BUREAU OF RECLAMATION

Sacramento River Temperature Task Group

Thursday, August 11, 2022, 1:00 pm – 2:15 pm

Conference Call:

+1(323) 457-6502 (US West)

Meeting ID: 657 079 320#

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Agenda

1:00 pm	Welcome and Agenda Review	Adam Fullerton, Kearns & West
1:05 pm	Purpose and Objective	Adam Fullerton, Kearns & West
1:10 pm	Action Items Tracking	Adam Fullerton, Kearns & West
1:25 pm	Shasta Cold Water Bypass Discussion	Tom Patton/Kristin White, Reclamation
2:10 pm	Review Action Items	Adam Fullerton, Kearns & West
2:15 pm	Adjourn	

Action Items from June 23, 2022

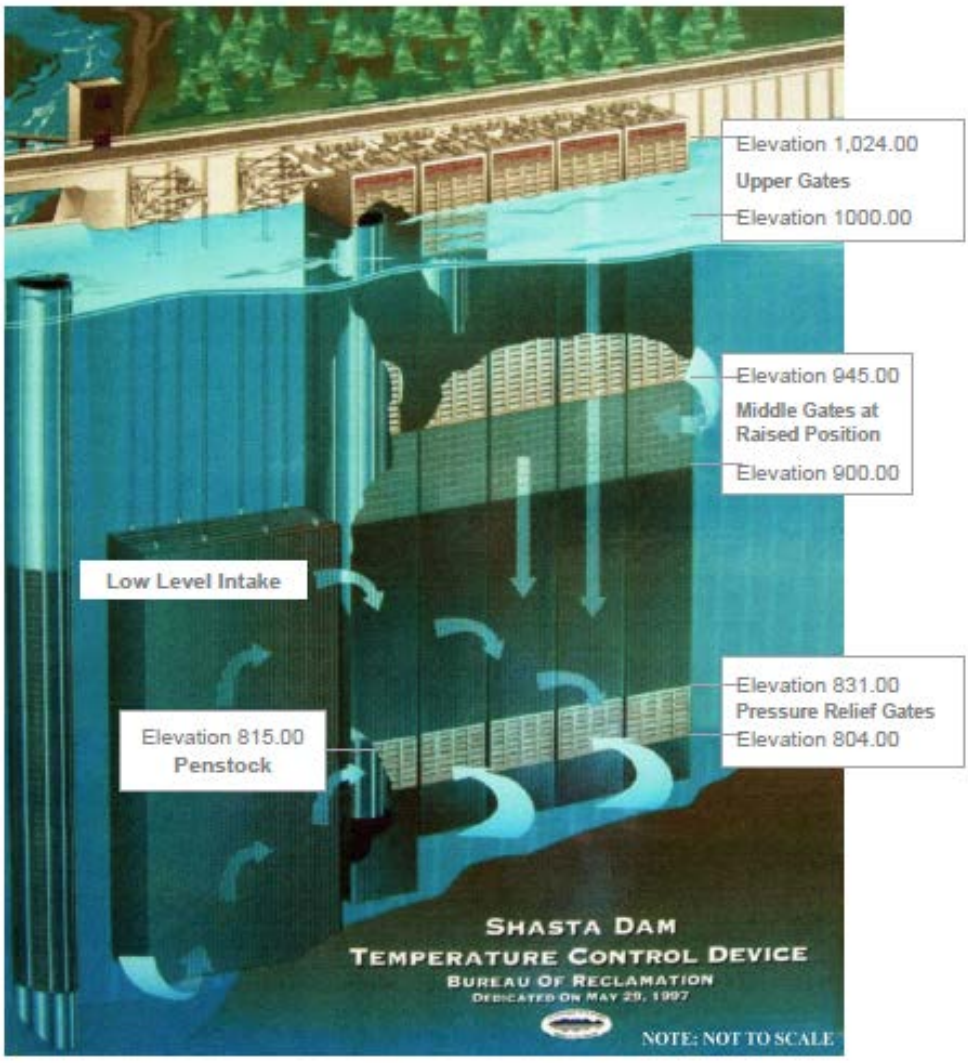
1. Matt Brown, USFWS – will find out how the refuges can utilize the flexibility in water flows from Shasta Reservoir to address water needs in August.
2. Kearns and West - will include discussion of the Cold Water Bypass- in the next meeting agenda and coordinate written communications as needed prior to the next meeting.

Temperature Control Device

The fourth unique attribute of the Sacramento River system is the TCD, which was constructed in 1997 to provide flexibility and improve efficiency in managing cold water resources in Shasta Lake. The TCD enables selective withdrawal of water from varying lake depths for release through the hydropower plant, while maintaining adequate water temperatures to support environmental objectives in the Sacramento River downstream of Keswick Dam.

