SYSTEM OPERATIONAL REQUEST: #2013-4

The following State, Federal, and Tribal Salmon Managers have participated in the preparation and support this SOR: National Marine Fisheries Service, Idaho Department of Fish and Game, Columbia River Inter-Tribal Fish Commission, Nez Perce Tribe, Colville Tribe, Oregon Department of Fish and Wildlife, and Washington Department of Fish and Wildlife.

TO:

Colonel John S. Kem	**COE-NWD**
Col. John Eisenhauer	**COE-NWD**
Lt. Col. Andrew Kelly	**COE-Walla Walla**
James D. Barton	**COE-Water Management**
Doug Baus	**COE-RCC**
David Poganis	**COE-PDD**
Karl Kanbergs	**COE-NWD-NP-WM-RCC**
Col. Bruce A. Estok	**COE-Seattle District**
Lorri Lee	**USBR-Boise Regional Director**
Elliot Mainzer	**BPA-Administrator**
Tony Norris	**BPA-PGPO-5**
Scott Bettin	**BPA- KEWR-4**
Steve Oliver	**BPA-PG-5**
Lori Bodi	**BPA-KE-4**

FROM: Paul Wagner Chair FPAC

DATE: July 23, 2013

SUBJECT: Water Temperature Issues at the Lower Granite Dam Adult Ladder

OBJECTIVE: To increase adult passage and reduce the water temperature in the Lower Granite Dam Adult Ladder.

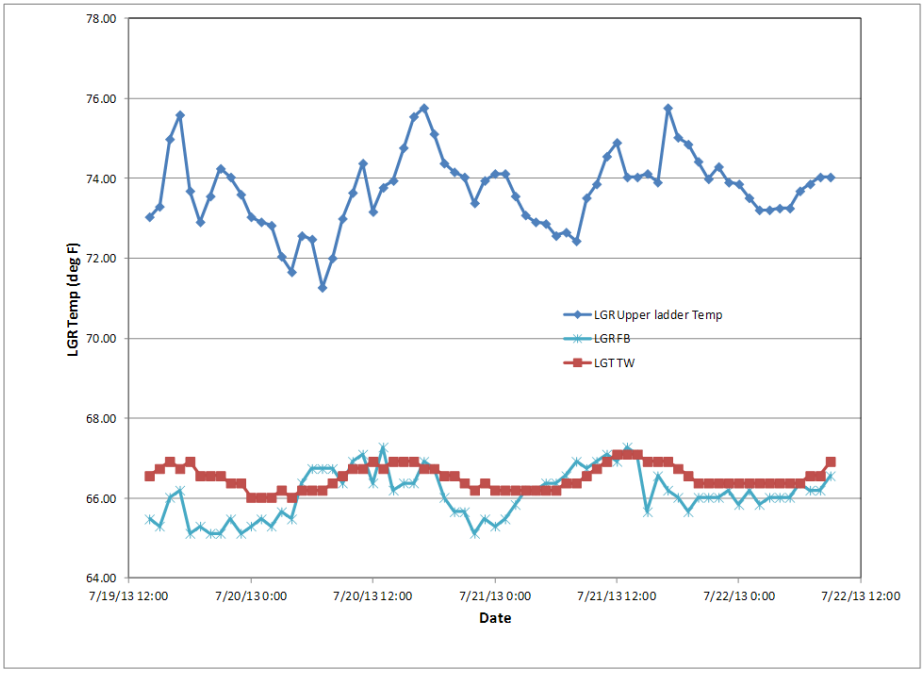
SPECIFICATIONS: Immediately take actions that may increase adult passage and decrease the water temperature in the adult ladder.

The Lower Granite forebay is currently operating at elevation 735.6 ft (7-22-13). The temperature of the ladder near the exit (20 feet from exit and 5 ft depth) has been ranging between 72 and 76º F. The upper ladder at LGR is comprised of two sources of water: 1) gravity flow directly from the forebay into the upper ladder. and, 2) auxiliary water coming from diffuser #14, which pulls water from the forebay at a depth of 18–20 feet. At a depth of 5 meters (16.4 feet), forebay water has been ranging between 68 and 72º F. Diffuser #14 has been contributing approximately 40% of the total ladder flow. The total contribution of gravity forebay water along with water from diffuser #14 contributes well over one-half of the entire ladder flow.

We are providing the following suggestions, but the COE should not be limited to these suggestions:

- Cycle navigation locks as much as practical to facilitate the passage of adult sockeye and potentially reduce thermal stratification in the forebay.
- Reduce the contribution of the warmest gravity flow water into the ladder and increase cool water from Diffuser #14. Possible alternatives to accomplish this objective include:
    - A modified gate could be installed at the exit that would limit the gravity flow water to the ladder. The gate could be designed to pull water from below the surface of the forebay, and the opening reduced to only supply a volume of water that would be necessary to supply the upper ladder above the contribution of Diffuser #14 water.
    - The forebay elevation could be reduced to MOP or elevation 733 feet. This would reduce the depth of gravity water at the exit by 2.6 feet.
    - In either case, to make up the loss in gravity water, the contribution of Diffuser #14 water would be increased (several degrees cooler than the gravity water).
- Utilize multiple pumps to pull cooler water from deeper into the forebay and add into the ladder. Specifically, this could aid cooling to facilitate fish passage from the diffuser to the exit.
- Temporarily extend the diffuser intake into deeper water to provide cooler water.
- Modify operations at Lower Granite Dam to the following: 1) from 0600 to 1800 maximize powerhouse operations (Unit 1 priority) while providing spill through the RSW and 2) from 1800 to 0600 operate to powerhouse station service and maximize spill.

JUSTIFICATION: Present temperatures in the ladder, as well as the discrepancy in the temperature between the ladder and the tailrace, are impeding adult passage at the facility. Fish count data over the past several days (http://www.fpc.org/currentdaily/HistFishTwo_7day-ytd_Adults.htm) have shown declines for all species.



Daily temperatures in the upper portion of the ladder have, at times, been close to 76ºF.

Elevated temperatures in the Lower Granite Adult ladder is not a new issue and it is apparent that long term modifications are necessary to avoid these high ladder temperatures in the future.