatory
- USFWS: support the SOR, although not listed as signatory
- COE: based on the current debris load, support placement of one set of screens this afternoon. The COE suggested re-installing screens in unit 11 and requested input on the best unit to start with and noted performance results would be monitored closely.
- Tom Lorz, on behalf of FPAC: suggest unit 11 or 12.
- NOAA: support SOR and choice of unit 11.

- USFWS: support SOR and choice of unit 11.
- OR: support SOR and choice of unit 11.
- ID: support SOR and choice of unit 11. Additionally, if the COE observes that the project could provide greater benefit to fish passage by adding more than one set of screens, recommend doing so.
- CRITFC: support SOR and choice of unit 11. Recommend placement of additional screens proceed from north to south.

Action/ Next Steps: The COE planned to install one set of screens in unit 11 on 5/28 and will keep TMT apprised of any additional installations prior to the 6/4 meeting. TMT will revisit this item with an update at the TMT meeting on 6/4.

Lower Monumental Transportation Operations

Dan Feil, COE, reported that on 5/19 transportation operations at Lower Monumental were suspended due to high flows; transport resumed on 5/24. Feil noted that variances in spill occur only when requested by tugboat captains during loading and for safety concerns.

Operations Review

Reservoirs: Grand Coulee was operating at 1256.3' and slowly filling. Hungry Horse was at 3529.9' with outflows of 5 kcfs and inflows in the range of 15-17 kcfs. Dworshak was at 1542.19' and had filled 27' over the last 7 days. Libby was operating at 2419', 40' from full with inflows of 40 kcfs. Albeni Falls was at 2042.2', with outflows in the range of 80-90 kcfs. Bonneville flows were in the 360-420 kcfs range. Snake River flows were in the range of 140 kcfs.

Fish: Paul Wagner, NOAA, reported that adult passage numbers were passing Bonneville at a rate of 1,500 per day. Jack counts continue to be strong, with a Juvenile Chinook peak of 200,000 on 5/19 at Lower Granite, 800,000 on 5/21 at Lower Monumental and 60,000 at John Day. Steelhead are expected to arrive at Bonneville shortly.

Power System: Nothing to report.

Water Quality: Tina Lundell, COE, reported that high flows at Lower Granite, Ice Harbor, McNary, and Bonneville led to involuntary spill and TDG exceedances. At Ice Harbor the COE are doing repairs on a malfunctioning monitoring antenna; Salmon Managers recommended more proactive and flexible management of TDG between Lower Monumental and Ice Harbor to maintain desired targets, noting the 1.5-2 day travel time between projects. Dworshak had several TDG exceedances, as high as 114%. Beginning last weekend, the project has been intermittently switching from all generation (62 MW) to all spill (1 kcfs). The reason for this is to put more generation and less spill on the lower river due to high TDG levels. Paul Wagner, NOAA, complimented the Action Agencies on their management of the high flows and power generation.

Next TMT Meeting: 6/4 face-to-face

Agenda Items include:

- Finalize notes/minutes
- Priest Rapids Operations Update
- Libby Sturgeon Flows
- TMT Guidelines Update
- Bonneville Screen Update
- Libby/Hungry Horse Summer Operations – NOTE: monitoring data would be helpful.
- Operations Review

**Columbia River Regional Forum
Technical Management Team Conference Call
May 28, 2008**

1. Introduction

Today's TMT call was chaired by Cathy Hlebechuk (COE) and facilitated by Robin Gumpert (DS Consulting) with representatives of CRITFC, USFWS, COE, BOR, BPA, NOAA, the Nez Perce Tribe, Oregon, Montana, Idaho, and others on the line. 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

Discussion of previous meeting minutes was postponed until TMT's next meeting in person June 4.

3. Initiation of Libby Sturgeon Flows

On behalf of the salmon managers, Jason Flory (USFWS) presented a draft SOR (not yet numbered) that had just been posted to the TMT website this morning. He gave background on the SOR and explained why it had to be posted unsigned at the last minute.

Earlier in the year, the sturgeon managers put together a draft SOR similar to the one submitted last year. The approach was the same, primarily temperature-driven based on the capacity to augment sturgeon flows without raising the temperatures above 50 degrees Celsius.

However, last week a boom crane broke at Libby Dam, making it impossible to maneuver the system of gates that draws water selectively from the layers of the reservoir. The gates are stacked in rows in front of the wetwells in order to release flows of the desired temperature. Until the crane is repaired, the gates remain stuck in their current position, limiting the capacity to manage temperatures during the sturgeon pulse. Libby outflows are currently being drawn from elevation 2,320 feet, which is not the coldest layers of the reservoir as the salmon managers had hoped.

The contractor is 95% sure the crane will be repaired by June 10. Meanwhile, the salmon managers thought that sturgeon operations would begin later this year than usual, sometime around June 10.

Under these circumstances, the revised SOR requests full powerhouse flows (approximately 26 kcfs using all five units) according to ramp rates in the Bi Op, beginning Sunday, June 1 and continuing for two days. After two days, outflows would drop to 20 kcfs using units 1-4 until the boom crane is repaired. The effects of operating at full powerhouse until the repair are uncertain, mainly because there are no gates in place to manage outflow temperatures at unit 5. The SOR hinges on getting the crane system in service by June 10. Once the crane is working, it will probably take a day or two to position the gates.

The SOR doesn't specify the tail end of the sturgeon operation because that will depend on spawning behavior and weather conditions. It is also unclear how long the sturgeon volume would last under conditions outlined in the SOR. If the crane is fixed on time, flows can taper off smoothly, avoiding a drastic summer drop in flows on the Snake. Normally the Libby reservoir begins to stratify around mid-May as surface layers warm up. This year, the reservoir has just begun to stratify at the end of May.

Hlebechuk asked whether any male sturgeon have been seen yet. High flows have prevented fish biologists from getting out on the river until now, Flory said. An answer will be available later this week. There was discussion of the schedule for getting the SOR signed in time to implement the operation. Flory was confident the SOR would be signed by Friday because it's already been internally vetted.

There was discussion of how decisions about the sturgeon operation should be made and communicated to TMT, given the difficulty of making firm plans at this point. The first question was how to manage outflows and temperatures between now and June 10. Several TMT members identified two options: flows of 20 kcfs running four units full powerhouse, or 25 kcfs running all five units full powerhouse. Operations after June 10 will depend on how quickly the gates can be stacked in place and on fish spawning behavior. Flory emphasized that efforts will be made to avoid a double-peak operation. Scott Bettin suggested that TMT members decide whether they would be comfortable with either 20 or 25 kcfs outflows until June 10, depending on what happens in the reservoir. If either option is acceptable, perhaps a simple email notification to TMT when the crane is fixed would suffice. Litchfield objected to that and requested an opportunity to discuss conditions in detail when more is known.

TMT members then stated their positions on the draft SOR and developed a decision making process based on current circumstances.

Montana – The SOR is acceptable as is, provided there are no major changes between the draft and signed versions.

NOAA and the **COE** – Supported the SOR and Montana's proposal for more in-depth conversation around June 10.

BPA, BOR, Oregon and Idaho – Did not object to the draft SOR.

CRITFC and the Nez Perce Tribe – Had no comments at this time.

Washington – No representative was present on today's call.

The Libby operation will consist of 14.8 kcfs outflows until June 1, when the ramp-up to full powerhouse using five units (approximately 26.4 kcfs outflows) will begin. Full powerhouse will continue for 48 hours, when the ramp-down to using four units (approximately 20 kcfs outflows) will begin. BPA preferred that the ramp-up begin in the middle of the day on June 1. There was discussion of whether that would be commensurate with Bi Op ramp rates. USFWS, BPA and COE agreed to resolve this outside of TMT, and there were no objections.

Unless there are changes in the draft SOR that require TMT's attention, Libby outflows will continue at approximately 26.4 kcfs from June 1 until TMT reviews the sturgeon operation at its June 4 meeting. A follow-up conference call on June 6 or June 9 might be necessary before the ramp-up begins.

4. Bonneville Fish Screen Update

Dan Feil described actions taken since TMT's May 21 decision to pull the fish screens from the Bonneville juvenile bypass system. Fish were being descaled by passing through the system with increased debris load that has caused plugging of the vertical barrier screens and project staff were unable to keep up with the pace at which the debris was accumulating. Therefore, the guidance screens were removed from unit 18 on May 21; units 11, 16 and 17 on May 22; and units 12-14 on May 23.

Flows have subsided, but are still 350 kcfs or more, Feil said. Smolt monitoring found that descaling rates dropped to 2-5% since the screens were removed. Project staff continue to remove debris from the trash racks in fish units and auxiliary water system. Accumulation of debris in gatewells and on the vertical barrier screens continues, even in the absence of guidance screens and after the vertical barrier screens were thoroughly cleaned. Debris accumulating on adult facility trash racks is similar to what's being observed on the vertical barrier screens due to the narrower bar spacing on adult facility trash racks compared to turbine unit trash racks.

Tom Lorz (CRITFC) presented SOR 2008-4 on behalf of the salmon managers. Large numbers of steelhead in the upper Snake are expected to arrive at Bonneville soon. These fish would benefit from having the bypass system fully installed. Feil noted that the COE had estimated the impact to overall dam survival of steelhead using COMPASS model inputs for steelhead and

assuming that a 5% reduction in survival of steelhead passing through the screened bypass system would result due to debris and increased incidence of descaling, determined that the difference in steelhead dam survival for screens in versus screens out was less than 1/10th of a percent. The COE also estimated survival differences for yearling Chinook salmon and concluded similarly that removing the guidance screens from BII turbine intakes would have a negligible effect on yearling Chinook dam survival. The salmon managers are concerned about the process of determining when the screens should be replaced. The SOR outlines criteria for reinstalling and maintaining the screens. TMT members presented their views.

Idaho and USFWS – Support the SOR.

COE – Based on debris loads seen at the project, it has not been prudent to replace the screens until now. Project and district staff will install one set of screens later this afternoon. The question is, in which unit? Units 11 and 18 on either side of the powerhouse tend to receive the most debris and unit 11 is likely to pass a lot of fish given it's proximity to the corner collector. Either of these would be a good choice to test whether the debris load is manageable. FPOM discussed this yesterday and decided that unit 11 or 12 would be the best place to start, Lorz said. He requested that the screen be installed as soon as possible, with a decision by Friday or earlier so that additional screens might be replaced before the weekend.

NOAA – Supports the SOR. Proposed starting with unit 11 to test the debris load.

USFWS and Oregon – Support the SOR, as well as an accelerated schedule for screen replacement.

Idaho – Wants the screens replaced as soon as possible. Agrees that unit 11 screens should be replaced first. Suggested replacing and testing combinations of guidance and VBS screens.

Washington – No representative was present today.

The COE will begin screen replacement with unit 11 and proceed south to north across the spillway. CRITFC, USFWS and NOAA agreed to this approach; Oregon and the Nez Perce had no objections.

5. Lower Monumental Transportation Operations

On Monday, May 19, transport operations were suspended at Lower Monumental due to high flows on the Snake, Feil reported. Flows have since subsided, and barges were able to resume transport operations on Saturday, May 24. Russ Kiefer noticed that spill has been reduced at 6 pm for 2-3 hours

over the past several days; Feil confirmed the spill reductions were for barge loading. Wave action at certain flow levels is unique to Lower Monumental due to the proximity of the barge loading facility, meaning spill must be reduced to allow the barge to dock safely. Project staff have been instructed not to reduce spill during the barge loading operation unless the tug operator requests it for safety.

6. Operations Review

a. Reservoirs. Grand Coulee is at elevation 1,256.3 feet and filling.

Hungry Horse is at elevation 3,529.9 feet, discharging 5 kcfs and about 30 feet from full. Inflows are 15-17 kcfs and leveling off.

Dworshak is at elevation 1,542.1 feet, having spilled 27 feet in the past 7 days. It's 58 feet from full. Inflows are down to 27 kcfs after peaking at 40 kcfs.

Libby is at elevation 2,419 feet, having spilled 14 feet last week. It's 40 feet from full. Inflows are at 40 kcfs after peaking at 65 kcfs.

Albeni Falls is at elevation 2,060.2 feet, around 2 feet from full. It's on free-flow, releasing as much volume as possible, currently around 90 kcfs. Flows of over 100 kcfs are expected.

Bonneville flows were 360-420 kcfs last week.

Snake River flows were 140-200 kcfs last week.

b. Fish. Adult passage numbers at Bonneville picked up again after dropping to 500 on May 22, Wagner reported. Counts have been around 1,500 for the past few days. Presumably high flows delayed these fish. Jack counts continue to be strong, a good sign for next year.

Juvenile passage numbers for yearling Chinook peaked at around 200,000 at Lower Granite on May 19. Peak passage at Bonneville was on May 19 and at Little Goose on May 21. On May 21, 800,000 fish passed Lower Monumental, which could be a record for yearling Chinook. Passage at McNary dropped from 158,000 fish on May 19 to 46,000 on May 27. Steelhead have followed the same pattern, with peak passage on the Snake occurring around May 20-22. The steelhead run will arrive at Bonneville shortly.

c. Power System. There was nothing to report today.

d. Water Quality. Flows in the lower Snake are around 135 kcfs and around 400 kcfs in the lower Columbia, Tina Lundell (COE) reported. These high flows have been causing exceedances at Lower Granite tailwater and all the downstream forebays except Bonneville. On May 26, an Ice Harbor gage

malfunctioned; it should be repaired today or tomorrow. There was discussion of how best to manage the spill cap at Lower Monumental. Lundell doubted that TDG readings at Ice Harbor are within criteria now and expressed reluctance to raise the Lower Monumental spill cap without knowing whether that would cause exceedances at Ice Harbor. If the spill cap is raised, exceedances would be likely to occur at Ice Harbor within 1½ -2 days' travel time.

Passing fish through the Lower Monumental powerhouse tends to result in lower return rates, Russ Kiefer said. Tailwater readings there have been around 115-116% TDG. Raising the gas cap at Lower Monumental now, while wind can strip the gas out of the river, could create better passage conditions for fish while still meeting the gas cap at Ice Harbor.

Kiefer wondered why spill at Lower Monumental was increased last night. That was probably due to overgeneration spill, as BPA has been having trouble finding load, Robyn MacKay said. With Lower Monumental in the #2 position on the spill priority list, it will kick in quickly whenever there is overgeneration, Feil noted. Wagner was impressed by how little overgeneration spill there has been, despite extremely high flows.

8. Next Meeting

The next TMT meeting will be June 4, with Libby sturgeon flows, Libby and Hungry Horse summer operations, Bonneville fish screens, a Priest Rapids update, and the standard operations review on the agenda. This summary prepared by consultant and writer Pat Vivian.

Name	Affiliation
Rick Kruger	Oregon
Kyle Dittmer	CRITFC
Jim Litchfield	Montana
Jason Flory	USFWS Spokane
Cathy Hlebechuk	COE
Tina Lundell	COE
John Roache	BOR
Robyn MacKay	BPA
Scott Bettin	BPA
Dan Feil	COE
Dan Spear	BPA
Dave Wills	USFWS
Paul Wagner	NOAA
Tim Heizenrader	Centaurus
Bruce McKay	Consultant
Russ George	WMC
Bill Crampton	CBB
Jennifer Miller	Susquehanna

Richelle Beck	DRA
Ruth Burris	PGE
John El	Constellation
Russ Kiefer	Idaho
Tom Le	Puget Sound Energy
Margaret Filardo	FPC
Greg Haller	Nez Perce
Tom Lorz	CRITFC
Bill Rudolph	NW Fish Letter

TECHNICAL MANAGEMENT TEAM

BOR : John Roache / Mary Mellema / Pat McGrane **BPA :** Robyn MacKay / Tony Norris / Scott Bettin
NOAA-F: Paul Wagner / Richard Dominique **USFWS :** David Wills / Steve Haeseker
OR : Rick Kruger / Ron Boyce **ID :** Russ Kiefer
WDFW : Cindy LeFleur **MT :** Jim Litchfield / Brian Marotz
COE: Jim Adams / Cathy Hlebechuk / Bob Buchholz

TMT MEETING

Wednesday June 4, 2008 09:00 - 12:00

1125 N.W. Couch Street, Suite 4A34
Portland, Oregon 97209-4142
Map Quest [\[Directions\]](#)

CONFERENCE PHONE LINE

Conference call line: 203-310-2162; PASS CODE = 4703150

To check into the building, take the elevator to the 5th floor and the guard will issue you an ID badge if you need one and will take you down to the meeting room on the 4th floor. If you have NOT attended a TMT meeting in the past you will need to call ahead and let Jim Adams (503) 808-3938, Cathy Hlebechuk (503) 808-3942, or Bob Buchholz (503) 808-3945 know, so you can be added to the TMT Visitor List and issued an ID badge. This badge may be used indefinitely. If you have attended TMT in the past you may re-use your ID badge indefinitely. If you are a federal employee you will also need to have an ID badge issued to you which can be used indefinitely.

We have had disruptions on the phone because people are not hitting 'mute' after dial in.
Please MUTE your Phone

*All members are encouraged to call Robin Gumpert with any issues or concerns they would like to see addressed.
Please e-mail her at robin76@cnnw.net or call her at (503) 248-4703.*

AGENDA

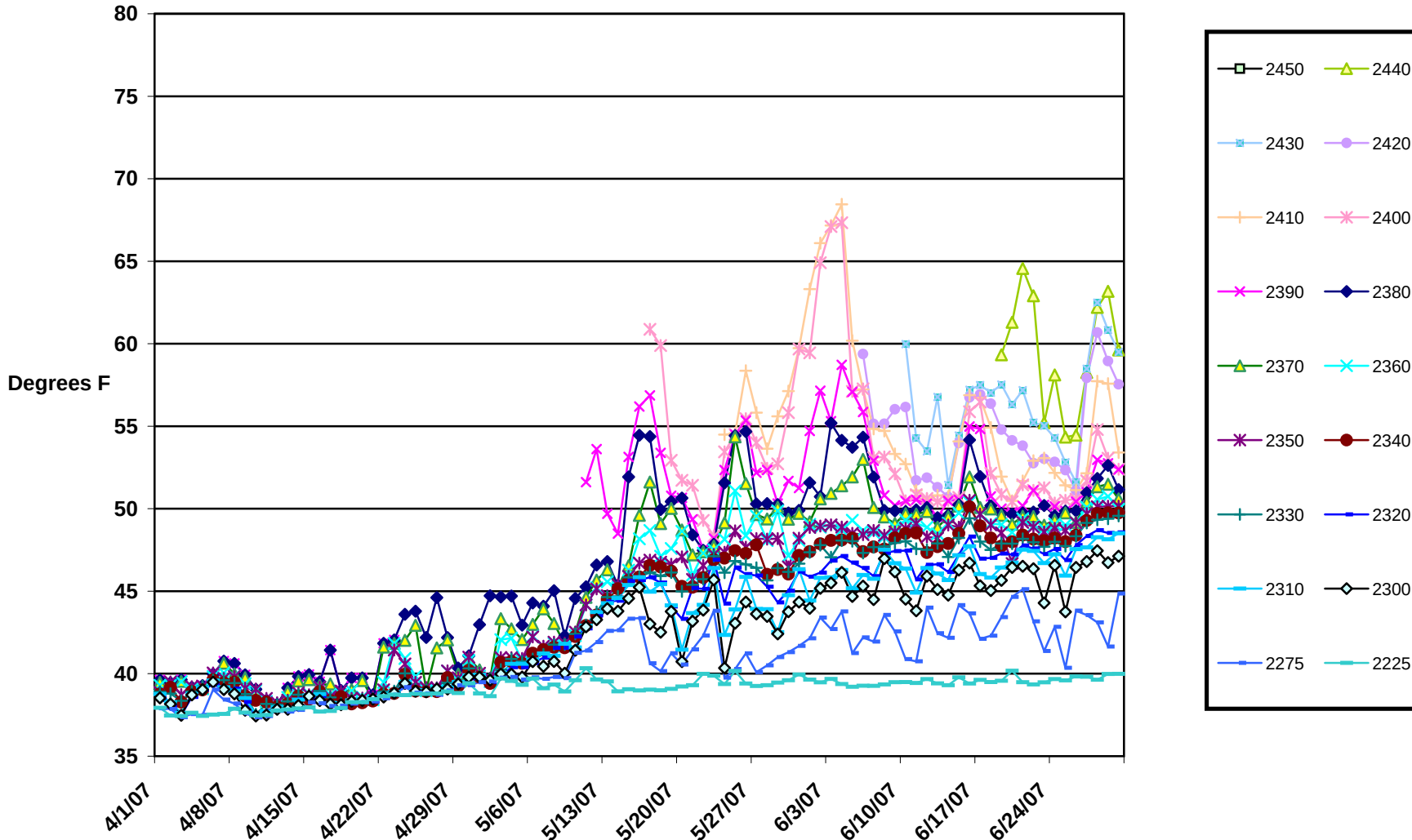
1. Welcome and Introductions
2. Review & Finalize notes/minutes [\[Meeting Minutes\]](#) 
3. Priest Rapids Operations Update - Russell Langshaw, Grant County PUD
[\[Priest Rapids\]](#) - 
4. Transmission Outages - Mike Viles - BPA
[\[Grizzly Summer Lake\]](#) - 
5. Libby Operations - Amy Reese, USACE
 - [\[Scenario 1\]](#) - 
 - [\[Scenario 2\]](#) - 
 - [\[Scenario 3\]](#) - 
 - [\[Scenario 4\]](#) - 

- [\[2008 Forebay\] -](#) 
 - [\[2007 Forebay\] -](#) 
 - [\[2008 ResRiv\] -](#) 
 - [\[Gate Placement2\] -](#) 
6. Hungry Horse Operations - *John Roache, BOR*
- [\[Scenario 1-4 Jun\] -](#) 
 - [\[Scenario 2-4 Jun\] -](#) 
7. Bonneville Screen Update - *Dan Feil, USACE*
8. TMT Guidelines Update - *All*
- [\[Update\]](#)
9. Operations Review
- a. Reservoirs
 - b. Fish
 - c. Power System
 - d. Water Quality
- [\[Spill Information 2008\]](#)
10. Other
- a. Set agenda for next meeting - **June 11, 2008**
[\[Calendar 2008\]](#) 

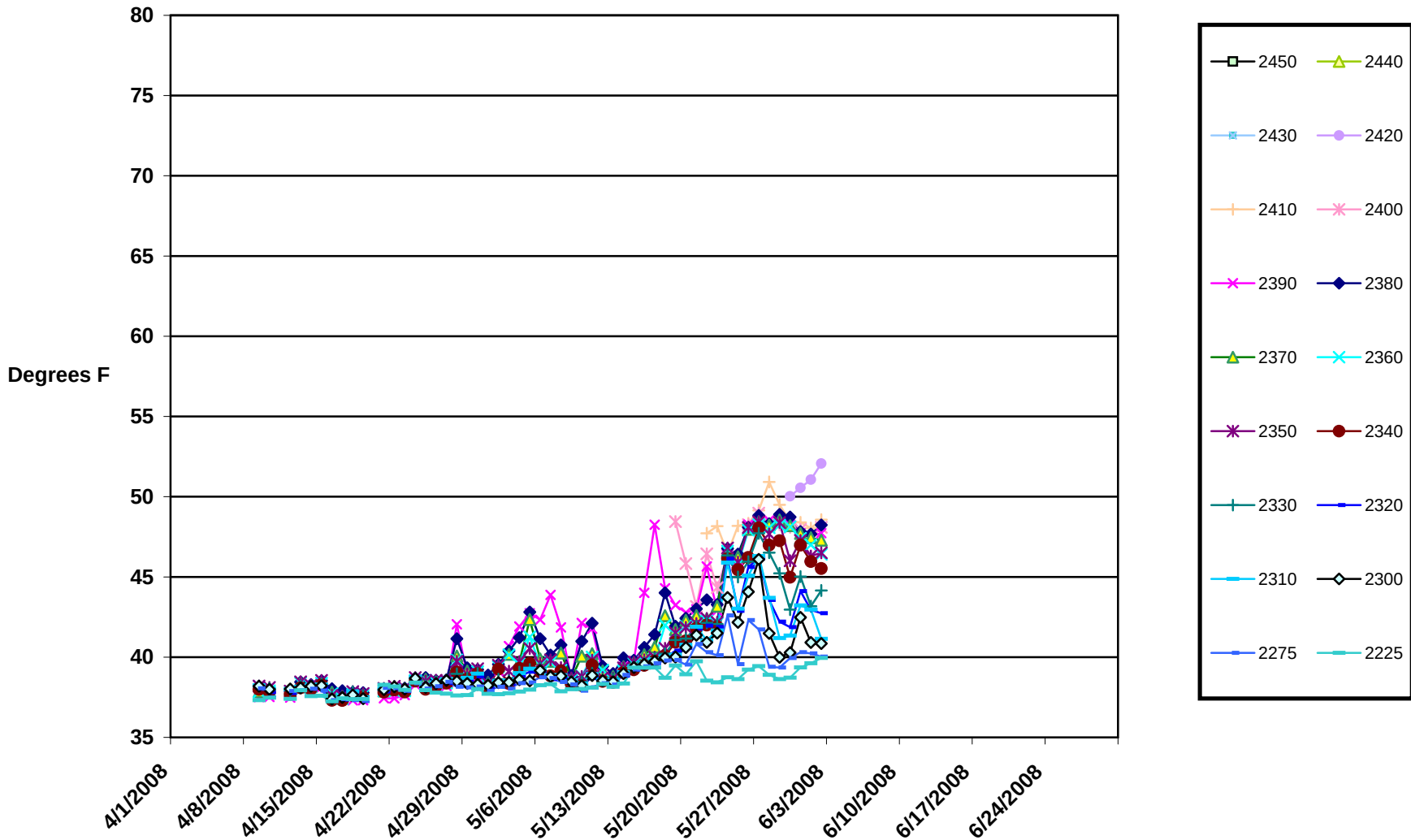
Questions about the meeting may be referred to:

*[Jim Adams](#) at (503) 808-3938, or
[Cathy Hlebechuk](#) at (503) 808-3942, or
[Bob Buchholz](#) at (503) 808-3945.*

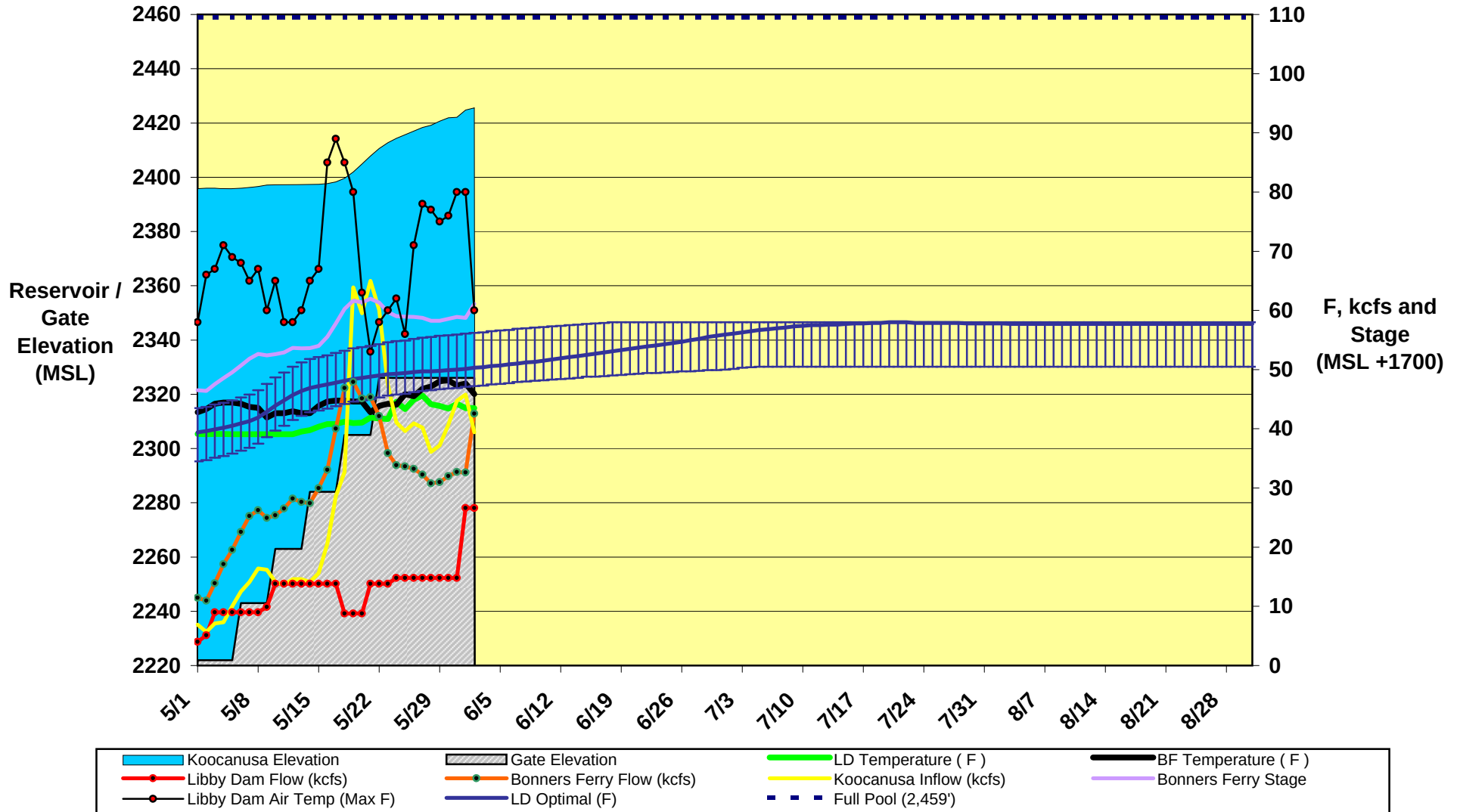
Kooacanusa Reservoir Temperatures 2007 Spring and Summer (1 April - 30 June)



Koocanusa Reservoir Temperatures 2008 Spring and Summer (1 April - 30 June)

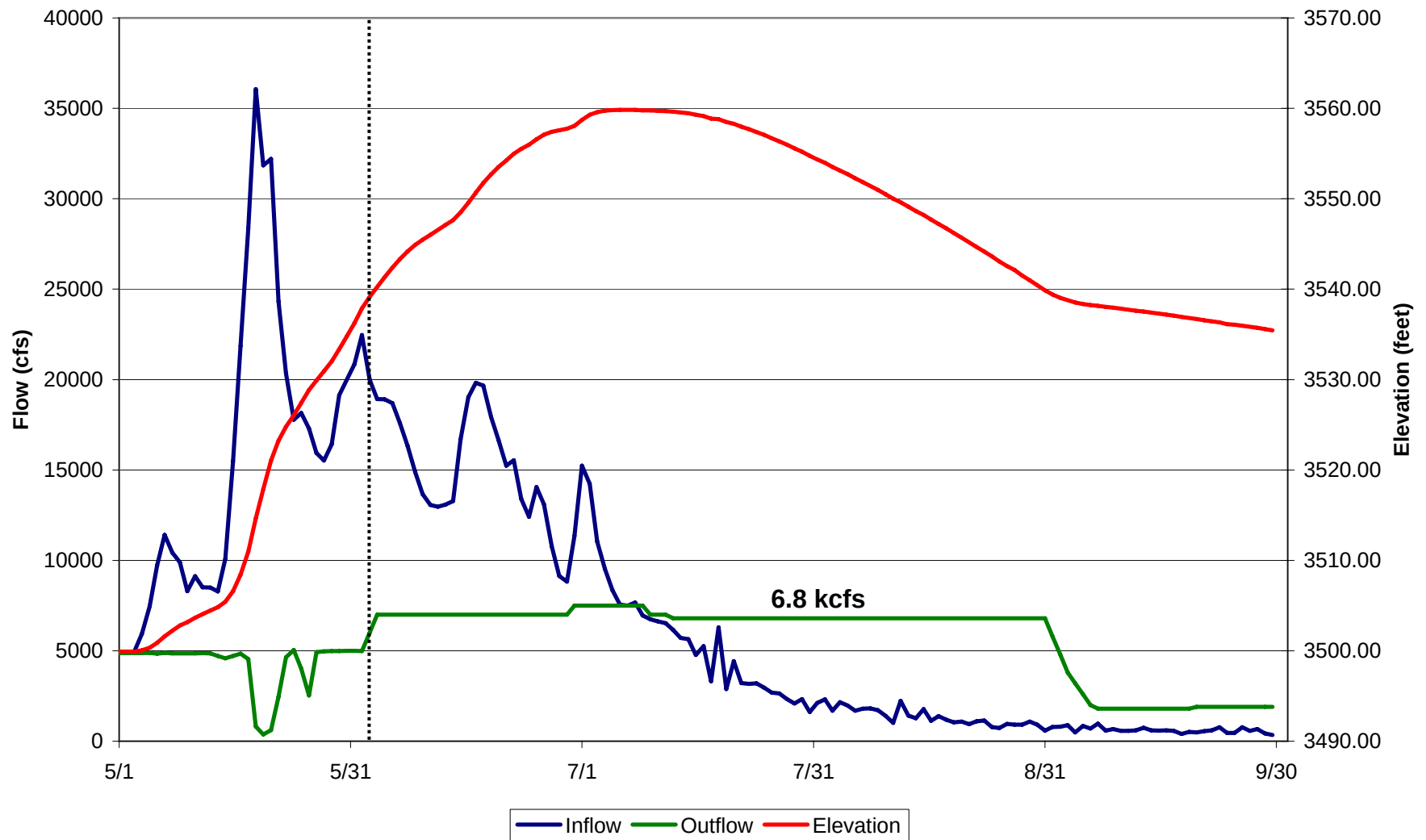


Kootenai River and Koocanusa Reservoir Temperatures 2008 BiOp Fish Operations (1 May - 31 August)

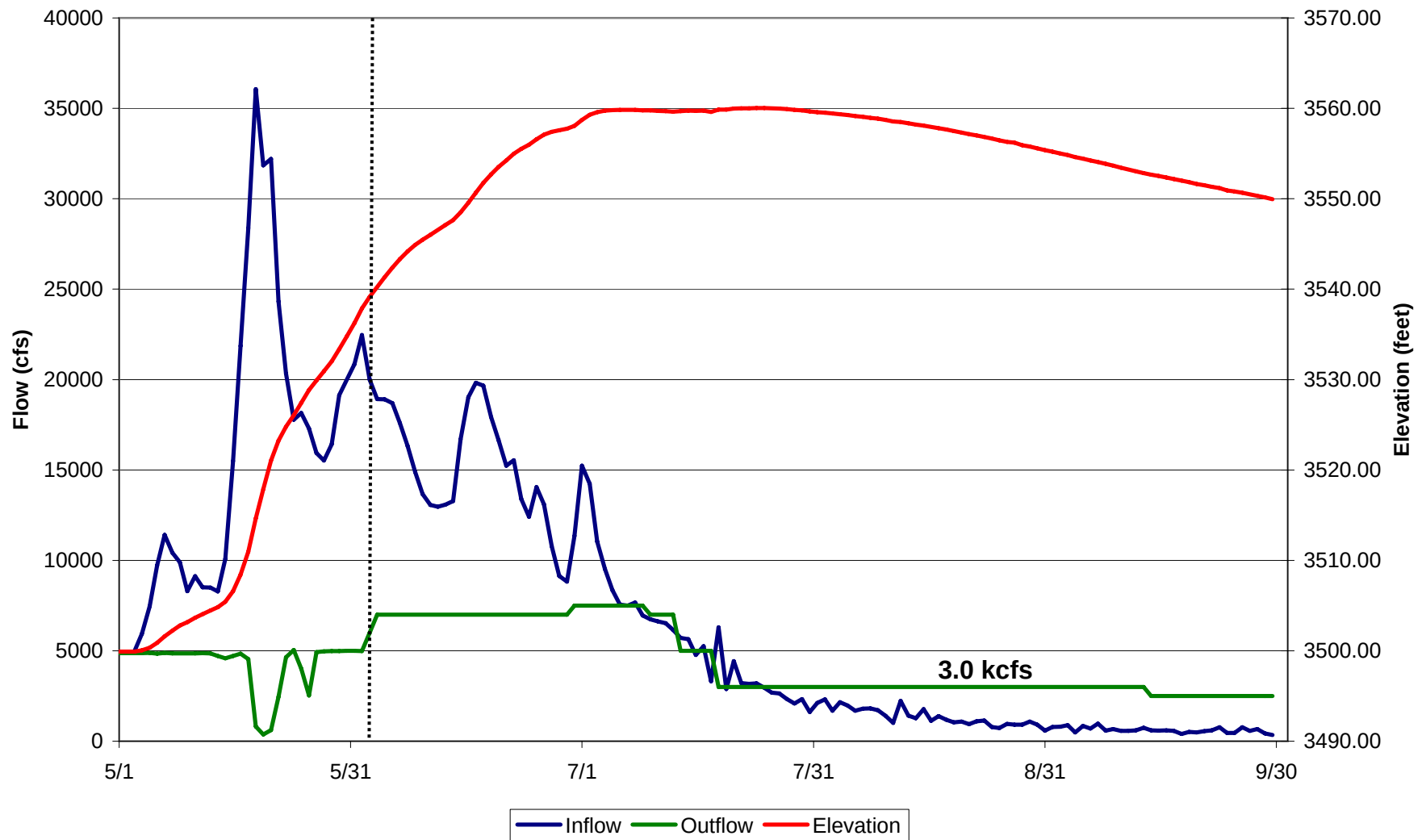


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Hungry Horse - Simulated Operations 2008 (WY 1999 Inflows)
Draft to 3540 End of August



Hungry Horse- Simulated Operations 2008 (WY 1999 Inflows)
Draft to 3550 End of September

