



# FISH PASSAGE CENTER

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## MEMORANDUM

TO: Michele DeHart

FROM: FPC Staff

DATE: September 28, 2016

SUBJECT: Special FFDFWG Meeting – Lower Granite Temperature Modeling Scoping Meeting (August 24, 2016)

At your request, Fish Passage Center staff members (Erin Cooper, Brandon Chockley, Bobby Hsu, and Margaret Filardo (by phone)) attended the Special FFDRWG Lower Granite Temperature Modeling Scoping Meeting hosted by the U.S. Army Corps of Engineers in Walla Walla, WA. Prior to the August 24, 2016 meeting, there had been discussions in FPAC as to what the special FFDFWG meeting would cover. An agenda was distributed on August 11, 2016 (attached) describing that the meeting would address a request by FFDRWG representatives to model temperatures at Lower Granite Dam as a tool to help the COE and fish managers better understand how to manage warmer summer water outflow periods. The goal of the meeting was to address Recommendation #7 of the NOAA 2015 Adult Sockeye Salmon Passage Report, which states “Develop water temperature models, or similar tools, to assess the effect of alternative project operations at Lower Granite and Little Goose dams on ladder and tailrace temperatures or implement a study to empirically assess the effect of proposed operations”. The special FFDRWG was also intended to establish the scope and schedule of the Project.

The COE started the meeting by outlining what they are currently proposing for the Project, which is to:

1. Develop a 3D CFD Model of Lower Granite Forebay
  - a. Assess operational impact on local forebay conditions
  - b. Including surface passage, gates, units, pumping
  - c. Various thermocline conditions
  - d. Provides input for 2D model downstream
2. Improve 2D (CEQUAL W2) model for input into the 3D model (Lower Granite Forebay)

3. Use new information from 3D model to run reach model in 2D
4. Install additional field equipment to measure near field tailrace and maybe forebay data (thermal and hydraulic; Tailrace ADCP and Buoy Hobos)

At the meeting there was discussion on the current tools that the COE uses to model temperatures in the Lower Snake River. The 2D (CEQUAL W2) model that is currently being used by the COE has been simplified to stop at the Lower Granite tailrace. This simplification was mostly to improve computation time. However, the COE still has a 2D model that can run through the entire Lower Snake River (to the Ice Harbor tailrace) but it is not being used at this time and would need to be updated.

During discussions of the 3D model, the COE expressed that the goal of the new 3D model would be to evaluate whether there is a measurable difference in temperature at Lower Granite and/or Little Goose as a result of operational changes such as: 1) spill with RSW in operation vs. deep spill only, 2) changes in unit priorities (Unit 1 vs. Unit 2), and 3) changes in spill volumes. The intent of the 3D model would be to inform the 2D model to predict temperatures through the rest of the Lower Snake River.

In summary, the COE followed the agenda and the draft notes that were circulated to meeting attendees on September 8, 2016 (attached) generally reflect the discussions. However, what the notes do not adequately reflect is that while this meeting had a narrowly defined objective, there were several comments on the need for a more comprehensive review of all possible changes that could be made to the system, and the necessary modeling, to provide reduced temperatures throughout the Lower Snake River. For example, there was a discussion of the potential benefits of a drawdown of the Lower Granite pool. In addition, NOAA representatives highlighted Recommendation #10 of their 2015 sockeye memo which states: "Evaluate the Dworshak cold water release program to maintain temperatures in the lower Snake River below 18°C during June and most of July to reduce adult sockeye salmon mortality in the lower Snake River." Many of these comments were deflected by the COE to be addressed in the NEPA process under the Biological Opinion. Finally, the COE committed to providing a scoping document within a couple of weeks of the meeting for review and comments. To date, we have only received the notes, which had the same proposal as the agenda.

Based on the concern expressed at the meeting, we believe that what is desired is a more comprehensive evaluation of temperature. Based on what we know thus far, this evaluation might include:

- The establishment of a process that would be transparent, and include all interested fishery agencies, to develop strategies to affect temperature from exceeding 20°C.
- The study may include both modeling exercises as well as experimental implementation.
- There should be an evaluation of model availability, and which model would be best to use to evaluate system wide effects of modifications to affect temperature.
- The process should consider innovative changes to the hydrosystem configuration and operation that avoid degrading the current fish passage protection measures in order to address temperature concerns.

- Potential operational changes that could be made could include such things as LGR drawdown (June 24, 2016 FPC memo), the additional drawdown of the Dworshak reservoir (June 30, 2016 FPC memo), and adding the selective withdrawal of cool water from Brownlee Reservoir.
- Consistent with Recommendation #5 of the NOAA Sockeye Memo, all adult ladders should be evaluated for modification that could be made to address temperature issues.

**USACE Walla Walla District  
SPECIAL FFDRWG MEETING**

**AGENDA - LGR TEMPERATURE MODELING SCOPING MEETING**

**August 24<sup>th</sup>, 2016**

**1:00 - 4:00 PM**

**Emergency Operations Center (check in with security) – Limit Space and Seating Available to 14-16  
RSVP**

**Conference Call/Web meeting Information:  
(877) 873-8017, Access Code 5842313, Security Code 1234  
<https://www.webmeeting.att.com>; (877) 873-8017, 5842313**

**Agenda/Discussion Topics**

Purpose of the Meeting: Request by FFDRWG Reps to model water temperatures at Lower Granite dam as a tool to help the Corps and fish managers better understand how to manage warmer summer water outflow periods.

