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Northwest Power and Conservation Council

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November 10, 2015

MEMORANDUM

TO: Fish and Wildlife Committee members

FROM: Jim Ruff – Manager, Mainstem Passage and River Operations

SUBJECT: Letter to the Corps of Engineers and mid-Columbia PUDs regarding completion of water temperature modeling

BACKGROUND:

Presenter: Jim Ruff

Summary: The climate change sub-strategy in the Council's 2014 Fish and Wildlife Program calls on the federal action agencies, in coordination and collaboration with others, to "assess whether climate change effects are altering or are likely to alter critical river flows, water temperatures or other habitat attributes in a way that could significantly affect fish and wildlife important to the program." The program also states "the Council supports ongoing studies and development of assessment methods by the federal action agencies and others. Further, the Council requests other entities to collaborate with the federal action agencies on this work." In order to take into account the potential effects of climate change, the region needs to evaluate future hydrologic and temperature alterations associated with climate change. A key aspect of such an assessment is for the federal and non-federal hydropower project operators to work collaboratively to complete the water temperature modeling capabilities in the mid-Columbia reach of the mainstem Columbia River from Grand Coulee Dam through the Hanford Reach. In September, the fish and wildlife committee recommended the Council should prepare and send a letter (attached) to the Corps of Engineers and the mid-Columbia PUDs that would: a)

acknowledge and compliment their ongoing water temperature modeling efforts; b) urge completion of those modeling efforts in individual river reaches; and c) encourage development of a Columbia Basin systemwide water temperature model for the mainstem Columbia and Snake Rivers.

Relevance: One of the Council's emerging high priorities addresses "preserving program effectiveness by ... taking into account the effects of climate change." (See p. 116 of the Council's 2014 Fish and Wildlife Program.) This priority action was recommended by numerous state, tribal and regional entities during the 2013-14 program amendment process and subsequently adopted by the Council into the program.

Workplan: This presentation addresses Council work plan item 2.B, which promotes regional fish and wildlife recovery by prioritizing and implementing 2014 Fish and Wildlife Program actions.

Background: Climate records indicate the Pacific Northwest has warmed about 1° C (or 1.8° F) since 1900, or about 50 percent more than the global average warming over the same period. The warming rate for the Pacific Northwest over the next half century is projected to be in the range of +0.2-0.9° C (or +0.4-1.6° F) per decade. Projected annual precipitation changes for the region over the next few decades are relatively modest and likely to be indistinguishable from natural variability. The projected future changes in temperature and precipitation will alter the snow pack, stream flow, and water quality in the Columbia Basin with the following anticipated impacts:

- Warmer temperatures will result in more precipitation falling as rain rather than snow;
- A potential for more winter flooding, affecting salmon eggs and overwintering juvenile fish;
- Snowpack will diminish, particularly in lower-elevation watersheds, with altered runoff timing;
- Peak river flows will likely shift to earlier in the spring;
- Water temperatures will continue to rise, affecting adult and juvenile salmon migration and disrupting growth; and
- Summer flows are likely to be lower, affecting adult and juvenile salmon migration.

These temperature and hydrologic changes are expected to have a variety of interrelated impacts on aquatic and terrestrial ecosystems in the Columbia River Basin. The Council's Fish and Wildlife Program recognizes the need to assess and, where necessary, respond to the [impacts of climate change](#), which could threaten the program's past and ongoing investments in habitat improvements in the Columbia River Basin.

To conduct a temperature assessment of the mainstem Columbia River, a collaborative effort by federal and non-federal project operators in developing water temperature models for the mid-Columbia reach of the river is needed to complete the temperature modeling capability for both the mainstem Snake and Columbia rivers. This temperature modeling work will enable the region to better assess the potential effects of climate change and hydropower project operations on summer water temperatures in both rivers.

More Info: The current status of the water temperature modeling effort in the mid-Columbia reach is that model development is largely completed for the Grand Coulee, Chief Joseph, Wells and Rocky Reach reservoirs. Temperature model development is currently underway by Grant County PUD in the Wanapum and Priest Rapids reservoirs and is expected to be completed in early 2016. Thus additional temperature model development is needed in Rock Island reservoir and for the Hanford Reach.