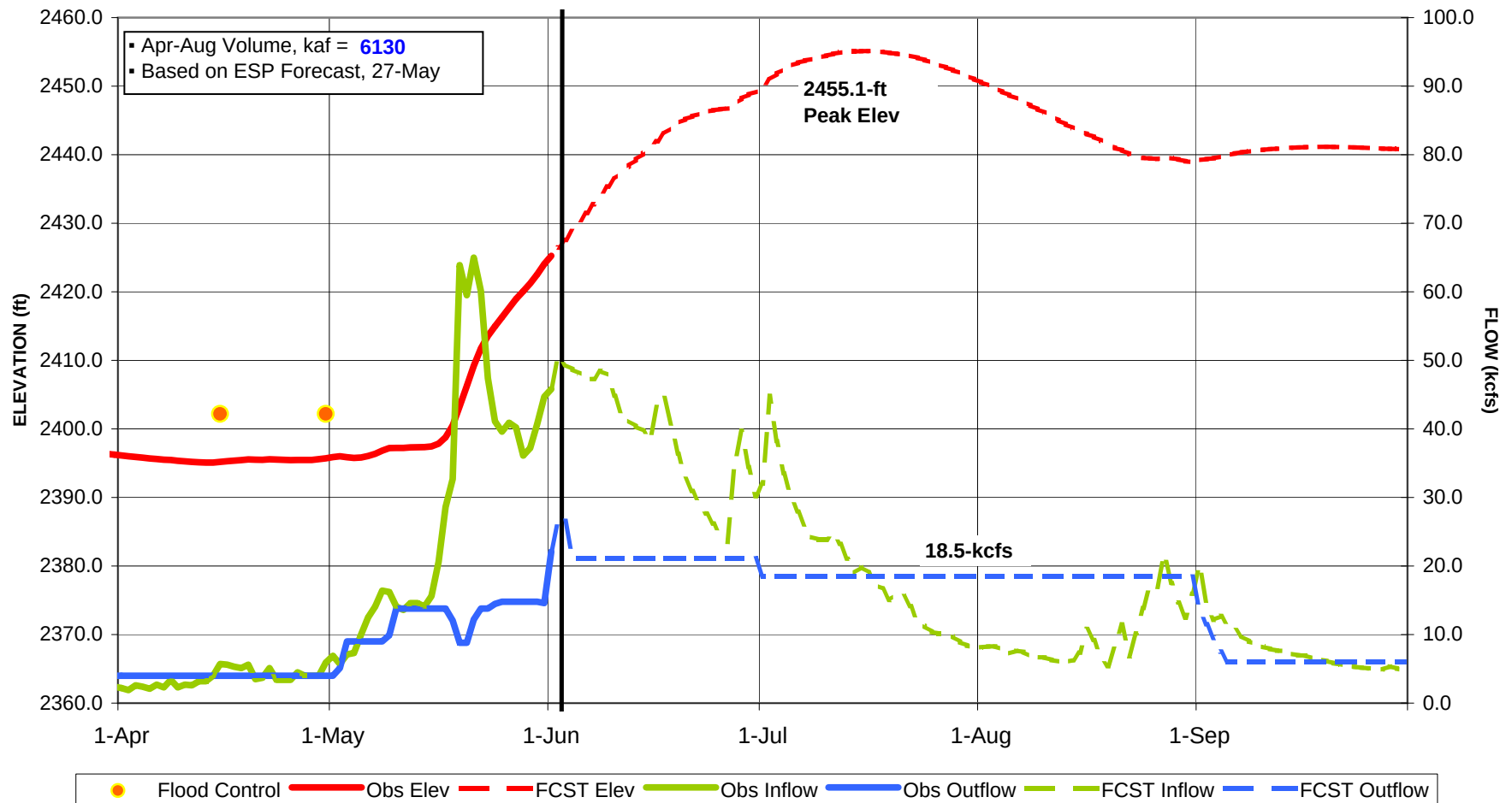


SCENARIO 1

LIBBY RESERVOIR

April-September 2008

Sturgeon Flows at 4 Units; Target 2439 feet on 31-Aug

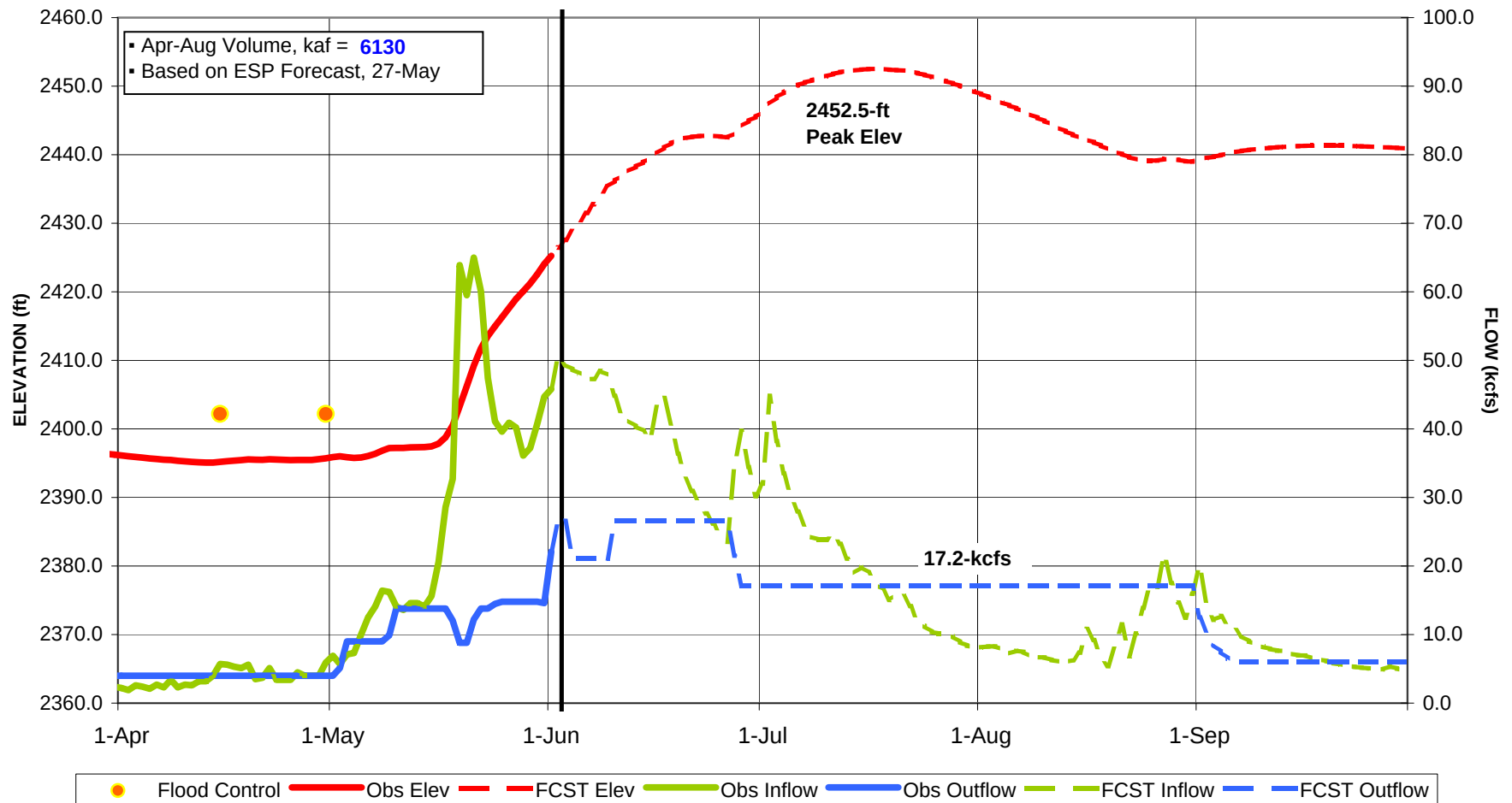


SCENARIO 2

LIBBY RESERVOIR

April-September 2008

Sturgeon Flow at Full Load; Target 2439 feet on 31-Aug

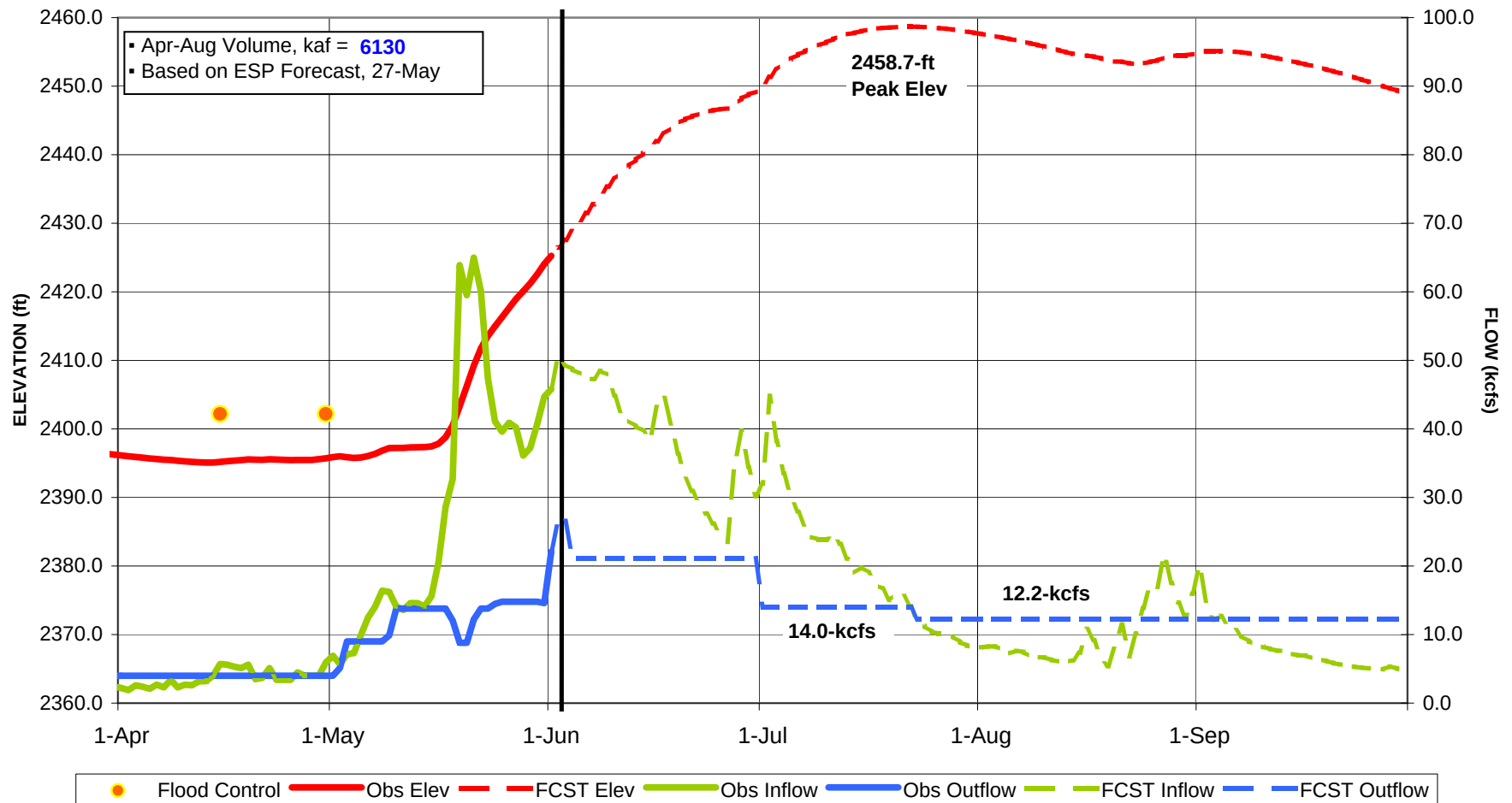


SCENARIO 3

LIBBY RESERVOIR

April-September 2008

Sturgeon Flows at 4 Units; Target 2449 feet on 30-Sep

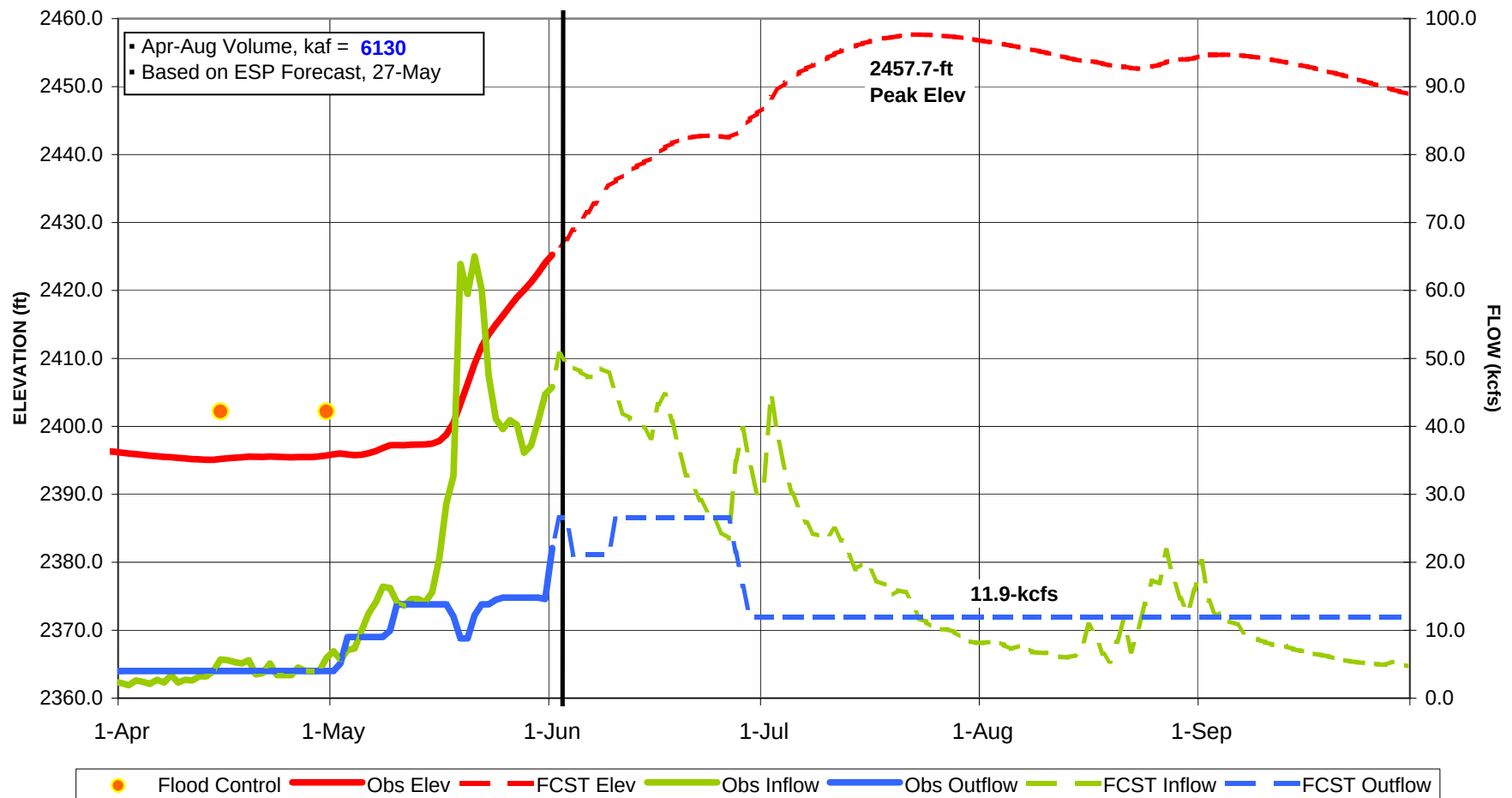


SCENARIO 4

LIBBY RESERVOIR

April-September 2008

Sturgeon Flows at Full Load; Target 2449 feet on 30-Sep



**Grizzly-Summer Lake 500 kV Line
Planned Outage
May 27-June 15 2008
1900-2400 hours**

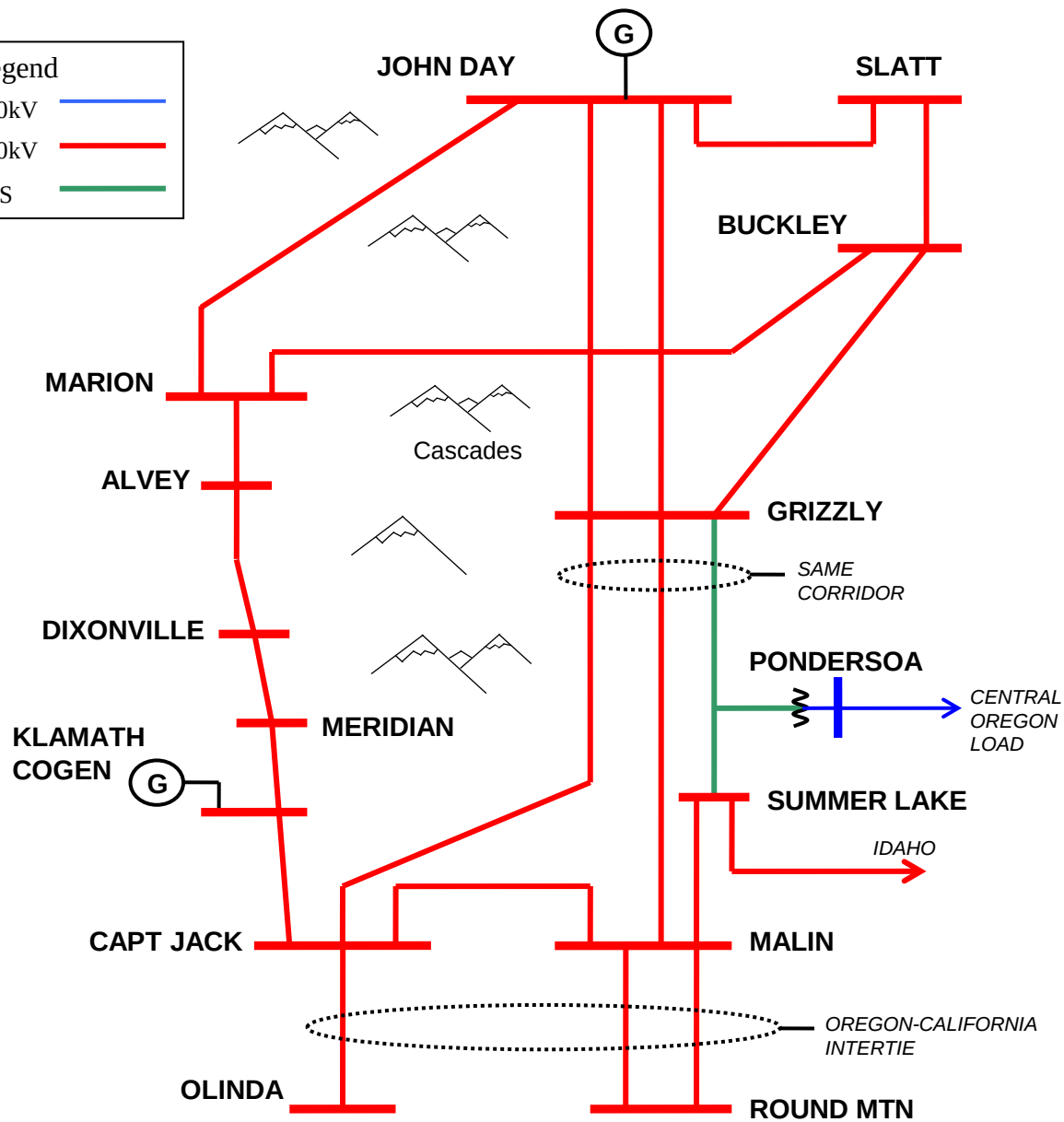
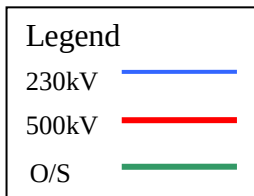
Mike Viles – BPA Transmission Operations

Technical Management Team

June 4, 2008

Background

- A continuous outage of sections of the Grizzly-Summer Lake line had been planned for spacer damper replacement for May 27 – June 15
- A planned outage of this line is hard to get because:
 - It significantly reduces the California-Oregon Intertie (COI) capability
 - OTC reduces from above 4000 MW to 2800 MW north to south to protect for the next double contingency
 - Ponderosa 500/230 kV transformer forced out of service and creates potential load service issues except during lighter load conditions
 - Late spring loads are lighter due to mild temperatures compared to winter and summer loads



Outage

- In early May it was decided to cancel this line outage due to concerns about the impact of the outage on the COI with a late runoff
- Work to replace gun shot insulators, repair conductor and repair overhead ground wire on the line had also been planned
- There was a need to get that work done to prevent an unplanned outage of the line
 - There would not be another window of opportunity to take a planned outage of this line in 2008

Damaged Insulator String



Repairing Insulator String



Outage

- Daily outages from 1900 to 2400 hours were coordinated to minimize the impact of the outage
 - All the repairs that are needed can be done during this 20 day period
 - Some of the work is being done during darkness so only the local line crew that is familiar with the terrain is willing to do the work

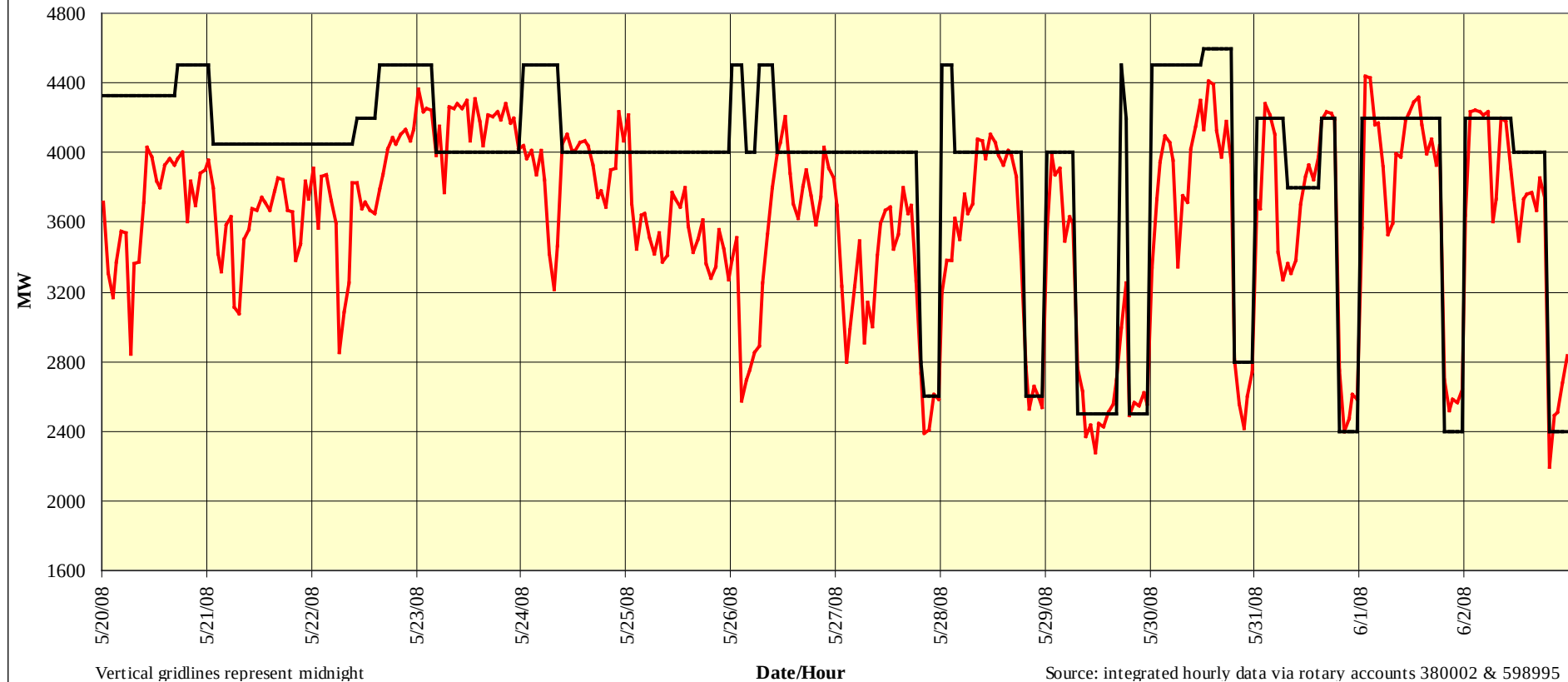
Outage Impacts

- The COI OTC is reduced to 2800 MW
 - The next slide shows the actual COI flow versus the scheduling limit which is lower than the OTC
- The PDCI is allowed to go to full 3100 MW capacity during the outage

COI Actual Flow vs Scheduling Capacity

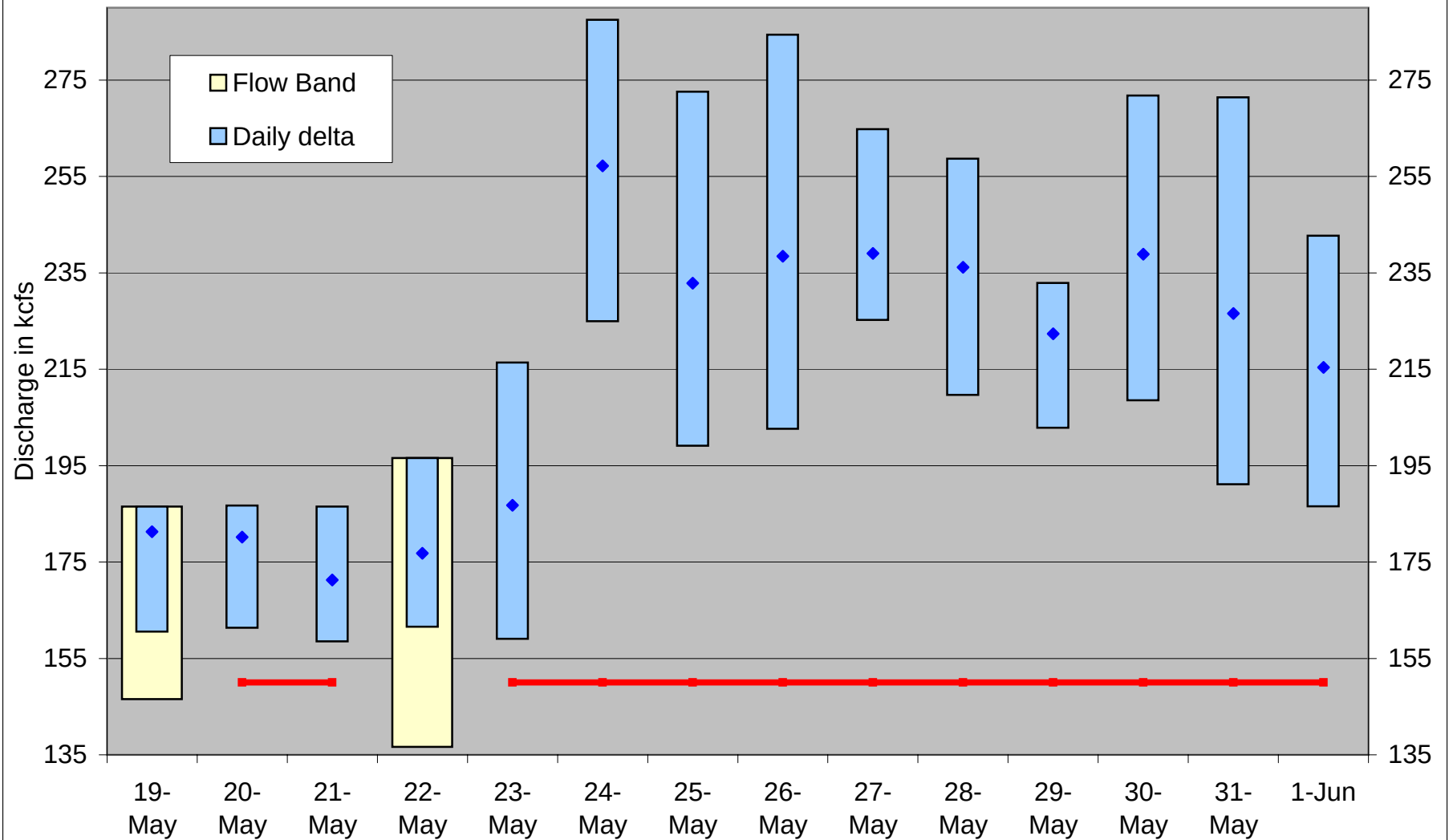
COI LOADINGS & CAPACITIES: MAY 20 - JUN 2, 2008, BY HOUR

— COI ACTUAL — COI N-S SCHEDULING CAPACITY



Priest Rapids Operations 2008

Number of exceedances: 0



GUIDELINES FOR TECHNICAL MANAGEMENT TEAM

~~March~~~~April~~~~May~~ 2003~~8~~

I. Introduction

The National Marine Fisheries Service's (NMFS) Biological Opinion on the "Reinitiation of Consultation on Operation of the Federal Columbia River Power System (FCRPS), Including the Juvenile Fish Transportation Program, and 19 Bureau of Reclamation Projects in the Columbia Basin", dated December 21, 2000, and the U.S. Fish and Wildlife Service's (USFWS) Biological Opinion on the "Effects to Listed Species from Operations of the FCRPS", dated December 20, 2000, call for the utilization of a Technical Management Team (TMT) to advise the operating agencies on dam and reservoir operations, thus optimizing passage conditions for juvenile and adult anadromous salmonids and resident fish. These guidelines are adopted in accordance with those Opinions.

The TMT is one of several technical teams within the Columbia River Regional Forum established by the NMFS, USFWS, the U.S. Army Corps of Engineers (COE), the U.S. Bureau of Reclamation (BOR), and the Bonneville Power Administration (BPA). The Regional Forum provides for regional discussion and recommendation on the operation and configuration of the FCRPS. Its goal is to develop consensus among the various members on these recommendations. The TMT's mission is specifically to ensure broad technical participation and use of the best available technical information, and to encourage consensus in recommendations on operating the FCRPS. When consensus is not achieved, the TMT ensures that the basis for participants' recommendations and Federal decisions is fully explained and documented. In such situations, questions can be elevated to the Implementation Team (IT) for resolution if requested by a TMT member.

The TMT operates under the Guidelines and Procedures approved November 7, 2002, for the Columbia River Regional Implementation Forum. The following more specific guidelines supplement the Forum's procedures for TMT operations. As the Forum procedures are refined, these guidelines may be revised.

II. Scope

The focus of the TMT is to implement the NMFS and USFWS Biological Opinions on operation of the FCRPS while considering the provisions of (and effects on) the Northwest Power Planning Council's (NPPC) Fish and Wildlife Program, other biological opinions, State and Tribal plans and programs, and other relevant operational requirements. Specifically, the TMT should explore operational scenarios under the Biological Opinions that would serve to protect other fish and wildlife in the Columbia River Basin and promote coordination and consistency with these other objectives to the extent possible.

III. Membership

See Forum Guidelines and Procedures.

The members and alternates of the TMT are listed in Attachment 1. Initial confirmation of membership, designation of representatives, and any changes in representation should be provided in writing to the NMFS Implementation Team Chair.

IV. Roles and Responsibilities

The TMT is responsible for discussion and recommendations to the Action Agencies (COE, BOR, and BPA) on hydro system flows at designated control points and expected project operations to implement the Biological Opinions for listed salmon, steelhead, sturgeon, and bull trout species within the Columbia River basin while taking into account the needs of (and effects on) other listed and non-listed species.

The TMT is to engage in joint decision-making that works toward consensus within the recognized authorities and management jurisdictions of its participating members. Specifically, the State, Tribal and Federal salmon managers (Salmon Managers) recommend the flows at the control points that best meet the needs of salmon and steelhead. These may include specific project operations, but this does not foreclose TMT consideration of alternative means of providing the same operating condition. Other participants (e.g., Resident Fish Managers) may also make recommendations consistent with the scope of these guidelines. The procedure vehicle for communicating a river or project condition, which will benefit salmon/steelhead/sturgeon migrations or resident fish, is verbally at a TMT meeting, or through a written system operational request (SOR). See Section V(d). All parties submitting SORs are encouraged to coordinate with other participants to the extent possible.

The Salmon Managers are responsible for the management of anadromous fish and Resident Managers are responsible for and resident fish in the basin. The COE and BOR are responsible for decisions on operation of the FCRPS projects; and the COE and BPA are responsible for Treaty agreements with Canada regarding storage in Canada and other Treaty-related matters. The participation of other affected sovereign and non-sovereign entities is intended to ensure that decision-makers have the broadest possible source of information upon which to base their decisions. All parties are encouraged to succinctly present their views regarding biological or operational recommendations. Input can provide alternative options for the appropriate authority to consider when making their decisions, but authority for implementing the request remains with the appropriate agencies.

The TMT is a year-round technical body. Winter planning will consist of development of a Water Management Plan and updating the 1-year and 5-year Biological Opinion Implementation Plans. The purpose of in-season management is to implement the Biological Opinions and the Water Management Plan. Post-season review will consist of a review of the previous year's activities and performances, and updating operating procedures

as needed. Throughout the year the COE, BOR, and BPA will coordinate planning and operational decisions that may affect salmon and other species, through the TMT (e.g., yearly agreement on Non-Treaty Storage Agreement spring/summer operation, the 5-year Idaho Power Company Agreement, and the Libby/Arrow swap). The COE, BOR and BPA will specifically use the TMT as a forum for the coordination and consideration of potential effects on salmon, steelhead and other species prior to a final decision. Idaho Power Company, the Mid-Columbia Public Utility Districts, and other non-sovereign participants are also encouraged to use TMT as a forum for coordination of planning and operational decisions throughout the year.

V. Operating Procedures

a) Annual Water Management Plan

The Annual Water Management Plan is developed and used by the action agencies as a decision-making and management tool, and includes all known or typical operations that will be implemented throughout the year based on prior years' gathered data.

Each year, the TMT will discuss and make suggested updates finalizeto thean annual Water Management Plan based on the run-off forecast and other factors specific to that year. A draft Fall/Winter Update will be available for review in October. A draft Spring/Summer Update will be available for review within two weeks of the March final forecast. A draft Fall/Winter update will be available for review in October. All interested parties may participate in the plan development and will be given an opportunity to review and comment on the draft plan. In general, the Salmon Managers will provide information on salmon and salmon operational requirements to be included in the plan. Resident Fish Managers will provide information on resident fish needs. The Action Agencies will provide information on reservoir status; planned project operations (and operating constraints); flow forecasts; anticipated special operations for research and other purposes; turbine outage and maintenance plans; and operating agreements and contracts that may affect annual operations. Priorities among competing needs should be resolved within the context of the scope of these guidelines. The Action Agencies will be responsible for finalizing the Water Management Plan.

b) Summary of In-season Management Key Events

Monday	Begin implementing operations based on last week's decision.
Tuesday (9 a.m.)	The COE posts or otherwise distributes flow projections to TMT members for Priest Rapids, McNary and Lower Granite, along with resulting reservoir operations and elevations, and current dissolved gas and temperature data. Salmon Managers will post or otherwise distribute biological information.
Tuesday (4 p.m.)	TMT Members (or others) submit SORs to the Reservoir Control Center (RCC) and send (fax) hard copies to TMT members and participants. The Salmon Managers will fax SORs to all project owners for which an operation is requested. The Salmon Managers

will post the SOR to the Fish Passage Center web page, or an electronic version of any SOR will be simultaneously sent to the Corps so that it is available for the TMT web page as soon as possible.

- Wednesday 9 a.m. The TMT meets bi-weekly, with conference call on alternate weeks if needed, to discuss in-season management data and SORs, document operations, and recommend the following two week's operations. By the start of the meeting all SORs and the disposition will be posted to the TMT web page for use by members who can not attend the meeting. If necessary, the TMT frames the issue(s) to be raised to the IT before 12 a.m.
- Thursday (3 p.m.) In case of impasse, disputes are resolved through the IT.
- Friday (noon) In the event an issue has been raised to the IT and the IT has resolved the issue, the Action Agencies document the operation to begin on the following Monday. This decision, and rationale, should be documented before the next regularly scheduled TMT meeting and sent to the Chair of TMT, who will post it on the TMT homepage
- Friday (p.m.) The TMT draft meeting notes are posted or otherwise distributed

c) In-season Management Data

The TMT will use the National Weather Service's River Forecast Center's (RFC)

~~streamflow~~[stream flow](#)

forecast for the Columbia River Basin, [the Corps' volume inflow forecast for the Libby and Dworshak projects, and the Bureau of Reclamation's inflow forecast for the Grand Coulee and Hungry Horse projects.](#) ~~These~~[This](#) forecasts (and the basic reservoir operations that are assumed when producing it) ~~is~~[are](#) the official forecasts to be used for the decision-making

process. The BPA forecast may be used as supplemental information. The COE will use the RFC forecast to prepare flow projections for Priest Rapids, McNary and Lower Granite. By 9 a.m. (or as early as possible after that) on Tuesday, the flow projections and resulting reservoir operations will be distributed to TMT members. The Action Agencies will also provide dissolved gas, temperature, and other physical monitoring data available for decision-making.

During the anadromous fish migration period, the Salmon Managers will provide biological information on salmon and steelhead numbers, migration timing and condition, for both the current year and historically. The USFWS, and others as appropriate, will provide relevant information on other fish and wildlife resources. These data will be posted by NMFS and USFWS each Tuesday by 4 p.m.

d) System Operational Requests

System Operational Requests (SOR) are an in-season management tool for bringing forth requests to deviate from or refine planned, existing or BiOp recommended operations. These requests should be intended to provide an operation that is biologically necessary to protect listed and other aquatic species of concern and human health and safety given in-season fluctuations of the hydro system and the status of the fish.

TMT members may provide recommendations to the TMT on hydro system flows and/or expected project operations consistent with the scope of these guidelines. Non-TMT members may also submit recommendations for consideration. These recommendations will be in the form of system operational requests (SORs) stating the flow objective(s) sought (e.g., keep flows at a location X in a W-Z range). Expected project operations may also be added. Each SOR will include the biological or operational basis for the recommendation. Each SOR will also indicate whether the request is to implement a NMFS or USFWS Biological Opinion, NPPC Fish and Wildlife Program, or other Federal, State or Tribal program. Non-TMT members may also submit SORs for special operating purposes for TMT consideration.

All SORs will be submitted by 4:00 p.m. on Tuesday via fax or email to the action agencies, or any other project owner that may be required to deliver a specified operation, provided that the flow projections were available by 9 a.m. that day. Electronic submittal through the Proposal Submission/Review form on the TMT homepage may also be used. TMT and public comments on the proposal can also be appended via the Internet form. If proposals are incomplete, or are not received in time for sufficient review, the TMT may choose to delay action, but lack of an SOR should not preclude discussion of relevant matters at the meeting.

SORs should list members of the agencies who have reviewed and support the request. The SOR will be outlined for description on the TMT SOR disposition web page. The SOR will be posted to the agenda prior to the start of the TMT meeting so that telephone participants can follow the conversation at the meeting.

When an SOR has been properly submitted, the Action Agencies (COE, BOR, BPA) should be prepared at TMT to describe the operational options and implications of meeting the request. Any decision to implement or not implement will be recorded in the official meeting materials and summarized at the end of those minutes. The meeting facilitator will clarify the decision at the meeting to assure that the record accurately reflects the disposition of the request.

e) Meetings

Between the last week of March and up to at least August 31 the TMT will meet every other Wednesday, or more often if necessary, to conduct in-season management. All meetings will be open to interested parties. A conference line will be available for those who cannot attend in person.

An agenda for each meeting will be distributed at least two business days prior to the meeting (the preceding Monday in the case of the regularly scheduled in-season meetings).

The principal purpose of the meetings and standing agenda items during the migration season is to review the status of the preceding week's SOR and operations, biological data, new SORs and project operating data, and to reach informed decisions on FCRPS operations for the following week(s). As other items are brought forward for TMT consideration they will be added to the agenda for future discussion, but lack of an agenda item will not preclude discussion of relevant matters at the meeting.

The discussion of SORs at TMT meetings will include distinct segments dealing with both biological and operational issues. Biological questions associated with an SOR will be addressed to ensure that the biological basis of the SOR is clear, and to allow the TMT to consider any additional biological information that may be made available at the meeting. The meeting will then move on to a discussion of operational alternatives to meet the SOR by the Action Agencies and members of the TMT. The Chair should ensure that adequate time is allotted to each segment of the meeting.

The Chair should also ensure that the support or opposition of each TMT member for an SOR and a final decision by the Action Agencies are noted in the minutes.

f) Meeting Facilitation

Meetings of the TMT will be facilitated by an impartial facilitator, who will allow all TMT members the opportunity to fully participate in discussions and to help members resolve conflicts as they arise. The meeting facilitator shall serve at the will of all members of TMT and should have skills as a meeting manager and conflict resolver. The meeting facilitator's role will include:

- Assisting the chair and TMT members in the development of meeting agendas
- Managing the meeting agenda in a balanced and even-handed fashion so that all members have an opportunity to speak and be heard
- Helping the group stay focused on the agenda and prioritize items that need action and further discussion
- Enforcing the ground rules established by the TMT (see Attachment 2)
- Helping the group reach consensus on decisions
- Helping the group resolve conflicts that may arise in the course of discussion
- Highlighting any decisions the group may reach
- Working with members between meetings to clarify issues, resolve disputes, and seek potential solutions to impasses
- Assisting members to develop opportunities that may resolve conflicts and increase the overall satisfaction with the TMT process in the long term, and
- Helping the group maintain a sense of humor

TMT members may give feedback directly to the facilitator or to the chair if they have concerns with the manner by which meetings are managed. The facilitator will be replaced if, after discussion with the facilitator, members believe he or she is not remaining impartial in the delivery of service.

g) In-season Decision making

On Wednesday morning the TMT will decide on operations for the following two weeks based on the available information and any pending SORs. These operating decisions will be made by consensus whenever possible. Consensus is defined as lack of a strong objection that would prompt one or more of the TMT members to elevate the issue to the IT. In the absence of consensus, the decision will be referred to the IT in accordance with the dispute resolution process described below. Objections to decisions that are not strong enough to prompt one or more TMT members to elevate the issue will be documented in the minutes of the TMT meeting.

If the recommendation is to implement the SOR or a modification of the SOR as agreed to by the TMT, then this should be documented for the minutes, and the SOR (and the Biological Opinion, Council's program or other plan on which it is based) may form the basis for the decision. If the Action Agencies do not agree to implement an SOR, they will describe for the minutes both the intended operation and the basis for that decision. The basis for the decision could include that the proposed operation is inconsistent with a Biological Opinion, that operational constraints prevent its implementation, that cost is prohibitive beyond that already included in the so-called "Fish Cap", or that the Action Agency has an alternative view of the best available biological information. If the Action Agencies believe the best available biological information supports a position that differs from that of the SOR sponsor(s), then the explanation should acknowledge this difference and should provide a clear, succinct written explanation of the data, analysis or judgment that supports the alternative view. In each case, a full explanation will be provided by the Action Agencies to the TMT and IT.

The final decision made by the COE and BOR on the following week's operation will be made at the meeting whenever possible. The TMT will try to avoid making decisions outside the established process. In-season FCRPS operating decisions made through a separate process, such as those under the Action Agencies' authority for emergency situations, will be explained and documented as soon as possible, but in any case no later than Friday following the TMT meeting.

h) Documentation

Minutes of all TMT meetings will be prepared in accordance with Regional Forum procedures and approved by the TMT. Every effort will be made to post the draft meeting notes to the TMT home page by close of business Friday afternoon following the meeting. Comments will be due by the following meeting.

The TMT meeting minutes will be used to keep track of the decision-making process. The minutes will include the substance of any SOR, the decision, the decision-maker, and the basis for the decision. The minutes will also include: (1) documentation of consensus or a listing of members objecting to an SOR or a final decision; and (2) when an SOR is not implemented, clear documentation of the reasons provided by the decision-maker.

If a decision is elevated to the IT and therefore not made at the weekly TMT meeting, documentation on the final decision reached will be provided separately in writing by the IT and will include the same information noted above. This documentation of the decision

should happen before the next regularly scheduled TMT meeting and be sent to the Chair of TMT, who will post it on the TMT homepage.

Each member is responsible for reviewing the decision documentation and the meeting minutes, especially if the agency he/she represents is one of the decision-makers.

Interested parties may request copies of the minutes if they have no access to the TMT homepage.

i) Distribution of Information

Meeting notes and material will be made available to TMT participants throughout the year. These materials will be made available through the TMT home page and may be reproduced on other Internet home pages where available. They will also be faxed to members and participants that request such services. Regular mail may be used for materials when time permits.

j) Public Participation

The public may comment on an issue at the end of the discussion on that issue or at the end of the meeting, based on the discretion of the group and the facilitator. They may also comment outside the TMT process.

VI. TMT Dispute Resolution Process

In the event that the TMT is unable to reach consensus on an issue, any member may request that the item be elevated to the IT. Every effort should be made to ensure that the issue is raised at least one week in advance of the monthly IT meeting (first Thursday of the month).

If, despite all efforts to the contrary, the TMT finds at its Wednesday morning meeting that it is unable to resolve a weekly in-season management dispute, and the decision cannot await consideration at the next regularly scheduled meeting, the IT will meet by conference call at 3:00 on Thursday afternoon. In the event that such a meeting is necessary, the TMT will prepare, and agree to, a brief summary of the issue(s) and a short description of the opposing viewpoints. This document will be given to the IT members by 1:00 p.m. on Thursday afternoon.

The IT will attempt to reach consensus. If the IT is unable to reach a consensus, then a final recommendation will be made by the appropriate agency (e.g., NMFS or USFWS if the issue relates to implementation of a Biological Opinion, or NPPC if the issue relates to implementation of the Fish and Wildlife Program). The member with the authority for the action will then make the decision and explain the rationale in writing. Whether IT acts by consensus, or the member with the authority for the action makes the decision to resolve a TMT conflict, it should be documented before the next regularly scheduled TMT meeting and sent to the Chair of TMT, who will post it on the TMT homepage.

VII. Emergency Meetings

Any member of the TMT may call a meeting when an emergency situation requires action of the TMT.

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ATTACHMENT 1

TECHNICAL MANAGEMENT TEAM (TMT) MEMBERS

ORGANIZATION - REPRESENTATIVE / ALTERNATES

National Marine Fisheries Service - Paul Wagner / Richard Dominigue
U. S. Army Corps of Engineers - Jim Adams / Cathy Hlebechuk / Bob Buchholz
Bonneville Power Administration – Robyn MacKay / Tony Norris / Scott Bettin
U.S. Bureau of Reclamation - John Roache / Mary Mellema / Pat McGrane
U.S. Fish & Wildlife Service - David Wills / Steve Haeseker
State of Washington - Cindy LaFleur
State of Oregon – Rick Kruger / Ron Boyce
State of Idaho - Russ Kiefer
State of Montana - Jim Litchfield / Brian Marotz

Confederated Tribes of the Colville Indian Reservation - ~~Jerry Marco / Kirk Truscott~~ Sheri Sears
Shoshone-Bannock Tribes of Fort Hall - Keith Kutchins

ELIGIBLE ORGANIZATION WITH NO OFFICIALLY DESIGNATED MEMBER - CONTACT PERSON / ALTERNATE

Kootenai Tribe of Idaho
Confederated Tribes of the Umatilla Indian Reservation
Confederated Salish & Kootenai Tribes of the Flathead Reservation
Confederated Tribes of the Warm Springs Reservation
Yakama Indian Nation
Shoshone-Paiute Tribes of Duck Valley Reservation
Burns Paiute Tribe
Kalispel Tribe
Spokane Tribe of Indians - Deanne Pavlik / Chuck Lee
Nez Perce Tribe of Idaho - Dave Statler / Greg Haller
Coeur d'Alene Tribe of Idaho
State of Alaska

ATTACHMENT 2.

MEETING GROUND-RULES & EXPECTATIONS

The following meeting ground-rules and expectations were discussed and agreed to by all members present at the _____ meeting of the TMT. They may be changed at the request of the Team.

I. Ground-Rules

Meetings will start and end on time unless members agree otherwise.

Members will treat each other with respect, which includes:

- ° Separating the people from the problem
- ° Listening to what others have to say
- ° No interruptions
- ° Monitoring your own air time
- ° No side conversations
- ° Letting the facilitator or chair know when you would like to speak
- ° Being mindful of tone when speaking directly to others
- ° Remembering that members are representing agencies, not stating individual opinions

During in-season management, each member agency/group will have one primary TMT representative who will sit at the table during meetings. Alternates or technical resource staff are welcome to attend and provide input through their primary representative, or when called on by TMT members. All are welcome to sit at the table --with preference for the primary representatives if there is a space limitation.

Any issues elevated from the TMT to the Implementation Team (IT) will be thoroughly discussed at TMT. TMT members will agree on the "issue statement" for the IT. The TMT Chair will then present the issue at the IT meeting. All TMT members will brief their agency IT representative on the issue prior to the IT meeting.

The meeting facilitator may make process comments in order to keep the group on track, focused and productive.

II. Expectations

Members are expected to come prepared to participate in the meetings. This means, they will provide necessary input to discussions and work towards making decisions based on information they have gathered from their respective agencies between meetings.

Members are expected to keep their agencies and staff apprised of decisions or important meeting discussions.

Members are expected to attend all meetings or send an alternate. If an alternate attends the

meeting, a briefing, both before and after the meeting, is expected of the primary representative. The group will not revisit information for members who were absent from or late to a meeting.

Members are expected to follow through on assignments to which they agree, or are given by other team members, on a timely basis. This includes requests for comments on information or reports from other team agencies.

The meeting facilitator is expected to keep the group on track and focused on agenda items. Additionally, the group expects the facilitator to assure equal participation, highlight any decisions that the group reaches, and maintain a sense of humor.

People who listen in on the telephone are expected to “sign-in” as they call in on the conference telephone line.

Group members may contact the facilitator at any time to make process suggestions, raise concerns or request additional assistance at or between meetings.

COLUMBIA RIVER REGIONAL FORUM

TECHNICAL MANAGEMENT TEAM

June 4, 2008 Meeting

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator/Notes: Erin Halton

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 of Minutes/Agenda

The 5/21 and 5/28 meeting minutes and facilitator notes had been posted to the web; TMT members requested more time to review the notes and will look to finalize them at the 6/18 face to face meeting.

Update on Missing CRITFC Fisherman

Kyle Dittmer, CRTIFC, reported that the body of the third CRITFC fisherman had been recovered. On behalf of CRITFC and the families of the fisherman, Dittmer thanked all who provided assistance to the recovery effort and added that CRITFC sent an official letter of thanks to the COE.

Priest Rapids Operations

Russell Langshaw, Grant County PUD, reported that thon rearing protection flows were expected to continue for 12 days: average daily discharges for 5/19-23 were 235 kcfs.

Action/Next Steps: Langshaw will provide a final Priest Rapids Operations report at the 6/18 TMT meeting.

Transmission Outages

Mike Viles, BPA, referred TMT to a power point presentation linked to the TMT agenda. His presentation provided detailed background information regarding the May 27-June 15 planned outage for the Grizzly-Summer Lake line. Viles noted the impacts to OR-CA inter-ties and central Oregon loads (limitation of 2800 megawatts.) He clarified that local crews are performing their work between 7 p.m. and midnight on a daily basis, to minimize the impacts of the outage as much as possible. Robyn MacKay, BPA, added that the take home for TMT is that the spill priority list is being used, with every effort made to minimize impacts to TDG levels.

Libby Sturgeon Flows

Amy Reese, COE, reported that Libby shifted operations to full powerhouse on 6/1, with flows in the range of 25.5-26.5 kcfs, and after 48 hours dropped 4 units at full load, with flows of approximately 21.3 kcfs. She referred TMT to four operation scenarios for Libby, based on last week's ESP runs with two scenarios assuming a hold of the 21.3 kcfs through the end of June and two scenarios assuming a return to powerhouse capacity the 10th of June. The scenarios showed anticipated elevations and flow levels for the

June-September timeframe; Reese acknowledged that the June final forecast is still pending and said that new scenarios will be developed as each new forecast is made available. Jason Flory, USFWS, provided an update on the crane repair work at Libby: the crane was repaired, but not yet installed in gate 10. Also, temperature management was possible in units 1-4 but not 5. He noted that the seasonal warming of the reservoir remains 2-3 weeks later than observed in recent years. Flory added that the Sturgeon Operations Team was scheduled for a conference call on 6/5 and would be making operational recommendations based on the latest telemetry data. He reported that seven sturgeon have been observed in the area; and given that, the USFWS recommended holding Bonner's Ferry area temperatures fairly steady, not dropping by more than 3.6°F. TMT members discussed the need to hear the results from the Sturgeon Operations Team before making any operational recommendations and scheduled a conference call for 6/6.

Action/ Next Steps: The COE will continue to operate Libby at 4 units at full load (approximately 21.3 kcfs.) TMT will discuss the recommendation from the Sturgeon Operations Team regarding Libby Operations for Sturgeon during a conference call scheduled for 2 p.m. on 6/6.

Libby/Hungry Horse Operations

John Roache, BOR, referred TMT to Hungry Horse scenarios linked to the TMT agenda. TMT members commended Roache and Reese for the complimentary aspects of the scenarios developed for the Libby and Hungry Horse. Roache reported that Hungry Horse was operating with outflows of 7 kcfs and would likely fill during the first week of July. He added that scenarios would be updated as new forecasts are made available.

Jim Litchfield, MT, thanked the BOR and COE for developing the scenarios for TMT review/discussion. He stated MT's desire for a collaborative process around Libby/Hungry Horse summer operations for 2008. Litchfield said that MT is looking to reach a compromise on operations via increased communication and collaboration in between and during TMT meetings, supported by close monitoring of existing conditions as the season progresses. He introduced two NPCC Council Members: Vice-Chair Bruce Measure and Fish and Wildlife Chair Rhonda Whiting, who signified their support for a collaboratively developed operation. Litchfield said that from Montana's perspective, an operation with flows in the range of 11-12 kcfs would be optimal, and referred to the recommendations written into the new 2008 BiOp. He also referred meeting participants to a DART webpage showing 2004-2007 Libby operations and added that Montana is seeking a win-win for anadromous and resident fish.

Rick Kruger, OR, acknowledged the recommendation from Montana and said that he would carry it back to Oregon's fish and wildlife policy makers for consideration. TMT members discussed next steps for discussion of Libby/Hungry Horse summer operations and suggested that email and/or phone conversation be convened after new scenarios made available next week.

Action/ Next Steps: The COE will provide updated scenarios for Libby to TMT members by late 6/11. DS Consulting will assist with email/phone conversation between TMT members prior to the 6/18 TMT meeting.

Bonneville Screen Update

Dan Feil, COE, reported that screens were placed in Bonneville unit 11 on 6/3, which resulted in debris collection in excess of the head differential criteria despite aggressive cleaning efforts. He said the screens would be removed on 6/5 and added that flows were expected to drop to a 370-380 kcfs range in a few days. Feil said that de-scaling at the project has dropped to the 5% range and clarified that the smolt index data shows that fish passage continues, assisted perhaps by the shallow migration of steelhead. TMT members asked whether unit 11 could be operated without its turning vane; Feil said he would inquire as to that possibility and email TMT members with the answer.

Update: Feil sent out the email below following the TMT meeting:

“...our design engineers at the District and they advised me that operating the STSs without the turning vanes (flow vanes) in place is not recommended. The turning vanes replace a large wide flange that serve as the upper beam on the STS frames. The turning vane acts as a structural member of the frame and operating the STSs without the turning vane in place would likely cause a frame failure under turbine load. Therefore, the Corps will not operate the STSs at Bonneville without turning vanes.”