Goals of the Project -Develop water temperature models, or similar tools, to assess the effect of alternative project operations at Lower Granite and Little Goose dams on ladder and tailrace temperatures or implement a study to empirically assess the effect of proposed operations.

This meeting will help establish the Scope and Schedule of the Project.

The Corps is proposing to model and evaluate the following:

- 1) Develop a 3D CFD Model of Lower Granite Forebay
  - Assess operational impact on local forebay conditions
  - Includes surface passage, gates, units, pumping
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- 3) Improve our 2D (CEQUAL W2) model for input into the 3D model (Granite Forebay)
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- 5) Install additional field equipment to measure near field tailrace and maybe forebay data (thermal and hydraulic; Tailrace ADCP and Buoy Hobos)

Group Discussion of the current plan.

Group input into additional topics or variables to include in the modeling.

- Necessary function of the model?
- Potential applications of the model?
- Spatial resolution needed?
- Temperature resolution needed?
- Any other output variables?

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**Attendee list:**

Derek Fryer	COE NWW
Charles Morrill	WDFW
Eric Cooper	FPC
Brandon Chockley	FPC
Russ Kiefer	IDFG
Michael Garrity	WDFW
Kim Johnson	BPA
Christine Peterson	BPA
Julie Doumbia	BPA
Eric Hockersmith	COE NWW
Steve Juul	COE NWW
Stephen Hall	COE NWW
Tim Wik	COE NWW
Bobby Hsu	FPC
Chris Peery	COE NWW
Chris Pinney	COE NWW
Bill Hevlin	NOAA
Trevor Condor	NOAA
Gary Fredrick	NOAA

**Phone list:**

Erick Van Dyke	ODFW
David Swank	USFWS
Lisa Wright	COE-RCC
Margaret Filardo	FPC

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Group Discussion of the current plan.

**Key Discussion Topics (rough draft meeting notes):**

Oregon wants a broader look at temperature modeling (Lower Snake and Columbia River). Mant comments about how this would be handled through the larger EIS that is forthcoming.

Steve Hall Discussed and clarified the current models, the Corps Operational model currently works to LGR tailwater.

Trevor Condor: suggested a management goal of maintaining Ice Harbor Tailrace to 68°F.  
Bill Hevlin – mgmt. goal to keep LGR and LGO tailraces at 68°F.

Discussion of Temperature sensing technology that could better inform the 3-d model and tailrace model. Kim Johnson asked how we will use the model when the model is finished, and about the time-frame to complete the model: hope to have the model working by this time next year (hope for use before next summer warm water conditions).

Russ Kiefer clarified that we are really talking about 2 time-frames: 1 is to better understand how the surface weir at LGR changes river temperature both above and below the dam. The 2<sup>nd</sup> time-frame for modeling the bigger picture is for the NEPA EIS process.

Several questions arose about how the operations (Surface weirs, traditiona spill, turbine ops) at LGR affect/effect water temperatures in the forebay, ladder, and tailrace at LGR. The same questions were asked about LGO.

Ryan discussed the McNary Forbay model and results – will send out to FFDRWG.

Trevor suggestion paying closer attention to Obj 10 of the Sockeye Report and how we could hypothetically manage Dworshak releases to keep water at 68°F to Ice Harbor Dam.

Steve Hall discussed a dramatic temperature event change where a heavy rain event drove Clearwater River Temps. Down 10°F at Orofino, yet no change in river temperature at Lewiston.

Questions about adult ladder temperature analysis for LGR and LGO systems at AFEP- Corps responded there would be a presentation at AFEP.

Russ would like to see what the influence of Lions Ferry hatchery discharge has on river temperatures at this location and potentially creating a cold water refuge for sockeye. Group discussed a large deep canyon that is in very close vicinity and can be seen on navigation maps.

Below is a list of questions that came from the meeting (in no particular order) :

- 1) How do operations at LGR and LGO (Surface weirs, traditional spill, powerhouse operations) influence water temperature profiles in the forebay and tailrace.
- 2) What is the influence of the Lyons Ferry discharge? Is this creating cold water refuge for sockeye?
- 3) Can we manage Dworshak to maintain 68°F at the Ice Harbor tailrace?
- 4) What is the temperature impact of Lower Granite Forebay elevations?
- 5) When does the LGR Ladder exit spray bar benefit get overridden by surface temperatures in the forebay (thermocline intensity)?
- 6) Can we map cold water hyporheic flow and zones of coldwater influence in the LSR?
- 7) What are the near field tailrace temperature conditions at LGR and is there new technology that can be used to measure temperature in a very hydrodynamic environment?
- 8) Where do outlets (surface, gates, and turbines) draw flow/temperature during different thermoclines?
- 9) Does turning the RSW off degrade the forebay environment thermally?
- 10) What is the influence of RSW flow on tailrace and reach conditions downstream
- 11) If coldwater could be released from the Middle Snake, what influence would this have at LGR Dam