Additional work will also be needed to link the individual water temperature models together into a Columbia-Snake river system application.¹ Developing a system application temperature model will require calibration, sensitivity analysis, and related activities once all the reservoir models are completed. Climate change and current condition (or baseline) scenarios will also need to be prepared, providing all the pertinent streamflow and relevant ambient conditions and inputs for the system application and subsequent temperature modeling analysis.

Attachment

¹ This is no small task. Development of a system planning temperature model application tool has not yet begun; such a system modeling tool will be needed for climate change modeling analyses in the mainstem Columbia and Snake rivers.

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DRAFT

November 17, 2015

Steve Barton
Chief, Columbia Basin Water Management Division
Northwestern Division, Corps of Engineers
P.O. Box 2870
Portland, OR 97208-2870

Dear Mr. Barton,

One of the Council's emerging high priorities in our 2014 Columbia River Basin Fish and Wildlife Program addresses "preserving program effectiveness by ... taking into account the effects of climate change." This priority action was recommended for the program by numerous state, tribal and regional entities.

In order to assess the potential effects of climate change, the region will need to evaluate future hydrologic and temperature alterations in the mainstem Columbia and Snake rivers. A key aspect of such an assessment is for the federal and non-federal hydropower project operators to work collaboratively to complete the water temperature modeling capabilities in the mid-Columbia reach of the mainstem Columbia River from Grand Coulee Dam through the Hanford Reach.

As you are aware, under expected climate change scenarios, projected future changes in temperature and precipitation will alter the snowpack, stream flow, and water quality in the Columbia Basin with the following anticipated impacts:

- Warmer temperatures will result in more precipitation falling as rain rather than snow
- There is the potential for more winter flooding, affecting salmon eggs and overwintering juvenile fish
- Snowpack will diminish, particularly in lower-elevation watersheds, with altered runoff timing
- Peak river flows will likely shift to earlier in the spring

- Water temperatures will continue to rise, affecting adult and juvenile salmon migration and disrupting growth, and
- Summer flows are likely to be lower, affecting both adult and juvenile salmon migration

These temperature and hydrologic changes are expected to have a variety of interrelated impacts on aquatic and terrestrial ecosystems in the Columbia River Basin, as well as on the operation of the Federal Columbia River Power System. The Council's fish and wildlife program recognizes the need to assess and, where necessary, respond to the impacts of climate change, which could threaten the program's past and ongoing investments in habitat improvements in the basin. Water temperature models for the mid-Columbia reach are needed in order to complete the temperature modeling capability for both the mainstem Columbia and Snake rivers, and also to better assess the potential effects of climate change and project operations on summer water temperatures in both rivers.

The Council understands that model development is largely completed for the Grand Coulee, Chief Joseph, Wells and Rocky Reach reservoirs. Temperature model development is currently underway by Grant County PUD in the Wanapum and Priest Rapids reservoirs and is expected to be completed in early 2016. Model development is incomplete for the Rock Island reservoir and for the Hanford Reach. We urge the Corps of Engineers to complete temperature modeling for the Hanford Reach. Additional work and collaboration by the Corps with the mid-Columbia PUDs will also be needed to link the individual water temperature models into a Columbia-Snake river system application. To enable evaluation of potential climate change effects on temperature throughout the mainstem Columbia and Snake rivers, it would be most helpful if this temperature modeling could be completed by early 2017.

In summary, the Council encourages the Corps of Engineers to expeditiously complete water temperature modeling for the Hanford Reach and to collaborate with the mid-Columbia PUDs to integrate the individual water temperature models into a Columbia-Snake river system model by early 2017. The Council also wishes to be kept apprised of the Corps' progress on this temperature modeling effort on a regular basis.

Thank you for making this temperature modeling effort a high priority.

Sincerely,

Phil Rockefeller, Chair

cc: Chelan County PUD-Steve Wright
Douglas County PUD-Bill Dobbins
Grant County PUD-Tony Webb

Washington Department of Ecology-Chad Brown
Washington Department of Ecology-Jim Bellatty
Washington Department of Ecology-Charlie McKinney

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