TMT Guidelines

TMT members discussed the most recent draft of the Guidelines, posted as a link to the TMT agenda. Jim Litchfield, MT, suggested a re-write of the guidelines was needed to have a more accurate reflection of actual TMT processes, but put forth no edits or revisions to the current version of the guidelines. Paul Wagner, NOAA, said he approved the draft version linked to the agenda. Russ Kiefer, ID, offered to email the facilitation team his edits to the current draft.

Action/ Next Steps: DS Consulting will email TMT members ‘nearly final’ draft of the guidelines that includes edits from ID and any other edits that are submitted by TMT members in the next week. TMT will look to approve that version of the guidelines at the 6/18 TMT meeting and plans to do a thorough revision of the Guidelines in the September timeframe.

Operations Review

Reservoirs: Grand Coulee was operating at 1268' and slowly filling. Hungry Horse was at 3539.22' with outflows of 7 kcfs and inflows of 20 kcfs. Libby was operating at 2427.21', with inflows of 46.4 kcfs and outflows of 23.63 kcfs. Dworshak was at 1567.35' with inflows of 27 kcfs and outflows of 8.7 kcfs. Albeni Falls was at 2061.35', with inflows of 101 kcfs and outflows of 90 kcfs. McNary average flows were 393 kcfs, with an expectation of dropping to the 370 kcfs range over the next few days. Lower Granite average flows were 150 kcfs.

Other: Dan Feil, COE, reported that as project operators at The Dalles followed the spill priority list on 6/2, they identified the need to add Dworshak to the list. He also reported that a one hour debris-clearing related outage was planned for Lower Granite.

Russ Kiefer, ID, expressed his frustration with the COE decision against moving water through the system earlier in the season and his overall concern for the amount of involuntary spill happening across projects; he requested not exceeding state water quality standards with spill at Dworshak and to spill only at night at Dworshak if possible. Greg Haller, Nez Perce Tribe, echoed Kiefer's concerns. BPA and the COE clarified that the Action Agencies were (and still are) operating under flood control criteria, that the intent was not to exceed spill criteria and that every effort was being made to mitigate spill and gas levels throughout the system. Robyn MacKay, BPA, added that over generation would likely continue for the next 7 days. Dan Feil, COE, said that operational adjustments would be made as needed so as not to exceed TDG standards and clarified that the COE does not anticipate any issue with achieving refill by 6/30. Paul Wagner, COE, said that more notice on this issue would have helped make a more informed decision. The COE asked the following parties to weigh in on the addition of Dworshak to the spill priority list:

- NOAA: no objection
- OR: no objection; share same frustration as expressed by ID and Nez Perce Tribe
- ID: no objection
- BPA: no objection
- BOR: no objection
- COE: no objection
- Nez Perce: no objection
- CRITFC: no objection

Fish: Paul Wagner, NOAA, reported that adult passage numbers were passing Bonneville at a rate of 1,000 per day. Juvenile counts are winding down and sub-yearling counts are expected to rise in the coming weeks.

Power System: Over-generation was an issue system-wide; load factoring was happening daily, with intent to manage TDG as best possible.

Water Quality: Tina Lundell, COE, reiterated that involuntary spill would likely continue across projects for the next week.

Next TMT Meeting: 6/18 face-to-face

Agenda Items include:

- Finalize notes/minutes
- Dworshak Summer Operations/Temperature Modeling
- Priest Rapids Operations Report
- Libby Sturgeon Flows
- TMT Guidelines – Approve Draft
- Libby/Hungry Horse Summer Operations
- Operations Review

**Columbia River Regional Forum
Technical Management Team Meeting
June 4, 2008**

1. Introduction

Today's TMT meeting was chaired by Dan Feil (COE) and facilitated by Erin Halton (DS Consulting) with representatives of USFWS, NOAA, COE, BPA, CRITFC, PPC, Montana, Oregon, Idaho, and others attending in person or by phone. 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

Minutes for the May 21 and 28 meetings have just been posted and will be open for comment at the next TMT meeting. Minutes through May 14 were finalized today.

3. CRITFC Update

Kyle Dittmer (CRITFC) presented the COE with a letter of appreciation for its work to recover the bodies of three tribal fishers who recently drowned.

4. Priest Rapids Operations Update

Approximately 12 days of the 2008 protection flow program remain, Russell Langshaw (Grant PUD) reported. Discharges dramatically increased on May 23 to an average of 235 kcfs. From that point on, Grant PUD has had 150 kcfs minimum flows in effect and expects these to continue for the next few weeks. Langshaw will give a final update at the TMT meeting on June 18.

5. Transmission Outages

Mike Viles (BPA) gave a slideshow presentation, attached to today's agenda, on the 500-kV Grizzly-Summer Lake line outage. The outage began May 27 and was originally planned to run continuously through June 15. However, with heavy runoff this spring, there was concern about involuntary spill raising TDG levels. The continuous outage was canceled, and an intermittent outage was planned for the off-peak times of 1900-2400 hours for 20 days.

This line will not be eligible for another outage until next year. Parts of the repair work can be postponed until then, but damage from vandalism to the insulators should be fixed before winter sets in because the situation increases the risk of a line fault.

BPA's performance criteria require protection from loss of lines next to each other. Viles explained why taking a single kV line out of service reduces the transmission capacity in the area from over 4,000 megawatts to about 2,800 megawatts. In this location, BPA is required to plan for a double contingency because of the line configuration. The biggest limitation involves two nuclear units in Arizona whose malfunction could disrupt the intertie line connecting the Northwest power grid to California.

Work on the insulators began May 27 and continues on a daily basis. Repairs are being done at night in the dark to avoid curtailing power sales during the day, thus reducing overgeneration spill. To avoid the need for future outages like this one, BPA has been working on bare-hand techniques that allow line workers to do repairs in a grounded suit without taking the line out of service. In future, bare-hand techniques could be applied to this line. At present, with uncontrolled spill happening system-wide, BPA has been using the salmon managers' spill priority list and employing other techniques to keep TDG levels below 125% for as many hours in a day as possible.

6. Libby Operations

The COE started the sturgeon operation Sunday, June 1, in response to the sturgeon SOR which was finalized Friday. Amy Reese (COE Seattle) presented four modeling scenarios (attached to today's agenda) that she prepared to help TMT compare the options for Libby Dam.

Scenario 1 – Assumes outflows stay at 4 units for the extent of the sturgeon volume. The reservoir drafts to 2,439 feet by the end of August. This scenario goes up to full powerhouse for 2 days, then drops to 21.3 kcfs outflows through the end of June. The end of August target elevation is 2,439 feet. At the end of June, the sturgeon flows ramp down to 18.5 kcfs, the rate chosen to draft the reservoir to that elevation by end August. In September, Libby ramps down for bull trout flows. Under this scenario, the reservoir elevation peaks at 2,455 feet sometime in mid-July. Running 4 units for the rest of June fully drafts the 1.04 maf sturgeon volume.

Scenario 2 – Resembles Scenario 1 in that it the end of August elevation is 2,439 feet. However, this operation goes to full load around June 10 instead of staying at 4 units for the duration of the sturgeon pulse. Full powerhouse flow is around 25-25.5 kcfs. The scenario assumes that selective withdrawal equipment at Libby is repaired before going to full powerhouse. Outflows are now limited to 4 units because unit 5 has no temperature control until the repairs are complete. Under this scenario, the sturgeon volume is exhausted earlier than Scenario 1. Jim Litchfield (Montana) asked if this scenario results in lower summer flows due to inflow forecasts. The reservoir elevation doesn't go as high, and the draft starts a couple of days earlier than in scenario 1, Reese replied.

Scenario 3 – This reservoir drafts to an end of August elevation of 2,449 feet. Outflows are around 14 kcfs for the first few weeks until the reservoir fills, at which point it drafts outflows of 12.2 kcfs for the rest of the summer.

Scenario 4 – Drafts to elevation 2,449 feet by the end of September, after going to full load for sturgeon flows. The reservoir peaks at elevation 2,457 feet, which is almost full. Summer outflows are around 11.9 kcfs.

There was general agreement that scenarios 2 and 4 are the most likely to materialize this year. As of yesterday, the selective withdrawal system is functional again, reported Greg Hoffman (COE Libby Dam). However, slot 10 was damaged by the boom collapse, so operators are hesitant to place gates in that slot, which has been drafting water from the coldest reservoir elevation available. The main decision now is whether to run 4 units or 5 at Libby. It would be premature to decide today whether to base the operation on flow temperatures or volume. At present, reservoir stratification is about 2-3 weeks behind schedule.

There is substantial sturgeon activity going on now at Libby, Jason Flory (USFWS Spokane) said. There are males in spawning condition and females in the hatchery. USFWS requested that temperatures drop no more than 3.6 degrees F at Bonners Ferry, and supports a full powerhouse operation as long as it doesn't exceed that limit.

Reese asked what the process will be for requesting a change in flows for the sturgeon pulse. The sturgeon managers have a call planned for Thursday afternoon, June 5, after which they will make a recommendation in the form of a SOR. TMT planned a conference call for 2 pm Friday, June 6, to discuss the outcome of the sturgeon recovery team meeting.

7. Hungry Horse Operations

The BOR's final June/July volume forecast for Hungry Horse is 1,200 kaf, 125% of normal, John Roache said. As a result of that forecast, outflows were increased to 7 kcfs yesterday. The reservoir will probably fill in early July instead of June because runoff is being pushed into later in the season. Roache presented two scenarios linked to today's agenda, one of which drafts the reservoir to elevation 3,540 feet by end August, the other to elevation 3,550 feet by end September. Roache will present updated scenarios at the next TMT meeting on June 18.

Discussion moved to the summer operation of Libby and Hungry Horse, specifically Montana's concerns about conditions for resident fish in these reservoirs. Montana collaboratively seeks an operation that comes as close as possible to the BiOp-recommendation, providing good conditions for both

anadromous and resident fish Jim Litchfield said, noting that it will be easier to find common ground on Hungry Horse operations than Libby.

Last year, Hungry Horse outflows were 4.3 kcfs all summer, with 17.3 kcfs outflows from Libby. Flows in 2004 were around 12.5 kcfs through the summer, ramping down to 9.6 kcfs in September – a good operation from Montana's perspective. The main goal is to keep flows as flat as possible into September.

Litchfield noted that Montana's two Council representatives were present today because Montana's stake in this outcome is very high. He suggested starting with a reasonable goal, such as 15 kcfs flat outflows from Libby, to be fine-tuned as forecasts change. Last year's process ended in elevating the dilemma to regional executives after a request for 15 kcfs flat outflows from Libby was rejected. Montana hopes to avoid a similar outcome this year.

TMT members then expressed their views on Libby and Hungry Horse summer operations this year.

Montana – Seeks collaboration and is willing to compromise on a gradually declining hydrograph through September 30 that resembles last year's operation. Montana is willing to compromise on reservoir refill for the sake of steady outflows. Montana advocates a ramp-down in August to stable flows when anadromous fish benefit less from flows in the lower river. Montana's perspective is that the 2008 BiOp went into effect when NOAA adopted it.

NOAA – Supports Montana's request for flat flows around 15 kcfs through summer. The tradeoff is between achieving reservoir refill with aggressive ramp-downs vs. maintaining steadier flows at a lower elevation in the reservoir

Oregon – Does not want flows to decline in the lower river. Would seek replacement for volume lost in the lower river if upstream elevations are kept stable. Oregon agrees with Montana that this is a social policy issue, not a technical issue. Believes the 2008 BiOp won't go into effect until the court approves it.

TMT will revisit this issue at its next meeting June 18. They discussed the possibility of a June 11 meeting as well. Amy Reese will update the COE's scenarios by June 11 in case TMT decides to have a conference call then.

8. Bonneville Screen Update

Dan Feil (COE) gave an update since last Wednesday's SOR and conference call to address this problem. The fish screens were replaced in unit 11 following the call. By the afternoon of Thursday, May 29, approximately 24 hours later, it was clear that the debris load remained overwhelming, so the screens were removed from unit 11 and not replaced until yesterday, June 3.

Flows are still over 400 kcfs depending on the time of day, a rate expected to continue until next week. Rates of descaling have gone way down – from over 50% to 5% or less. Unit 11 and all other units are being operated according to the FPP at the high end of 1% to mitigate gas impacts from high flows. Feil pointed out that next year the TIE crane will be available, allowing more efficient screen cleaning than the gantry crane allows.

Russ Kiefer (Idaho) asked why the smolt index stayed high with the screens out from May 21-23. Feil couldn't explain it, but said people have been surprised by the number of fish found in the collection system without the screens in place. The smolt index itself is calculated on a 1:1 ratio. Smolt sampling data indicate that fish were still being guided somehow into the bypass system without the screens in place.

Dave Wills suggested removing the turning vane from unit 11 and evaluating passage with screens in place during the high flows that are expected the rest of this week. Idaho, BOR and Montana raised no objections. Dan Feil will update TMT members via email.

9. TMT Guidelines

These look fine, Paul Wagner said, suggested they be revisited in August or September. Jim Litchfield suggested whittling the document down from its present length of 12 pages to something more concise; Wagner agreed some serious cutting could be done in future. Russ Kiefer had already sent comments to the facilitation team. The guidelines will be revisited in August or September.

10. Dworshak Operations

This issue was not on the agenda for today, but the operations review of Dworshak elicited extensive discussion of BPA's request to add Dworshak to the spill priority list. The purpose of the request is to move spill around on the system rather than loading up one location with gas, Robyn MacKay explained. Spilling 2 kcfs at Dworshak is roughly equivalent to spilling 15 kcfs at Bonneville because 2 kcfs of flow reduction at Dworshak reduces TDG production at all the dams downstream.

Idaho expressed concern about uncontrolled spill on Snake River projects, plus the fact that TDG levels have gone above state water quality standards several times recently. Three weeks ago, the salmon managers' request to maintain outflows at full powerhouse was not implemented due to concerns about refill – and now Dworshak is spilling. Idaho would prefer to move the water through the powerhouse instead of spilling at Dworshak because of gas impacts. Also, high flows during daylight hours create difficult conditions for fishers on the north fork of the Clearwater. Russ Kiefer advocated a more fish-friendly operation at Dworshak; Greg Haller (Nez Perce) seconded that.

Dworshak has been filling fast, even with high outflows, Feil said. Adding Dworshak to the spill priority list would mitigate gas throughout the system. Kiefer favored filling the reservoir soon to accumulate more volume for flow augmentation in late June and early July. Haller seconded that recommendation.

Steve Hall (COE) discussed Dworshak operations under current high flows. The reservoir is fuller now because some of the ESP years of record went to a fill and spill situation in the modeling exercise. So the COE has been trying to walk a fine line between filling too soon and spilling to the gas cap. The pool elevation might be limited because of flood control requirements, specifically a snow-covered area requirement. Overgeneration spill can be expected on the Snake for the next 5-7 days.

Laura Hamilton asked if Dworshak is added to the spill priority list, should it be listed last or second to last? Wagner's preference was to list Dworshak after Grand Coulee, second to last on the list. Dave Wills asked whether the COE has concerns about refilling Dworshak this year; the answer was an emphatic no. The target date for refill is June 30 if flood control allows.

NOAA, USFWS, BOR, Oregon, Idaho, and Nez Perce representatives did not object to BPA's request to add Dworshak to the spill priority list. USFWS assented with the caveat that TDG levels at Dworshak will be managed in accordance with state water quality standards. Idaho, CRITFC and Nez Perce representatives were uncomfortable adding Dworshak to the list without further discussion of its placement. Spill conditions being what they are, Dworshak could be last on the list and still have to spill, BPA and COE representatives agreed. The way to keep Dworshak spill from exceeding water quality standards is to set the spill caps low, Hamilton said. At Dworshak, the balance between spill and powerhouse flows affects TDG production.

11. Operations Review

a. Reservoirs. Grand Coulee is at elevation 1,268 feet and filling.

Hungry Horse is at elevation 3,539.22 feet and filling. Outflows are 7 kcfs and inflows are 20 kcfs.

Libby is at elevation 2,427.21 feet, with inflows of 46.4 kcfs and outflows of 23.63 kcfs using 4 units.

Albeni Falls is at elevation 2,061.35 feet, with inflows of 101.8 kcfs and outflows of 97.1 kcfs. Almost all inflows are being passed. Kiefer asked whether that much spill is creating gas problems. A visit to the TDG web page showed TDG readings of over 115%. Albeni Falls is a low head project, with not enough

difference in elevations above and below the project to produce energy, Robyn MacKay (BPA) said.

The Dalles did not experience a true power or transmission emergency recently, contrary to previous reportage, Feil explained. Bays unauthorized for use except in a flow emergency that could impact dam safety were used for overgeneration spill early Monday morning, June 2. The COE followed the salmon managers' spill priority list when they put bays 1-9 into service. The spill priority list has been updated for various gas levels.

Bonneville flows peaked at 420 kcfs on May 31. Flows are now around 411 kcfs, and will probably continue above 400 kcfs until June 8. Fish screens will be reinstalled when flows are in the 370 kcfs range.

The 7-day average at Lower Granite was 150 kcfs. A log became stuck in the RSW on June 2, and spill was shut off for less than an hour to remove it. Large, woody debris has been piling up in the Lower Granite forebay even with the RSW in place.

Dworshak is at elevation 1,567.35 feet, with inflows of 27 kcfs and outflows of 8.7 kcfs. Inflows averaged about 30 kcfs last week. There was extensive discussion of whether or not to put Dworshak on the spill priority list; see agenda item #10 above.

b. Fish. Adult passage counts at Bonneville are around 1,000 per day and holding steady, Wagner reported. In terms of juvenile migration, yearlings are winding down, with substantial but dwindling numbers. Meanwhile subyearling counts are increasing, a transition that normally occurs this time of year.

c. Power System. The whole system is in a state of overgeneration spill, Robyn MacKay said. BPA has been load factoring daily. Schedulers and traders are looking for every opportunity to move power until the flows come down.

d. Water Quality. Laura Hamilton (COE) gave a quick overview of recent SYSTDG data linked to the TMT web page. The entire system has been in involuntary spill since May 16 and is expected to remain so into the near future.

8. Next Meeting

The next regularly scheduled TMT meeting will be June 18, with finalizing the meeting notes for May 21 and 28, a Priest Rapids wrap-up of 2008 protection flows, an update on Libby and Hungry Horse with the focus on Libby operations, TMT guidelines, and the standard operations review on the agenda. This summary prepared by consultant and writer Pat Vivian.

<i>Name</i>	<i>Affiliation</i>
Rick Kruger	Oregon
Dave Wills	USFWS
Paul Wagner	NOAA
Dan Feil	COE
Robyn MacKay	BPA
Kyle Dittmer	CRITFC
Bob Buchholz	COE
Shane Scott	PPC
Scott Boyd	COE
Jennifer Miller	Susquehanna
Holli Krebs	JP Morgan
Tim Heizenrader	Centaurus
Bob Diaz	PPM
Tina Lundell	COE
Mike Viles	BPA
John Roache	BOR
Jim Litchfield	Montana
Dan Spear	BPA
Russ George	WMC
Bruce Measure	Montana
Rhonda Whiting	Montana
Steve Hall	COE

<i>Phone:</i>	
Russ Kiefer	Idaho
Dave Benner	FPC
Margaret Filardo	FPC
Russell Langshaw	Grant PUD
Barry Espensen	CBB
Richelle Beck	DRA
Bruce McKay	Consultant
Amy Reese	COE Seattle
Tom Le	Puget Sound Energy
Greg Haller	Nez Perce
Mike Butchko	Powerex
Jason Flory	USFWS Spokane

TECHNICAL MANAGEMENT TEAM

BOR : John Roache / Mary Mellema / Pat McGrane **BPA :** Robyn MacKay / Tony Norris / Scott Bettin
NOAA-F: Paul Wagner / Richard Dominique **USFWS :** David Wills / Steve Haeseker
OR : Rick Kruger / Ron Boyce **ID :** Russ Kiefer
WDFW : Cindy LeFleur **MT :** Jim Litchfield / Brian Marotz
COE: Jim Adams / Cathy Hlebechuk / Bob Buchholz

CONFERENCE CALL

Friday June 6, 2008 2:00 - 3:00

**1125 N.W. Couch Street, Suite 4A34
Portland, Oregon 97209-4142
Map Quest [\[Directions\]](#)**

CONFERENCE PHONE LINE

Conference call line: 203-310-2162; PASS CODE = 4703150

**We have had disruptions on the phone because people are not hitting 'mute' after dial in.
Please MUTE your Phone**

*All members are encouraged to call Robin Gumpert with any issues or concerns they would like to see addressed.
Please e-mail her at robin76@cnnm.net or call her at (503) 248-4703.*

AGENDA

1. Welcome and Introductions
2. Libby Operations - Amy Reese, USACE
[\[SOR-FWS #2\]](#)- Jason Flory, USFWS; Greg Hoffman, USACE 
3. Other

Questions about the meeting may be referred to:

*[Dan Feil](#) at (503) 808-3943, or
[Jim Adams](#) at (503) 808-3938, or
[Cathy Hlebechuk](#) at (503) 808-3942, or
[Bob Buchholz](#) at (503) 808-3945.*

SYSTEM OPERATIONAL REQUEST: FWS #2

TO:	Col. Steven R. Miles	COE-NWD
	Jim Barton	COE-Water Management
	Robert Buccholz	COE-RCC
	David Ponganis	COE-PDD
	Col. Michael McCormick	COE-Seattle District
	J. William McDonald	USBR-Boise Regional Director
	Steven Wright	BPA-Administrator
	Steve Oliver	BPA-PG-5

FROM: Susan Martin, Supervisor, U.S. Fish and Wildlife Service, Upper Columbia Fish and Wildlife Office, on behalf of the Libby BiOp Policy Group

DATE: June 06, 2008

SUBJECT: Phase II - 2008 Libby Dam Releases for Sturgeon and Bull Trout Augmentation Flows

EXISTING CONDITIONS:

- Based on the May final April-August volume runoff forecast of 6.116 million acre-feet, we are within a tier 3 operations year for Kootenai River white sturgeon as defined in the Fish and Wildlife Service's February 2006 Biological Opinion (2006 BiOp) on operations of Libby Dam. The minimum recommended release volume for sturgeon conservation under these circumstances is 1,041 thousand acre-feet.
- The selective withdrawal gate system at Libby Dam became temporarily inoperable on 22 May, 2008.
- Sturgeon augmentation flows began on 01 June with an increase of flow from Libby Dam to full powerhouse capacity for 48 hours (26.6 kcfs), followed by a ramp down to 4 turbines (21.3 kcfs) until present.
- As of 05 June, 2008, the functionality of the system has been restored to near full utility.
- Temperature control is limited to the existing arrangement of gates stacked into place in slots providing water to turbines 1 through 4 (Figure 1).
- There are gates placed into slots 8 and 9, but no gates in slot 10; thus temperature control through unit 5 is limited (drafting through unit 5 equates to drafting the coldest water available to the selective withdrawal system).

- The overall functionality of the selective withdrawal system is sufficient enough that temperature management during full powerhouse flows can likely be accomplished through gate placements in slots servicing units 1 through 4, thus mitigating for potentially negative thermal affects of cold water through unit 5.
- Sonic-tagged F4 females remain in the spawning reach at this time, and males in spawning condition have been caught for hatchery purposes in recent days. It is expected that these biological indicators will remain positive through the proposed flow regime.
- Increasing flow from Libby Dam at this time will allow maintenance of stage at Bonners Ferry (Figure 2 – purple line, right axis) as local inflows recede, in accordance with the desire to achieve the depth attribute in the 2006 BiOp (Table 1).

Gate Elevation	Gate #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
2459	Full Pool														
2409	Top of all gates														
2398	18														
2388	17														
2377	16														
2367	15														
2357	14														
2346	13	6/4	6/4	6/4	6/4	6/4	6/5	6/5	6/5	6/5					
2336	12	6/4	6/4	6/4	6/4	6/4	6/5	6/5	6/5	6/5					
2326	11	6/4	6/4	6/4	6/4	6/4	6/5	6/5	6/5	6/5					
2315	10	5/6	5/7	5/7	5/7	5/8	5/8	5/20	5/21	5/21					
2305	9	5/6	5/7	5/7	5/7	5/8	5/8	5/20	5/21	5/21					
2295	8	5/6	5/6	5/7	5/7	5/8	5/8	5/20	5/21	5/21					
2284	7	5/6	5/6	5/7	5/7	5/8	5/8	5/20	5/21	5/21					
2274	6	5/6	5/6	5/7	5/7	5/8	5/8	5/20	5/21	5/21					
2263	5	5/6	5/6	5/7	5/7	5/8	5/8	5/20	5/21	5/21					
2253	4	5/6	5/6	5/7	5/7	5/8	5/8	5/8	5/21	5/21					
2243	3	5/6	5/6	5/7	5/7	5/7	5/8	5/8	5/20	5/21					
2232	2	5/6	5/6	5/7	5/7	5/7	5/8	5/8	5/20	5/21					
2222	1	5/6	5/6	5/7	5/7	5/7	5/8	5/8	5/20	5/21	5/21				

Figure 1. Selective withdrawal gate placement at Libby Dam as of June 4, 2008.

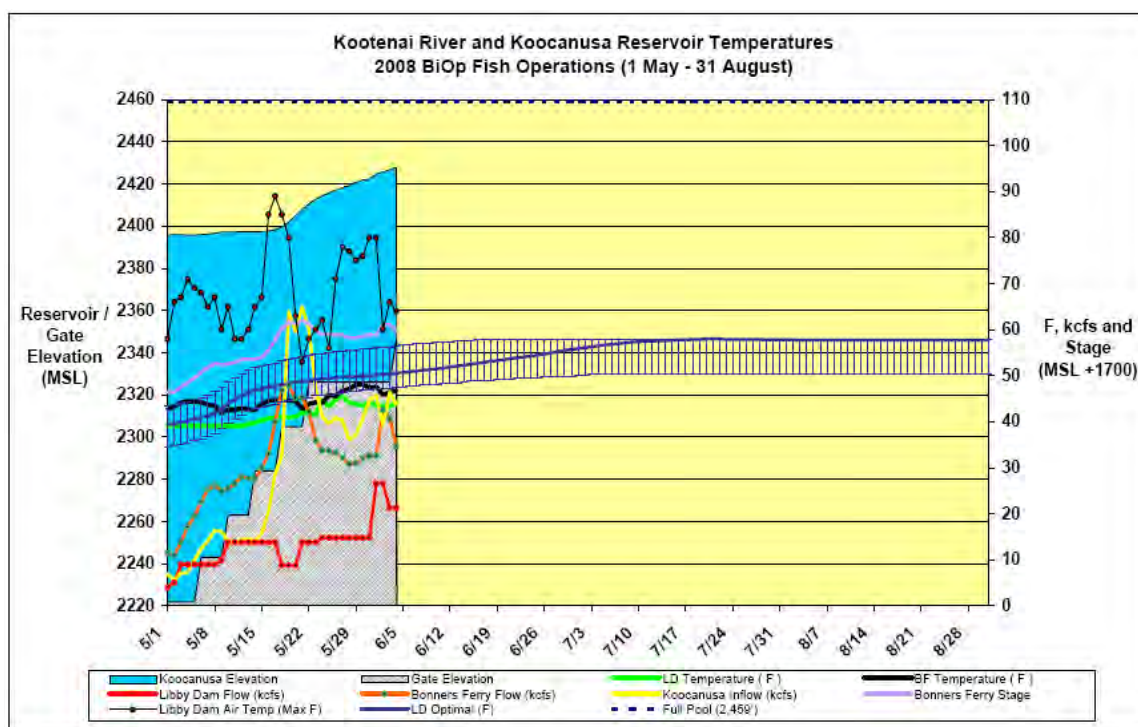


Figure 2. Koocanusa Reservoir and Libby Dam conditions as of June 4, 2008.

Table 1. Kootenai Sturgeon Habitat Attributes from 2006 Libby Dam BiOp.

Attribute	Measure	Objective
Area: RM 141.4 to RM 159.7		
Timing of Augmentation Flows	May into July (triggered by sturgeon spawning condition), in all years except for Tier 1.	Provide conditions for normal migration and spawning behavior.
Duration of Peak Augmentation Flows for Adult Migration and Spawning	Maximize peak augmentation flows with available water for as many days as possible, up to 14 days during the peak of the spawning period with pulses ¹ , in all years except for Tier 1.	Through in-season management, provide peak augmentation flows that lead to a biological benefit for sturgeon to maximize migration and spawning behavior via a normalized hydrograph.
Duration of Post-Peak Augmentation Flows for Incubation and Rearing	Maximize post-peak augmentation flows with available water for as many days as possible, up to 21 days, in all years except for Tier 1.	Through in-season management, provide post-peak augmentation flows that lead to a biological benefit for sturgeon to maximize embryo/free embryo incubation and rearing via descending limb of a normalized hydrograph.
Minimum Flow Velocity ²	3.3 ft/s and greater in approximately 60% of the area of rocky substrate in the area of RM 152 to RM 157 during post-peak augmentation flows.	Provide conditions for spawning and embryo/free embryo incubation and rearing.
Temperature Fluctuation	Optimize temperature releases at Libby Dam to maintain 50 degrees F with no more than a 3.6 degree F drop.	Provide conditions for normal migration and spawning behavior via a normalized thermograph.
Depth at Spawning Sites	Intermittent depths of 16.5 to 23 ft or greater in 60% of	Provide conditions for normal migration and

¹ Kootenai sturgeon spawn on the descending limb of the hydrograph. “Pulses” refer to slight reductions in flow during this two week period to initiate spawning.

² In order to develop an agreed upon estimate and measurement of the areal extent of the velocity and depth attributes, the Action Agencies shall, together with the Service and in collaboration with other involved parties as needed, develop appropriate assessment tools (e.g., hydrologic models) of the braided reach.

	the area of rocky substrate from RM 152 to RM 157 during peak augmentation flows.	spawning behavior.
Substrate Extent/Spawning Structures	Approximately 5 miles of continuous rocky substrate; create conditions/features that improve the likelihood of recruitment success.	Provide habitat for embryo/free embryo incubation and rearing.
Minimum Frequency of Occurrence	<u>To facilitate meeting the attributes via:</u> Powerhouse plus 10,000 cfs flow test: the flow test will occur 3 or more times during the next 10 years; 3 times within the next 4 years if conditions allow, and other options are not available to meet this measure. <u>Habitat improvement projects and other options:</u> through adaptive management, as noted in RPA Action 6, implement the habitat projects and other available options no later than 2010 and continuing through the term of the proposed action.	Maximize the probability that habitat attributes necessary for successful in-river sturgeon spawning and recruitment will be provided multiple times during the term of the proposed action.

SPECIFICATIONS:

Given these conditions, and the gradually warming forebay water temperatures (Figure 3), the technical team recommends the following procedures to continue the sturgeon augmentation operation at Libby Dam for 2008:

1. On Saturday, June 7, 8:00 a.m. Mountain Time, increase Libby Dam discharge from 21,300 cfs (4 turbines) to full powerhouse discharge following 2006 BiOp ramping rates.
2. Maintain full powerhouse discharge for 14 days.
3. Decrease discharge to the summer flat flow level using the remainder of the augmentation volume in a gradually receding shape following 2006 BiOp ramping rates.
4. Sturgeon Flow Planning Technical Team members strongly endorse the more normative summer flows recommended at Libby Dam in the 2008 NOAA Fisheries Biological Opinion.

JUSTIFICATION:

A continued effort is needed to provide spawning and incubation flows to meet habitat attributes for depth, velocity and temperature in the Kootenai River as defined in the 2006 BiOp RPA for Kootenai River white sturgeon (Table 1). USGS has performed modeling of the braided reach with the observed 2006 and 2007 flows, and based on these results, the velocity attribute and the minimum depth attribute of 16.5' intermittently in 60% of the braided reach (RM 152-157) is achievable with flows at Bonners Ferry of roughly 35,000 cfs (as per 2006 and 2007 sturgeon flow data; Figure 4); the maximum depth attribute of 23' may not be achievable without exceeding flood stage of 1,764' MSL.

Temperature is known to be very important in sturgeon spawning behavior in conjunction with flows. Temperature development towards appropriate conditions is approximately 3 weeks later than at this time in 2007 (Figure 3) - sturgeon augmentation operations have been delayed due to these conditions.

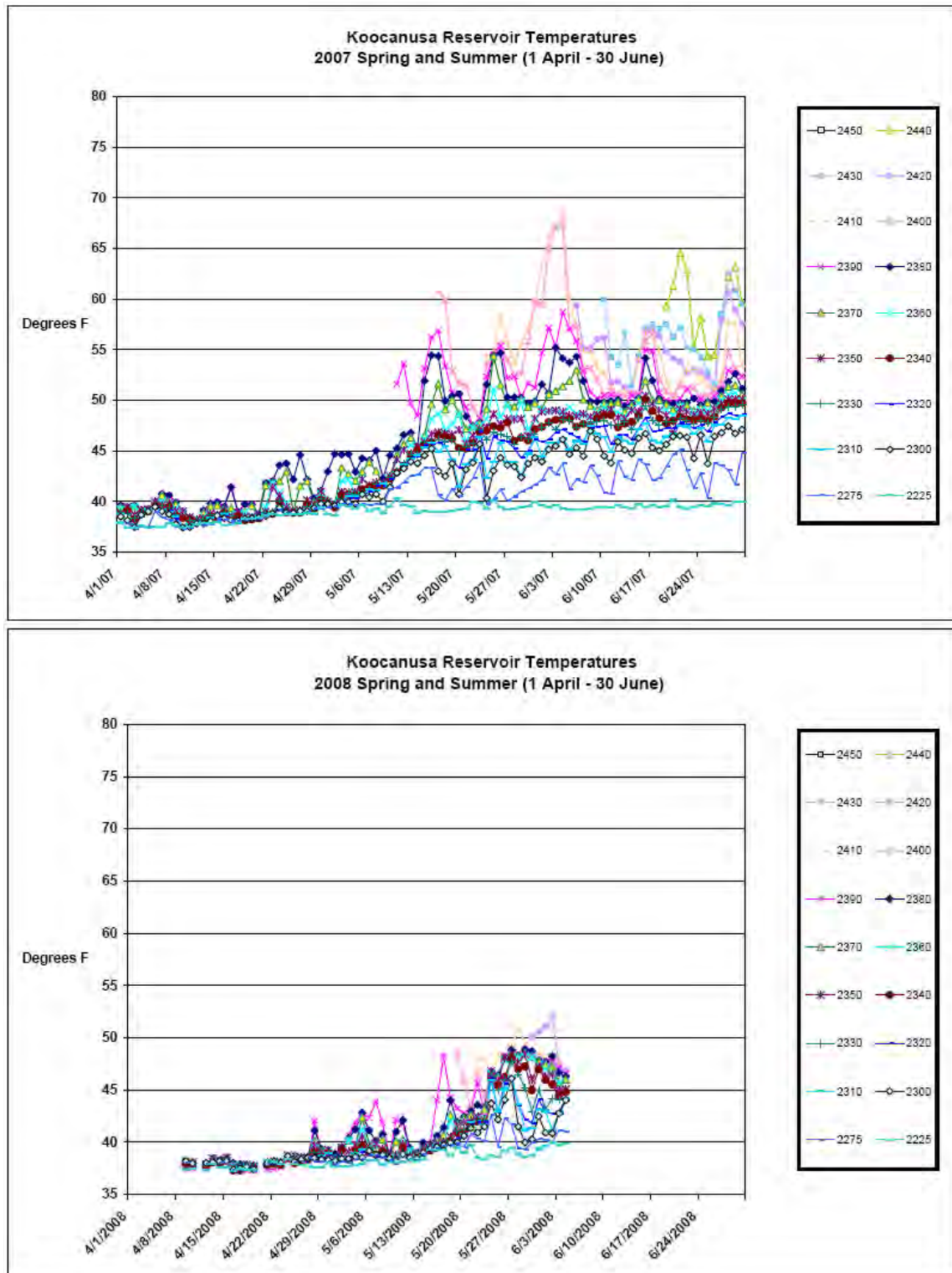


Figure 3. Koocanusa Reservoir forebay temperature in 2007 and 2008 (as of June 4). The reservoir remained isothermic until early May in 2008; mid-column temperature reached and maintained 46.4° F (8° C) by mid-May in 2007 and did not attain this temperature in 2008 until late the last week of May.

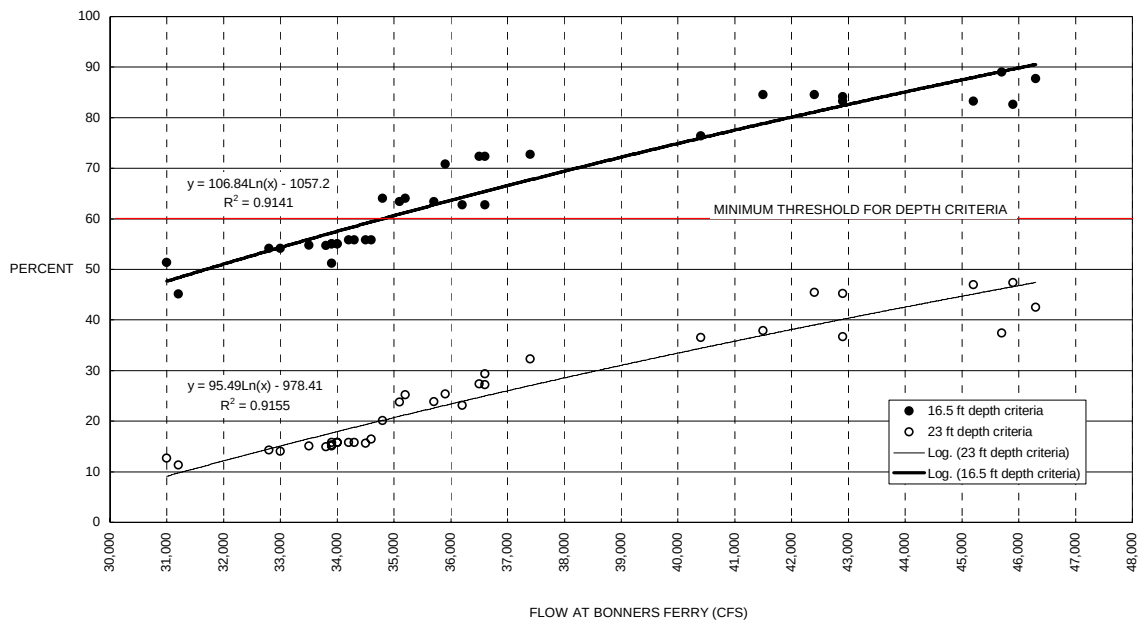


Figure 4. Kootenai River stream flow and percent of longitudinal profile between RM 152 and 157 meeting or exceeding water depths of 16.5 and 23 ft, respectively, during 2006 (May 18 to June 5) and 2007 (May 22 to June 5) white sturgeon spawning flow augmentation (combined data). To ascertain the percentage of depth attribute attained for each flow, choose a flow on the x-axis and follow the vertical gridline to the intersection of the line of fit (either the 16.5 ft or 23 ft).

Given current and predicted 2008 water and biological conditions, the operations described in this document are intended to provide the best opportunity to achieve the attributes listed in Table 1 and to support the sturgeon conservation aquaculture program operated by the Kootenai Tribe of Idaho. The sturgeon managers request the flexibility to allow for in-season management of dam operations in response to evolving conditions. Previous years' operations have shown that conditions at Libby Dam and the Kootenai River can change rapidly; therefore, allowing for flexibility in operations should aid in achieving the sturgeon habitat attributes.

COLUMBIA RIVER REGIONAL FORUM

TECHNICAL MANAGEMENT TEAM

June 6, 2008 Conference Call

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Robin Gumpert

Notes: Erin Halton

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.

Libby Sturgeon Flows/USFWS SOR #2008-2

Amy Reese, COE, reported that the Libby elevation was 2429.3', and was operating with inflows of 41.3 kcfs and outflows of 21.3 kcfs. Jason Flory, USFWS, referred TMT to an SOR posted as a link to the meeting agenda. Flory recalled USFWS' SOR 2008-1 and the subsequent operations up through this week. The recommendation in the new SOR is to ramp the project up to full powerhouse the morning of 6/7 and hold for 14 days, followed by gradual ramp down of remaining sturgeon flows as the transition is made to summer operations. The COE and BPA said that pre-coordination efforts were underway at the project, in anticipation of approval of the SOR. Cathy Hlebechuk, COE, said that depending on reservoir/river and weather conditions during the weeks ahead, the COE might have to increase outflows at some point rather than gradually ramp down flows to reach the end of August elevation of 2439 feet. Greg Hoffman, COE, clarified that selective withdrawal gates would be structurally capable to meet the requested operation.

The following parties weighed in on the proposed SOR:

- NOAA: no objection
- BOR: no objection
- ID: no objection
- CRITFC: no objection

Action/ Next Steps: The COE will shift Libby operations to full power house the morning of 6/7. TMT will discuss the operation at the scheduled 6/18 face-to-face meeting.

Other

Dan Feil, COE, reported on a request for a one-week outage for installation of gate hoist in the two TSW bays at McNary, in anticipation of transport operations later this summer. Spill during the outage would be shifted to non-TSW bays. He added that a contractor is in place and could begin the work on 6/10, if the request is approved. Feil said the request is being vetted through FPOM and FFDRWG; he asked TMT members to weigh in on the request. Russ Kiefer, ID, suggested perhaps delaying installation and Paul Wagner, NOAA, requested time to discuss the request with Gary Fredericks, project biologist for NOAA.

Action/Next Steps: Dan Feil will contact TMT members via email (and/or phone, if necessary) on 6/9, to follow up on this item. TMT will revisit this item as necessary.

**Columbia River Regional Forum
Technical Management Team Conference Call
June 6, 2008**

1. Introduction

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

2. Libby Operations – SOR 2008-FWS-2

Amy Reese (COE Seattle) gave an update on Libby operations. The current reservoir elevation is 2,429.3 feet, with average inflows of 41.3 kcfs. Outflows are 21.3 kcfs, running 4 units.

Discussion moved to the SOR submitted by USFWS May 28. At that time, USFWS realized that a failure incident on Libby Dam involving the crane that allows temperature control could affect sturgeon releases. Earlier this week, the damaged boom was replaced, making temperature control of Libby releases possible again. For a sturgeon managers' conference call yesterday, Amy Reese put together a series of scenarios. The sturgeon managers discussed the options and reached unanimous agreement on a recommendation to return to full powerhouse as soon as possible and maintain at that outflow for the next 14 days. That is the essence of today's SOR. At the end of the 14 days, the remainder of the sturgeon volume should be used to taper flows down gradually to summer levels. This SOR ties up the previously open-ended nature of the requested sturgeon operation.

Slot 10 at Libby Dam still can't hold selective withdrawal gates because of damage from the crane collapse, Greg Hoffman (COE Libby) reported. Fourteen days of full powerhouse would pass approximately 852 kaf, leaving 187 kaf of the sturgeon volume remaining, Cathy Hlebechuk (COE) estimated. She cautioned TMT that, while the COE will try to decrease flows effectively, flows may remain at powerhouse capacity to manage the rate of refill. Nothing mechanically would prohibit implementation of today's SOR. BPA and the COE were prepared to implement the SOR beginning tomorrow morning, unless TMT objected. NOAA, Idaho, BOR and CRITFC did not object.

3. McNary Dam Gate Hoist

A new operational issue has come up, Dan Feil (COE) reported. Next week, the COE is planning to begin work to install a gate hoist on the second

TSW at McNary Dam. Installing gate hoists on the TSW bays will allow the bays to be opened and closed for the transport operations scheduled to begin later this summer as part of the Fish Operations Plan. While the TSWs will be shut off during the outage, spill levels won't be reduced, Feil emphasized. The contractor plans to begin the gate hoist installation on Tuesday, June 10. Work will continue for about a week, which will require an outage of the two TSW bays. However, instead of shutting spill off, the volume will be shifted to other bays across the spillway. The current spill proportion at McNary is 40%, excluding involuntary spill and that proportion will continue through this outage.

Plans for the outage had already been vetted by FPOM and FFDRWG prior to today's call. Feil polled TMT members on the line. NOAA preferred to wait until Monday, June 9, before deciding whether to object. Idaho questioned the benefits and timing of doing the installation next week, but didn't raise a formal objection. No other TMT members weighed in on this issue today. Feil will contact them on Monday to discuss the issue further.

4. Next Meeting

The next regularly scheduled TMT meeting will be June 18, with a possible conference call before then. This summary prepared by consultant and writer Pat Vivian.

<i>Name</i>	<i>Affiliation</i>
Greg Hoffman	COE Libby Dam
Jason Flory	USFWS
Kyle Dittmer	CRITFC
Robyn MacKay	BPA
Jim Adams	COE
Paul Wagner	NOAA
Russ Kiefer	Idaho
John Roache	BOR
Cathy Hlebechuk	COE
Amy Reese	COE Seattle
Dan Feil	COE

GUIDELINES FOR TECHNICAL MANAGEMENT TEAM

~~March~~~~April~~[May](#) 2003~~8~~

I. Introduction

The National Marine Fisheries Service's (NMFS) Biological Opinion on the "Reinitiation of Consultation on Operation of the Federal Columbia River Power System (FCRPS), Including the Juvenile Fish Transportation Program, and 19 Bureau of Reclamation Projects in the Columbia Basin", dated December 21, 2000, and the U.S. Fish and Wildlife Service's (USFWS) Biological Opinion on the "Effects to Listed Species from Operations of the FCRPS", dated December 20, 2000, call for the utilization of a Technical Management Team (TMT) to advise the operating agencies on dam and reservoir operations, thus optimizing passage conditions for juvenile and adult anadromous salmonids and resident fish. These guidelines are adopted in accordance with those Opinions.

The TMT is one of several technical teams within the Columbia River Regional Forum established by the NMFS, USFWS, the U.S. Army Corps of Engineers (COE), the U.S. Bureau of Reclamation (BOR), and the Bonneville Power Administration (BPA). The Regional Forum provides for regional discussion and recommendation on the operation and configuration of the FCRPS. Its goal is to develop consensus among the various members on these recommendations. The TMT's mission is specifically to ensure broad technical participation and use of the best available technical information, and to encourage consensus in recommendations on operating the FCRPS. When consensus is not achieved, the TMT ensures that the basis for participants' recommendations and Federal decisions is fully explained and documented. In such situations, questions can be elevated to the Implementation Team (IT) for resolution if requested by a TMT member.

The TMT operates under the Guidelines and Procedures approved November 7, 2002, for the Columbia River Regional Implementation Forum. The following more specific guidelines supplement the Forum's procedures for TMT operations. As the Forum procedures are refined, these guidelines may be revised.

