

Summary of 2013 Adaptive Management Operations at Lower Granite for Adult Passage

- On July 15, 2013, operation of the Lower Granite Dam adult trap was suspended due to warm water temperatures above FPP criteria.
- On July 22, 2013, TMT convened at the request of Russ Kiefer, Idaho, to discuss recent observations of poor sockeye conversion between Little Goose and Lower Granite and to evaluate possible operational solutions. Water temperature data indicated adult sockeye may be delayed by a “thermal block” at the project due to significant warming in the top 10 feet of the forebay which supplies water to the upper fish ladder. The tailrace was maintained relatively cool ($\leq 68^{\circ}\text{F}$) by Dworshak flow augmentation water which settles to the bottom of the reservoir and passes through the deeper turbine intakes. The TMT consensus was to modify unit priority to operate Unit 1 through the following morning for increased attraction flow to the ladder and then re-evaluate passage and temperature data.
- On July 23, 2013, the Salmon Managers submitted [SOR-2013-4](#) (signatories: NOAA Fisheries, Nez Perce Tribe, Umatilla Tribe, Colville Tribe, Oregon, Idaho, Washington) that proposed alternating between daytime (0600-1800) Unit 1 priority during peak adult passage hours, and nighttime (1800-0600) spill to the TDG cap (~26 kcfs) with one unit operating at speed-no-load (5 kcfs). The two operations were intended to balance spill over the 24-hr period, in consideration that operating Unit 1 during minimum generation (river flow $< \sim 35$ kcfs) results in approximately 6 kcfs less spill than other units¹ at a time when juveniles are still migrating downstream. The Action Agencies implemented the operations and instituted procedures to provide daily updates of hourly adult passage and temperature data.
- On July 25, 2013, auxiliary water supply pumps #1 and #2 began operating to supply the upper ladder with cooler, deeper water from forebay elevation 705 ft, as opposed to the existing intakes located at the forebay surface and elevation 727 ft. The water supply from diffuser 14 was reduced in order to maintain a higher proportion of cooler water in the ladder from the deeper auxiliary pumps, which reduced flow to the adult trap below operational levels. However, fully opening the diffuser-14 intake to supply the trap would have increased temperatures above FPP criteria. Therefore the adult trap remained out of service during the operation of the auxiliary pumps to cool the ladder. The pumps ran continuously through September 18 and the trap was returned to service on September 23.
- On July 29-31, four additional temperature data-loggers (Hobos) were installed at the ladder exit, diffuser-14, count station and junction pool to provide increased resolution of the temperature differential. The data indicated the auxiliary pumps #1 and #2 reduced temperatures throughout the ladder. The cooling benefit of the pumps was reduced at times when high winds mixed warm forebay surface water to the depth of the pump intakes.
- Throughout the remainder of the 2013 summer spill season and continuing until October 9, adaptive management operations were regionally coordinated and modified as necessary based on temperature data and counts of adult sockeye (mid-July through early August) and fall Chinook (mid-August through early October) during a period of low river flows and multiple concurrent special operations that limited project capacity (e.g., roof repair, Doble tests, unit maintenance).

¹ Unit 1 has fixed blades and operates at the upper end of the 1% range (~ 17-19 kcfs), as opposed to Unit 2 (or next available unit) that can be adjusted to operate at the lower 1% (~11-12 kcfs).

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• Hourly data of ladder temperatures and adult passage were provided to TMT at meetings in July, August and September 2013 (see TMT [meeting agendas](#) for attachments). Counts of adult fish passage in relation to project operations are summarized below in **Table 1**. Preliminary analysis indicates the highest adult passage occurred in response to the operation of auxiliary pumps #1 and #2 in combination with Unit 1. The operation of Unit 1 also resulted in improved tailrace hydraulics by pushing out the eddy that forms during RSW spill (**Figure 1**) and provided cooler water in the vicinity of the south ladder entrance by mixing Dworshak flow augmentation water.

Table 1. Adult Chinook counts at Lower Granite Dam July 25 - August 10, 2013, in relation to project operations - Unit 1 Priority, Unit 2 Priority (FPP), TDG cap spill. Emergency auxiliary pumps operated throughout this period.

	Unit 1	Unit 2 (FPP)	Spill TDG Cap
Counted Up	2,021	260	30
Counted Down	1,337	232	42
Total Net Count	684	28	-12
Hours Operated	239	88	60
Total Fish per Hour	2.862	0.318	-0.2

Figure 1. Lower Granite Dam July 2013 tailrace conditions during Unit 2 priority (FPP) with upstream flow (left) and Unit 1 priority with downstream flow (right). Photos courtesy of Darren Ogden.



Unit 2 Priority (FPP)



Unit 1 Priority