II. Scope

The focus of the TMT is to implement the NMFS and USFWS Biological Opinions on operation of the FCRPS while considering the provisions of (and effects on) the Northwest Power Planning Council's (NPPC) Fish and Wildlife Program, other biological opinions, State and Tribal plans and programs, and other relevant operational requirements. Specifically, the TMT should explore operational scenarios under the Biological Opinions that would serve to protect other fish and wildlife in the Columbia River Basin and promote coordination and consistency with these other objectives to the extent possible.

III. Membership

See Forum Guidelines and Procedures.

The members and alternates of the TMT are listed in Attachment 1. Initial confirmation of membership, designation of representatives, and any changes in representation should be provided in writing to the NMFS Implementation Team Chair.

IV. Roles and Responsibilities

The TMT is responsible for discussion and recommendations to the Action Agencies (COE, BOR, and BPA) on hydro system flows at designated control points and expected project operations to implement the Biological Opinions for listed salmon, steelhead, sturgeon, and bull trout species within the Columbia River basin while taking into account the needs of (and effects on) other listed and non-listed species.

The TMT is to engage in joint decision-making that works toward consensus within the recognized authorities and management jurisdictions of its participating members. Specifically, the State, Tribal and Federal salmon managers (Salmon Managers) recommend the flows at the control points that best meet the needs of salmon and steelhead. These may include specific project operations, but this does not foreclose TMT consideration of alternative means of providing the same operating condition. Other participants (e.g., Resident Fish Managers) may also make recommendations consistent with the scope of these guidelines. The [procedure vehicle](#) for communicating a river or project condition, which will benefit salmon/steelhead/sturgeon migrations or resident fish, is [verbally at a TMT meeting, or through a written](#) system operational request (SOR). See Section V(d). All parties submitting SORs are encouraged to coordinate with other participants to the extent possible.

The Salmon Managers are responsible for the management of anadromous [fish and Resident Managers are responsible for](#) ~~and~~ resident fish in the basin. The COE and BOR are responsible for decisions on operation of the FCRPS projects; and the COE and BPA are responsible for Treaty agreements with Canada regarding storage in Canada and other Treaty-related matters. The participation of other affected sovereign and non-sovereign entities is intended to ensure that decision-makers have the broadest possible source of information upon which to base their decisions. All parties are encouraged to succinctly present their views regarding biological or operational recommendations. Input can provide alternative options for the appropriate authority to consider when making their decisions, but authority for implementing the request remains with the appropriate agencies.

The TMT is a year-round technical body. Winter planning will consist of development of a Water Management Plan [and updating the 1-year and 5-year Biological Opinion Implementation Plans](#). ~~and updating the 1-year and 5-year Biological Opinion Implementation Plans~~. The purpose of in-season management is to implement the Biological Opinions and the Water Management Plan. Post-season review will consist of a review of the previous year's activities and performances, and updating operating procedures

as needed. Throughout the year the COE, BOR, and BPA will coordinate planning and operational decisions that may affect salmon and other species, through the TMT (e.g., yearly agreement on Non-Treaty Storage Agreement spring/summer operation, the 5-year Idaho Power Company Agreement, and the Libby/Arrow swap). The COE, BOR and BPA will specifically use the TMT as a forum for the coordination and consideration of potential effects on salmon, steelhead and other species prior to a final decision. Idaho Power Company, the Mid-Columbia Public Utility Districts, and other non-sovereign participants are also encouraged to use TMT as a forum for coordination of planning and operational decisions throughout the year.

V. Operating Procedures

a) Annual Water Management Plan

The Annual Water Management Plan is developed and used by the action agencies as a decision-making and management tool, and includes all known or typical operations that will be implemented throughout the year based on prior years' gathered data.

Each year, the TMT will discuss and make suggested updates ~~finalizeto thean~~ annual Water Management Plan based on the run-off forecast and other factors specific to that year. A draft Fall/Winter Update will be available for review in October. A draft Spring/Summer Update will be available for review within two weeks of the March final forecast. ~~A draft Fall/Winter update will be available for review in October.~~ All interested parties may participate in the plan development and will be given an opportunity to review and comment on the draft plan. In general, the Salmon Managers will provide information on salmon and salmon operational requirements to be included in the plan. Resident Fish Managers will provide information on resident fish needs. The Action Agencies will provide information on reservoir status; planned project operations (and operating constraints); flow forecasts; anticipated special operations for research and other purposes; turbine outage and maintenance plans; and operating agreements and contracts that may affect annual operations. Priorities among competing needs should be resolved within the context of the scope of these guidelines. The Action Agencies will be responsible for finalizing the Water Management Plan.

b) Summary of In-season Management Key Events

Monday	Begin implementing operations based on last week's decision.
Tuesday (9 a.m.)	The COE posts or otherwise distributes flow projections to TMT members for Priest Rapids, McNary and Lower Granite, along with resulting reservoir operations and elevations, and current dissolved gas and temperature data. Salmon Managers will post or otherwise distribute biological information.
Tuesday (4 p.m.)	TMT Members (or others) submit SORs to the Reservoir Control Center (RCC) and send (fax) hard copies to TMT members and participants. The Salmon Managers will fax SORs to all project owners for which an operation is requested. The Salmon Managers

will post the SOR to the Fish Passage Center web page, or an electronic version of any SOR will be simultaneously sent to the Corps so that it is available for the TMT web page as soon as possible.

Wednesday 9 a.m. The TMT meets bi-weekly, with conference call on alternate weeks if needed, to discuss in-season management data and SORs, document operations, and recommend the following two week's operations. By the start of the meeting all SORs and the disposition will be posted to the TMT web page for use by members who can not attend the meeting. If necessary, the TMT frames the issue(s) to be raised to the IT before 12 a.m.

Thursday (3 p.m.) In case of impasse, disputes are resolved through the IT.

Friday (noon) In the event an issue has been raised to the IT and the IT has resolved the issue, the Action Agencies document the operation to begin on the following Monday. This decision, and rationale, should be documented before the next regularly scheduled TMT meeting and sent to the Chair of TMT, who will post it on the TMT homepage

Friday (p.m.) The TMT draft meeting notes are posted or otherwise distributed

c) In-season Management Data

The TMT will use the National Weather Service's River Forecast Center's (RFC)

~~streamflow~~[stream flow](#)

forecast for the Columbia River Basin, [the Corps' volume inflow forecast for the Libby and Dworshak projects, and the Bureau of Reclamation's inflow forecast for the Grand Coulee and Hungry Horse projects.](#) ~~These~~[This](#) forecasts (and the basic reservoir operations that are assumed when producing it) ~~is~~[are](#) the official forecasts to be used for the decision-making

process. The BPA forecast may be used as supplemental information. The COE will use the RFC forecast to prepare flow projections for Priest Rapids, McNary and Lower Granite. By 9 a.m. (or as early as possible after that) on Tuesday, the flow projections and resulting reservoir operations will be distributed to TMT members. The Action Agencies will also provide dissolved gas, temperature, and other physical monitoring data available for decision-making.

During the anadromous fish migration period, the Salmon Managers will provide biological information on salmon and steelhead numbers, migration timing and condition, for both the current year and historically. The USFWS, and others as appropriate, will provide relevant information on other fish and wildlife resources. These data will be posted by NMFS and USFWS each Tuesday by 4 p.m.

d) System Operational Requests

System Operational Requests (SOR) are an in-season management tool for bringing forth requests to deviate from or refine planned, existing or BiOp recommended operations. These requests should be intended to provide an operation that is biologically necessary to protect listed and other aquatic species of concern and human health and safety given in-season fluctuations of the hydro system and the status of the fish.

TMT members may provide recommendations to the TMT on hydro system flows and/or expected project operations consistent with the scope of these guidelines. Non-TMT members may also submit recommendations for consideration. These recommendations will be in the form of system operational requests (SORs) stating the flow objective(s) sought (e.g., keep flows at a location X in a W-Z range). Expected project operations may also be added. Each SOR will include the biological or operational basis for the recommendation. Each SOR will also indicate whether the request is to implement a NMFS or USFWS Biological Opinion, NPPC Fish and Wildlife Program, or other Federal, State or Tribal program. Non-TMT members may also submit SORs for special operating purposes for TMT consideration.

All SORs will be submitted by 4:00 p.m. on Tuesday via fax or email to the action agencies, or any other project owner that may be required to deliver a specified operation, provided that the flow projections were available by 9 a.m. that day. Electronic submittal through the Proposal Submission/Review form on the TMT homepage may also be used. TMT and public comments on the proposal can also be appended via the Internet form. If proposals are incomplete, or are not received in time for sufficient review, the TMT may choose to delay action, but lack of an SOR should not preclude discussion of relevant matters at the meeting.

SORs should list members of the agencies who have reviewed and support the request. The SOR will be outlined for description on the TMT SOR disposition web page. The SOR will be posted to the agenda prior to the start of the TMT meeting so that telephone participants can follow the conversation at the meeting.

When an SOR has been properly submitted, the Action Agencies (COE, BOR, BPA) should be prepared at TMT to describe the operational options and implications of meeting the request. Any decision to implement or not implement will be recorded in the official meeting materials and summarized at the end of those minutes. The meeting facilitator will clarify the decision at the meeting to assure that the record accurately reflects the disposition of the request.

e) Meetings

Between the last week of March and up to at least August 31 the TMT will meet every other Wednesday, or more often if necessary, to conduct in-season management. All meetings will be open to interested parties. A conference line will be available for those who cannot attend in person.

An agenda for each meeting will be distributed at least two business days prior to the meeting (the preceding Monday in the case of the regularly scheduled in-season meetings).

The principal purpose of the meetings and standing agenda items during the migration season is to review the status of the preceding week's SOR and operations, biological data, new SORs and project operating data, and to reach informed decisions on FCRPS operations for the following week(s). As other items are brought forward for TMT consideration they will be added to the agenda for future discussion, but lack of an agenda item will not preclude discussion of relevant matters at the meeting.

The discussion of SORs at TMT meetings will include distinct segments dealing with both biological and operational issues. Biological questions associated with an SOR will be addressed to ensure that the biological basis of the SOR is clear, and to allow the TMT to consider any additional biological information that may be made available at the meeting. The meeting will then move on to a discussion of operational alternatives to meet the SOR by the Action Agencies and members of the TMT. The Chair should ensure that adequate time is allotted to each segment of the meeting.

The Chair should also ensure that the support or opposition of each TMT member for an SOR and a final decision by the Action Agencies are noted in the minutes.

f) Meeting Facilitation

Meetings of the TMT will be facilitated by an impartial facilitator, who will allow all TMT members the opportunity to fully participate in discussions and to help members resolve conflicts as they arise. The meeting facilitator shall serve at the will of all members of TMT and should have skills as a meeting manager and conflict resolver. The meeting facilitator's role will include:

- Assisting the chair and TMT members in the development of meeting agendas
- Managing the meeting agenda in a balanced and even-handed fashion so that all members have an opportunity to speak and be heard
- Helping the group stay focused on the agenda and prioritize items that need action and further discussion
- Enforcing the ground rules established by the TMT (see Attachment 2)
- Helping the group reach consensus on decisions
- Helping the group resolve conflicts that may arise in the course of discussion
- Highlighting any decisions the group may reach
- Working with members between meetings to clarify issues, resolve disputes, and seek potential solutions to impasses
- Assisting members to develop opportunities that may resolve conflicts and increase the overall satisfaction with the TMT process in the long term, and
- Helping the group maintain a sense of humor

TMT members may give feedback directly to the facilitator or to the chair if they have concerns with the manner by which meetings are managed. The facilitator will be replaced if, after discussion with the facilitator, members believe he or she is not remaining impartial in the delivery of service.

g) In-season Decision making

On Wednesday morning the TMT will decide on operations for the following two weeks based on the available information and any pending SORs. These operating decisions will be made by consensus whenever possible. Consensus is defined as lack of a strong objection that would prompt one or more of the TMT members to elevate the issue to the IT. In the absence of consensus, the decision will be referred to the IT in accordance with the dispute resolution process described below. Objections to decisions that are not strong enough to prompt one or more TMT members to elevate the issue will be documented in the minutes of the TMT meeting.

If the recommendation is to implement the SOR or a modification of the SOR as agreed to by the TMT, then this should be documented for the minutes, and the SOR (and the Biological Opinion, Council's program or other plan on which it is based) may form the basis for the decision. If the Action Agencies do not agree to implement an SOR, they will describe for the minutes both the intended operation and the basis for that decision. The basis for the decision could include that the proposed operation is inconsistent with a Biological Opinion, that operational constraints prevent its implementation, that cost is prohibitive beyond that already included in the so-called "Fish Cap", or that the Action Agency has an alternative view of the best available biological information. If the Action Agencies believe the best available biological information supports a position that differs from that of the SOR sponsor(s), then the explanation should acknowledge this difference and should provide a clear, succinct written explanation of the data, analysis or judgment that supports the alternative view. In each case, a full explanation will be provided by the Action Agencies to the TMT and IT.

The final decision made by the COE and BOR on the following week's operation will be made at the meeting whenever possible. The TMT will try to avoid making decisions outside the established process. In-season FCRPS operating decisions made through a separate process, such as those under the Action Agencies' authority for emergency situations, will be explained and documented as soon as possible, but in any case no later than Friday following the TMT meeting.

h) Documentation

Minutes of all TMT meetings will be prepared in accordance with Regional Forum procedures and approved by the TMT. Every effort will be made to post the draft meeting notes to the TMT home page by close of business Friday afternoon following the meeting. Comments will be due by the following meeting.

The TMT meeting minutes will be used to keep track of the decision-making process. The minutes will include the substance of any SOR, the decision, the decision-maker, and the basis for the decision. The minutes will also include: (1) documentation of consensus or a listing of members objecting to an SOR or a final decision; and (2) when an SOR is not implemented, clear documentation of the reasons provided by the decision-maker.

If a decision is elevated to the IT and therefore not made at the weekly TMT meeting, documentation on the final decision reached will be provided separately in writing by the IT and will include the same information noted above. This documentation of the decision

should happen before the next regularly scheduled TMT meeting and be sent to the Chair of TMT, who will post it on the TMT homepage.

Each member is responsible for reviewing the decision documentation and the meeting minutes, especially if the agency he/she represents is one of the decision-makers.

Interested parties may request copies of the minutes if they have no access to the TMT homepage.

i) Distribution of Information

Meeting notes and material will be made available to TMT participants throughout the year. These materials will be made available through the TMT home page and may be reproduced on other Internet home pages where available. They will also be faxed to members and participants that request such services. Regular mail may be used for materials when time permits.

j) Public Participation

The public may comment on an issue at the end of the discussion on that issue or at the end of the meeting, based on the discretion of the group and the facilitator. They may also comment outside the TMT process.

VI. TMT Dispute Resolution Process

In the event that the TMT is unable to reach consensus on an issue, any member may request that the item be elevated to the IT. Every effort should be made to ensure that the issue is raised at least one week in advance of the monthly IT meeting (first Thursday of the month).

If, despite all efforts to the contrary, the TMT finds at its Wednesday morning meeting that it is unable to resolve a weekly in-season management dispute, and the decision cannot await consideration at the next regularly scheduled meeting, the IT will meet by conference call at 3:00 on Thursday afternoon. In the event that such a meeting is necessary, the TMT will prepare, and agree to, a brief summary of the issue(s) and a short description of the opposing viewpoints. This document will be given to the IT members by 1:00 p.m. on Thursday afternoon.

The IT will attempt to reach consensus. If the IT is unable to reach a consensus, then a final recommendation will be made by the appropriate agency (e.g., NMFS or USFWS if the issue relates to implementation of a Biological Opinion, or NPPC if the issue relates to implementation of the Fish and Wildlife Program). The member with the authority for the action will then make the decision and explain the rationale in writing. Whether IT acts by consensus, or the member with the authority for the action makes the decision to resolve a TMT conflict, it should be documented before the next regularly scheduled TMT meeting and sent to the Chair of TMT, who will post it on the TMT homepage.

VII. Emergency Meetings

Any member of the TMT may call a meeting when an emergency situation requires action of the TMT.

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ATTACHMENT 1

TECHNICAL MANAGEMENT TEAM (TMT) MEMBERS

ORGANIZATION - REPRESENTATIVE / ALTERNATES

National Marine Fisheries Service - Paul Wagner / Richard Dominigue
U. S. Army Corps of Engineers - Jim Adams / Cathy Hlebechuk / Bob Buchholz
Bonneville Power Administration – Robyn MacKay / Tony Norris / Scott Bettin
U.S. Bureau of Reclamation - John Roache / Mary Mellema / Pat McGrane
U.S. Fish & Wildlife Service - David Wills / Steve Haeseker
State of Washington - Cindy LaFleur
State of Oregon – Rick Kruger / Ron Boyce
State of Idaho - Russ Kiefer
State of Montana - Jim Litchfield / Brian Marotz

Confederated Tribes of the Colville Indian Reservation - ~~Jerry Marco~~ / ~~Kirk Truscott~~ Sheri Sears
Shoshone-Bannock Tribes of Fort Hall - Keith Kutchins

ELIGIBLE ORGANIZATION WITH NO OFFICIALLY DESIGNATED MEMBER - CONTACT PERSON / ALTERNATE

Kootenai Tribe of Idaho
Confederated Tribes of the Umatilla Indian Reservation
Confederated Salish & Kootenai Tribes of the Flathead Reservation
Confederated Tribes of the Warm Springs Reservation
Yakama Indian Nation
Shoshone-Paiute Tribes of Duck Valley Reservation
Burns Paiute Tribe
Kalispel Tribe
Spokane Tribe of Indians - Deanne Pavlik / Chuck Lee
Nez Perce Tribe of Idaho - Dave Statler / Greg Haller
Coeur d'Alene Tribe of Idaho
State of Alaska

ATTACHMENT 2.

MEETING GROUND-RULES & EXPECTATIONS

The following meeting ground-rules and expectations were discussed and agreed to by all members present at the _____ meeting of the TMT. They may be changed at the request of the Team.

I. Ground-Rules

Meetings will start and end on time unless members agree otherwise.

Members will treat each other with respect, which includes:

- ° Separating the people from the problem
- ° Listening to what others have to say
- ° No interruptions
- ° Monitoring your own air time
- ° No side conversations
- ° Letting the facilitator or chair know when you would like to speak
- ° Being mindful of tone when speaking directly to others
- ° Remembering that members are representing agencies, not stating individual opinions

During in-season management, each member agency/group will have one primary TMT representative who will sit at the table during meetings. Alternates or technical resource staff are welcome to attend and provide input through their primary representative, or when called on by TMT members. All are welcome to sit at the table --with preference for the primary representatives if there is a space limitation.

Any issues elevated from the TMT to the Implementation Team (IT) will be thoroughly discussed at TMT. TMT members will agree on the "issue statement" for the IT. The TMT Chair will then present the issue at the IT meeting. All TMT members will brief their agency IT representative on the issue prior to the IT meeting.

The meeting facilitator may make process comments in order to keep the group on track, focused and productive.

II. Expectations

Members are expected to come prepared to participate in the meetings. This means, they will provide necessary input to discussions and work towards making decisions based on information they have gathered from their respective agencies between meetings.

Members are expected to keep their agencies and staff apprised of decisions or important meeting discussions.

Members are expected to attend all meetings or send an alternate. If an alternate attends the

meeting, a briefing, both before and after the meeting, is expected of the primary representative. The group will not revisit information for members who were absent from or late to a meeting.

Members are expected to follow through on assignments to which they agree, or are given by other team members, on a timely basis. This includes requests for comments on information or reports from other team agencies.

The meeting facilitator is expected to keep the group on track and focused on agenda items. Additionally, the group expects the facilitator to assure equal participation, highlight any decisions that the group reaches, and maintain a sense of humor.

People who listen in on the telephone are expected to “sign-in” as they call in on the conference telephone line.

Group members may contact the facilitator at any time to make process suggestions, raise concerns or request additional assistance at or between meetings.

TECHNICAL MANAGEMENT TEAM

BOR : John Roache / Mary Mellema / Pat McGrane **BPA :** Robyn MacKay / Tony Norris / Scott Bettin
NOAA-F: Paul Wagner / Richard Dominique **USFWS :** David Wills / Steve Haeseker
OR : Rick Kruger / Ron Boyce **ID :** Russ Kiefer
WDFW : Cindy LeFleur **MT :** Jim Litchfield / Brian Marotz
COE: Jim Adams / Cathy Hlebechuk / Bob Buchholz

CONFERENCE CALL

Wednesday June 11, 2008 9:00 - 10:30

1125 N.W. Couch Street, Suite 4A34
Portland, Oregon 97209-4142
Map Quest [\[Directions\]](#)

CONFERENCE PHONE LINE

Conference call line: 203-310-2162; PASS CODE = 4703150

**We have had disruptions on the phone because people are not hitting 'mute' after dial in.
Please MUTE your Phone**

*All members are encouraged to call Robin Gumpert with any issues or concerns they would like to see addressed.
Please e-mail her at robin76@cnnm.net or call her at (503) 248-4703.*

AGENDA

1. Welcome and Introductions
2. McNary TSW Gate Hoist Installation

[\[McNary Spill Pattern\]](#) 

[\[McNary Spill Pattern for Spillway Bay 20 outage\]](#) 

3. Bonneville Screen Status
4. Other

Questions about the meeting may be referred to:

[Dan Feil](#) at (503) 808-3943, or

[Jim Adams](#) at (503) 808-3938, or

[Cathy Hlebechuk](#) at (503) 808-3942, or

[Bob Buchholz](#) at (503) 808-3945.

Table MCN-X. McNary 2008 Spill Pattern for fish passage. (Discharge at forebay elevation 339)

(10 June 2008)

SPILLWAY BAY (Gate Opening in feet)																						Total Stops	Total Spill (kcfs)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		
																		5.5	5.2	1		11.7	20.7
																	1	5.5	5.2	1		12.7	22.7
																	1	5.5	5.2	1	1	13.7	24.7
																	1	5.5	5.2	2	1	14.7	26.6
																	2	5.5	5.2	2	1	15.7	28.5
																1	2	5.5	5.2	2	1	16.7	30.5
																2	2	5.5	5.2	2	1	17.7	32.4
														1		2	2	5.5	5.2	2	1	18.7	34.4
														1		2	2	5.5	5.2	2	2	19.7	36.3
														2		2	2	5.5	5.2	2	2	20.7	38.2
														2	1	2	2	5.5	5.2	2	2	21.7	40.2
														2	2	2	2	5.5	5.2	2	2	22.7	42.1
													1	2	2	2	2	5.5	5.2	2	2	23.7	44.1
													2	2	2	2	2	5.5	5.2	2	2	24.7	46.0
										1		2		2	2	2	2	5.5	5.2	2	2	25.7	48.0
										2		2		2	2	2	2	5.5	5.2	2	2	26.7	49.9
								1		2		2		2	2	2	2	5.5	5.2	2	2	27.7	51.9
								2		2		2		2	2	2	2	5.5	5.2	2	2	28.7	53.8
								2	1	2		2		2	2	2	2	5.5	5.2	2	2	29.7	55.8
								2	2	2		2		2	2	2	2	5.5	5.2	2	2	30.7	57.7
								2	2	2		2	1	2	2	2	2	5.5	5.2	2	2	31.7	59.7
								2	2	2		2	2	2	2	2	2	5.5	5.2	2	2	32.7	61.6
								2	2	2	1	2	2	2	2	2	2	5.5	5.2	2	2	33.7	63.6
								2	2	2	2	2	2	2	2	2	2	5.5	5.2	2	2	34.7	65.5
							1		2	2	2	2	2	2	2	2	2	5.5	5.2	2	2	35.7	67.5

1) TSWs in bays 19 and 20 have flow equivalent to 5.5 and 5.2 stops at forebay elevation of 339, respectively.

2) Raise gates for TSWs approximately 3 to 5 feet above water surface to ensure free surface and debris passage.

Table MCN-X. McNary 2008 Spill Pattern for fish passage. (Discharge at forebay elevation 339)

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		
						2		2	2	2	2	2	2	2	2	2	2	5.5	5.2	2	2	36.7	69.4
2.5	2	3.5				2		2		2		2	1	2		2	2	5.5	5.2	2	2	37.7	70.9
2.5	2	3.5				2		2		2		2	1	2	1	2	2	5.5	5.2	2	2	38.7	72.9
2.5	2	3.5			1	2		2		2		2	1	2	1	2	2	5.5	5.2	2	2	39.7	74.9
2.5	2	3.5			1	2		2	1	2		2	1	2	1	2	2	5.5	5.2	2	2	40.7	76.9
2.5	2	3.5			1	2		2	1	2	1	2	1	2	1	2	2	5.5	5.2	2	2	41.7	78.9
2.5	2	3.5			1	2	1	2	1	2	1	2	1	2	1	2	2	5.5	5.2	2	2	42.7	80.9
2.5	2	3.5	1		1	2	1	2	1	2	1	2	1	2	1	2	2	5.5	5.2	2	2	43.7	82.9
2.5	2	3.5	1		1	2	1	2	1	2	1	2	1	2	1	2	2	5.5	5.2	2.5	2.5	44.7	84.6
2.5	2	3.5	1		1	2	1	2	1	2	1	2	2	2	1	2	2	5.5	5.2	2.5	2.5	45.7	86.5
2.5	2	3.5	1		1	2	1	2	1	2	1	2	2	2	2	2	2	5.5	5.2	2.5	2.5	46.7	88.4
2.5	2	3.5	1		2	2	1	2	1	2	1	2	2	2	2	2	2	5.5	5.2	2.5	2.5	47.7	90.3
2.5	2	3.5	1		2	2	1	2	2	2	1	2	2	2	2	2	2	5.5	5.2	2.5	2.5	48.7	92.2
2.5	2	3.5	1		2	2	1	2	2	2	2	2	2	2	2	2	2	5.5	5.2	2.5	2.5	49.7	94.1
2.5	2	3.5	1		2	2	2	2	2	2	2	2	2	2	2	2	2	5.5	5.2	2.5	2.5	50.7	96.0
2.5	2	3.5	2		2	2	2	2	2	2	2	2	2	2	2	2	2	5.5	5.2	2.5	2.5	51.7	97.9
2.5	2.5	4	2		2	2	2	2	2	2	2	2	2	2	2	2	2	5.5	5.2	2.5	2.5	52.7	99.5
2.5	2.5	4	2		2	2	2	2	2	2	2	2	2	2	2	2	2	5.5	5.2	3.5	2.5	53.7	101.2
2.5	2.5	4	2		2	2	2	2	2	2	2	2	2	2	2.5	2.5	3	5.5	5.2	2.5	2.5	54.7	102.9
2.5	2.5	4	2		2	2.5	2	2	2	2.5	2	2	2	2	2.5	2.5	3	5.5	5.2	2.5	2.5	55.7	104.6
2.5	2.5	4	2		2	2.5	2	2	2	2.5	2	2	2	2.5	2.5	2.5	3	5.5	5.2	2.5	2.5	56.2	105.5
2.5	2.5	4	2		2	2.5	2	2.5	2	2.5	2	2.5	2	2.5	2.5	2.5	3	5.5	5.2	2.5	2.5	57.2	107.2
2.5	2.5	4	2		2.5	2.5	2	2.5	2.5	2.5	2	2.5	2	2.5	2.5	2.5	3	5.5	5.2	2.5	2.5	58.2	108.9
2.5	2.5	4	2		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2	2.5	2.5	2.5	3	5.5	5.2	2.5	2.5	59.2	110.6
2.5	2.5	4	3		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2	2.5	2.5	2.5	3	5.5	5.2	2.5	2.5	60.2	112.3

- 1) TSWs in bays 19 and 20 have flow equivalent to 5.5 and 5.2 stops at forebay elevation of 339, respectively.
- 2) Raise gates for TSWs approximately 3 to 5 feet above water surface to ensure free surface and debris passage.

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		
2.5	2.5	4	3		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3	5.5	5.2	3	2.5	61.2	114.0	
2.5	2.5	4	3		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3	3	3	5.5	5.2	3	2.5	62.2	115.7
2.5	2.5	4.5	3		2.5	2.5	2.5	2.5	2.5	3	2.5	2.5	2.5	2.5	3	3	3	5.5	5.2	3	2.5	63.2	117.3
2.5	2.5	4.5	3		2.5	3	2.5	3	2.5	3	2.5	3	2.5	2.5	3	3	3	5.5	5.2	3	2.5	64.7	119.9
2.5	2.5	4.5	3		3	3	2.5	3	2.5	3	2.5	3	2.5	3	3	3	3	5.5	5.2	3	2.5	65.7	121.6
2.5	2.5	5	3		3	3	2.5	3	3	3	2.5	3	2.5	3	3	3	3	5.5	5.2	3	2.5	66.7	123.2
2.5	2.5	5	3		3	3	3	3	3	3	3	3	2.5	3	3	3	3	5.5	5.2	3	2.5	67.7	124.9
3	3	5	3		3	3	3	3	3	3	3	3	2.5	3	3	3	3	5.5	5.2	3	2.5	68.7	126.6
3	3	5	3		3	3	3	3	3	3	3	3	3	3	3	3	3	5.5	5.2	3	3	69.7	128.3
3	3	5	3		3	3	3	3	3	3	3	3	3	3	3	3	4	5.5	5.2	3	3	70.7	129.9
3	3	5	3		3	3	3	3	3	3	3	3	3	3	3	4	4	5.5	5.2	3	3	71.7	131.5
3	4	5	3		3	3	3	3	3	3	3	3	3	3	3	4	4	5.5	5.2	3	3	72.7	133.1
4	4	5	3		3	3	3	3	3	3	3	3	3	3	3	4	4	5.5	5.2	3	3	73.7	134.7
4	4	5	3		3	4	3	3	3	3	3	3	3	3	3	4	4	5.5	5.2	3	3	74.7	136.3
4	4	5	3		3	4	3	3	3	4	3	3	3	3	3	4	4	5.5	5.2	3	3	75.7	137.9
4	4	5	3		3	4	3	3	3	4	3	3	3	4	3	4	4	5.5	5.2	3	3	76.7	139.5
4	4	5	3		3	4	3	4	3	4	3	3	3	4	3	4	4	5.5	5.2	3	3	77.7	141.1
4	4	5	3		3	4	3	4	3	4	3	4	3	4	3	4	4	5.5	5.2	3	3	78.7	142.7
4	4	5	3		4	4	3	4	3	4	3	4	3	4	3	4	4	5.5	5.2	3	3	79.7	144.3
4	4	5	3		4	4	3	4	4	4	3	4	3	4	3	4	4	5.5	5.2	3	3	80.7	145.9
4	4	5	3		4	4	3	4	4	4	4	4	3	4	3	4	4	5.5	5.2	3	3	81.7	147.5
4	4	5	3		4	4	4	4	4	4	4	4	3	4	3	4	4	5.5	5.2	3	3	82.7	149.1
4	4	5	3		4	4	4	4	4	4	4	4	3	4	4	4	4	5.5	5.2	3	3	83.7	150.7
4	4	5	4		4	4	4	4	4	4	4	4	3	4	4	4	4	5.5	5.2	3	3	84.7	152.3
4	4	5	4		4	4	4	4	4	4	4	4	3	4	4	4	4	5.5	5.2	4	3	85.7	153.9

- 1) TSWs in bays 19 and 20 have flow equivalent to 5.5 and 5.2 stops at forebay elevation of 339, respectively.
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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		
4	4	5	4		4	4	4	4	4	4	4	4	4	4	4	4	4	5.5	5.2	4	3	86.7	155.5
4	4	5	4		4	4	4	4	4	4	4	4	4	4	4	4	5	5.5	5.2	4	3	87.7	157.1
4	4	5	4		4	4	4	4	4	4	4	4	4	4	4	5	5	5.5	5.2	4	3	88.7	158.7
4	5	5	4		4	4	4	4	4	4	4	4	4	4	4	5	5	5.5	5.2	4	3	89.7	160.3
5	5	5	4		4	4	4	4	4	4	4	4	4	4	4	5	5	5.5	5.2	4	3	90.7	161.9
5	5	5	4		4	5	4	4	4	4	4	4	4	4	4	5	5	5.5	5.2	4	3	91.7	163.5
5	5	5	4		4	5	4	4	4	5	4	4	4	4	4	5	5	5.5	5.2	4	3	92.7	165.1
5	5	5	4		4	5	4	4	4	5	4	4	4	5	4	5	5	5.5	5.2	4	3	93.7	166.7
5	5	5	4		4	5	4	5	4	5	4	4	4	5	4	5	5	5.5	5.2	4	3	94.7	168.3
5	5	5	4		4	5	4	5	4	5	4	5	4	5	4	5	5	5.5	5.2	4	3	95.7	169.9
5	5	5	4		4	5	4	5	4	5	4	5	4	5	4	5	5	5.5	5.2	5	3	96.7	171.5
5	5	5	4		5	5	4	5	4	5	4	5	4	5	4	5	5	5.5	5.2	5	3	97.7	173.1
5	5	5	4		5	5	4	5	5	5	4	5	4	5	4	5	5	5.5	5.2	5	3	98.7	174.7
5	5	5	4		5	5	4	5	5	5	5	5	4	5	4	5	5	5.5	5.2	5	3	99.7	176.3
5	5	5	4		5	5	5	5	5	5	5	5	4	5	4	5	5	5.5	5.2	5	3	100.7	177.9
5	5	5	4		5	5	5	5	5	5	5	5	4	5	5	5	5	5.5	5.2	5	3	101.7	179.5
5	5	5	5		5	5	5	5	5	5	5	5	4	5	5	5	5	5.5	5.2	5	3	102.7	181.1
5	5	6	5		5	5	5	5	5	5	5	5	4	5	5	5	5	5.5	5.2	5	3	103.7	182.7
5	5	6	5		5	5	5	5	5	5	5	5	5	5	5	5	5	5.5	5.2	5	3	104.7	184.3
5	5	6	5		5	5	5	5	5	5	5	5	5	5	5	5	6	5.5	5.2	5	3	105.7	185.9
5	5	6	5		5	5	5	5	5	5	5	5	5	5	5	6	6	5.5	5.2	5	3	106.7	187.5
5	5	6	5		5	5	5	5	5	5	5	5	5	6	5	6	6	5.5	5.2	5	3	107.7	189.1
5	5	6	5		5	5	5	5	5	5	5	6	5	6	5	6	6	5.5	5.2	5	3	108.7	190.7
5	5	6	5		5	5	5	5	5	5	5	6	5	6	6	6	6	5.5	5.2	5	3	109.7	192.3
5	5	6	6		5	5	5	5	5	5	5	6	5	6	6	6	6	5.5	5.2	5	3	110.7	193.9

- 1) TSWs in bays 19 and 20 have flow equivalent to 5.5 and 5.2 stops at forebay elevation of 339, respectively.
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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		
5	5	6	6		5	5	5	5	5	5	5	6	5	6	6	6	6	5.5	5.2	6	3	111.7	195.5
5	5	6	6		5	5	5	5	5	5	6	6	5	6	6	6	6	5.5	5.2	6	3	112.7	197.1
5	5	6	6		5	5	5	5	5	5	5	6	6	6	6	6	6	5.5	5.2	6	4	113.7	198.7
5	5	6	6		5	5	5	5	5	5	6	6	6	6	6	6	6	5.5	5.2	6	4	114.7	200.3
5	5	6	6		5	5	5	5	5	5	6	6	6	6	6	6	6	5.5	5.2	6	4	114.7	200.3
5	5	6	6		5	6	5	5	5	6	6	6	6	6	6	6	6	5.5	5.2	6	4	116.7	203.5
5	5	6	6		5	6	5	5	5	6	6	6	6	6	6	6	6	5.5	5.2	6	4	116.7	203.5
5	5	6	6		6	6	5	6	5	6	6	6	6	6	6	6	6	5.5	5.2	6	4	118.7	206.7
5	5	6	6		6	6	5	6	5	6	6	6	6	6	6	6	6	5.5	5.2	6	4	118.7	206.7
5	5	6	6		6	6	6	6	6	6	6	6	6	6	6	6	6	5.5	5.2	6	4	120.7	209.9
6	6	6	6		6	6	6	6	6	6	6	6	6	6	6	6	6	5.5	5.2	6	4	122.7	213.1
6	6	6	6		6	6	6	6	6	6	6	6	6	6	6	6	6	5.5	5.2	6	4	122.7	213.1
6	6	6	6		6	6	6	6	6	7	6	7	6	7	6	7	6	5.5	5.2	6	4	126.7	219.5
6	6	6	6		6	7	6	7	6	7	6	7	6	7	6	7	6	5.5	5.2	6	4	128.7	222.7
6	6	7	6		6	7	6	7	6	7	6	7	6	7	6	7	6	5.5	5.2	6	4	129.7	224.3
7	6	7	6		6	7	6	7	6	7	6	7	6	7	6	7	7	5.5	5.2	6	4	131.7	227.5
7	6	7	6		6	7	6	7	6	7	6	7	7	7	7	7	7	5.5	5.2	6	4	133.7	230.7
7	6	7	6		6	7	6	7	7	7	7	7	7	7	7	7	7	5.5	5.2	6	4	135.7	233.9
7	6	7	6		7	7	7	7	7	7	7	7	7	7	7	7	7	5.5	5.2	6	4	137.7	237.1
7	7	7	7		7	7	7	7	7	7	7	7	7	7	7	7	7	5.5	5.2	6	4	139.7	240.3
7	7	7	7		7	7	7	7	7	7	7	7	7	7	7	7	7	5.5	5.2	6	6	141.7	243.5
7	7	7	7		7	7	7	7	7	7	7	7	7	7	7	7	7	5.5	5.2	6	6	141.7	243.5
7	7	7	7		7	7	7	7	7	7	7	7	7	7	7	7	7	5.5	5.2	6	6	141.7	243.5
7	7	7	7		7	7	7	7	7	7	7	7	7	7	7	7	7	5.5	5.2	6	6	141.7	243.5

- 1) TSWs in bays 19 and 20 have flow equivalent to 5.5 and 5.2 stops at forebay elevation of 339, respectively.
- 2) Raise gates for TSWs approximately 3 to 5 feet above water surface to ensure free surface and debris passage.

Table MCN-XX. McNary 2008 Spill Pattern for fish passage. (Discharge at forebay elevation 339)

(10 June 2008)

SPILLWAY BAY (Gate Opening in feet)																						Total Stops	Total Spill (kcfs)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		
																		5.5	5.2	1		11.7	20.7
																	1	5.5	5.2	1		12.7	22.7
																	1	5.5	5.2	1	1	13.7	24.7
																	1	5.5	5.2	2	1	14.7	26.6
																	2	5.5	5.2	2	1	15.7	28.5
																1	2	5.5	5.2	2	1	16.7	30.5
																2	2	5.5	5.2	2	1	17.7	32.4
														1		2	2	5.5	5.2	2	1	18.7	34.4
														1		2	2	5.5	5.2	2	2	19.7	36.3
														2		2	2	5.5	5.2	2	2	20.7	38.2
														2	1	2	2	5.5	5.2	2	2	21.7	40.2
														2	2	2	2	5.5	5.2	2	2	22.7	42.1
													1	2	2	2	2	5.5	5.2	2	2	23.7	44.1
													2	2	2	2	2	5.5	5.2	2	2	24.7	46.0
										1		2		2	2	2	2	5.5	5.2	2	2	25.7	48.0
										2		2		2	2	2	2	5.5	5.2	2	2	26.7	49.9
								1		2		2		2	2	2	2	5.5	5.2	2	2	27.7	51.9
								2		2		2		2	2	2	2	5.5	5.2	2	2	28.7	53.8
								2	1	2		2		2	2	2	2	5.5	5.2	2	2	29.7	55.8
								2	2	2		2		2	2	2	2	5.5	5.2	2	2	30.7	57.7
								2	2	2		2	1	2	2	2	2	5.5	5.2	2	2	31.7	59.7
								2	2	2		2	2	2	2	2	2	5.5	5.2	2	2	32.7	61.6
								2	2	2	1	2	2	2	2	2	2	5.5	5.2	2	2	33.7	63.6
								2	2	2	2	2	2	2	2	2	2	5.5	5.2	2	2	34.7	65.5
						1		2	2	2	2	2	2	2	2	2	2	5.5	5.2	2	2	35.7	67.5

- 1) TSWs in bays 19 and 20 have flow equivalent to 5.5 and 5.2 stops at forebay elevation of 339, respectively.
- 2) Raise gates for TSWs approximately 3 to 5 feet above water surface to ensure free surface and debris passage.

Table MCN-XX. McNary 2008 Spill Pattern for fish passage. (Discharge at forebay elevation 339)

(10 June 2008)

SPILLWAY BAY (Gate Opening in feet)																						Total Stops	Total Spill (kcfs)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		
						2		2	2	2	2	2	2	2	2	2	2	5.5	5.2	2	2	36.7	69.4
2.5	2	3.5				2		2		2		2	1	2		2	2	5.5	5.2	2	2	37.7	70.9
2.5	2	3.5				2		2		2		2	1	2	1	2	2	5.5	5.2	2	2	38.7	72.9
2.5	2	3.5				2		2	1	2		2	1	2	1	2	2	5.5	5.2	2	2	39.7	74.9
2.5	2	3.5				2		2	1	2	1	2	1	2	1	2	2	5.5	5.2	2	2	40.7	76.9
2.5	2	3.5				2	1	2	1	2	1	2	1	2	1	2	2	5.5	5.2	2	2	41.7	78.9
2.5	2	3.5				2	1	2	1	2	1	2	1	2	1	2	2	5.5	5.2	2.5	2.5	42.7	80.6
2.5	2	3.5				2	1	2	1	2	1	2	2	2	1	2	2	5.5	5.2	2.5	2.5	43.7	82.5
2.5	2	3.5				2	1	2	1	2	1	2	2	2	2	2	2	5.5	5.2	2.5	2.5	44.7	84.4
2.5	2	3.5				2	1	2	2	2	1	2	2	2	2	2	2	5.5	5.2	2.5	2.5	45.7	86.3
2.5	2	3.5				2	1	2	2	2	2	2	2	2	2	2	2	5.5	5.2	2.5	2.5	46.7	88.2
2.5	2	3.5				2	2	2	2	2	2	2	2	2	2	2	2	5.5	5.2	2.5	2.5	47.7	90.1
2.5	2.5	4				2	2	2	2	2	2	2	2	2	2	2	2	5.5	5.2	2.5	2.5	48.7	91.7
2.5	2.5	4				2	2	2	2	2	2	2	2	2	2	2	2	5.5	5.2	3.5	2.5	49.7	93.4
2.5	2.5	4				2	2	2	2	2	2	2	2	2	2.5	2.5	3	5.5	5.2	2.5	2.5	50.7	95.1
2.5	2.5	4				2.5	2	2	2	2.5	2	2	2	2	2.5	2.5	3	5.5	5.2	2.5	2.5	51.7	96.8
2.5	2.5	4				2.5	2	2	2	2.5	2	2	2	2.5	2.5	2.5	3	5.5	5.2	2.5	2.5	52.2	97.7
2.5	2.5	4				2.5	2	2.5	2.5	2.5	2	2.5	2	2.5	2.5	2.5	3	5.5	5.2	2.5	2.5	53.7	100.2
2.5	2.5	4				2.5	2.5	2.5	2.5	2.5	2.5	2.5	2	2.5	2.5	2.5	3	5.5	5.2	2.5	2.5	54.7	101.9
2.5	2.5	4				2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3	5.5	5.2	3	2.5	55.7	103.6
2.5	2.5	4				2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3	3	3	5.5	5.2	3	2.5	56.7	105.3
2.5	2.5	4.5				2.5	2.5	2.5	2.5	3	2.5	2.5	2.5	2.5	3	3	3	5.5	5.2	3	2.5	57.7	107.0
2.5	2.5	4.5				3	2.5	2.5	2.5	3	2.5	3	2.5	2.5	3	3	3	5.5	5.2	3	2.5	58.7	108.7
2.5	2.5	4.5				3	2.5	3	2.5	3	2.5	3	2.5	3	3	3	3	5.5	5.2	3	2.5	59.7	110.4
2.5	2.5	5				3	2.5	3	3	3	2.5	3	2.5	3	3	3	3	5.5	5.2	3	2.5	60.7	112.0

- 1) TSWs in bays 19 and 20 have flow equivalent to 5.5 and 5.2 stops at forebay elevation of 339, respectively.
- 2) Raise gates for TSWs approximately 3 to 5 feet above water surface to ensure free surface and debris passage.

Table MCN-XX. McNary 2008 Spill Pattern for fish passage. (Discharge at forebay elevation 339)

(10 June 2008)

SPILLWAY BAY (Gate Opening in feet)																						Total Stops	Total Spill (kcfs)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		
2.5	2.5	5				3	3	3	3	3	3	3	2.5	3	3	3	3	5.5	5.2	3	2.5	61.7	113.7
3	3	5				3	3	3	3	3	3	3	2.5	3	3	3	3	5.5	5.2	3	2.5	62.7	115.4
3	3	5				3	3	3	3	3	3	3	3	3	3	3	3	5.5	5.2	3	3	63.7	117.1
3	3	5				3	3	3	3	3	3	3	3	3	3	3	4	5.5	5.2	3	3	64.7	118.7
3	3	5				3	3	3	3	3	3	3	3	3	3	4	4	5.5	5.2	3	3	65.7	120.3
3	4	5				3	3	3	3	3	3	3	3	3	3	4	4	5.5	5.2	3	3	66.7	121.9
4	4	5				3	3	3	3	3	3	3	3	3	3	4	4	5.5	5.2	3	3	67.7	123.5
4	4	5				4	3	3	3	3	3	3	3	3	3	4	4	5.5	5.2	3	3	68.7	125.1
4	4	5				4	3	3	3	4	3	3	3	3	3	4	4	5.5	5.2	3	3	69.7	126.7
4	4	5				4	3	3	3	4	3	3	3	4	3	4	4	5.5	5.2	3	3	70.7	128.3
4	4	5				4	3	4	3	4	3	3	3	4	3	4	4	5.5	5.2	3	3	71.7	129.9
4	4	5				4	3	4	3	4	3	4	3	4	3	4	4	5.5	5.2	3	3	72.7	131.5
4	4	5				4	3	4	4	4	3	4	3	4	3	4	4	5.5	5.2	3	3	73.7	133.1
4	4	5				4	3	4	4	4	4	4	3	4	3	4	4	5.5	5.2	3	3	74.7	134.7
4	4	5				4	4	4	4	4	4	4	3	4	3	4	4	5.5	5.2	3	3	75.7	136.3
4	4	5				4	4	4	4	4	4	4	3	4	4	4	4	5.5	5.2	3	3	76.7	137.9
4	4	5				4	4	4	4	4	4	4	3	4	4	4	4	5.5	5.2	4	3	77.7	139.5
4	4	5				4	4	4	4	4	4	4	4	4	4	4	4	5.5	5.2	4	3	78.7	141.1
4	4	5				4	4	4	4	4	4	4	4	4	4	4	5	5.5	5.2	4	3	79.7	142.7
4	4	5				4	4	4	4	4	4	4	4	4	4	5	5	5.5	5.2	4	3	80.7	144.3
4	5	5				4	4	4	4	4	4	4	4	4	4	5	5	5.5	5.2	4	3	81.7	145.9
5	5	5				4	4	4	4	4	4	4	4	4	4	5	5	5.5	5.2	4	3	82.7	147.5
5	5	5				5	4	4	4	4	4	4	4	4	4	5	5	5.5	5.2	4	3	83.7	149.1
5	5	5				5	4	4	4	5	4	4	4	4	4	5	5	5.5	5.2	4	3	84.7	150.7
5	5	5				5	4	4	4	5	4	4	4	5	4	5	5	5.5	5.2	4	3	85.7	152.3

- 1) TSWs in bays 19 and 20 have flow equivalent to 5.5 and 5.2 stops at forebay elevation of 339, respectively.
- 2) Raise gates for TSWs approximately 3 to 5 feet above water surface to ensure free surface and debris passage.

Table MCN-XX. McNary 2008 Spill Pattern for fish passage. (Discharge at forebay elevation 339)

(10 June 2008)

SPILLWAY BAY (Gate Opening in feet)																						Total Stops	Total Spill (kcfs)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		
5	5	5				5	4	5	4	5	4	4	4	5	4	5	5	5.5	5.2	4	3	86.7	153.9
5	5	5				5	4	5	4	5	4	5	4	5	4	5	5	5.5	5.2	4	3	87.7	155.5
5	5	5				5	4	5	4	5	4	5	4	5	4	5	5	5.5	5.2	5	3	88.7	157.1
5	5	5				5	4	5	5	5	4	5	4	5	4	5	5	5.5	5.2	5	3	89.7	158.7
5	5	5				5	4	5	5	5	5	5	4	5	4	5	5	5.5	5.2	5	3	90.7	160.3
5	5	5				5	5	5	5	5	5	5	4	5	4	5	5	5.5	5.2	5	3	91.7	161.9
5	5	5				5	5	5	5	5	5	5	4	5	5	5	5	5.5	5.2	5	3	92.7	163.5
5	5	6				5	5	5	5	5	5	5	4	5	5	5	5	5.5	5.2	5	3	93.7	165.1
5	5	6				5	5	5	5	5	5	5	5	5	5	5	5	5.5	5.2	5	3	94.7	166.7
5	5	6				5	5	5	5	5	5	5	5	5	5	5	6	5.5	5.2	5	3	95.7	168.3
5	5	6				5	5	5	5	5	5	5	5	5	5	6	6	5.5	5.2	5	3	96.7	169.9
5	5	6				5	5	5	5	5	5	5	5	6	5	6	6	5.5	5.2	5	3	97.7	171.5
5	5	6				5	5	5	5	5	5	6	5	6	5	6	6	5.5	5.2	5	3	98.7	173.1
5	5	6				5	5	5	5	5	5	6	5	6	6	6	6	5.5	5.2	5	3	99.7	174.7
5	5	6				5	5	5	5	5	5	6	5	6	6	6	6	5.5	5.2	6	3	100.7	176.3
5	5	6				5	5	5	5	5	6	6	5	6	6	6	6	5.5	5.2	6	3	101.7	177.9
5	5	6				5	5	5	5	5	5	6	6	6	6	6	6	5.5	5.2	6	4	102.7	179.5
5	5	6				5	5	5	5	5	6	6	6	6	6	6	6	5.5	5.2	6	4	103.7	181.1
5	5	6				5	5	5	5	5	6	6	6	6	6	6	6	5.5	5.2	6	4	103.7	181.1
5	5	6				6	5	5	5	6	6	6	6	6	6	6	6	5.5	5.2	6	4	105.7	184.3
5	5	6				6	5	6	5	6	6	6	6	6	6	6	6	5.5	5.2	6	4	106.7	185.9
5	5	6				6	5	6	5	6	6	6	6	6	6	6	6	5.5	5.2	6	4	106.7	185.9
5	5	6				6	6	6	6	6	6	6	6	6	6	6	6	5.5	5.2	6	4	108.7	189.1
5	5	6				6	6	6	6	6	6	6	6	6	6	6	6	5.5	5.2	6	4	108.7	189.1
6	6	6				6	6	6	6	6	6	6	6	6	6	6	6	5.5	5.2	6	4	110.7	192.3

- 1) TSWs in bays 19 and 20 have flow equivalent to 5.5 and 5.2 stops at forebay elevation of 339, respectively.
- 2) Raise gates for TSWs approximately 3 to 5 feet above water surface to ensure free surface and debris passage.

Table MCN-XX. McNary 2008 Spill Pattern for fish passage. (Discharge at forebay elevation 339)

(10 June 2008)

SPILLWAY BAY (Gate Opening in feet)																						Total Stops	Total Spill (kcfs)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		
6	6	6				6	6	6	6	6	6	6	6	6	6	6	6	5.5	5.2	6	4	110.7	192.3
6	6	6				6	6	6	6	6	6	6	6	6	6	6	6	5.5	5.2	6	4	110.7	192.3
6	6	6				6	6	6	6	6	6	6	6	6	6	6	6	5.5	5.2	6	4	110.7	192.3
6	6	6				6	6	6	6	7	6	7	6	7	6	7	6	5.5	5.2	6	4	114.7	198.7
6	6	6				6	6	6	6	7	6	7	6	7	6	7	6	5.5	5.2	6	4	114.7	198.7
6	6	6				7	6	7	6	7	6	7	6	7	6	7	6	5.5	5.2	6	4	116.7	201.9
6	6	7				7	6	7	6	7	6	7	6	7	6	7	6	5.5	5.2	6	4	117.7	203.5
6	6	7				7	6	7	6	7	6	7	6	7	6	7	6	5.5	5.2	6	4	117.7	203.5
7	6	7				7	6	7	6	7	6	7	6	7	6	7	7	5.5	5.2	6	4	119.7	206.7
7	6	7				7	6	7	6	7	6	7	6	7	6	7	7	5.5	5.2	6	4	119.7	206.7
7	6	7				7	6	7	6	7	6	7	7	7	7	7	7	5.5	5.2	6	4	121.7	209.9
7	6	7				7	7	7	7	7	7	7	7	7	7	7	7	5.5	5.2	6	4	124.7	214.7
7	7	7				7	7	7	7	7	7	7	7	7	7	7	7	5.5	5.2	6	4	125.7	216.3
7	7	7				7	7	7	7	7	7	7	7	7	7	7	7	5.5	5.2	6	6	127.7	219.5
7	7	7				7	7	7	7	7	7	7	7	7	7	7	7	5.5	5.2	6	6	127.7	219.5
7	7	7				7	7	7	7	7	7	7	7	7	7	7	7	5.5	5.2	6	6	127.7	219.5
7	7	7				7	7	7	7	7	7	7	7	7	7	7	7	5.5	5.2	6	6	127.7	219.5
7	7	7				7	7	7	7	7	7	7	7	7	7	7	7	5.5	5.2	6	6	127.7	219.5
7	7	7				7	7	7	7	7	7	7	7	7	7	7	7	5.5	5.2	6	6	127.7	219.5
7	7	7				7	7	7	7	7	7	7	7	7	7	7	7	5.5	5.2	6	6	127.7	219.5
7	7	7				7	7	7	7	7	7	7	7	7	7	7	7	5.5	5.2	6	6	127.7	219.5
7	7	7				7	7	7	7	7	7	7	7	7	7	7	7	5.5	5.2	6	6	127.7	219.5
7	7	7				7	7	7	7	7	7	7	7	7	7	7	7	5.5	5.2	6	6	127.7	219.5
7	7	7				7	7	7	7	7	7	7	7	7	7	7	7	5.5	5.2	6	6	127.7	219.5
7	7	7				7	7	7	7	7	7	7	7	7	7	7	7	5.5	5.2	6	6	127.7	219.5

- 1) TSWs in bays 19 and 20 have flow equivalent to 5.5 and 5.2 stops at forebay elevation of 339, respectively.
- 2) Raise gates for TSWs approximately 3 to 5 feet above water surface to ensure free surface and debris passage.

Table MCN-Z. McNary 2008 Spill Pattern for fish passage with SB 20 off. (Discharge at forebay elevation 339)

(11 June 2008)

SPILLWAY BAY (Gate Opening in feet)																						Total Stops	Total Spill (kcfs)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		
																1	2	5.5		2	1	11.5	21.4
																2	2	5.5		2	1	12.5	23.3
														1		2	2	5.5		2	1	13.5	25.3
														1		2	2	5.5		2	2	14.5	27.2
														2		2	2	5.5		2	2	15.5	29.1
														2	1	2	2	5.5		2	2	16.5	31.1
														2	2	2	2	5.5		2	2	17.5	33.0
													1	2	2	2	2	5.5		2	2	18.5	35.0
													2	2	2	2	2	5.5		2	2	19.5	36.9
										1		2		2	2	2	2	5.5		2	2	20.5	38.9
										2		2		2	2	2	2	5.5		2	2	21.5	40.8
								1		2		2		2	2	2	2	5.5		2	2	22.5	42.8
								2		2		2		2	2	2	2	5.5		2	2	23.5	44.7
								2	1	2		2		2	2	2	2	5.5		2	2	24.5	46.7
								2	2	2		2		2	2	2	2	5.5		2	2	25.5	48.6
								2	2	2		2	1	2	2	2	2	5.5		2	2	26.5	50.6
								2	2	2		2	2	2	2	2	2	5.5		2	2	27.5	52.5
								2	2	2	1	2	2	2	2	2	2	5.5		2	2	28.5	54.5
								2	2	2	2	2	2	2	2	2	2	5.5		2	2	29.5	56.4
						1		2	2	2	2	2	2	2	2	2	2	5.5		2	2	30.5	58.4
						2		2	2	2	2	2	2	2	2	2	2	5.5		2	2	31.5	60.3
				1		2		2	2	2	2	2	2	2	2	2	2	5.5		2	2	32.5	62.3
				2		2		2	2	2	2	2	2	2	2	2	2	5.5		2	2	33.5	64.2
2.5	2	3.5		2		2		2		2		2	1	2		2	2	5.5		2	2	34.5	65.7
2.5	2	3.5		2		2		2		2		2	1	2	1	2	2	5.5		2	2	35.5	67.7

- 1) TSWs in bays 19 and 20 have flow equivalent to 5.5 and 5.2 stops at forebay elevation of 339, respectively.
- 2) Raise gates for TSWs approximately 3 to 5 feet above water surface to ensure free surface and debris passage.

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SPILLWAY BAY (Gate Opening in feet)																						Total Stops	Total Spill (kcfs)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		
2.5	2	3.5		2	1	2		2		2		2	1	2	1	2	2	5.5		2	2	36.5	69.7
2.5	2	3.5		2	1	2		2	1	2		2	1	2	1	2	2	5.5		2	2	37.5	71.7
2.5	2	3.5		2	1	2		2	1	2	1	2	1	2	1	2	2	5.5		2	2	38.5	73.7
2.5	2	3.5		2	1	2	1	2	1	2	1	2	1	2	1	2	2	5.5		2	2	39.5	75.7
2.5	2	3.5	1	2	1	2	1	2	1	2	1	2	1	2	1	2	2	5.5		2	2	40.5	77.7
2.5	2	3.5	1	2	1	2	1	2	1	2	1	2	1	2	1	2	2	5.5		2.5	2.5	41.5	79.4
2.5	2	3.5	1	2	1	2	1	2	1	2	1	2	2	2	1	2	2	5.5		2.5	2.5	42.5	81.3
2.5	2	3.5	1	2	1	2	1	2	1	2	1	2	2	2	2	2	2	5.5		2.5	2.5	43.5	83.2
2.5	2	3.5	1	2	2	2	1	2	1	2	1	2	2	2	2	2	2	5.5		2.5	2.5	44.5	85.1
2.5	2	3.5	1	2	2	2	1	2	2	2	1	2	2	2	2	2	2	5.5		2.5	2.5	45.5	87.0
2.5	2	3.5	1	2	2	2	1	2	2	2	2	2	2	2	2	2	2	5.5		2.5	2.5	46.5	88.9
2.5	2	3.5	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	5.5		2.5	2.5	47.5	90.8
2.5	2	3.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	5.5		2.5	2.5	48.5	92.7
2.5	2.5	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	5.5		2.5	2.5	49.5	94.3
2.5	2.5	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	5.5		3.5	2.5	50.5	96.0
2.5	2.5	4	2	2	2	2	2	2	2	2	2	2	2	2	2.5	2.5	3	5.5		2.5	2.5	51.5	97.7
2.5	2.5	4	2	2	2	2.5	2	2	2	2.5	2	2	2	2	2.5	2.5	3	5.5		2.5	2.5	52.5	99.4
2.5	2.5	4	2	2.5	2	2.5	2	2	2	2.5	2	2	2	2.5	2.5	2.5	3	5.5		2.5	2.5	53.5	101.1
2.5	2.5	4	2	2.5	2	2.5	2	2.5	2	2.5	2	2.5	2	2.5	2.5	2.5	3	5.5		2.5	2.5	54.5	102.8
2.5	2.5	4	2	2.5	2.5	2.5	2	2.5	2.5	2.5	2	2.5	2	2.5	2.5	2.5	3	5.5		2.5	2.5	55.5	104.5
2.5	2.5	4	2	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2	2.5	2.5	2.5	3	5.5		2.5	2.5	56.5	106.2
2.5	2.5	4	3	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2	2.5	2.5	2.5	3	5.5		2.5	2.5	57.5	107.9
2.5	2.5	4	3	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3	5.5		3	2.5	58.5	109.6
2.5	2.5	4	3	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3	3	3	5.5		3	2.5	59.5	111.3
2.5	2.5	4.5	3	2.5	2.5	2.5	2.5	2.5	2.5	3	2.5	2.5	2.5	2.5	3	3	3	5.5		3	2.5	60.5	113.0

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2.5	2.5	4.5	3	2.5	2.5	3	2.5	2.5	2.5	3	2.5	3	2.5	2.5	3	3	3	5.5		3	2.5	61.5	114.7
2.5	2.5	4.5	3	3	2.5	3	2.5	3	2.5	3	2.5	3	2.5	2.5	3	3	3	5.5		3	2.5	62.5	116.4
2.5	2.5	4.5	3	3	3	3	2.5	3	2.5	3	2.5	3	2.5	3	3	3	3	5.5		3	2.5	63.5	118.1
2.5	2.5	5	3	3	3	3	2.5	3	3	3	2.5	3	2.5	3	3	3	3	5.5		3	2.5	64.5	119.7
2.5	2.5	5	3	3	3	3	3	3	3	3	3	3	2.5	3	3	3	3	5.5		3	2.5	65.5	121.4
3	3	5	3	3	3	3	3	3	3	3	3	3	2.5	3	3	3	3	5.5		3	2.5	66.5	123.1
3	3	5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	5.5		3	3	67.5	124.8
3	3	5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	5.5		3	3	68.5	126.4
3	3	5	3	3	3	3	3	3	3	3	3	3	3	3	3	4	4	5.5		3	3	69.5	128.0
3	4	5	3	3	3	3	3	3	3	3	3	3	3	3	3	4	4	5.5		3	3	70.5	129.6
4	4	5	3	3	3	3	3	3	3	3	3	3	3	3	3	4	4	5.5		3	3	71.5	131.2
4	4	5	3	3	3	4	3	3	3	3	3	3	3	3	3	4	4	5.5		3	3	72.5	132.8
4	4	5	3	3	3	4	3	3	3	4	3	3	3	3	3	4	4	5.5		3	3	73.5	134.4
4	4	5	3	4	3	4	3	3	3	4	3	3	3	3	3	4	4	5.5		3	3	74.5	136.0
4	4	5	3	4	3	4	3	3	3	4	3	3	3	4	3	4	4	5.5		3	3	75.5	137.6
4	4	5	3	4	3	4	3	4	3	4	3	3	3	4	3	4	4	5.5		3	3	76.5	139.2
4	4	5	3	4	3	4	3	4	3	4	3	4	3	4	3	4	4	5.5		3	3	77.5	140.8
4	4	5	3	4	4	4	3	4	3	4	3	4	3	4	3	4	4	5.5		3	3	78.5	142.4
4	4	5	3	4	4	4	3	4	4	4	3	4	3	4	3	4	4	5.5		3	3	79.5	144.0
4	4	5	3	4	4	4	3	4	4	4	4	4	3	4	3	4	4	5.5		3	3	80.5	145.6
4	4	5	3	4	4	4	4	4	4	4	4	4	3	4	3	4	4	5.5		3	3	81.5	147.2
4	4	5	3	4	4	4	4	4	4	4	4	4	3	4	4	4	4	5.5		3	3	82.5	148.8
4	4	5	4	4	4	4	4	4	4	4	4	4	3	4	4	4	4	5.5		3	3	83.5	150.4
4	4	5	4	4	4	4	4	4	4	4	4	4	3	4	4	4	4	5.5		4	3	84.5	152.0
4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	5.5		4	3	85.5	153.6

- 1) TSWs in bays 19 and 20 have flow equivalent to 5.5 and 5.2 stops at forebay elevation of 339, respectively.
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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		
4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	5	5.5		4	3	86.5	155.2
4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	5	5	5.5		4	3	87.5	156.8
4	5	5	4	4	4	4	4	4	4	4	4	4	4	4	4	5	5	5.5		4	3	88.5	158.4
5	5	5	4	4	4	4	4	4	4	4	4	4	4	4	4	5	5	5.5		4	3	89.5	160.0
5	5	5	4	4	4	5	4	4	4	4	4	4	4	4	4	5	5	5.5		4	3	90.5	161.6
5	5	5	4	4	4	5	4	4	4	5	4	4	4	4	4	5	5	5.5		4	3	91.5	163.2
5	5	5	4	5	4	5	4	4	4	5	4	4	4	4	4	5	5	5.5		4	3	92.5	164.8
5	5	5	4	5	4	5	4	4	4	5	4	4	4	5	4	5	5	5.5		4	3	93.5	166.4
5	5	5	4	5	4	5	4	5	4	5	4	4	4	5	4	5	5	5.5		4	3	94.5	168.0
5	5	5	4	5	4	5	4	5	4	5	4	5	4	5	4	5	5	5.5		4	3	95.5	169.6
5	5	5	4	5	4	5	4	5	4	5	4	5	4	5	4	5	5	5.5		5	3	96.5	171.2
5	5	5	4	5	5	5	4	5	4	5	4	5	4	5	4	5	5	5.5		5	3	97.5	172.8
5	5	5	4	5	5	5	4	5	5	5	4	5	4	5	4	5	5	5.5		5	3	98.5	174.4
5	5	5	4	5	5	5	4	5	5	5	5	5	4	5	4	5	5	5.5		5	3	99.5	176.0
5	5	5	4	5	5	5	5	5	5	5	5	5	4	5	4	5	5	5.5		5	3	100.5	177.6
5	5	5	4	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5.5		5	3	101.5	179.2
5	5	5	5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5.5		5	3	102.5	180.8
5	5	6	5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5.5		5	3	103.5	182.4
5	5	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5.5		5	3	104.5	184.0
5	5	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	6	5.5		5	3	105.5	185.6
5	5	6	5	5	5	5	5	5	5	5	5	5	5	5	5	6	6	5.5		5	3	106.5	187.2
5	5	6	5	5	5	5	5	5	5	5	5	5	5	6	5	6	6	5.5		5	3	107.5	188.8
5	5	6	5	5	5	5	5	5	5	5	5	6	5	6	5	6	6	5.5		5	3	108.5	190.4
5	5	6	5	5	5	5	5	5	5	5	5	6	5	6	6	6	6	5.5		5	3	109.5	192.0
5	5	6	6	5	5	5	5	5	5	5	5	6	5	6	6	6	6	5.5		5	3	110.5	193.6

- 1) TSWs in bays 19 and 20 have flow equivalent to 5.5 and 5.2 stops at forebay elevation of 339, respectively.
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5	5	6	6	5	5	5	5	5	5	5	5	6	5	6	6	6	6	5.5		6	3	111.5	195.2
5	5	6	6	5	5	5	5	5	5	5	6	6	5	6	6	6	6	5.5		6	3	112.5	196.8
5	5	6	6	5	5	5	5	5	5	5	5	6	6	6	6	6	6	5.5		6	4	113.5	198.4
5	5	6	6	5	5	5	5	5	5	5	5	6	6	6	6	6	6	5.5		6	4	113.5	198.4
5	5	6	6	6	5	5	5	5	5	5	6	6	6	6	6	6	6	5.5		6	4	115.5	201.6
5	5	6	6	6	5	5	5	5	5	5	6	6	6	6	6	6	6	5.5		6	4	115.5	201.6
5	5	6	6	6	5	6	5	5	5	6	6	6	6	6	6	6	6	5.5		6	4	117.5	204.8
5	5	6	6	6	5	6	5	5	5	6	6	6	6	6	6	6	6	5.5		6	4	117.5	204.8
5	5	6	6	6	6	6	5	6	5	6	6	6	6	6	6	6	6	5.5		6	4	119.5	208.0
5	5	6	6	6	6	6	5	6	5	6	6	6	6	6	6	6	6	5.5		6	4	119.5	208.0
5	5	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5.5		6	4	121.5	211.2
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5.5		6	4	123.5	214.4
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5.5		6	4	123.5	214.4
6	6	6	6	6	6	6	6	6	6	7	6	7	6	7	6	7	6	5.5		6	4	127.5	220.8
6	6	6	6	6	6	7	6	7	6	7	6	7	6	7	6	7	6	5.5		6	4	129.5	224.0
6	6	7	6	7	6	7	6	7	6	7	6	7	6	7	6	7	6	5.5		6	4	131.5	227.2
7	6	7	6	7	6	7	6	7	6	7	6	7	6	7	6	7	7	5.5		6	4	133.5	230.4
7	6	7	6	7	6	7	6	7	6	7	6	7	7	7	7	7	7	5.5		6	4	135.5	233.6
7	6	7	6	7	6	7	6	7	7	7	7	7	7	7	7	7	7	5.5		6	4	137.5	236.8
7	6	7	6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	5.5		6	4	139.5	240.0
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	5.5		6	4	141.5	243.2
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	5.5		6	6	143.5	246.4
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	5.5		6	6	143.5	246.4
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	5.5		6	6	143.5	246.4

- 1) TSWs in bays 19 and 20 have flow equivalent to 5.5 and 5.2 stops at forebay elevation of 339, respectively.
- 2) Raise gates for TSWs approximately 3 to 5 feet above water surface to ensure free surface and debris passage.

COLUMBIA RIVER REGIONAL FORUM

TECHNICAL MANAGEMENT TEAM

June 11, 2008 Conference Call

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Robin Gumpert

Notes: Erin Halton

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.

McNary TSW Hoist Installation

Jim Adams, COE reported on the status of McNary TSW gate hoist installation in gates 19 and 20, to enable operations for summer transportation operations at the project. The work began during the morning of 6/10; the spill gate was set in a fixed position, at 200 kcfs with total flows at the project of 350-365 kcfs and 55-57% spill. Adams said the operation would continue from 0700-1800 hours through Friday, 6/13 and shared the following details of the operation with TMT:

- Work scheduled for 6/12: The gate hoist from spill bay 5 will be removed, requiring outages in bays 4 and 6 for safety. Outages in bays 4 and 6 will last two hours before resuming and bay 5 is expected to be offline for 4-6 hours total.
- For 6/13: Hoist from bay 5 will be moved to 20, which may or may not require an outage during installation. If, for safety reasons, Bay 20 will need to be out of service, the outage would be for 6-8 hours. At Bay 19, a crane will be connected to the gate and therefore will not require an outage.
- Roger Golladay, McNary Project Operator for the COE, provided a status update: the installation is ahead of schedule, with transfer of the bay 5 gate hoist expected to commence during the p.m. of 6/11 and installation of the hoist in bay 19 expected for 6/12.

Adams added that the COE is coordinating with BPA throughout the operation, to provide spill level adjustments as necessary. TMT members expressed an interest in reviewing spill patterns for bays 19 and 20; the COE planned to post the patterns as links to the agenda following the TMT call. The following parties provided input on the operation:

- ID: no objection
- OR: no objection
- WA: no objection
- USFWS: no objection
- NOAA: no objection, appreciate the progress made and expected completion ahead of schedule and, given this, has no concern for outages as outlined during the call.
- BOR: no objection
- BPA: no objection, appreciate shift in schedule.

- Colville Tribe: no objection
- Spokane Tribe: no objection
- CRITFC: no objection

Action/Next Steps: The COE will move forward with their planned operation and will keep TMT apprised of any new developments. The COE will post spill patterns for bays 19 and 20 to the agenda and will provide a report on the operation to TMT members at the 6/18 meeting.

Bonneville Screens Update

Dan Feil, COE, reported that reinstallation of the screens has been delayed, due to the high level of debris observed by project biologists. Flows at the project were near 400 kcfs, with a ten foot head differential on trash racks at the fish unit. TMT members commented on the smolt index, which indicates that guidance through the bypass is occurring without the screens in place. Feil added that the COE's ongoing acoustic tag study will provide data regarding the effect of screens/no screens on fish passage at the project.

Action/Next Steps: The COE will keep TMT apprised of any new developments and this item will be on the agenda for the 6/18 TMT meeting. Data from the tag study will be presented at the TMT year end review meeting in November (as well as the COE's annual AFEP review.)

Other

Russ Kiefer, ID, observed that Lower Monumental spill dropped to 15% of flow and made a request to the COE to closely monitor TDG and spill caps to provide ample daytime flow for fish passage in the Lower Monumental/Ice Harbor areas to the extent possible. The COE reported that coordination with NOAA on 6/6 and anticipation of high winds informed the decision to shift spill caps back up at the project, and that the effect on TDG at the next downstream gauge takes about two days. Wind levels likely contributed to de-gassing of TDG generated at Lower Monumental over the weekend and the COE clarified that conditions were dictating spill levels. The COE acknowledged the concerns raised by ID and the possible idiosyncrasies in tailwater gauge readings; ID acknowledged the complexities associated with managing TDG during over-generation.

Next TMT Meeting: 6/18 face-to-face

Agenda Items include:

- Finalize facilitator notes / official minutes
- TMT Guidelines – Finalize Draft
- Dworshak Summer Operations/Temperature Modeling
- Priest Rapids Operations Report
- McNary TSW Hoist Installation Update
- Bonneville Screen Update
- Libby Sturgeon Flows Operation
- Libby/Hungry Horse Summer Operations
- Operations Review

**Columbia River Regional Forum
Technical Management Team Conference Call
June 11, 2008**

1. Introduction

Today's TMT call was chaired by Jim Adams (COE) and facilitated by Robin Gumpert (DS Consulting) with representatives of BPA, USFWS, COE, BOR, NOAA, FPC, Oregon, Washington, Idaho 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. McNary TSW Gate Hoist

Adams and Roger Golladay (COE), who is overseeing installation of gate hoists at McNary Dam, reported to TMT. The gate hoists will allow the TSWs in bays 19 and 20 to be turned on and off for fish transportation purposes.

Preparation for the gate hoist installation began yesterday when all the spill gates were set in a fixed position to release a constant volume across the spill bay. This was done as a precaution for worker safety. Yesterday the fixed spill rate at McNary was 200 kcfs, with 55-57% spill and total flows of 350-365 kaf. The fixed spill operation began yesterday and will continue daily, from 7 am-6 pm, through Friday, June 13.

The initial plan was to use the first two days (Tuesday and Wednesday) to prepare for the removal of the gate hoist from gate 5 and installation of that hoist onto gate 20. In addition, gates 5 and 19 were being prepared for the use of a gantry crane to operate these two gates. On Thursday, the hoist from gate 5 would be removed in preparation to install it onto gate 20 on Friday. While removing the hoist from gate 5, gates 4 and 6 would need to be closed for worker safety for a total of about 2 hours. Gate 5 would need to stay closed for a total of 6-8 hours. It was uncertain whether gate 20 would need to be closed for worker safety during the installation of the hoist from gate 5. It would be a decision made at the moment. If the gate had to be closed, it was expected that it would be out for no more than 6-8 hours.

In an update, Roger Golladay reported that the work was ahead of schedule and that the removal of the hoist in gate 5 might occur today instead of tomorrow.

Rick Kruger asked, during times when spill is uniformly set at all gates, what happens to involuntary spill? Will the powerhouse absorb excess capacity? BPA has been estimating flows and communicating with the project operator, Adams said. If the estimates turn out to be in error, there will be opportunities to adjust the spill rate such as during the lunch hour. In addition, the project

operator may give the contractor 30 minutes to move personnel into a safe zone if necessary.

Dave Wills (USFWS) asked whether problems with spill patterns in bays 4-6 are anticipated. An outage of only a few hours would have minimal impact, Wagner replied. Adams will post to the TMT web page the spill pattern to be used if the outage in gate 20 lasts for a full day. He asked TMT to respond quickly if they see a problem because the installation is proceeding ahead of schedule. NOAA will internally review the spill pattern before gate 20 is scheduled for possible closure. A spill level above 40% like this generally has a flat spill pattern, with flows evenly spread out across the bays, Feil said. The effects on egress should be negligible.

{Supplemental Note: At 2:05 pm on Wednesday June 11th, Paul Wagner communicated through E-mail that Gary Fredricks had reviewed the spill patterns to be used during the McNary spillbay outages and indicated that he had no problem with them.}

USFWS, NOAA, BOR, BPA, CRITFC, Idaho, Oregon, Washington, the Colville Tribe, and the Spokane Tribes voiced no objections to this operation. Adams will notify TMT if bay 20 must be closed. TMT will check in on this installation at its June 18 meeting.

3. Bonneville Screen Status

Dan Feil gave an update on debris accumulation at Bonneville Dam. On Monday, flows decreased to around 300 kcfs, and the COE briefly considered reinstalling the STS guidance screens. However, over the weekend significant debris accumulated on the trash racks in the fish units. The trash racks provide a good indication of what would happen if the vertical barrier screens were reinstalled because they both tend to trap finer debris that has been observed in the gatewells. In light of these findings the COE postponed the screen installation, and flows subsequently rose back up to 400 kcfs. Monitoring of debris accumulation at the project continues, as does daily debris removal.

NOAA approved of this approach. Kiefer asked why there's been little change in the smolt index at Bonneville, despite the STS guidance screens being out. The large numbers of smolts in the 2nd powerhouse bypass system available for monitoring has been surprising, Feil said. The reasons for this phenomenon are unknown, inviting speculation that passage could be equally good with the screens out or in. The COE will do follow-up analysis via an acoustic tagging study underway to monitor passage at Bonneville. The study may provide insight into how the screen removal affected fish passage.

The COE will continue to monitor this situation, and TMT will revisit it at the next TMT meeting June 18.

4. Spill Caps at Lower Monumental

Yesterday the spill cap at Lower Monumental was down to only 15% of flow, Russ Kiefer (Idaho) said. He requested consideration of whether that level of spill is unnecessarily low, given that present gas levels are the result of overgeneration spill at night. Yesterday Lower Monumental spilled 30%, with a tailrace reading of 119.2% TDG. Today the Ice Harbor forebay went back down to 112%, indicating that Lower Monumental should be spilling more than 50%.

Last week the spill cap was set at 22 kcfs because of high TDG levels, Adams replied. Surprisingly, Ice Harbor tailwater TDG levels appeared to drop when Lower Monumental was spilling at the increased rate of 35 kcfs. However, it appears that the lower TDG readings were caused by lateral variations in the TDG levels of water hitting the gage and were not a reliable indication of actual TDG production in the river.

After consulting with NOAA, the COE investigated this phenomenon by conducting an experiment. The Lower Monumental spill cap was raised, and two days later TDG levels in the Ice Harbor forebay increased by 1-2%. This finding confirmed the COE's hypothesis that TDG levels being generated by 35 kcfs spill were actually higher than those generated by 22 kcfs spill, despite the misleading tailwater gage readings. Yesterday the COE dropped the Lower Monumental spill cap back down to 22 kcfs, then subsequently raised it to 30 kcfs because wind throughout the Columbia and Snake basins was degassing the river.

Once the wind stops degassing the river, whatever TDG goes into the water at Lower Monumental will show up at the Ice Harbor gage about two days later, Adams explained. The setting of spill caps is done in consultation with NOAA on a daily basis. In order to keep TDG levels within state criteria at Ice Harbor forebay, the COE estimates daily how much TDG the Lower Monumental powerhouse is passing, plus how much the spillway is generating, then factors in the prevailing weather conditions two days in advance.

Today's Ice Harbor tailwater readings of 119.2% and 119.4% for 8 am and 9 am respectively, with Lower Monumental spill levels of 30.8 kcfs and 30.7 kcfs respectively, are right on target for TDG management, Adams said. TMT will revisit this issue at its next meeting.

5. Next Meeting

The next regularly scheduled TMT meeting will be June 18, with Dworshak summer operations, a Priest Rapids update, Libby sturgeon flows, the TMT guidelines, Libby and Hungry Horse summer operations, Bonneville fish screens, McNary construction work, and the usual operations review on the agenda. This summary prepared by consultant and writer Pat Vivian.

<i>Name</i>	<i>Affiliation</i>
Scott Bettin	BPA
Dave Wills	USFWS
Jim Adams	COE
Roger Golladay	COE McNary Dam
Dan Feil	COE
Tim Heizenrader	Centaurus
Holli Krebs	JP Morgan
Ben Houseman	COE Bonneville Dam
Russ George	WMC
Glen Trager	Shell Energy
Tom Le	Puget Sound Energy
Rick Kruger	Oregon
Sherry Sears	Colville Tribe
John Roache	BOR
Margaret Filardo	FPC
Bill Crampton	CBB
Cindy LeFleur	Washington
Paul Wagner`	NOAA
Russ Kiefer	Idaho
Kyle Dittmer	CRITFC
Deanna XX	Spokane Tribes

TECHNICAL MANAGEMENT TEAM

BOR : John Roache / Mary Mellema / Pat McGrane **BPA :** Robyn MacKay / Tony Norris / Scott Bettin
NOAA-F: Paul Wagner / Richard Dominique **USFWS :** David Wills / Steve Haeseker
OR : Rick Kruger / Ron Boyce **ID :** Russ Kiefer
WDFW : Cindy LeFleur **MT :** Jim Litchfield / Brian Marotz
COE: Jim Adams / Cathy Hlebechuk / Bob Buchholz

TMT MEETING

Wednesday June 18, 2008 09:00 - 12:00

1125 N.W. Couch Street, Suite 4A34
Portland, Oregon 97209-4142
Map Quest [\[Directions\]](#)

CONFERENCE PHONE LINE

Conference call line: 203-310-2162; PASS CODE = 4703150

To check into the building, take the elevator to the 5th floor and the guard will issue you an ID badge if you need one and will take you down to the meeting room on the 4th floor. If you have NOT attended a TMT meeting in the past you will need to call ahead and let Jim Adams (503) 808-3938, Cathy Hlebechuk (503) 808-3942, or Bob Buchholz (503) 808-3945 know, so you can be added to the TMT Visitor List and issued an ID badge. This badge may be used indefinitely. If you have attended TMT in the past you may re-use your ID badge indefinitely. If you are a federal employee you will also need to have an ID badge issued to you which can be used indefinitely.

We have had disruptions on the phone because people are not hitting 'mute' after dial in.
Please MUTE your Phone

*All members are encouraged to call Robin Gumpert with any issues or concerns they would like to see addressed.
Please e-mail her at robin76@cnnw.net or call her at (503) 248-4703.*

AGENDA

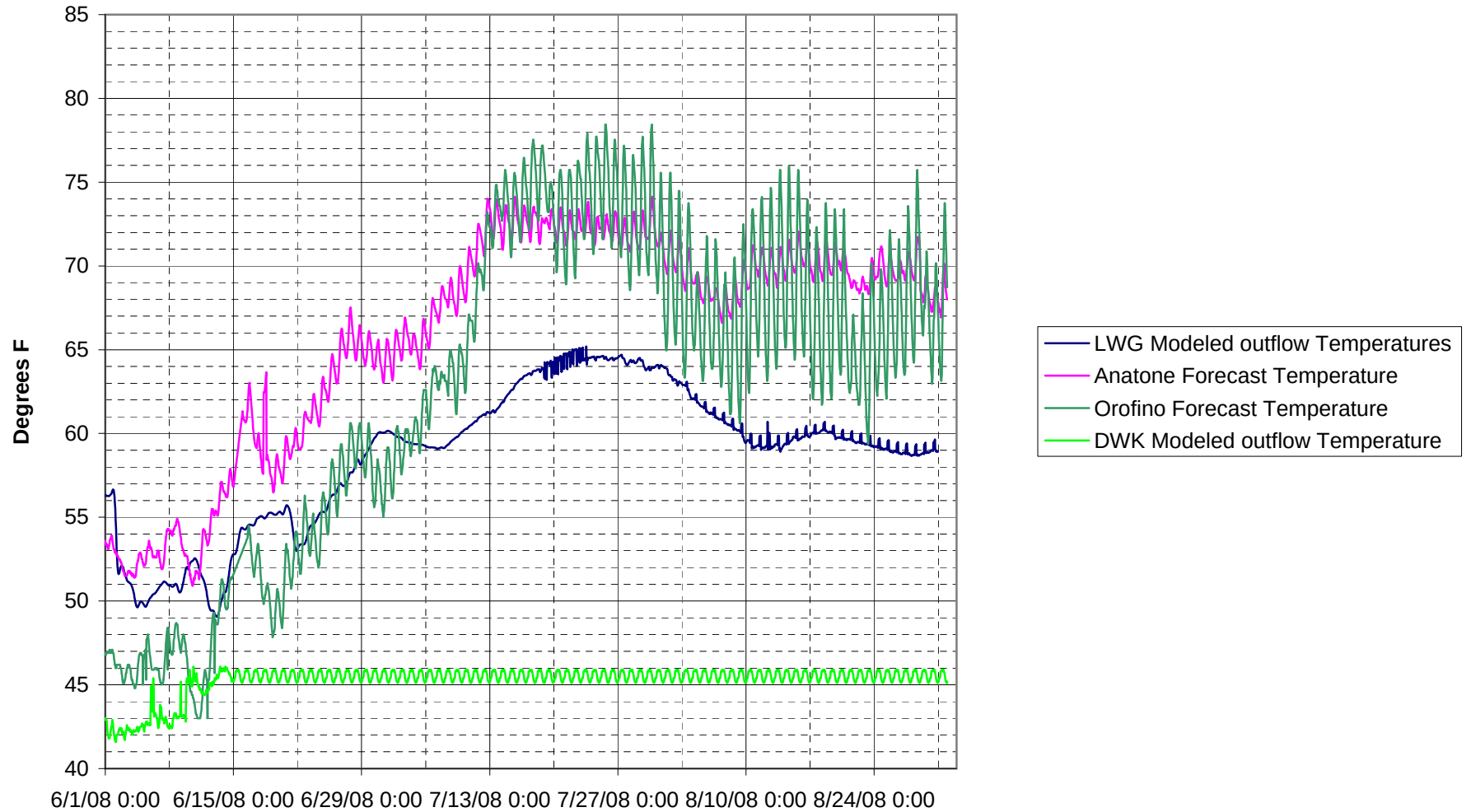
1. Welcome and Introductions
2. Review & Finalize notes/minutes [\[Meeting Minutes\]](#) 
3. Priest Rapids Operations Update - Russell Langshaw, Grant County PUD
[\[Priest Rapids\]](#) 
4. 2008 Summer Treaty Fishery - Kyle Dittmer, CRITFC
[\[SOR 2008-C2\]](#)
5. McNary TSW Gate Hoist Installation Update - Jim Adams, USACE
6. Bonneville STS Update - Dan Feil, USACE
7. Dworshak Operations
 - a. Current Operations - Stephen Hall, USACE
[\[DWR ESP Ops\]](#) 
 - b. Current Conditions - Jim Adams, USACE

- [\[CROHMS Water Quality Reports\]](#)
 - [\[DWR Temp String\]](#)
 - c. Summer Operations - *All*
 - [\[Dworshak Temp Ops\]](#) 
 - [\[DWR Summer 2008\]](#) 
- 8. Libby Operations - *Amy Reese, USACE*
 - [\[WY 2008 Columbia River Basin ESP Plots\]](#)
 - [\[2439 foot\]](#) 
 - [\[2449 foot\]](#) 
 - [\[Max Elevation\]](#) 
- a. Libby Sturgeon Flows
 - b. Libby Summer Operations
- 9. Hungry Horse Operations - *John Roache, USBR*
 - [\[3540 foot elevation\]](#) 
 - [\[3550 foot elevation\]](#) 
- 10. Grand Coulee Operations - *John Roache, USBR*
- 11. TMT Guidelines - Finalize Draft - *All*
 - [\[TMT Guidelines - June 8\]](#) 
- 12. Operations Review
 - a. Reservoirs
 - b. Fish
 - c. Power System
 - d. Water Quality
 - [\[Spill Information 2008\]](#)
 - [\[Historical WQ\]](#)
- 13. Other
 - a. Set agenda for next meeting - **June 25, 2008**
 - [\[Calendar 2008\]](#) 

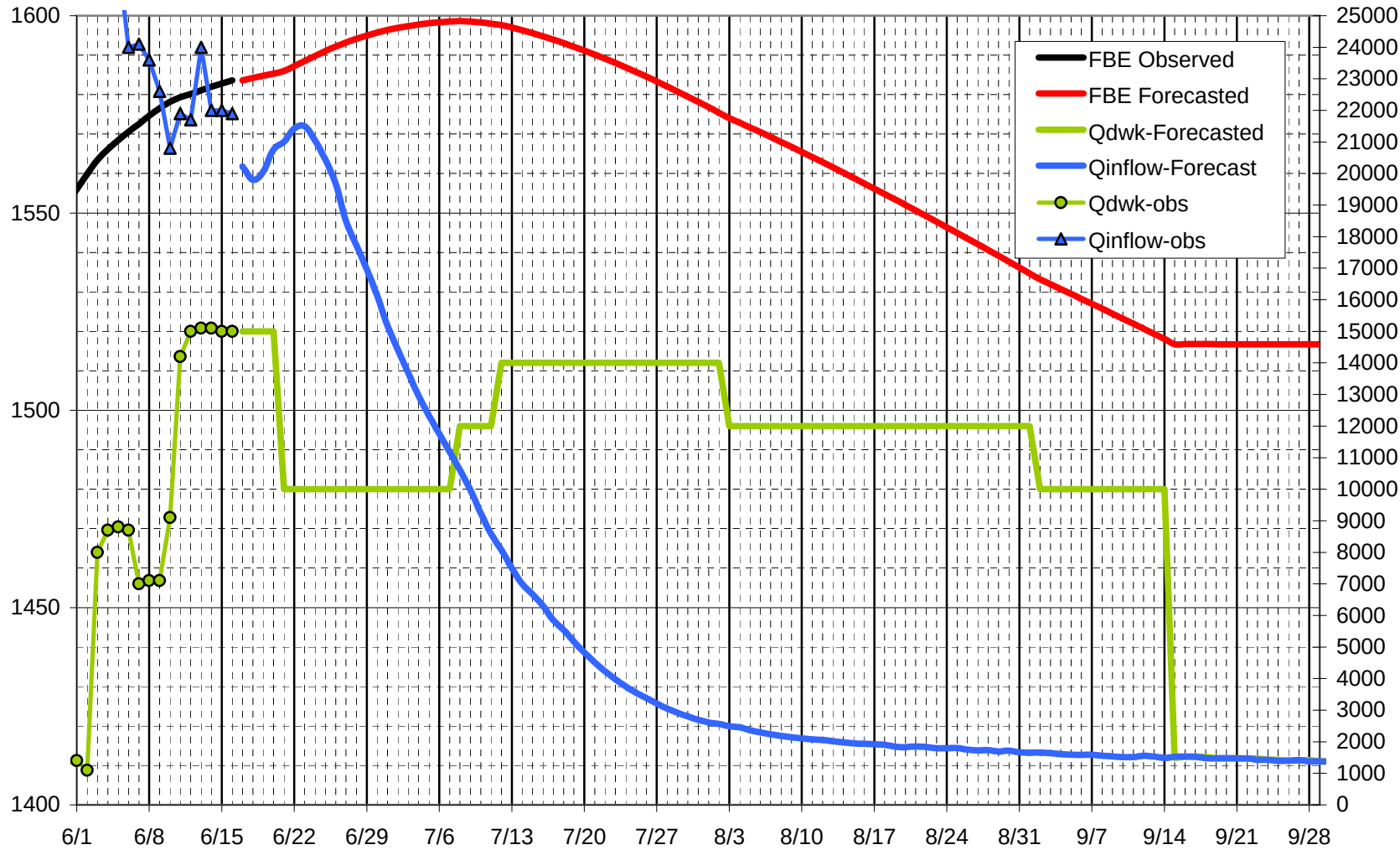
Questions about the meeting may be referred to:

*[Jim Adams](#) at (503) 808-3938, or
[Cathy Hlebechuk](#) at (503) 808-3942, or
[Bob Buchholz](#) at (503) 808-3945.*

Water Temperature Comparisons
Observed data thru 6/16/08
Forecast Temperatures from Year 2002

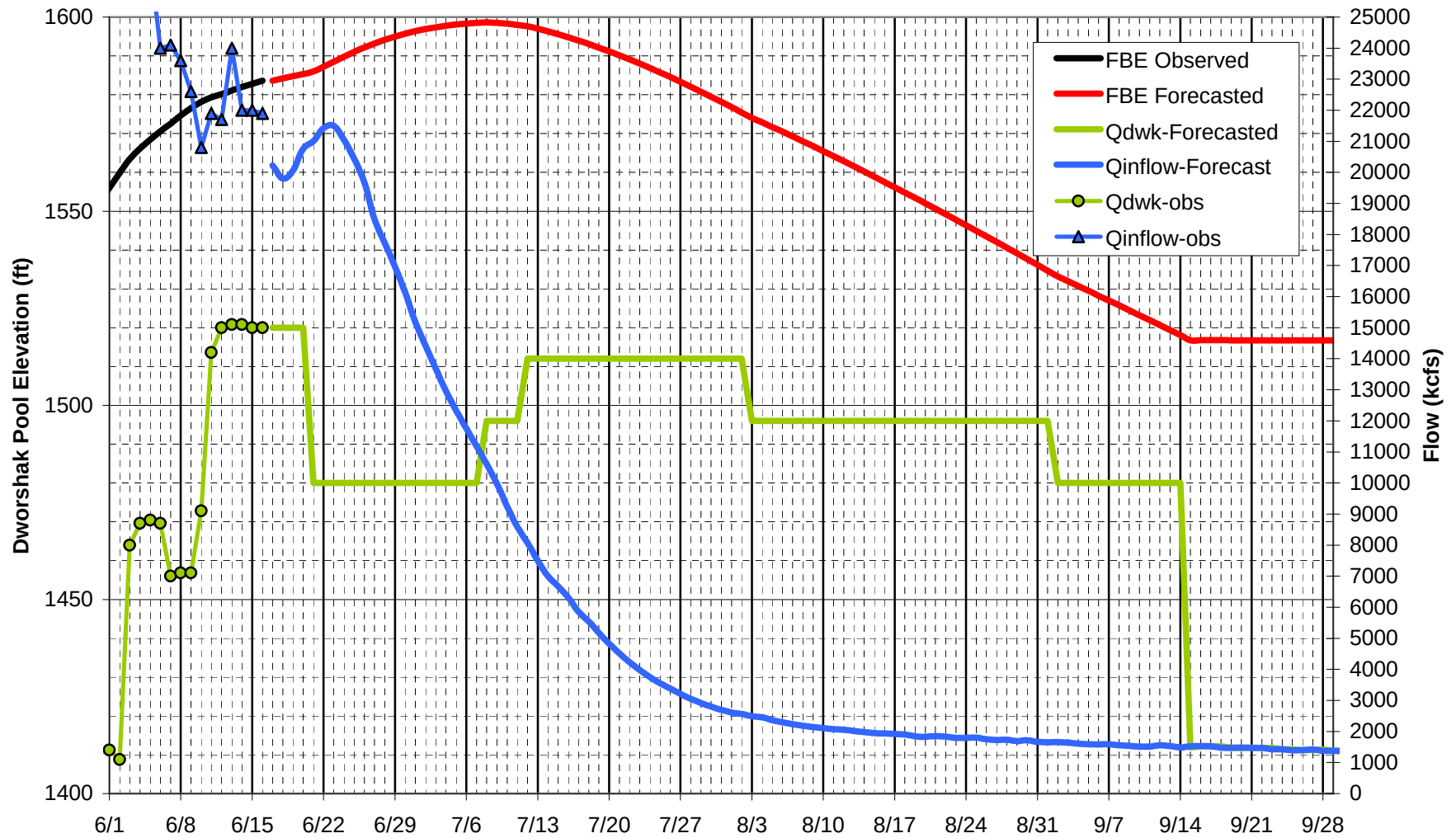


Proposed 2008 Operations



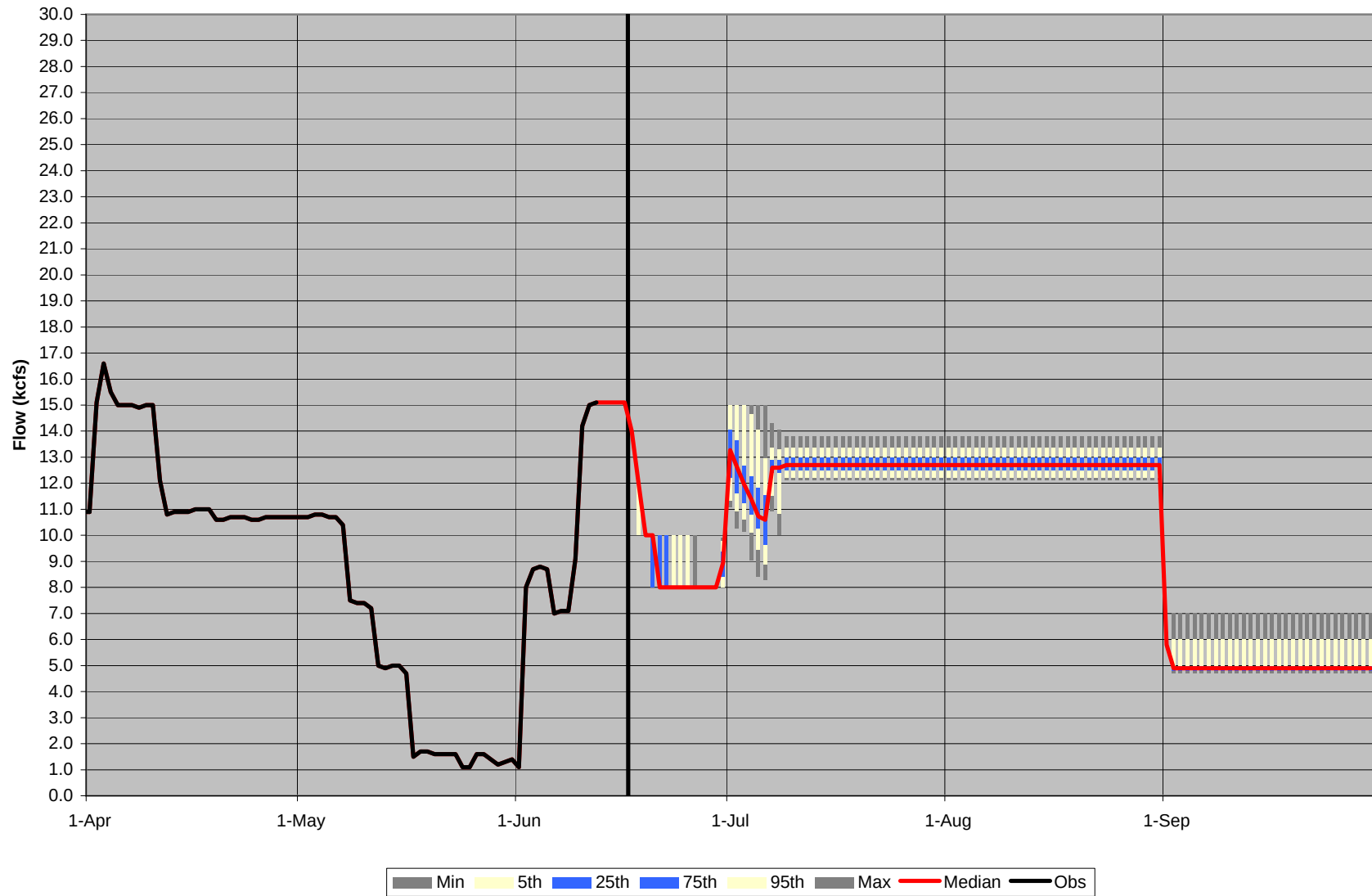
Dworshak Pool Elevation (ft)

2008

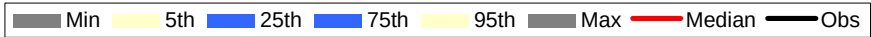


Dworshak Outflow Statistics

Based on June 17, 2008 ESP



Based on June 17, 2008 ESF



Modeling of Dworshak Summer 2008 Operations



Kyle Dittmer

Hydrologist - Meteorologist

June 18, 2008

TMT Presentation

Columbia River Inter-Tribal Fish Commission

Portland, Oregon

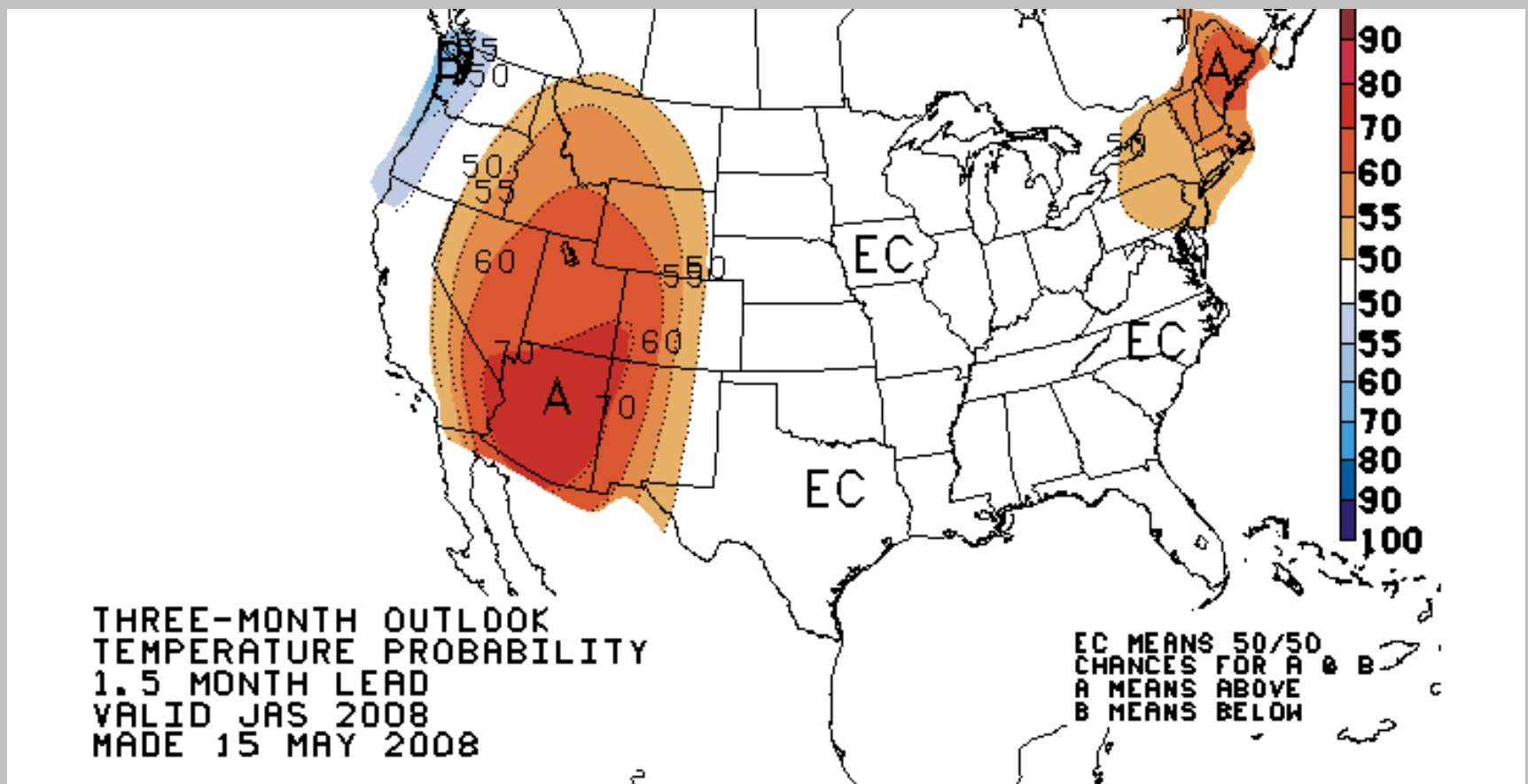
Introduction



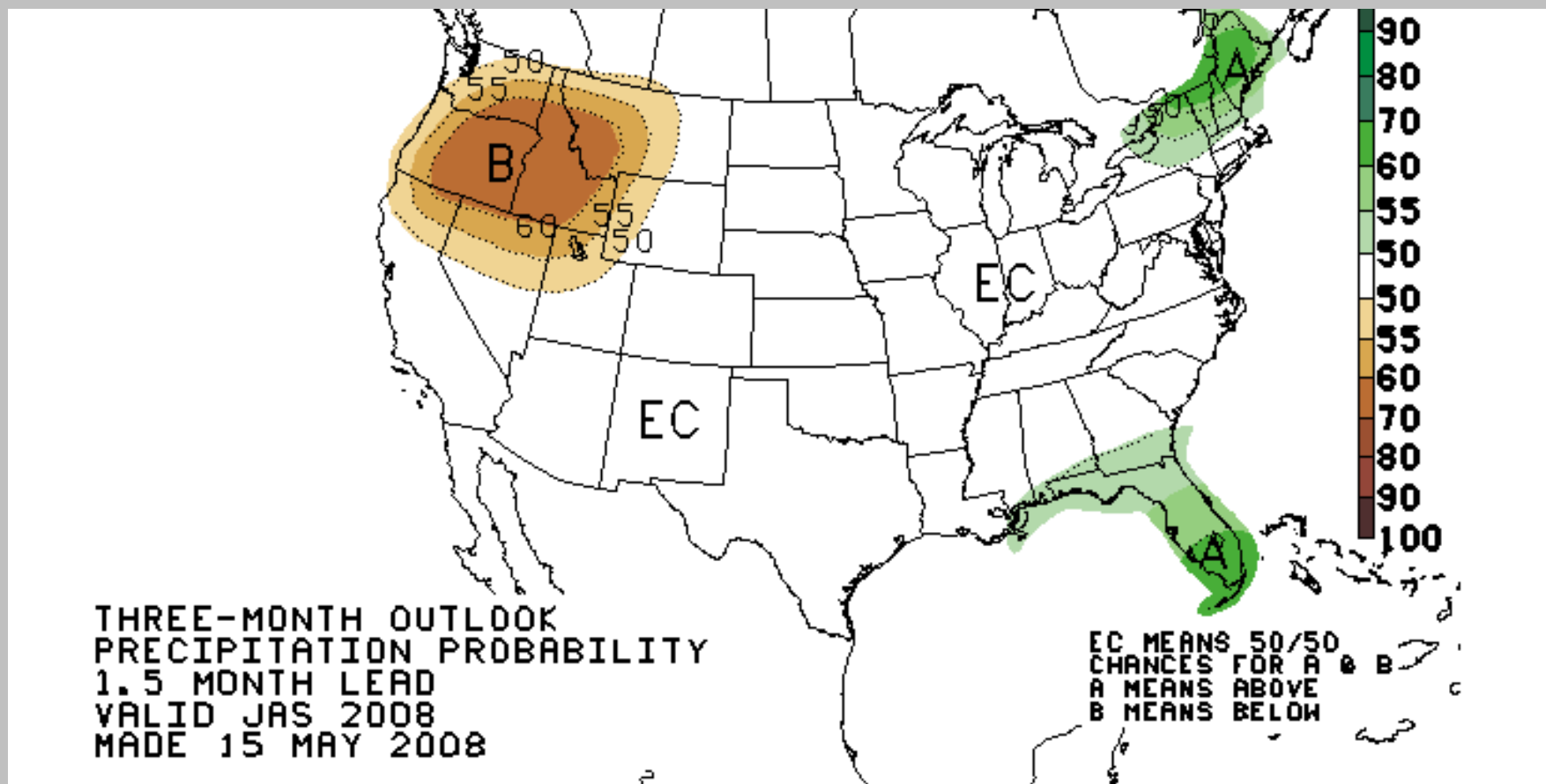
- Goals: (1) Model Dworshak flows and elevations for summer operation scenarios. (2) Evaluate impacts on Dworshak pool elevation and lower Snake water temperature and flow.
- CRITFC's Hydro spreadsheet: modeled outflows and elevations. Inflows provided by NOAA-NWRFC.
- EPA's RBM-10 model: water temperature. Assumes (1) 1975, 1976, 1985, and 1989 weather years, (2) 1999 tributary inflows, (3) 2000 Dworshak and Brownlee water temperatures, and (3) Dworshak release temperatures are 43 to 45 degF.

Lewiston air temperature						Dworshak
(degF)	MAY	JUN	JUL	AUG	SEP	April-July Inflow (KaF)
1975	57.79	63.6	77.74	70.39	66.15	3342
Departure	-0.4	-2.0	4.0	-1.4	2.7	
1976	59.69	62.95	73.89	69.97	68.98	3524
Departure	1.5	-2.7	0.1	-1.8	5.5	
1985	60.26	66.9	79.94	69.47	56.8	2913
Departure	2.0	1.0	5.9	-2.9	-6.9	
1989	59.34	68.57	74.47	71.35	66.03	2603
Departure	1.0	2.7	0.4	-1.0	2.3	
Average Departure:	1.0	-0.3	2.6	-1.8	0.9	3,096
	MAY	JUN	JUL	AUG	SEP	NWS June WSF (KaF):
2008 departure	2.5	-4				2880
Assumption: "ENSO-cold and PDO-warm/cool"						
Oct. 2007 - May 2008: MEI = -1.06 (+/- 0.32) PDO = -1.06 (+/- 0.34)						

NOAA 90-day forecast



NOAA 90-day forecast



Highlights of Scenarios

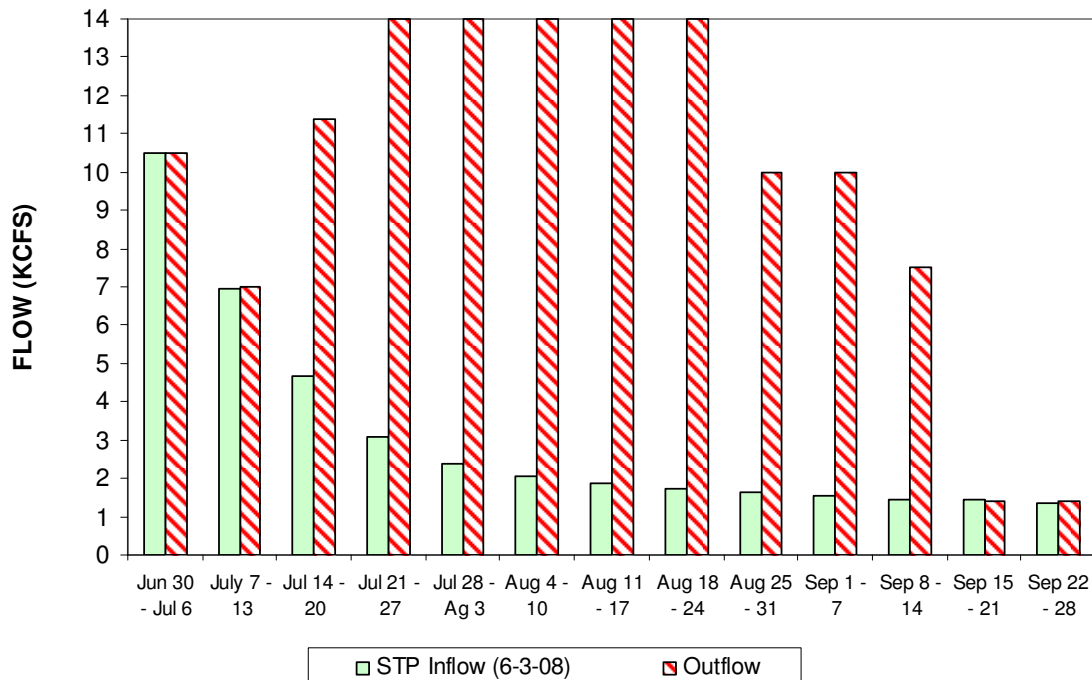


- Nez Perce Tribe 2008: draft to 1535 feet by Aug. 31, then 1520 feet by Sept. 30. Shape the July-August outflow to balance NPT concerns with lower Snake needs. Outflows are 7.5 to 14 kcfs.
- TMT-2007: draft to 1535 ft by Aug. 31, then 1520 feet by Sept. 30. Outflows are based on 2007 observed weekly elevations. More water is shaped in July. Outflows are 8.5 to 14 kcfs.
- Observed water temperatures: June 10 – June 17.

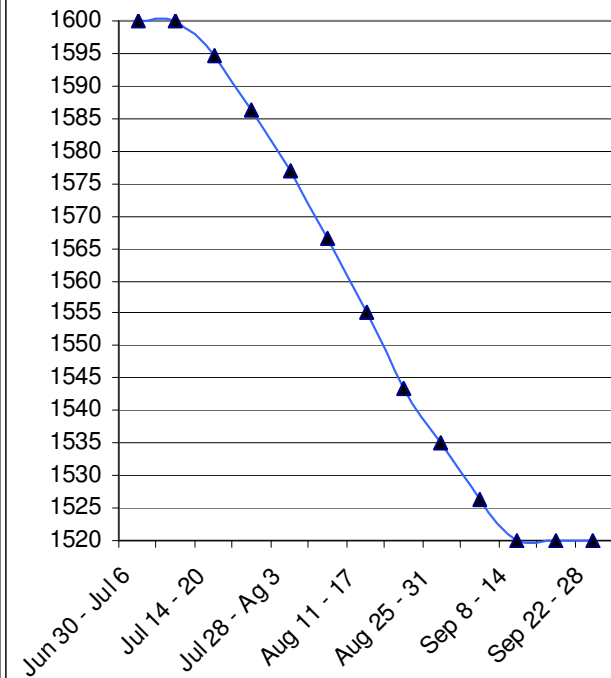
NPT 2008



DWORSHAK SEASONAL FLOWS: NEZ PERCE TRIBE PLAN



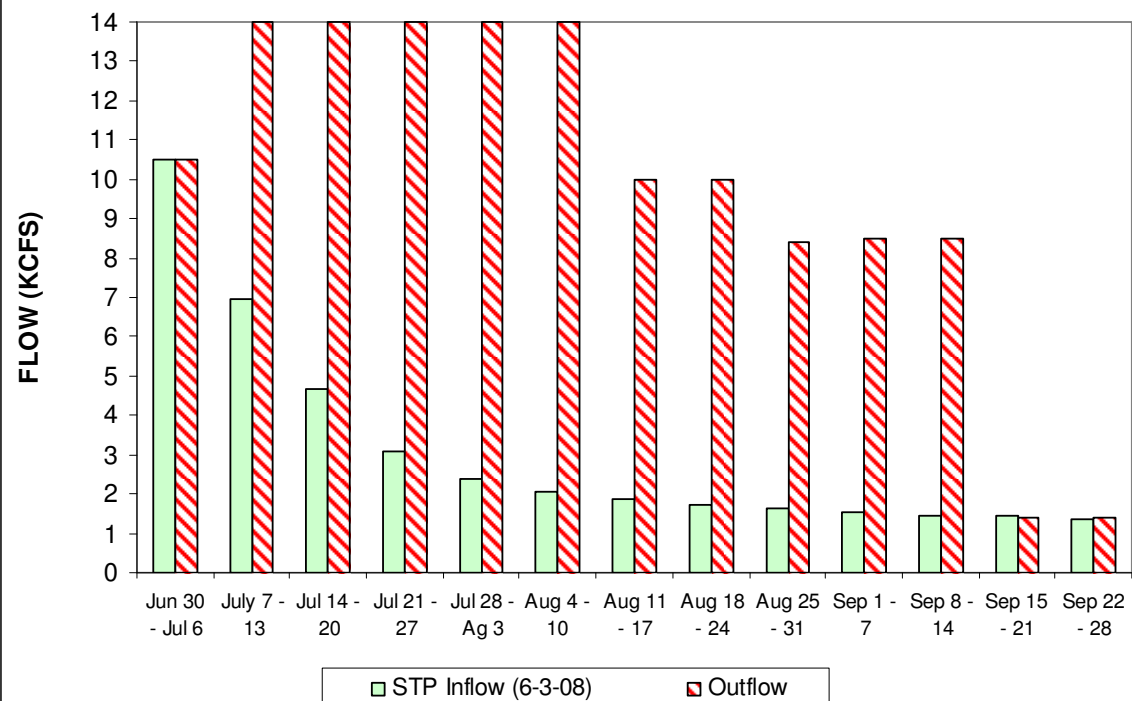
DWORSHAK POOL ELEVATIONS



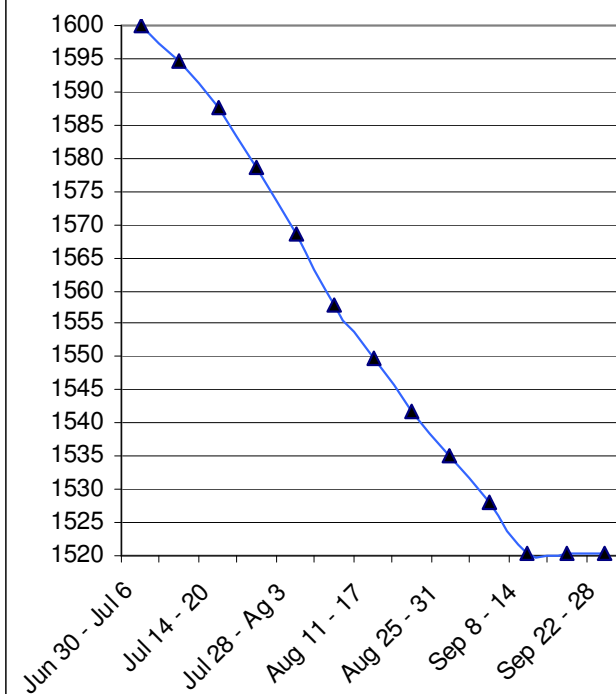
TMT-2007



DWORSHAK SEASONAL FLOWS: TMT-2007 Operation



DWORSHAK POOL ELEVATIONS

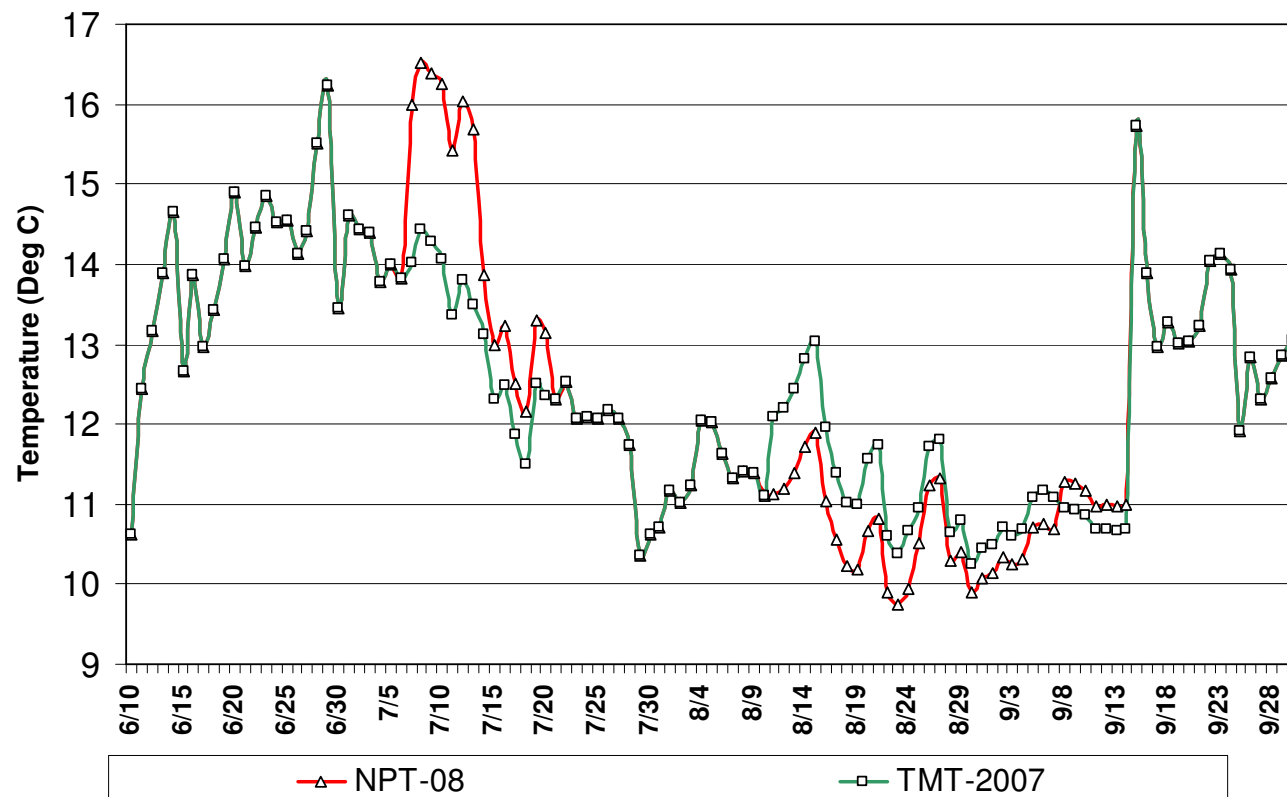


Modeled Water Temperature

(Model data courtesy of Ben Cope, EPA-Seattle)



Figure 1A: Clearwater River at Mouth (RM1)
1975

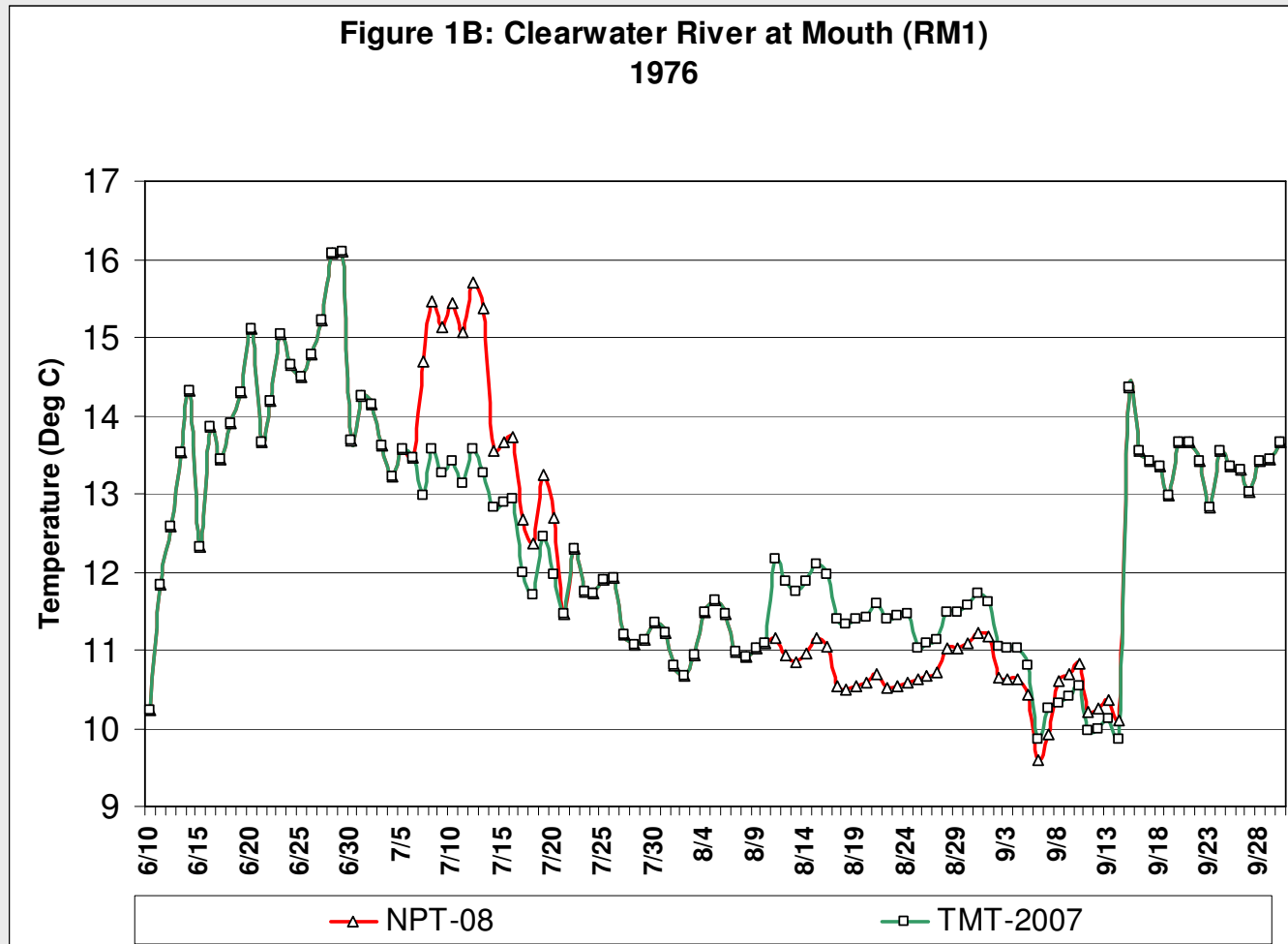


Modeled Water Temperature

(Model data courtesy of Ben Cope, EPA-Seattle)



Figure 1B: Clearwater River at Mouth (RM1)
1976

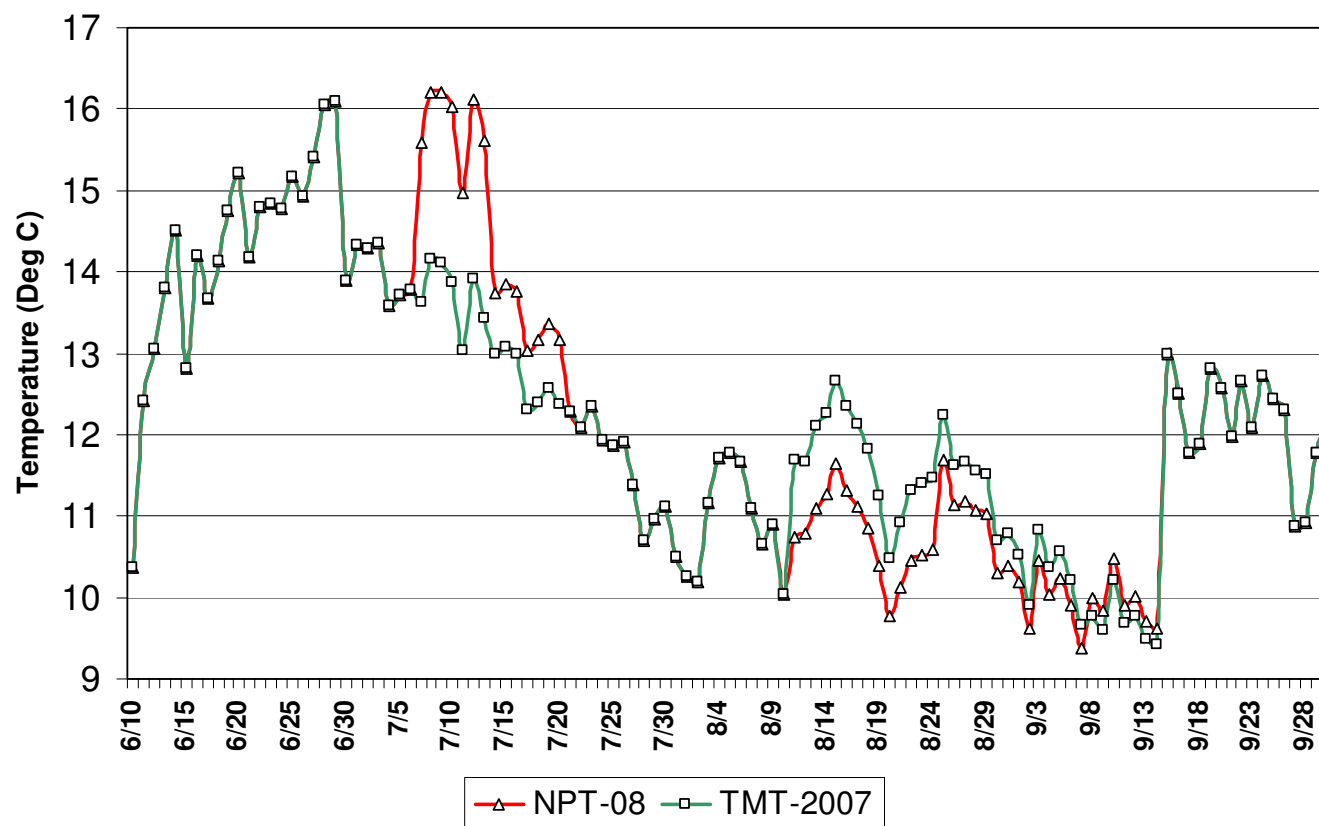


Modeled Water Temperature

(Model data courtesy of Ben Cope, EPA-Seattle)



Figure 1C: Clearwater River at Mouth (RM1)
1985

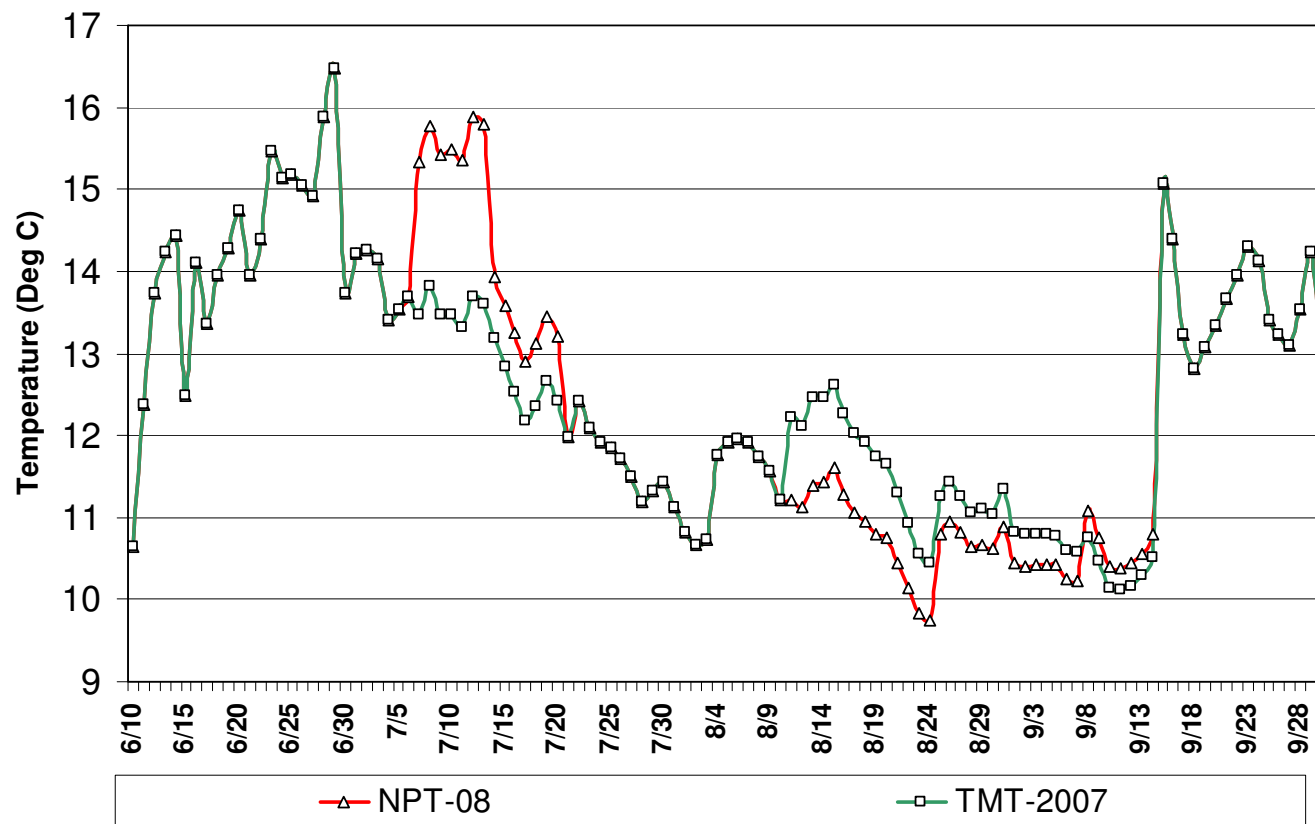


Modeled Water Temperature

(Model data courtesy of Ben Cope, EPA-Seattle)

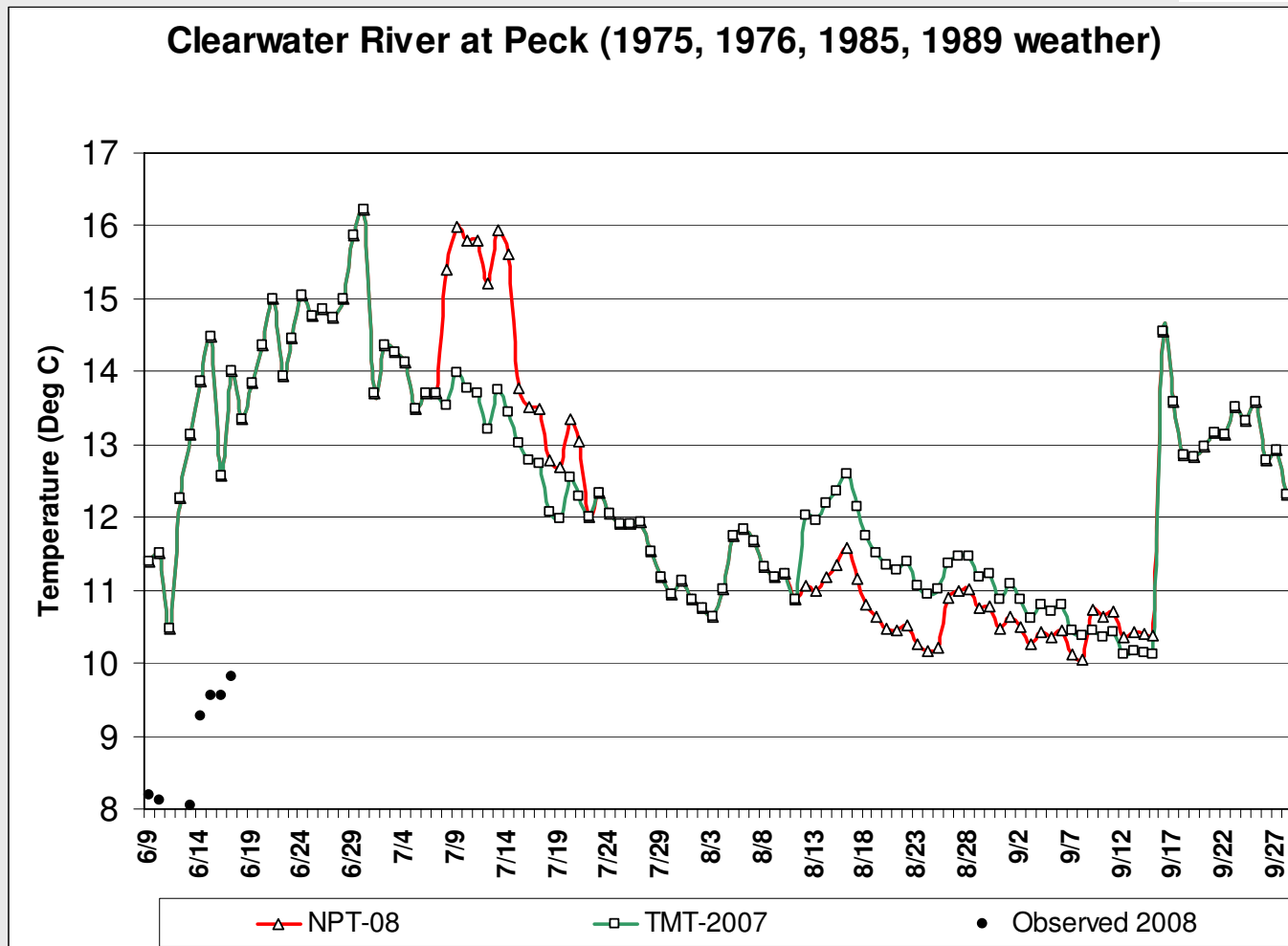


Figure 1D: Clearwater River at Mouth (RM1)
1989



Modeled Water Temperature

(Model data courtesy of Ben Cope, EPA-Seattle)

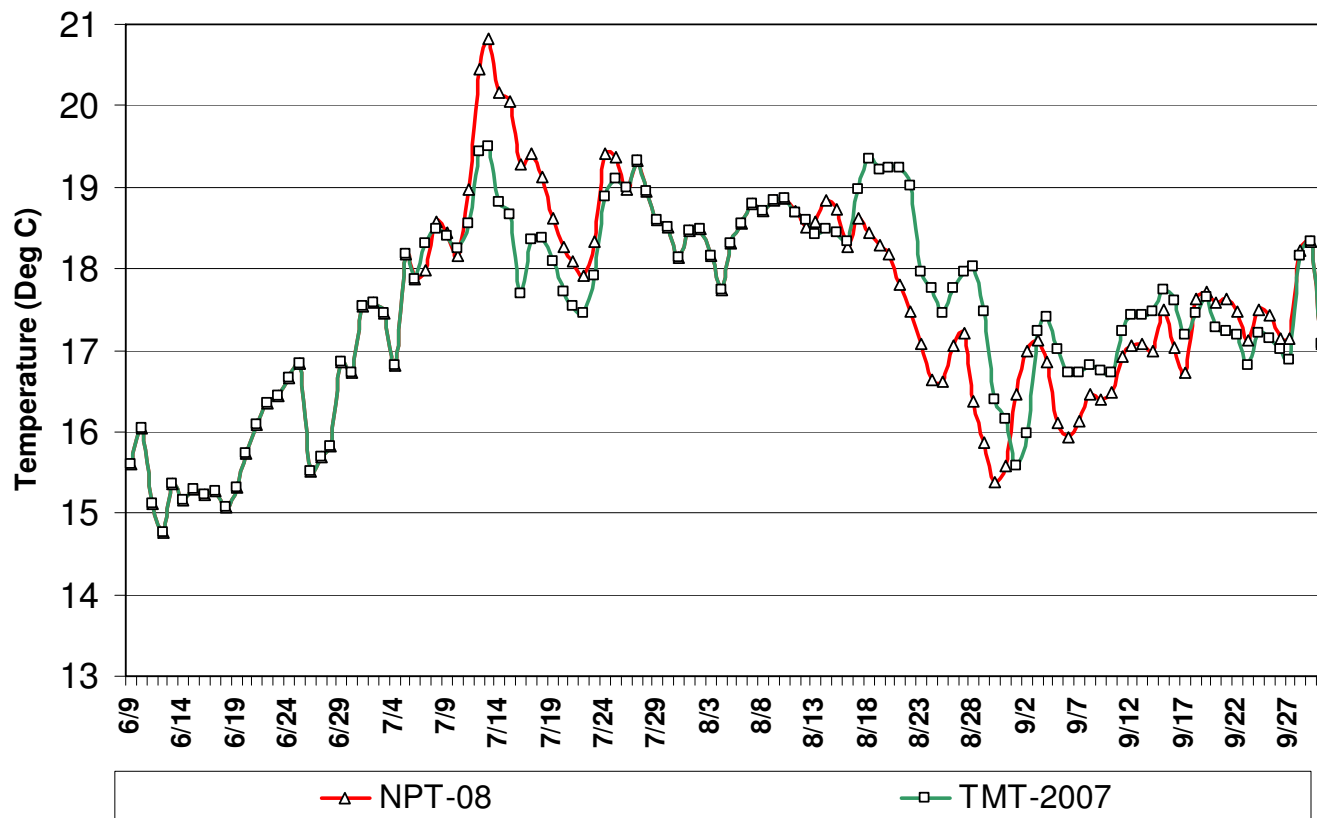


Modeled Water Temperature

(Model data courtesy of Ben Cope, EPA-Seattle)



Figure 2A: Lower Granite Dam (RM107)
1975

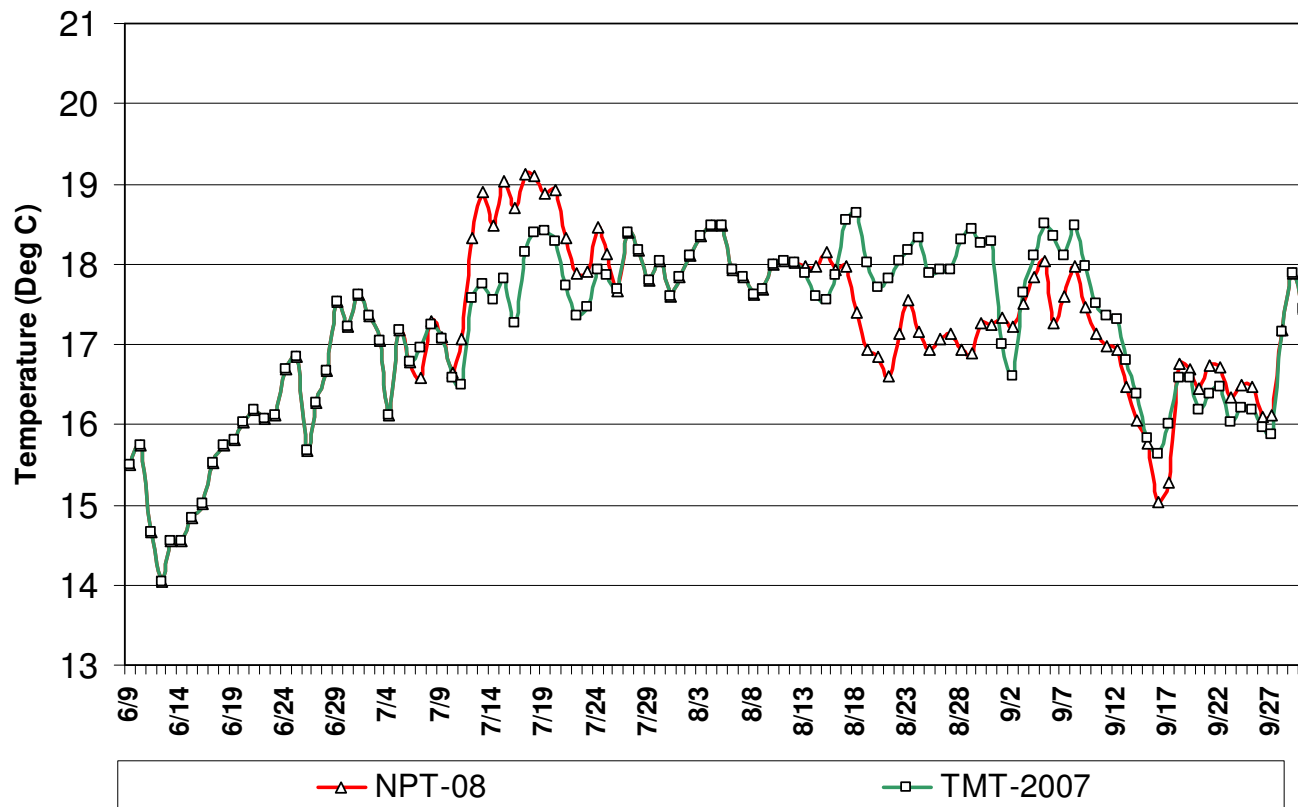


Modeled Water Temperature

(Model data courtesy of Ben Cope, EPA-Seattle)

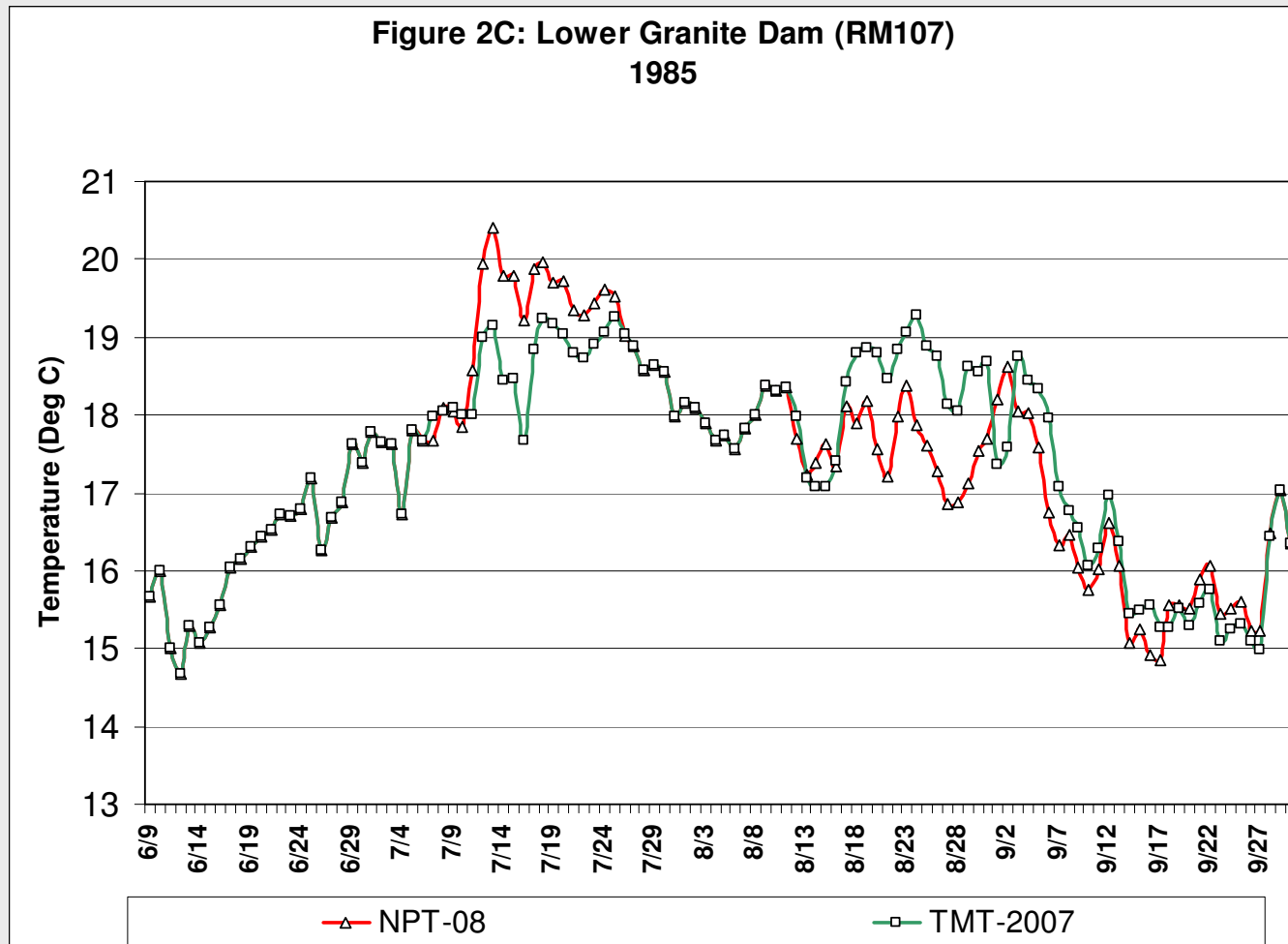


Figure 2B: Lower Granite Dam (RM107)
1976



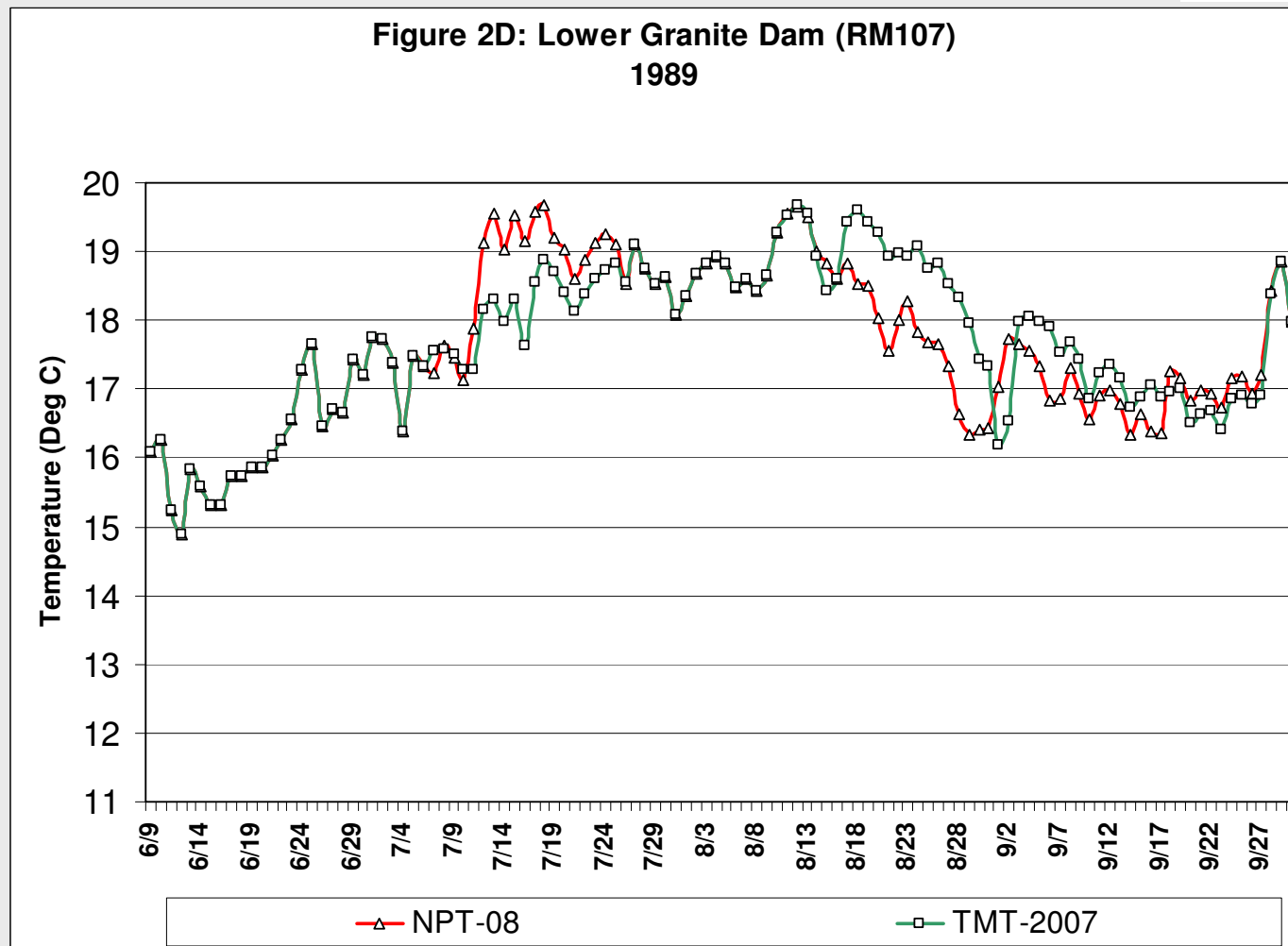
Modeled Water Temperature

(Model data courtesy of Ben Cope, EPA-Seattle)



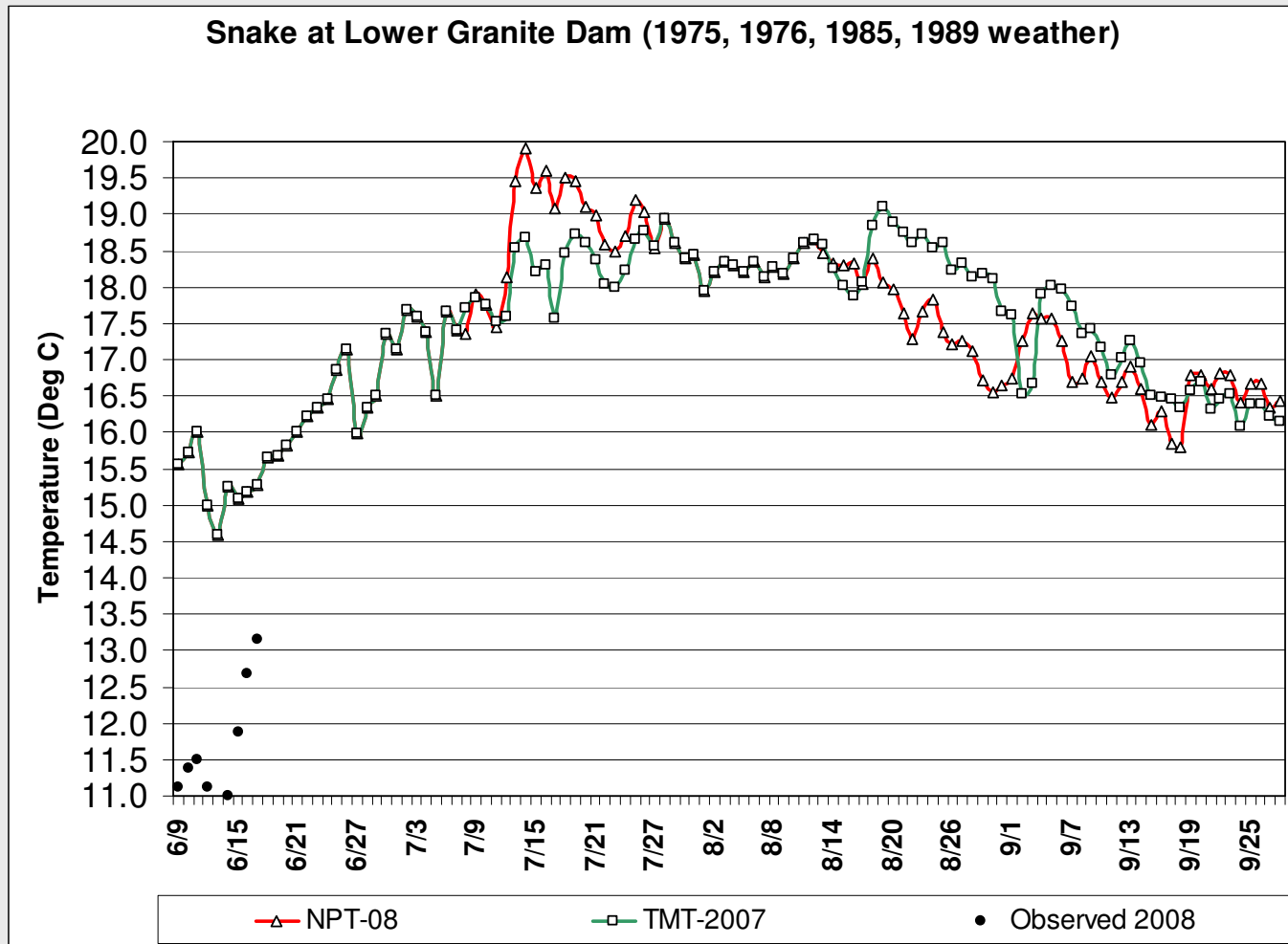
Modeled Water Temperature

(Model data courtesy of Ben Cope, EPA-Seattle)



Modeled Water Temperature

(Model data courtesy of Ben Cope, EPA-Seattle)

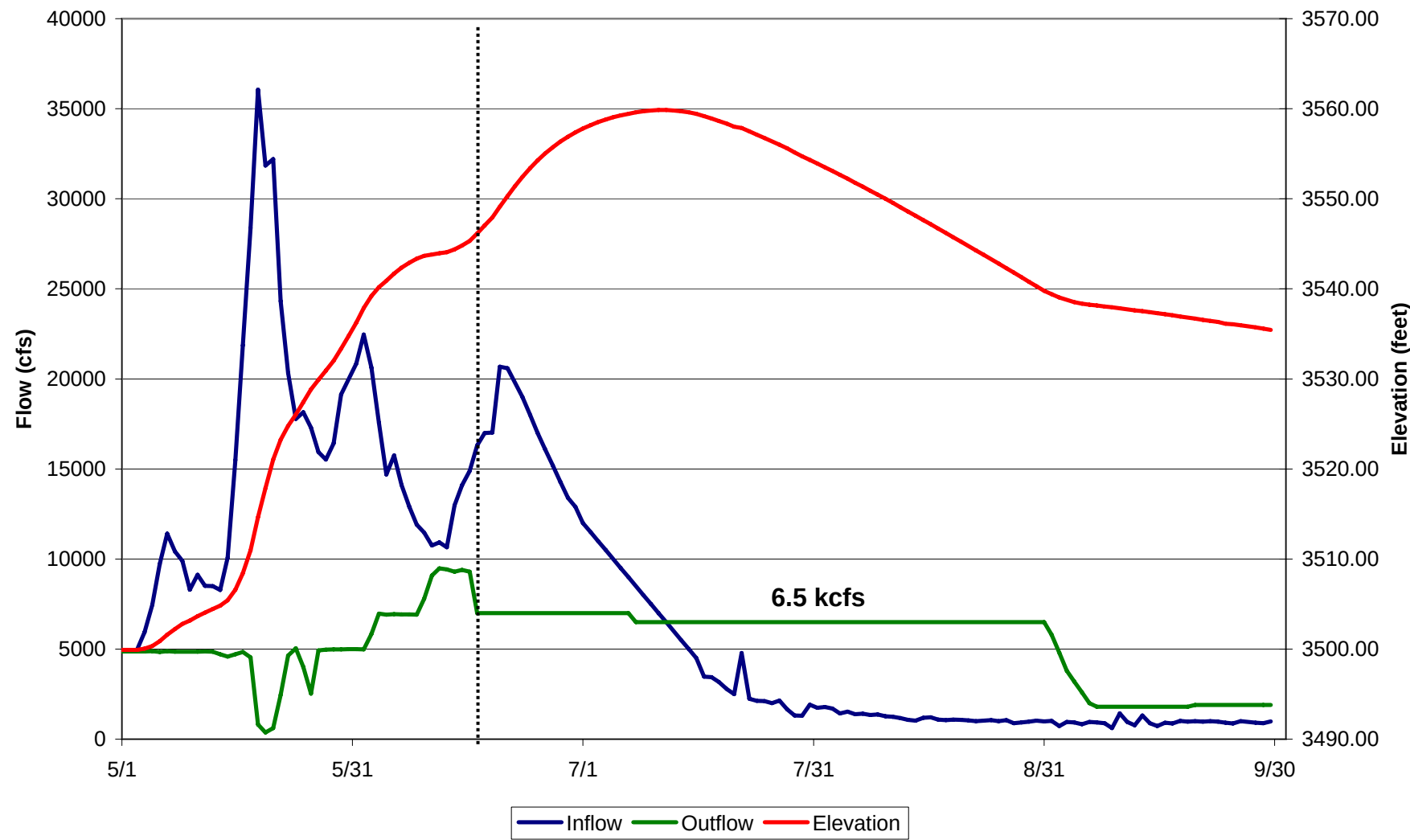


Conclusions

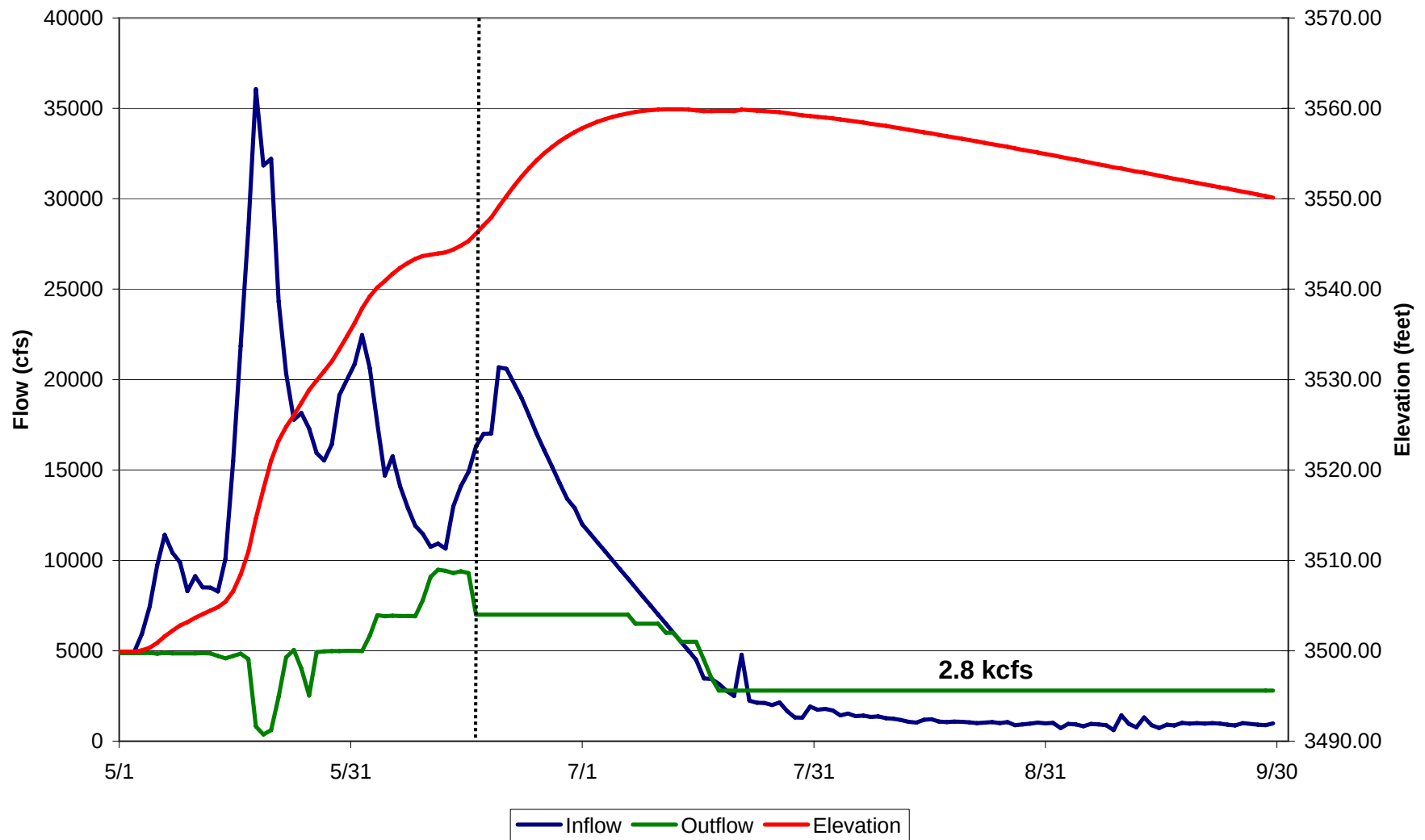


- Nez Perce Tribe-2008: Draft 1794 KaF (July-Sept). Outflows 7.5 to 14 kcfs. Balance and temperature control is achieved in early July and September. September carryover: ~200 KaF.
- TMT-2007 Operation: Draft 1787KaF (July-Sept.). Outflows 8.5 to 14 kcfs. September carryover: ~200 KaF.
- Water temperature modeling shows that NPT 2008 gives a good balance for temperature control (20 degC) in July and September (very important for returning adults and their spawning conditions).
- What are your questions? ☺

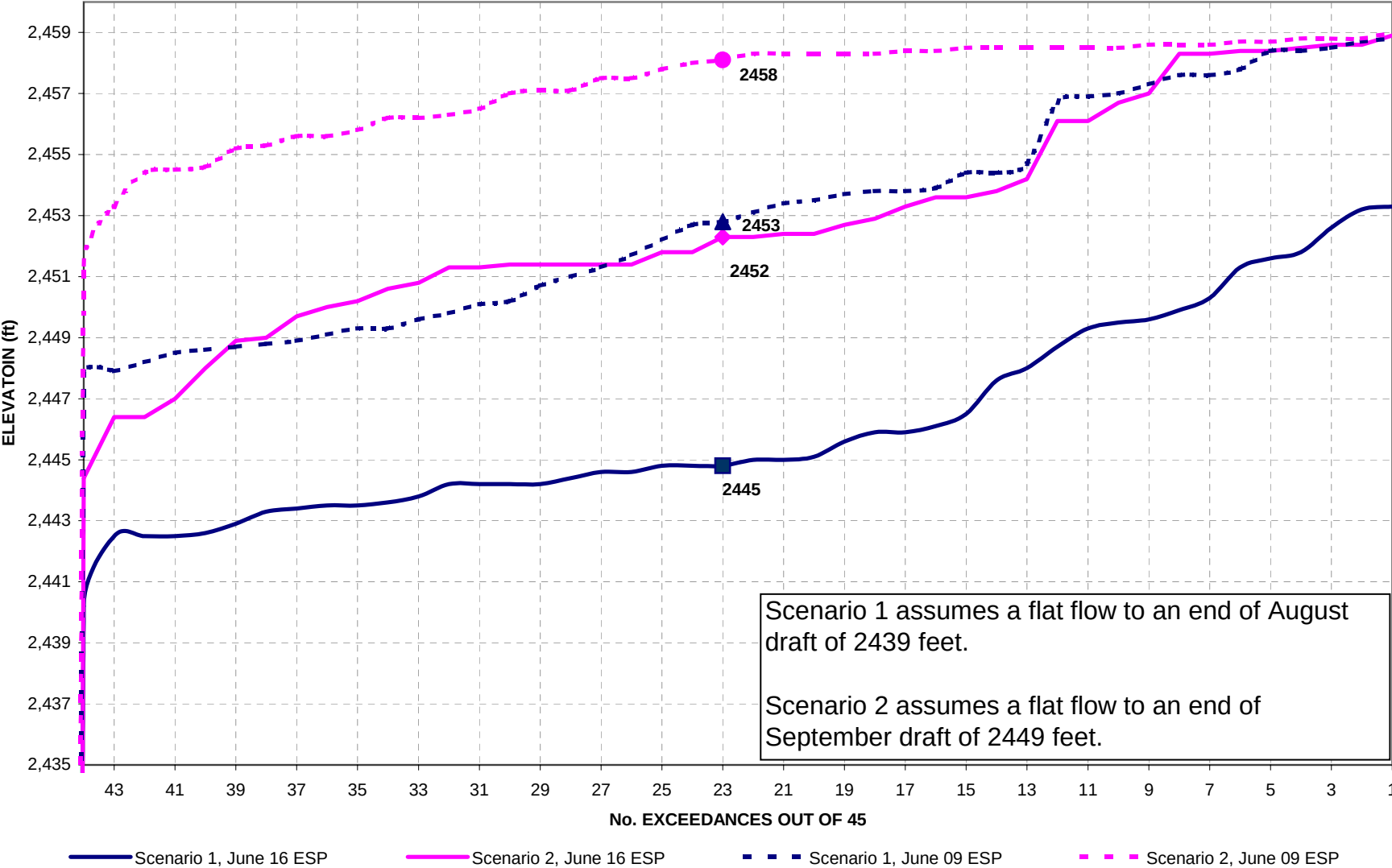
Hungry Horse - Simulated Operations 2008
Draft to 3540 End of August



Hungry Horse- Simulated Operations 2008
Draft to 3550 End of September

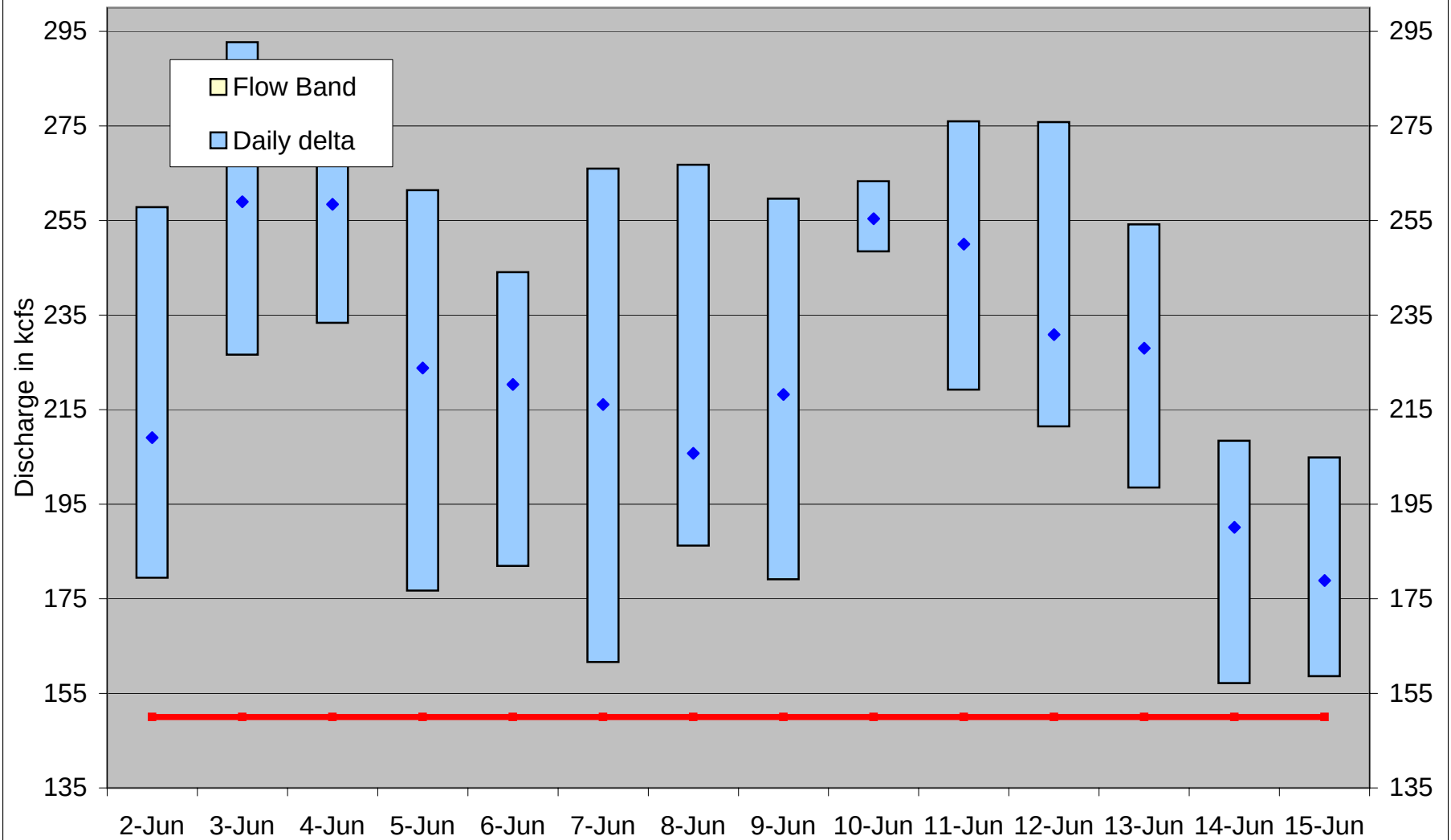


LIBBY MODELED MAX ELEVATION (MAY - AUGUST)

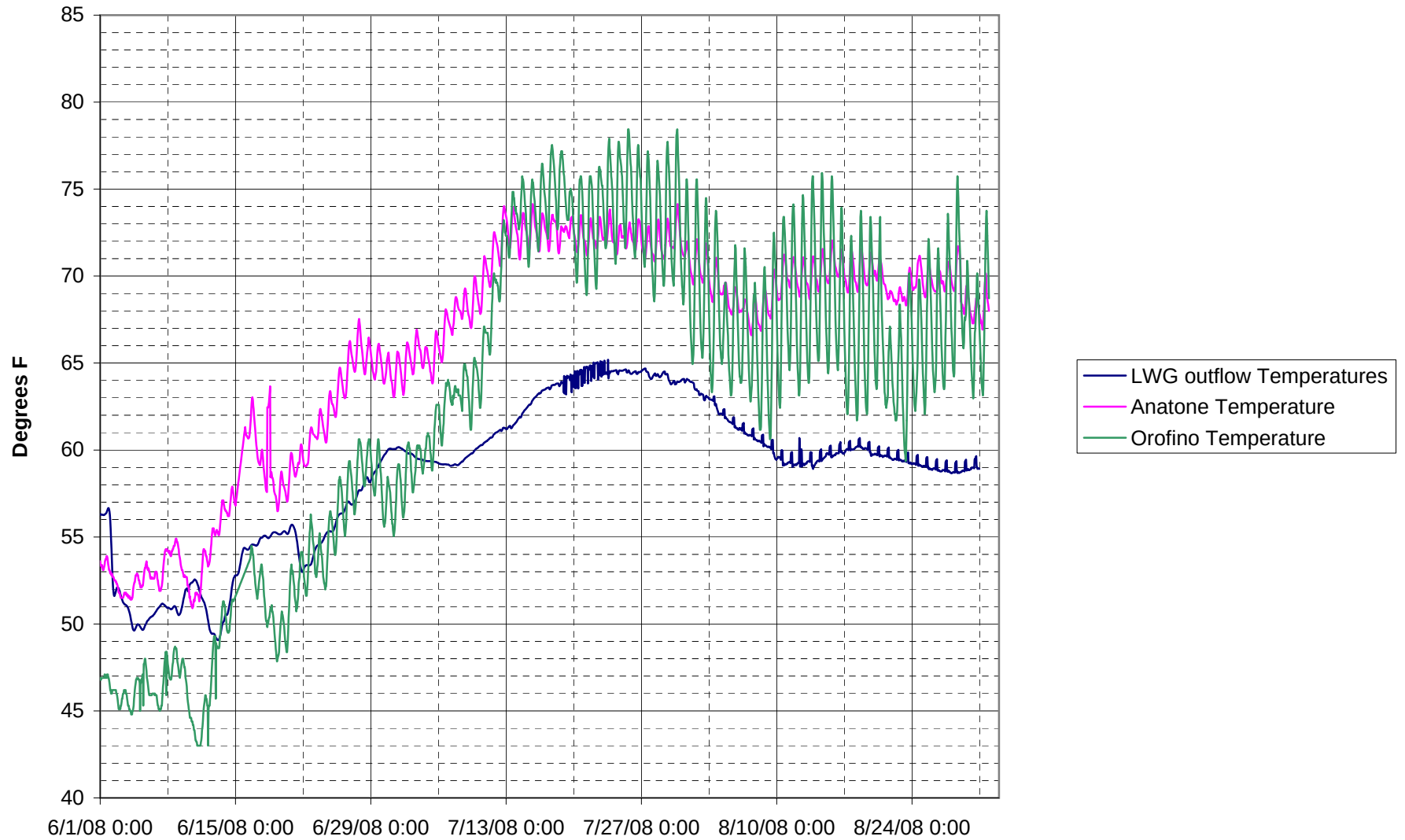


Priest Rapids Operations 2008

Number of exceedances: 0

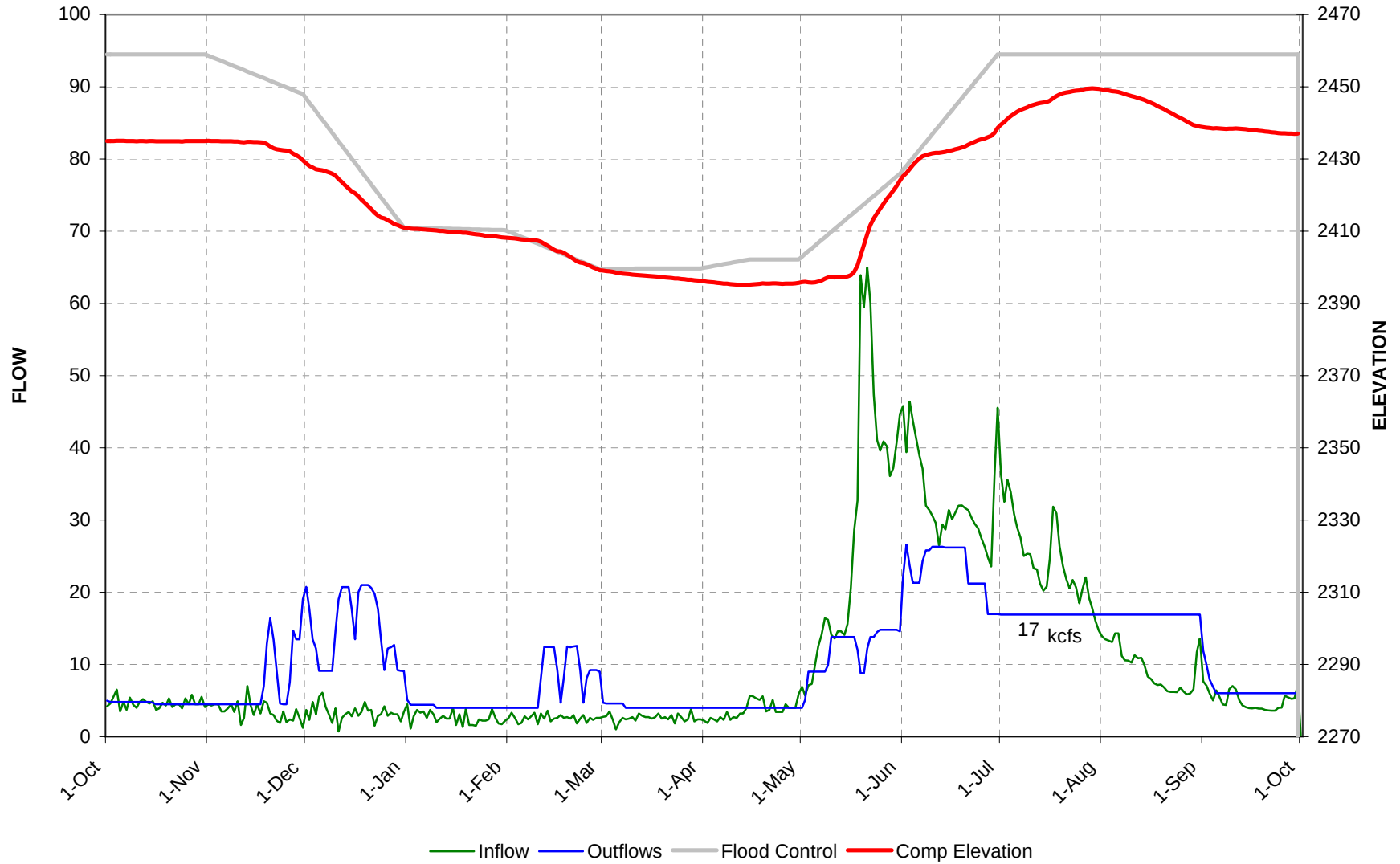


Water Temperature Comparisons



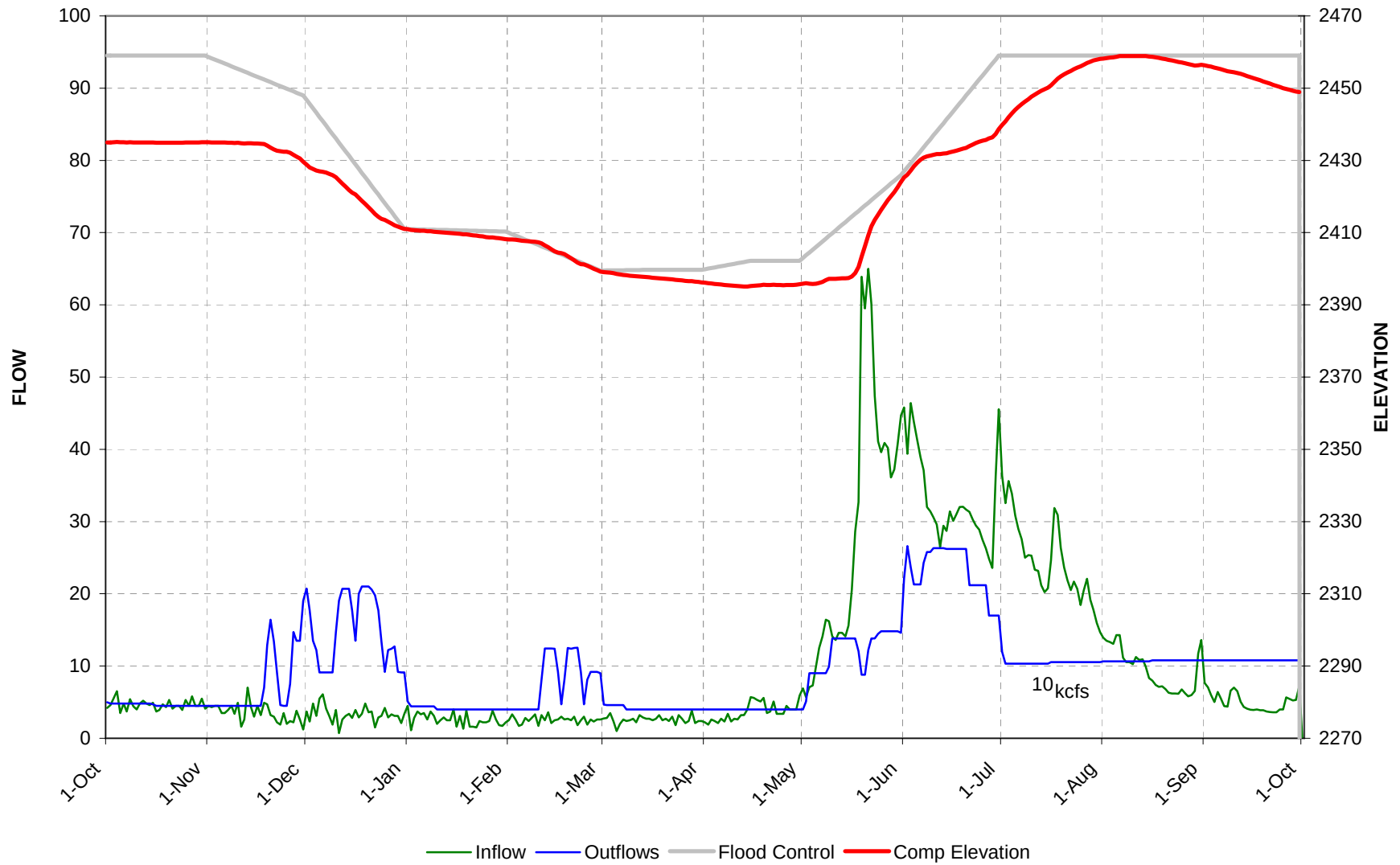
Modeled ESP Trace - June 16th

Apr - Aug Volume: 6.006



Modeled ESP Trace - June 16th

Apr - Aug Volume: 6.006



GUIDELINES FOR TECHNICAL MANAGEMENT TEAM

~~March~~~~April~~[May](#) 2003~~8~~

I. Introduction

The National Marine Fisheries Service's (NMFS) Biological Opinion on the "Reinitiation of Consultation on Operation of the Federal Columbia River Power System (FCRPS), Including the Juvenile Fish Transportation Program, and 19 Bureau of Reclamation Projects in the Columbia Basin", dated December 21, 2000, and the U.S. Fish and Wildlife Service's (USFWS) Biological Opinion on the "Effects to Listed Species from Operations of the FCRPS", dated December 20, 2000, call for the utilization of a Technical Management Team (TMT) to advise the operating agencies on dam and reservoir operations, thus optimizing passage conditions for juvenile and adult anadromous salmonids and resident fish. These guidelines are adopted in accordance with those Opinions.

The TMT is one of several technical teams within the Columbia River Regional Forum established by the NMFS, USFWS, the U.S. Army Corps of Engineers (COE), the U.S. Bureau of Reclamation (BOR), and the Bonneville Power Administration (BPA). The Regional Forum provides for regional discussion and recommendation on the operation and configuration of the FCRPS. Its goal is to develop consensus among the various members on these recommendations. The TMT's mission is specifically to ensure broad technical participation and use of the best available technical information, and to encourage consensus in recommendations on operating the FCRPS. When consensus is not achieved, the TMT ensures that the basis for participants' recommendations and Federal decisions is fully explained and documented. In such situations, questions can be elevated to the Implementation Team (IT) for resolution if requested by a TMT member.

The TMT operates under the Guidelines and Procedures approved November 7, 2002, for the Columbia River Regional Implementation Forum. The following more specific guidelines supplement the Forum's procedures for TMT operations. As the Forum procedures are refined, these guidelines may be revised.

II. Scope

The focus of the TMT is to implement the NMFS and USFWS Biological Opinions on operation of the FCRPS while considering the provisions of (and effects on) the Northwest Power Planning Council's (NPPC) Fish and Wildlife Program, other biological opinions, State and Tribal plans and programs, and other relevant operational requirements. Specifically, the TMT should explore operational scenarios under the Biological Opinions that would serve to protect other fish and wildlife in the Columbia River Basin and promote coordination and consistency with these other objectives to the extent possible.

III. Membership

See Forum Guidelines and Procedures.

The members and alternates of the TMT are listed in Attachment 1. Initial confirmation of membership, designation of representatives, and any changes in representation should be provided in writing to the NMFS Implementation Team Chair.

IV. Roles and Responsibilities

The TMT is responsible for discussion and recommendations to the Action Agencies (COE, BOR, and BPA) on hydro system flows at designated control points and expected project operations to implement the Biological Opinions for listed salmon, steelhead, sturgeon, and bull trout species within the Columbia River basin while taking into account the needs of (and effects on) other listed and non-listed species.

The TMT is to engage in joint decision-making that works toward consensus within the recognized authorities and management jurisdictions of its participating members. Specifically, the State, Tribal and Federal salmon managers (Salmon Managers) recommend the flows at the control points that best meet the needs of salmon and steelhead. These may include specific project operations, but this does not foreclose TMT consideration of alternative means of providing the same operating condition. Other participants (e.g., Resident Fish Managers) may also make recommendations consistent with the scope of these guidelines. The [procedure vehicle](#) for communicating a river or project condition, which will benefit salmon/steelhead/sturgeon migrations or resident fish, is [verbally at a TMT meeting, or through a written](#) system operational request (SOR). See Section V(d). All parties submitting SORs are encouraged to coordinate with other participants to the extent possible.

The Salmon Managers are responsible for the management of anadromous [fish and Resident Managers are responsible for](#) ~~and~~ resident fish in the basin. The COE and BOR are responsible for decisions on operation of the FCRPS projects; and the COE and BPA are responsible for Treaty agreements with Canada regarding storage in Canada and other Treaty-related matters. The participation of other affected sovereign and non-sovereign entities is intended to ensure that decision-makers have the broadest possible source of information upon which to base their decisions. All parties are encouraged to succinctly present their views regarding biological or operational recommendations. Input can provide alternative options for the appropriate authority to consider when making their decisions, but authority for implementing the request remains with the appropriate agencies.

The TMT is a year-round technical body. Winter planning will consist of development of a Water Management Plan [and updating the 1-year and 5-year Biological Opinion Implementation Plans](#). ~~and updating the 1-year and 5-year Biological Opinion Implementation Plans~~. The purpose of in-season management is to implement the Biological Opinions and the Water Management Plan. Post-season review will consist of a review of the previous year's activities and performances, and updating operating procedures

as needed. Throughout the year the COE, BOR, and BPA will coordinate planning and operational decisions that may affect salmon and other species, through the TMT (e.g., yearly agreement on Non-Treaty Storage Agreement spring/summer operation, the 5-year Idaho Power Company Agreement, and the Libby/Arrow swap). The COE, BOR and BPA will specifically use the TMT as a forum for the coordination and consideration of potential effects on salmon, steelhead and other species prior to a final decision. Idaho Power Company, the Mid-Columbia Public Utility Districts, and other non-sovereign participants are also encouraged to use TMT as a forum for coordination of planning and operational decisions throughout the year.

V. Operating Procedures

a) Annual Water Management Plan

The Annual Water Management Plan is developed and used by the action agencies as a decision-making and management tool, and includes all known or typical operations that will be implemented throughout the year based on prior years' gathered data.

Each year, the TMT will discuss and make suggested updates ~~finalizeto thean~~ annual Water Management Plan based on the run-off forecast and other factors specific to that year. A draft Fall/Winter Update will be available for review in October. A draft Spring/Summer Update will be available for review within two weeks of the March final forecast. ~~A draft Fall/Winter update will be available for review in October.~~ All interested parties may participate in the plan development and will be given an opportunity to review and comment on the draft plan. In general, the Salmon Managers will provide information on salmon and salmon operational requirements to be included in the plan. Resident Fish Managers will provide information on resident fish needs. The Action Agencies will provide information on reservoir status; planned project operations (and operating constraints); flow forecasts; anticipated special operations for research and other purposes; turbine outage and maintenance plans; and operating agreements and contracts that may affect annual operations. Priorities among competing needs should be resolved within the context of the scope of these guidelines. The Action Agencies will be responsible for finalizing the Water Management Plan.

b) Summary of In-season Management Key Events

Monday	Begin implementing operations based on last week's decision.
Tuesday (9 a.m.)	The COE posts or otherwise distributes flow projections to TMT members for Priest Rapids, McNary and Lower Granite, along with resulting reservoir operations and elevations, and current dissolved gas and temperature data. Salmon Managers will post or otherwise distribute biological information.
Tuesday (4 p.m.)	TMT Members (or others) submit SORs to the Reservoir Control Center (RCC) and send (fax) hard copies to TMT members and participants. The Salmon Managers will fax SORs to all project owners for which an operation is requested. The Salmon Managers

will post the SOR to the Fish Passage Center web page, or an electronic version of any SOR will be simultaneously sent to the Corps so that it is available for the TMT web page as soon as possible.

Wednesday 9 a.m. The TMT meets bi-weekly, with conference call on alternate weeks if needed, to discuss in-season management data and SORs, document operations, and recommend the following two week's operations. By the start of the meeting all SORs and the disposition will be posted to the TMT web page for use by members who can not attend the meeting. If necessary, the TMT frames the issue(s) to be raised to the IT before 12 a.m.

Thursday (3 p.m.) In case of impasse, disputes are resolved through the IT.

Friday (noon) In the event an issue has been raised to the IT and the IT has resolved the issue, the Action Agencies document the operation to begin on the following Monday. This decision, and rationale, should be documented before the next regularly scheduled TMT meeting and sent to the Chair of TMT, who will post it on the TMT homepage

Friday (p.m.) The TMT draft meeting notes are posted or otherwise distributed

c) In-season Management Data

The TMT will use the National Weather Service's River Forecast Center's (RFC)

~~streamflow~~[stream flow](#)

forecast for the Columbia River Basin, [the Corps' volume inflow forecast for the Libby and Dworshak projects, and the Bureau of Reclamation's inflow forecast for the Grand Coulee and Hungry Horse projects.](#) ~~These~~[This](#) forecasts (and the basic reservoir operations that are assumed when producing it) ~~is~~[are](#) the official forecasts to be used for the decision-making

process. The BPA forecast may be used as supplemental information. The COE will use the RFC forecast to prepare flow projections for Priest Rapids, McNary and Lower Granite. By 9 a.m. (or as early as possible after that) on Tuesday, the flow projections and resulting reservoir operations will be distributed to TMT members. The Action Agencies will also provide dissolved gas, temperature, and other physical monitoring data available for decision-making.

During the anadromous fish migration period, the Salmon Managers will provide biological information on salmon and steelhead numbers, migration timing and condition, for both the current year and historically. The USFWS, and others as appropriate, will provide relevant information on other fish and wildlife resources. These data will be posted by NMFS and USFWS each Tuesday by 4 p.m.

d) System Operational Requests

System Operational Requests (SOR) are an in-season management tool for bringing forth requests to deviate from or refine planned, existing or BiOp recommended operations. These requests should be intended to provide an operation that is biologically necessary to protect listed and other aquatic species of concern and human health and safety given in-season fluctuations of the hydro system and the status of the fish.

TMT members may provide recommendations to the TMT on hydro system flows and/or expected project operations consistent with the scope of these guidelines. Non-TMT members may also submit recommendations for consideration. These recommendations will be in the form of system operational requests (SORs) stating the flow objective(s) sought (e.g., keep flows at a location X in a W-Z range). Expected project operations may also be added. Each SOR will include the biological or operational basis for the recommendation. Each SOR will also indicate whether the request is to implement a NMFS or USFWS Biological Opinion, NPPC Fish and Wildlife Program, or other Federal, State or Tribal program. Non-TMT members may also submit SORs for special operating purposes for TMT consideration.

All SORs will be submitted by 4:00 p.m. on Tuesday via fax or email to the action agencies, or any other project owner that may be required to deliver a specified operation, provided that the flow projections were available by 9 a.m. that day. Electronic submittal through the Proposal Submission/Review form on the TMT homepage may also be used. TMT and public comments on the proposal can also be appended via the Internet form. If proposals are incomplete, or are not received in time for sufficient review, the TMT may choose to delay action, but lack of an SOR should not preclude discussion of relevant matters at the meeting.

SORs should list members of the agencies who have reviewed and support the request. The SOR will be outlined for description on the TMT SOR disposition web page. The SOR will be posted to the agenda prior to the start of the TMT meeting so that telephone participants can follow the conversation at the meeting.

When an SOR has been properly submitted, the Action Agencies (COE, BOR, BPA) should be prepared at TMT to describe the operational options and implications of meeting the request. Any decision to implement or not implement will be recorded in the official meeting materials and summarized at the end of those minutes. The meeting facilitator will clarify the decision at the meeting to assure that the record accurately reflects the disposition of the request.

e) Meetings

Between the last week of March and up to at least August 31 the TMT will meet every other Wednesday, or more often if necessary, to conduct in-season management. All meetings will be open to interested parties. A conference line will be available for those who cannot attend in person.

An agenda for each meeting will be distributed at least two business days prior to the meeting (the preceding Monday in the case of the regularly scheduled in-season meetings).

The principal purpose of the meetings and standing agenda items during the migration season is to review the status of the preceding week's SOR and operations, biological data, new SORs and project operating data, and to reach informed decisions on FCRPS operations for the following week(s). As other items are brought forward for TMT consideration they will be added to the agenda for future discussion, but lack of an agenda item will not preclude discussion of relevant matters at the meeting.

The discussion of SORs at TMT meetings will include distinct segments dealing with both biological and operational issues. Biological questions associated with an SOR will be addressed to ensure that the biological basis of the SOR is clear, and to allow the TMT to consider any additional biological information that may be made available at the meeting. The meeting will then move on to a discussion of operational alternatives to meet the SOR by the Action Agencies and members of the TMT. The Chair should ensure that adequate time is allotted to each segment of the meeting.

The Chair should also ensure that the support or opposition of each TMT member for an SOR and a final decision by the Action Agencies are noted in the minutes.

f) Meeting Facilitation

Meetings of the TMT will be facilitated by an impartial facilitator, who will allow all TMT members the opportunity to fully participate in discussions and to help members resolve conflicts as they arise. The meeting facilitator shall serve at the will of all members of TMT and should have skills as a meeting manager and conflict resolver. The meeting facilitator's role will include:

- Assisting the chair and TMT members in the development of meeting agendas
- Managing the meeting agenda in a balanced and even-handed fashion so that all members have an opportunity to speak and be heard
- Helping the group stay focused on the agenda and prioritize items that need action and further discussion
- Enforcing the ground rules established by the TMT (see Attachment 2)
- Helping the group reach consensus on decisions
- Helping the group resolve conflicts that may arise in the course of discussion
- Highlighting any decisions the group may reach
- Working with members between meetings to clarify issues, resolve disputes, and seek potential solutions to impasses
- Assisting members to develop opportunities that may resolve conflicts and increase the overall satisfaction with the TMT process in the long term, and
- Helping the group maintain a sense of humor

TMT members may give feedback directly to the facilitator or to the chair if they have concerns with the manner by which meetings are managed. The facilitator will be replaced if, after discussion with the facilitator, members believe he or she is not remaining impartial in the delivery of service.

g) In-season Decision making

On Wednesday morning the TMT will decide on operations for the following two weeks based on the available information and any pending SORs. These operating decisions will be made by consensus whenever possible. Consensus is defined as lack of a strong objection that would prompt one or more of the TMT members to elevate the issue to the IT. In the absence of consensus, the decision will be referred to the IT in accordance with the dispute resolution process described below. Objections to decisions that are not strong enough to prompt one or more TMT members to elevate the issue will be documented in the minutes of the TMT meeting.

If the recommendation is to implement the SOR or a modification of the SOR as agreed to by the TMT, then this should be documented for the minutes, and the SOR (and the Biological Opinion, Council's program or other plan on which it is based) may form the basis for the decision. If the Action Agencies do not agree to implement an SOR, they will describe for the minutes both the intended operation and the basis for that decision. The basis for the decision could include that the proposed operation is inconsistent with a Biological Opinion, that operational constraints prevent its implementation, that cost is prohibitive beyond that already included in the so-called "Fish Cap", or that the Action Agency has an alternative view of the best available biological information. If the Action Agencies believe the best available biological information supports a position that differs from that of the SOR sponsor(s), then the explanation should acknowledge this difference and should provide a clear, succinct written explanation of the data, analysis or judgment that supports the alternative view. In each case, a full explanation will be provided by the Action Agencies to the TMT and IT.

The final decision made by the COE and BOR on the following week's operation will be made at the meeting whenever possible. The TMT will try to avoid making decisions outside the established process. In-season FCRPS operating decisions made through a separate process, such as those under the Action Agencies' authority for emergency situations, will be explained and documented as soon as possible, but in any case no later than Friday following the TMT meeting.

h) Documentation

Minutes of all TMT meetings will be prepared in accordance with Regional Forum procedures and approved by the TMT. Every effort will be made to post the draft meeting notes to the TMT home page by close of business Friday afternoon following the meeting. Comments will be due by the following meeting.

The TMT meeting minutes will be used to keep track of the decision-making process. The minutes will include the substance of any SOR, the decision, the decision-maker, and the basis for the decision. The minutes will also include: (1) documentation of consensus or a listing of members objecting to an SOR or a final decision; and (2) when an SOR is not implemented, clear documentation of the reasons provided by the decision-maker.

If a decision is elevated to the IT and therefore not made at the weekly TMT meeting, documentation on the final decision reached will be provided separately in writing by the IT and will include the same information noted above. This documentation of the decision

should happen before the next regularly scheduled TMT meeting and be sent to the Chair of TMT, who will post it on the TMT homepage.

Each member is responsible for reviewing the decision documentation and the meeting minutes, especially if the agency he/she represents is one of the decision-makers.

Interested parties may request copies of the minutes if they have no access to the TMT homepage.

i) Distribution of Information

Meeting notes and material will be made available to TMT participants throughout the year. These materials will be made available through the TMT home page and may be reproduced on other Internet home pages where available. They will also be faxed to members and participants that request such services. Regular mail may be used for materials when time permits.

j) Public Participation

The public may comment on an issue at the end of the discussion on that issue or at the end of the meeting, based on the discretion of the group and the facilitator. They may also comment outside the TMT process.

VI. TMT Dispute Resolution Process

In the event that the TMT is unable to reach consensus on an issue, any member may request that the item be elevated to the IT. Every effort should be made to ensure that the issue is raised at least one week in advance of the monthly IT meeting (first Thursday of the month).

If, despite all efforts to the contrary, the TMT finds at its Wednesday morning meeting that it is unable to resolve a weekly in-season management dispute, and the decision cannot await consideration at the next regularly scheduled meeting, the IT will meet by conference call at 3:00 on Thursday afternoon. In the event that such a meeting is necessary, the TMT will prepare, and agree to, a brief summary of the issue(s) and a short description of the opposing viewpoints. This document will be given to the IT members by 1:00 p.m. on Thursday afternoon.

The IT will attempt to reach consensus. If the IT is unable to reach a consensus, then a final recommendation will be made by the appropriate agency (e.g., NMFS or USFWS if the issue relates to implementation of a Biological Opinion, or NPPC if the issue relates to implementation of the Fish and Wildlife Program). The member with the authority for the action will then make the decision and explain the rationale in writing. Whether IT acts by consensus, or the member with the authority for the action makes the decision to resolve a TMT conflict, it should be documented before the next regularly scheduled TMT meeting and sent to the Chair of TMT, who will post it on the TMT homepage.

VII. Emergency Meetings

Any member of the TMT may call a meeting when an emergency situation requires action of the TMT.

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ATTACHMENT 1

TECHNICAL MANAGEMENT TEAM (TMT) MEMBERS

ORGANIZATION - REPRESENTATIVE / ALTERNATES

National Marine Fisheries Service - Paul Wagner / Richard Dominigue
U. S. Army Corps of Engineers - Jim Adams / Cathy Hlebechuk / Bob Buchholz
Bonneville Power Administration – Robyn MacKay / Tony Norris / Scott Bettin
U.S. Bureau of Reclamation - John Roache / Mary Mellema / Pat McGrane
U.S. Fish & Wildlife Service - David Wills / Steve Haeseker
State of Washington - Cindy LaFleur
State of Oregon – Rick Kruger / Ron Boyce
State of Idaho - Russ Kiefer
State of Montana - Jim Litchfield / Brian Marotz

Confederated Tribes of the Colville Indian Reservation - ~~Jerry Marco / Kirk Truscott~~ Sheri Sears
Shoshone-Bannock Tribes of Fort Hall - Keith Kutchins

ELIGIBLE ORGANIZATION WITH NO OFFICIALLY DESIGNATED MEMBER - CONTACT PERSON / ALTERNATE

Kootenai Tribe of Idaho
Confederated Tribes of the Umatilla Indian Reservation
Confederated Salish & Kootenai Tribes of the Flathead Reservation
Confederated Tribes of the Warm Springs Reservation
Yakama Indian Nation
Shoshone-Paiute Tribes of Duck Valley Reservation
Burns Paiute Tribe
Kalispel Tribe
Spokane Tribe of Indians - Deanne Pavlik / Chuck Lee
Nez Perce Tribe of Idaho - Dave Statler / Greg Haller
Coeur d'Alene Tribe of Idaho
State of Alaska

ATTACHMENT 2.

MEETING GROUND-RULES & EXPECTATIONS

The following meeting ground-rules and expectations were discussed and agreed to by all members present at the _____ meeting of the TMT. They may be changed at the request of the Team.

I. Ground-Rules

Meetings will start and end on time unless members agree otherwise.

Members will treat each other with respect, which includes:

- ° Separating the people from the problem
- ° Listening to what others have to say
- ° No interruptions
- ° Monitoring your own air time
- ° No side conversations
- ° Letting the facilitator or chair know when you would like to speak
- ° Being mindful of tone when speaking directly to others
- ° Remembering that members are representing agencies, not stating individual opinions

During in-season management, each member agency/group will have one primary TMT representative who will sit at the table during meetings. Alternates or technical resource staff are welcome to attend and provide input through their primary representative, or when called on by TMT members. All are welcome to sit at the table --with preference for the primary representatives if there is a space limitation.

Any issues elevated from the TMT to the Implementation Team (IT) will be thoroughly discussed at TMT. TMT members will agree on the "issue statement" for the IT. The TMT Chair will then present the issue at the IT meeting. All TMT members will brief their agency IT representative on the issue prior to the IT meeting.

The meeting facilitator may make process comments in order to keep the group on track, focused and productive.

II. Expectations

Members are expected to come prepared to participate in the meetings. This means, they will provide necessary input to discussions and work towards making decisions based on information they have gathered from their respective agencies between meetings.

Members are expected to keep their agencies and staff apprised of decisions or important meeting discussions.

Members are expected to attend all meetings or send an alternate. If an alternate attends the

meeting, a briefing, both before and after the meeting, is expected of the primary representative. The group will not revisit information for members who were absent from or late to a meeting.

Members are expected to follow through on assignments to which they agree, or are given by other team members, on a timely basis. This includes requests for comments on information or reports from other team agencies.

The meeting facilitator is expected to keep the group on track and focused on agenda items. Additionally, the group expects the facilitator to assure equal participation, highlight any decisions that the group reaches, and maintain a sense of humor.

People who listen in on the telephone are expected to “sign-in” as they call in on the conference telephone line.

Group members may contact the facilitator at any time to make process suggestions, raise concerns or request additional assistance at or between meetings.

COLUMBIA RIVER REGIONAL FORUM

TECHNICAL MANAGEMENT TEAM

June 18, 2008 Meeting

FACILITATOR'S SUMMARY NOTES ON FUTURE ACTIONS

Facilitator: Robin Gumpert

Notes: Erin Halton

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 of Minutes/Agenda

The 5/21, 5/28 and 6/4 meeting minutes and facilitator notes had been posted to the web; no further changes were made during the meeting and they were considered final. The 6/6/ and 6/11 official meeting minutes and facilitator notes had not yet been posted to the web; TMT will look to finalize them at the 7/2 face-to-face meeting.

2008 Summer Treaty Fishing

Kyle Dittmer, CRITFC, reported on SOR 2008-C2, posted as a link to the TMT agenda. The request was for stable 1' elevation constraints for The Dalles, John Day, and Bonneville pools; Dittmer said that the duration of summer treaty fishing will be determined at upcoming tribal meetings and that CRITFC would inform their federal partners of the dates as soon as they are known. Dittmer added that net flight surveys will be occurring during the treaty fishing timeframe. The COE acknowledged the request in the SOR and clarified that Bonneville lower pool elevation of the past weekend was due to clean up of a kite boarder area at Hood River. After discussing the request with CRITFC, the COE planned to operate Bonneville under a 1.5' hard /1' soft constraint, The Dalles under a 1.5' soft constraint with a priority for 1900 to 1700 hours, and John Day under a 1.5' hard constraint. The COE asked that CRITFC notify them as to the dates that are planned for platform fishing.

Action/Next Steps: The COE will share their teletype regarding treaty fishing with CRITFC. CRITFC will inform the COE of the expected dates for platform fishing and for the duration of the summer treaty fishing season. CRITFC gave TMT members a head's up that there will likely be an SOR sent to them by 6/26 for future Treaty fisheries.

McNary TSW Hoist Installation

Jim Adams, COE reported on the McNary TSW gate hoist installation that took place during the week of 6/9. Work was completed by 6/12, as discussed during the 6/11 TMT call. Adams clarified that the duration of the outage in gates 4, 5, and 6 was for 2 hours 45 minutes; that gates 19 and 20 did not require an outage, and that all gates had been enabled for transportation operations. The COE acknowledged project operator Roger Golladay for his work and NOAA commended the COE on a job well done.

Bonneville Screen Update

Dan Feil, COE, reported that screens had been placed in Bonneville units 12 and 14, with additional screens expected to be placed in units 13 and 16 later in the day on 6/18. Feil added that units 11 and 15 were temporarily out of service and expected to be back online on 6/19.

Action/Next Steps: The COE will closely monitor debris collection at the project and will inform TMT members when units 11 and 15 are back online, either via email or posting a link to today's TMT agenda.

Dworshak Operations/Temperature Modeling

Steve Hall, COE, reported on the current status and near-term operations for Dworshak: the project has outflows of 15 kcfs and is at elevation 1585.8' (about 15' feet from full pool.) The COE plan for the near term is to operate Dworshak outflows at 12 kcfs through the weekend, with adjustments made as needed to ensure that spill operations that might result in gas cap exceedances (passing inflows above 15 kcfs) don't occur and to prepare for the transition to summer operations after the July 4th weekend. Hall referred TMT members to ESP graphs linked to the TMT agenda and said that the latest data indicated a 100% chance of achieving refill by 7/1, assuming inflows stayed at or below 14 kcfs. The COE indicated that if inflows are over 14 kcfs, the elevation may be held below full pool a few days longer. Hall noted that it was uncertain when and how the 40" of snow pack will run-off; a snow flight survey scheduled for 6/24 will provide more information on the snow pack in the basin and will be sent to TMT members for consideration. The BOR expressed support for the short-term plan as outlined by the COE and noted the balance of multiple uses for flows and the cooler than historically average weather and in-river temperatures expected at the project over the next few days.

Dave Statler, Nez Perce Tribe, asked whether it might be more prudent to move to an elevation of 1600' (full pool) earlier than currently scheduled, to prepare for the temperature control needs of summer operations. The COE clarified that there is less risk of gas cap exceedances with the short term operation outlined above and that they are required to manage to these caps. Paul Wagner, NOAA, said he was glad to hear that the fisheries' objective of passing "good" inflows early in July and avoiding a double peak was shared by the COE.

Jim Adams, COE, reported on temperature data posted as a link to the TMT agenda. He noted the lower than average thermocline and said that Dworshak outflow temperatures were near 46°F; Dave Wills, USFWS, clarified that temperatures in the range of 46-48° were good from the Dworshak Hatchery's perspective, as opposed to temperatures lower than 45°F. Tracy Schwartz, COE, reported on CEQUAL modeling results, noting that he did not expect to see temperatures rise above 65°F this season, staying well below the 68°F criteria for the Lower Granite tailrace. Kyle Dittmer, CRITFC, reported on temperature modeling results from EPA's RBM 10 model, posted as a link to the TMT

agenda; he noted the similarities to the COE modeling results and said that conditions are favorable for Dworshak summer operations.

Action/ Next Steps:

- The COE will operate Dworshak with outflows at 12 kcfs through the weekend, with adjustments made as needed to protect against gas cap exceedances.
- The COE will provide an update on Dworshak conditions for TMT members via email on 6/25.
- The COE will share results from the snow flight survey with TMT members via email, likely on 6/25.
- Dworshak operations will be on the agenda for the 7/2 TMT meeting. TMT members may convene a conference call prior to that meeting.
- Dave Wills, USFWS, planned to touch base with the Dworshak Hatchery prior to the 7/2 TMT meeting.

Libby Sturgeon Flows/ Libby & Hungry Horse Summer Operations

Amy Reese, COE, reported on operations for Libby sturgeon flows: the project will ramp down to four units (approximately 20.8 kcfs) on 6/20 and hold until 6/28, when the 1.04 MAF sturgeon volume is expected to be exhausted. She referred TMT to operation scenarios posted as links to the agenda based on last week's ESP runs that showed traces for achieving an elevation of 2439' by the end of August and 2449' by the end of September. Assuming a 6.0 MAF volume, Reese said that scenario 1 showed flows of 17.0 kcfs would be needed to maintain steady flows through the end of August. She added that if the median volume of 5.5 MAF were assumed, flows of about 13.5 kcfs would be needed to maintain steady flows through the end of August. Scenario 2 showed reaching 2449' by the end of September would require flows of around 10 kcfs. John Roache, BOR, referred TMT to Hungry Horse scenarios linked to the TMT agenda; he reported that Hungry Horse had inflows currently around 16 kcfs and expected inflows to increase to around 18-19 kcfs. The scenarios showed traces for achieving an elevation of 3540' by the end of August and 3550' by the end of September.

Montana representatives Brian Marotz and Jim Litchfield noted their support for an operation with as stable flows as possible through September and referred to language in the 2008 BiOp to draft Libby to 10' from full by the end of September. Litchfield noted that MT is open to discussions if a compromise on Libby operations could be reached amongst TMT members. NOAA shared similar support for a compromise operation. Rick Kruger, OR, acknowledged MT's proposal and reported that Oregon is not in a position to support any operation that would sacrifice velocities in the Lower Columbia River. There were discrepancies and clarity was needed on various interpretations of court orders, the Fish Operations Plan and 2004 BiOp concerning this particular operation. Facilitator Robin Gumpert acknowledged the policy considerations and court process overlay that has challenged a technical discussion of this issue, and it was suggested that TMT members engage their agencies in seeking clarity on what their

interpretations and intentions are for this year's summer operations for Libby and Hungry Horse.

Action/ Next Steps:

- The COE planned to operate Libby at 17 kcfs following the end of sturgeon flows and leading into the next TMT discussion, on 7/2.
- MT planned to draft an SOR for Libby/Hungry Horse summer operations and flow reduction. MT planned to coordinate with the COE and the BOR and any other interested TMT members on possible scenarios for Libby/Hungry Horse that will be part of the SOR.
- All will bring clarity from their various agencies on their interpretations of the various guidance documents and processes on this operation this year (including the 2004 BiOp), to aid in the discussion.
- It was acknowledged that Oregon's position will very likely not change on this issue.
- NOTE: The COE reported on a potential for a one-unit outage at Libby for the month of August. This aspect will need to be included in further discussions concerning Libby summer operations.

Grand Coulee Operations:

John Roache, BOR, reported on the BOR plan to provide beach access over the July 4th weekend; the project is tentatively scheduled to achieve refill elevation of 1290' elevation by 7/14. There were no objections to the proposed operation from TMT members. Scenarios showed a draft would begin after achieving refill, with McNary flows forecasted to be near 200 kcfs at that time.

TMT Guidelines

Due to time constraints, TMT members deferred discussion of this item to the 7/2 meeting.

Operations Review

Reservoirs: Grand Coulee was operating at 1283.4'. Hungry Horse was at 3546.1' with outflows of 7 kcfs. Libby was operating at 2432.6', with inflows of 30.2 kcfs and outflows of 26.2 kcfs. Dworshak was at 1585.8' with inflows of 23.2 kcfs and outflows of 14.8 kcfs. Albeni Falls was at 2059.8', with inflows and outflows near 82 kcfs. Seven day average flows at McNary were 352 kcfs, Lower Granite flows were 122 kcfs and Bonneville average flows were 363 kcfs.

Fish: Paul Wagner, NOAA, reported that adult passage numbers were a couple thousand per day for summer Chinook. Jack and Sockeye counts were very strong, steelhead and yearling spring Chinook counts are winding down, and Fall Chinook are on the upswing.

Power System: Cathy Hlebechuk, COE reported that a ramp rate exceedances at Libby and Hungry Horse on June 14 was due to a four-minute line trip.

Water Quality: Jim Adams, COE, reported several TDG exceedances due to over-generation. The COE continues to manage TDG as best can. Adams noted upcoming shifts from spring to summer operations at Lower Monumental, Bonneville and Lower Granite.

Priest Rapids Operations

Russell Langshaw, Grant County PUD, reported that rearing protection flows were maintained well this year, with only 3 exceedances for the season.

Action/Next Steps: Langshaw will provide a final Priest Rapids Operations report at the TMT year-end review meeting.

Next TMT Meeting: 7/2 face-to-face

Agenda Items include:

- Finalize notes/minutes
- Dworshak Summer Operations/Temperature Modeling
- Libby Sturgeon Flows Report
- TMT Guidelines – Approve Draft
- Libby/Hungry Horse Summer Operations
- Operations Review

**Columbia River Regional Forum
Technical Management Team Meeting
June 18, 2008**

1. Introduction

Today's TMT meeting was chaired by Jim Adams (COE) and facilitated by Robin Gumpert (DS Consulting) with representatives of COE, USFWS, BOR, BPA, CRITFC, NOAA, Montana, Oregon, Idaho, the Nez Perce Tribe, Spokane Tribe 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

Discussion of the meeting minutes was postponed until the next meeting.

3. Priest Rapids Operations Update

The protection program ended on June 17, Russell Langshaw (Grant Co. PUD) reported. He provided TMT with information linked to today's agenda. During the three-week period, protection flows ranged from 158 kcfs to 293 kcfs. The average daily delta during that time was about 60 kcfs. In general it was a great season, with only one major exceedance during the first week of operations. Langshaw will present an annual summary of 2008 operations.

4. 2008 Summer Treaty Fishery – SOR 2008-C2

Kyle Dittmer (CRITFC) presented this SOR for 2-1/2 days of tribal gillnet fishing from Monday, June 23, through 6 pm, Wednesday, June 25. As for all tribal fisheries, the SOR requests a stable elevation within a 1-foot band. CRITFC will conduct net flights over the zone 6 pools to establish locations of fishery nets. The tribes are considering an additional 2-3 weeks of summer fishing and will let their federal partners know as soon as decisions are made.

Paul Wagner (NOAA) asked how frequently updates are provided regarding fishing times. Summer seasons are quite variable, ranging from 1-5 weeks depending on how much of the run is available for harvest. Dittmer asked why the Bonneville pool elevation was low recently. It dropped on Saturday, May 14, because the COE was doing cleanup of the Hood River sand spit, Cathy Hlebechuk (COE) explained.

The COE will provide for the treaty fishery a 1.5-foot hard constraint and a 1-foot soft constraint on Bonneville operations. The Dalles pool will be operated in a 1.5 foot range as a soft constraint with the evening hours from 1900 to 0600

as a priority. Now that flows are high, the COE will do its best to maintain elevations as a soft constraint. The normal operating range for John Day pool is elevation 262.5-264 feet and the COE will continue to operate the project within that 1.5-foot range.

Adams asked whether there are times when the elevation constraints are less crucial to tribal fishers, such as when they are using platforms instead of gillnets. Dittmer said he'll notify the COE when the fishers are using platforms, but that doesn't affect how important elevation constraints are to them.

5. McNary TSW Gate Hoist Installation Update

On Tuesday and Wednesday, June 10-11, as preparation for the installation of the gate hoist, the TSW gates at McNary were set in a fixed position for reasons of worker safety, Adams reported. Gates 4 and 6 were out of service for 2 hours and 45 minutes instead of the 2 hours planned, due to problems with the installation in Gate 5.. Meanwhile, the TSWs never had to be turned off for installation in gates 19 and 20. All gates are functional again, and the TSWs can now be turned off for transportation.

6. Bonneville Screen Update

Over the weekend, flows declined significantly at Bonneville, Dan Feil (COE) reported. On Monday morning, June 16, workers reinstalled the screens in units 12 and 14 at the Bonneville 2nd powerhouse. Today they will install screens in units 13 and 16 and proceed to the north, with the exception of units 11 and 15 which are out of service.

However, this morning flows went back up to nearly 400 kcfs. The COE is monitoring the situation and will keep TMT informed. Dave Wills (USFWS) asked how long unit 11 will be out of service; Fiel said he would find out.

7. Dworshak Operations

A. Current Operations and Conditions. The COE has been running 15 kcfs outflows from Dworshak due to snow covered area criteria, Steve Hall reported. Recent satellite imagery allowed the COE to drop this limitation on outflows. ESP runs this week show outflows going down to 8 kcfs during refill, which may be a low prediction. The COE intends to drop discharges from 15 to 12 kcfs and watch the situation. More than 40 inches of snow above 6,000 feet remains to come as residual runoff. Another RFC forecast showed higher flows, which has the COE concerned, so there may be fluctuations in Dworshak outflows. Going to 12 kcfs outflows is a prudent operation, but that might rise to 15 kcfs again, depending on how the snowmelt comes off. The goal is to fill the Dworshak pool by July 1.

The COE chose 2002 as an analog year to 2008, which maybe up to 25% less in flow volume, Hall said. There is a lot of uncertainty regarding snowmelt and a possibility the snowpack is frozen. Estimated runoff to come is around 3.4 maf, with ESP forecasts showing 3.3 as an average this week. As of yesterday, the COE decided to keep outflows at 14 kcfs or higher. The COE is using all sources of information and watching this situation closely.

Now that we have about 15 feet of storage space at Dworshak to work with, it seems more prudent to get closer to refill at this time, Dave Statler (NPT) said. He recommended backing off now to full powerhouse capacity. If the reservoir doesn't fill now, it could mean having to choose later between providing water for cooling and reaching the refill target.

The COE goal is to fill the reservoir by July 1 as long as there is low risk of exceeding the 110% TDG state criteria, Hall replied. The 15 feet of storage space in Dworshak now could vanish quickly if inflows rise. The COE believes, based on modeling done to date, that ESP forecasts don't capture this risk adequately. Currently the pool is rising by about a foot of elevation per day, and pool elevation will rise as outflows are cut. Cutting back to 10 kcfs out could fill the reservoir by June 28, but that would mean passing inflows of 17-20 kcfs which would be way above the gas cap. The COE recognizes the desire to pass good inflows in the first week of July and intends to do so as long as that doesn't result in TDG exceedances later due to lack of storage capacity.

John Roache (BOR) seconded Hall's concerns with regard to ESP predictions of Hungry Horse Dam inflows. Roache expressed a similar belief that reservoir elevations would rise faster than predicted. Paul Wagner (NOAA) supported the goal of filling the reservoir and passing inflows to the extent possible during summer. The overall fisheries goal is to pass as much inflow as possible during the summertime instead of refilling the reservoir too quickly, thus diminishing the potential volume that could be stored later in the season.

Jim Adams presented Dworshak temperature string data, which shows a sharp thermocline and not much flexibility in terms of Dworshak outflow temperatures at this time. No drastic increase in temperatures due to weather is predicted. Dworshak reservoir is significantly cooler than this time last year, as is Lower Granite. Outflow temperatures are around 46 degrees F, and TDG levels are under the 110% state criteria. No sharp increases in air temperature are expected. The hatchery probably prefers outflow temperatures of around 46-47 degrees F, Dave Wills (USFWS) said. He will check with them to confirm.

For now through July 1, the COE will institute the following operation of Dworshak reservoir: Outflows will drop to 12 kcfs some time between now and this coming weekend, and will continue at 12 kcfs through the weekend. The COE will track inflow volumes and raise outflows up or down accordingly. The target elevation for Dworshak pool is 1,600 feet, or full, on July 1. At the next

TMT meeting on July 2, the COE will share new information, including data regarding its snow cover investigation.

B. Dworshak Summer Operations. The COE presented CEQUAL modeling regarding current conditions and outflow temperatures at Dworshak. Tracy Schwartz (COE) explained the assumptions that went into the model. According to observed data through June 16, the COE used 1975 inflows to set up a release schedule for Dworshak based on 1975 inflows because those year's volumes tend to match 2008 volumes well. The model predicts full pool around July 4, with outflows of 15 kcfs dropping down to 10 kcfs later in July for the sake of refill. Then the goal will be to move the reservoir from full pool down to a target elevation of 1,535 feet by August 1.

The model shows temperatures through June 16 for Anatone, Orofino and Lower Granite outflows. In forecasting for the Anatone and Orofino gages, the COE used 2002 temperatures and releases. The model indicates that temperatures at Anatone and Orofino gages are likely to jump into the mid-70s F range, but temperatures at Lower Granite tailwater won't exceed 65 degrees F. Based on conditions to date, it appears there will be no problem keeping Lower Granite outflows under the 68 degrees F criteria. Dave Wills asked for a printout of modeled Dworshak outflow temperatures to give hatchery personnel; Adams will post that information to the TMT web site when he receives it.

Kyle Dittmer presented CRITFC's Dworshak summer 2008 scenarios, modeled in conjunction with EPA's RBM 10 model. Dittmer had already given FPAC this information in coordination with the Nez Perce Tribe. The analysis includes two scenarios, the Nez Perce Tribe 2008 Plan and the TMT 2007 Plan.

A hydrometeorology approach was used for both scenarios, based on four surrogate years – in this case 1975, 1976, 1985 and 1989, which all had similar weather patterns to 2008. The weather trend for 2008 looks warm in July, cooling by September. The average volume for the four surrogate years was 2,096 kaf, which is similar to the COE's forecast of 2,081 kaf. Ocean conditions are in a strong PDO negative phase now. This is the coldest spring the Northwest has experienced since 1972. The projection for 2008 is for a very short summer, hot in July but cooling again in August. By contrast the NOAA 90-day forecast shows an above average chance of warmer than normal temperatures in Idaho from July through September.

Both of the CRITFC scenarios assume that Dworshak reservoir is full at elevation 1,600 feet on July 1. Under the Nez Perce scenario, the reservoir drafts to 1,535 feet by August 31, then 1,520 feet by the end of September, according to the recent Dworshak operations agreement between the Action Agencies and the Nez Perce Tribe. The main difference between the two scenarios is in how the water is shaped during July and August. Outflows of 14 kcfs would start 2 weeks earlier under the TMT operation than under the Nez Perce operation. The

reservoir reaches the same elevation under both scenarios. Dittmer recommended that temperatures be watched closely in July under the TMT operation. Favorable conditions this year will probably yield a good operation under either scenario.

There was general consensus among TMT members that the COE proceed with its outlined operation through July 1. Email communication might be needed before the next TMT meeting July 2, but probably not another conference call unless a problem arises. The COE will email TMT its projected operation based on information available.

8. Libby Operations

Amy Reese (COE) presented two scenarios for Libby summer outflows, beginning with the current sturgeon operation. On June 7, Libby went to powerhouse capacity (5 units), as the SOR submitted by USFWS requested for sturgeon flows. The SOR called for 14 days of powerhouse flows. The COE therefore plans to ramp down to 4 units on the evening of June 20 and maintain 4 units, or 20.8 kcfs outflows, until June 28. At that time, the sturgeon volume of approximately 1.04 maf will be expended, and the project will transition to summer operation.

Scenario 1 for the Libby summer operation assumes an end of August elevation of 2,439 feet. Under this scenario, 17 kcfs outflow is needed for a straight line draft from the end of sturgeon flows until the end of August elevation. The peak elevation of the pool is 2,450 feet in late July. The inflows in this scenario have a 6.0 maf inflow volume for the April – August period, which is halfway between the median ESP forecast of 5.5 maf and the COE forecast of 6.5 maf. Paul Wagner asked what outflows would be with 5.5 maf inflow volume. The median outflow from all ESP traces for the summer flow is about 13.5 kcfs under scenario 1, Reese said.

Scenario 2 for the Libby summer operation assumes an end of September elevation of 2,449 feet, based on the same inflows as in Scenario 1. The difference in the two operations is a summer outflow of 10 kcfs needed under Scenario 2 to achieve the end of September elevation of 2,449 feet. There was discussion of whether ESP might be underestimating inflows in Libby basin as well as Dworshak; Reese believed that was true and for that reason used a trace with a volume higher than the median trace.

Brian Marotz (Montana) addressed the biology related to scenario 1. Because flows would remain at 17 kcfs in the Kootenai River, resident fish production in Montana would be lost when flows subsequently plummet on September 1. At 9 kcfs outflows from Libby, all riffle habitat is covered. Under scenario 1, the opportunity to keep water close to the shoreline vegetation would

be lost, which is vital for summer production of zooplankton and aquatic insects in the reservoir.

Scenario 2, on the other hand, provides relatively flat flows of 10 kcfs, and biological production is best when flows are stable or gradually declining, Marotz said.. The biological outcome in the reservoir and river is far better under scenario 2. Scenario 2 represents full implementation of the BiOp as Montana understands it, as well as the best available science for both resident and anadromous fish.

The discussion then moved to Libby summer operations in light of uncertainties this year regarding the BiOp and the court-mandated operation.

Montana proposed a compromise between the two scenarios, drafting the reservoirs more for anadromous flows in June and July when fall Chinook are more actively migrating. Then the operation would ramp down and establish a more stable flow in August and September for resident fish. Montana supported the COE's starting plan of ramping Libby outflows down to 17 kcfs, with further rampdowns in August. Montana expressed a willingness to be flexible on this issue and asked others to do the same. Finding a compromise plan that would benefit both resident and anadromous fish will mean setting aside the requirement for a 20-foot draft by the end of August.

NOAA initiated the 20-foot draft in 1995 for summer flows at Libby as a proposed operation to support downstream flows and that operation became locked-in, Wagner said. In 1995 when Snake River fall Chinook had just been listed, there were only 75 adults returning to the river; now there are thousands, so fish managers are in a position to change this operation. NOAA endorsed Montana's proposal to adopt a compromise this year and hoped others would consider such compromise in light of current policy. **BPA** added a historical perspective that the 20 foot draft was chosen arbitrarily, without hydrological analysis to determine the impact on other operations. **USFWS** asked whether the new BiOp includes summer flow targets at McNary. NOAA said yes, but these flow targets weren't intended to be met every day or every hour. A footnote in the 2000 BiOp says these targets can't be met under most conditions, Montana said.

Oregon is not in a position to consider a compromise operation this year. Oregon would be happy to see Montana get its preferred operation at Libby and Hungry Horse, but not at the expense of velocities in the lower river. There was extended discussion of what the 2007 rollover means in terms of Libby and Hungry Horse. Oregon's position is that the operational plan in effect right now calls for a full 20-foot draft. Oregon indicated that it would object to any SOR that eliminates this requirement, elevating the dispute to IT and regional executives.

Montana's position is that language in the court agreement refers to the 2004 BiOp, which recommended the Montana plan as an experiment, and also

the 20-foot draft. This means fish managers have the flexibility to implement the BiOp with a compromise operation that addresses both recommendations. Montana proposed 17 kcfs outflows, as identified in the COE's model runs when sturgeon flows end, then a ramp down to 12 kcfs in August and 10 kcfs in September. There was discussion of the extent to which 2007 operations involved a compromise with Montana that could be rolled over into this year's operations. Montana will prepare a Libby and Hungry Horse SOR based on the compromise proposal presented today, for consideration at the next TMT meeting. Montana asked TMT to work collaboratively on a solution.

BPA requested a starting outflow to use when the sturgeon volume is expended next Friday while TMT continues to work through the process. There was general consensus on Libby outflows of 17 kcfs when the sturgeon volume ends, with an understanding that will change.

There will be a unit outage at Libby from July 28 through August, during which 3 units will be available to provide outflows from Libby, the **COE** said. The COE plans to draft the full 20 feet from Libby and bring the reservoir to elevation 2,439 feet by end August. There was discussion of the legal grounds on which that operation is based. Donna Silverberg suggested further investigation of how much flexibility the COE really has regarding Libby and Hungry Horse operations in light of what the 2004 BiOp says. The planned Libby operation for now is 20.8 kcfs outflows, running 4 units at full load from June 20-28. On June 28 the project will ramp down to 17 kcfs, or 3 units full load. TMT will revisit this issue July 2. *{Supplemental Notation: During August, there will be a unit outage. During this outage, the project prefers to operate using only 3 units. However, the 4th unit can be used if necessary.}*

9. Hungry Horse Operations

John Roache (BOR) presented two scenarios based on current inflows. Scenario 1 drafts Hungry Horse reservoir to elevation 3,520 feet by end August, Scenario 2 drafts to elevation 3,550 feet by end September. Hungry Horse is releasing 7 kcfs now and is approximately 14 feet from full. Roache echoed the COE's sense that inflow volumes could be larger than predicted by the ESP forecasts. For example, inflows from Horse rose from 10 kcfs last weekend to 16 kcfs today. Full powerhouse at Horse is estimated at around 11.5 kcfs at the current reservoir elevation. Roache estimated the reservoir will probably fill in the first week of July.

Scenario 1 assumes a 20 foot draft of Hungry Horse, with 6.5 kcfs summer flows that ramp down to minimum flows of around 1.5-2 kcfs around the end of August or early September. Scenario 2 assumes a 10 foot draft, with a flat flow of 2.8 kcfs to hit elevation 3,550 feet by end September. The difference between the scenarios amounts to 3-4 kcfs outflows, which will change if inflows drop. Litchfield asked for the assumed volume runoff. For the June/July forecast

it was 1,200 kaf, or 125% of normal. Roache said. Wills asked, in either of these scenarios, are projected flows into September sufficient to provide Columbia Falls minimums? Yes, required flows for Columbia Falls minimums are projected to be around 1.5-2.2 kcfs by September, Roache replied.

The same biological principle applies here as at Libby, Marotz said, noting a striking elevation difference between scenarios 1 and 2. The fluctuations involved in Scenario 1 are not beneficial to biology, he said. Scenario 2 drafts to elevation 3,550 feet and keeps the shoreline wetted for a much longer period, which is excellent for reservoir productivity. TMT will revisit this issue July 2.

10. Grand Coulee Operations

BOR's proposed operation this summer is to refill Grand Coulee after the July 4th weekend, reaching elevation 1,290 feet sometime on or before July 14, Roache said. The purpose of this operation is to provide beach access for recreation over the July 4th weekend while also being committed to refilling to 1290 feet by July 14th in order to provide summer flow augmentation. Delaying refill to elevation 1290 feet until after the July 4th weekend will reshape some of the flows from the second week of July into late July and August. Flows at McNary are projected to be more than 220 kcfs through the first half of July under any refill scenario, Roache said. There were no objections to BOR's proposed operation.

11. TMT Guidelines

This topic was postponed until the July 2 meeting.

12. Operations Review

a. Reservoirs. Grand Coulee is at elevation 1,283.4 feet and filling. Hungry Horse is at elevation 3,546 feet, discharging 7 kcfs. BOR is watching inflows daily.

Libby is at elevation 2,432.6 feet, with inflows of 30.2 kcfs and outflows of 26.2 kcfs.

Albeni Falls is at elevation 2,059 feet at the Hope gage. The project is passing inflows of 82 kcfs.

Dworshak is at elevation 1,585.8 feet, with inflows of 23.2 kcfs and outflows of 14.8 kcfs.

The 7-day average for inflows at Lower Granite is 122 kcfs. The 7-day average for inflows at McNary is 352 kcfs. The 7-day average for inflows at Bonneville is 363 kcfs. Flows are still running on the high side.

b. Fish. This is summer Chinook season, with a couple thousand adults passing per day, Wagner said. Jack spring Chinook counts are very strong, which is a good sign for next year. Ocean conditions this year are excellent, better than last year. The sockeye run is strong this year as well. Passage forecasts for the Snake River are higher than seen in recent years. Juvenile migration is winding down for spring Chinook and steelhead, while fall Chinook migration is increasing.

c. Power System. BPA had nothing to report at today's meeting. There was a 4-minute line trip at Hungry Horse and Libby, during which the BiOp ramp rates provided in the emergency were temporarily exceeded.

d. Water Quality. There have been a number of TDG exceedances on the system due to overcapacity flows and some overgeneration flows. Lower Granite tailwater gage has registered exceedances in most days of June. Maintenance work caused a spill increase at Lower Granite, resulting in TDG levels in the 124% range. Lower Monumental and Ice Harbor forebay gages have registered a number of exceedances lately, caused in part by gas generated at Lower Granite. Bonneville spill levels are well over 100 kcfs. The COE reminded everyone that spring is almost over, and a number of project operations will shift beginning June 21, most notably at Lower Monumental, Lower Granite and Bonneville dams. The alternating 40%/60% spill regime for research begins June 19 at McNary.

14. McNary Spill Bay Outage

This planned outage ran from 9 am until shortly after 11 am today, Dan Feil reported. The inoperable acoustic hydrophone was repaired and alternating spill treatments of 40% and 60% spill for summer will begin soon. The COE sent TMT members an email regarding this outage on June 17th.

15. Next Meeting

The next regularly scheduled TMT meeting will be July 2, with Dworshak operations, Libby and Hungry Horse operations, review of meeting minutes, the TMT guidelines, and the usual operations review on the agenda. This summary prepared by consultant and writer Pat Vivian.

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