TCD Physical Configurations

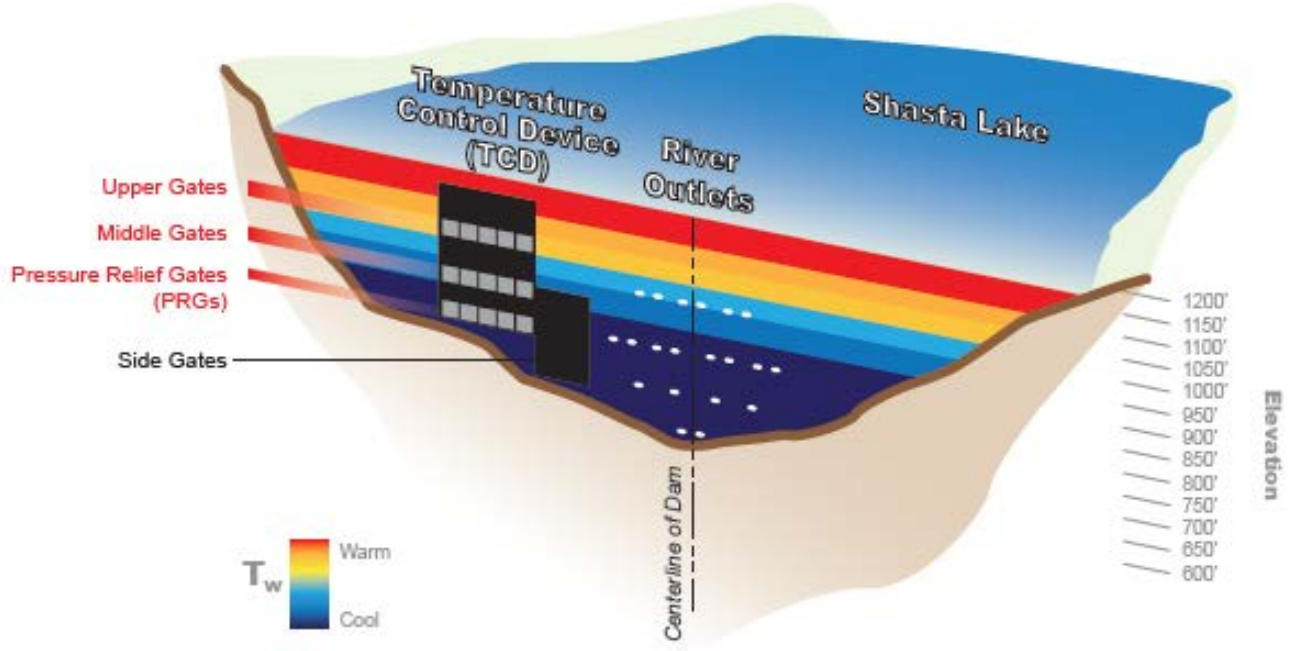
The TCD is located on the upstream face of Shasta Dam and includes four sets of gates: the upper, middle, lower (also termed Pressure Relief Gates, or PRGs), and side gates. The TCD is also open at the top, allowing releases through this ungated section when reservoir storage levels are high. The side gates, located adjacent to middle and lower gates access to Low Level Intake (LLI). Reservoir waters enters the LLI vertically through the bottom of that structure.



The TCD was constructed specifically for Shasta Lake thermal conditions, hydropower operations, and other physical attributes of Shasta Dam. Reservoir size, stratification dynamics, progression of gate use through the temperature management season, and downstream conditions and objectives were all considered in facility design.

Waters entering the TCD from any of the gates can flow to all five powerhouse penstocks. Although waters are often drawn into the TCD at different elevations with different temperatures, resulting tail bay temperatures vary minimally, indicating that waters are well mixed within the TCD prior to release through the penstocks. (See also discussions on the non-baffled system related to hydraulic constraints, page 3-15.)

The TCD was not designed to be water tight; hence, there are areas where leakage can be considerable and may affect overall performance of the TCD. Reservoir storage and stratification; the timing and order of gate opening and closing, both laterally (left to right within a gate level) and vertically (among the four gate levels); flow rate; and leakage can all play a role in TCD performance.

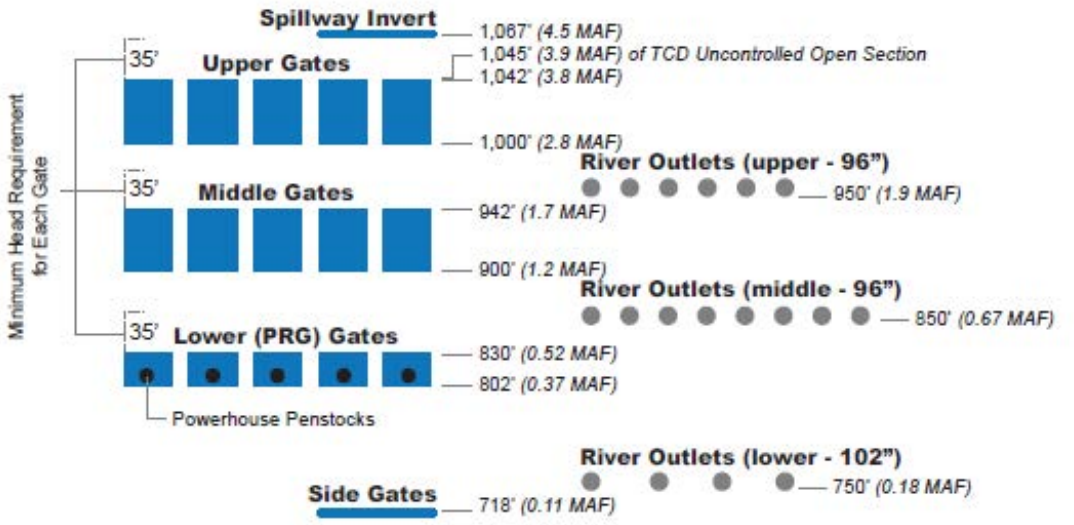


Hydraulic Constraints of TCD Gate Use

Hydraulic constraints include minimum head requirements for hydropower production and gate access. Minimum head requirements for each set of gates are 35 feet. The illustration below shows the outlet facilities on Shasta Dam with their corresponding elevation and storage information. The 35-foot hydraulic buffer required for gate operation was also indicated in the illustration.

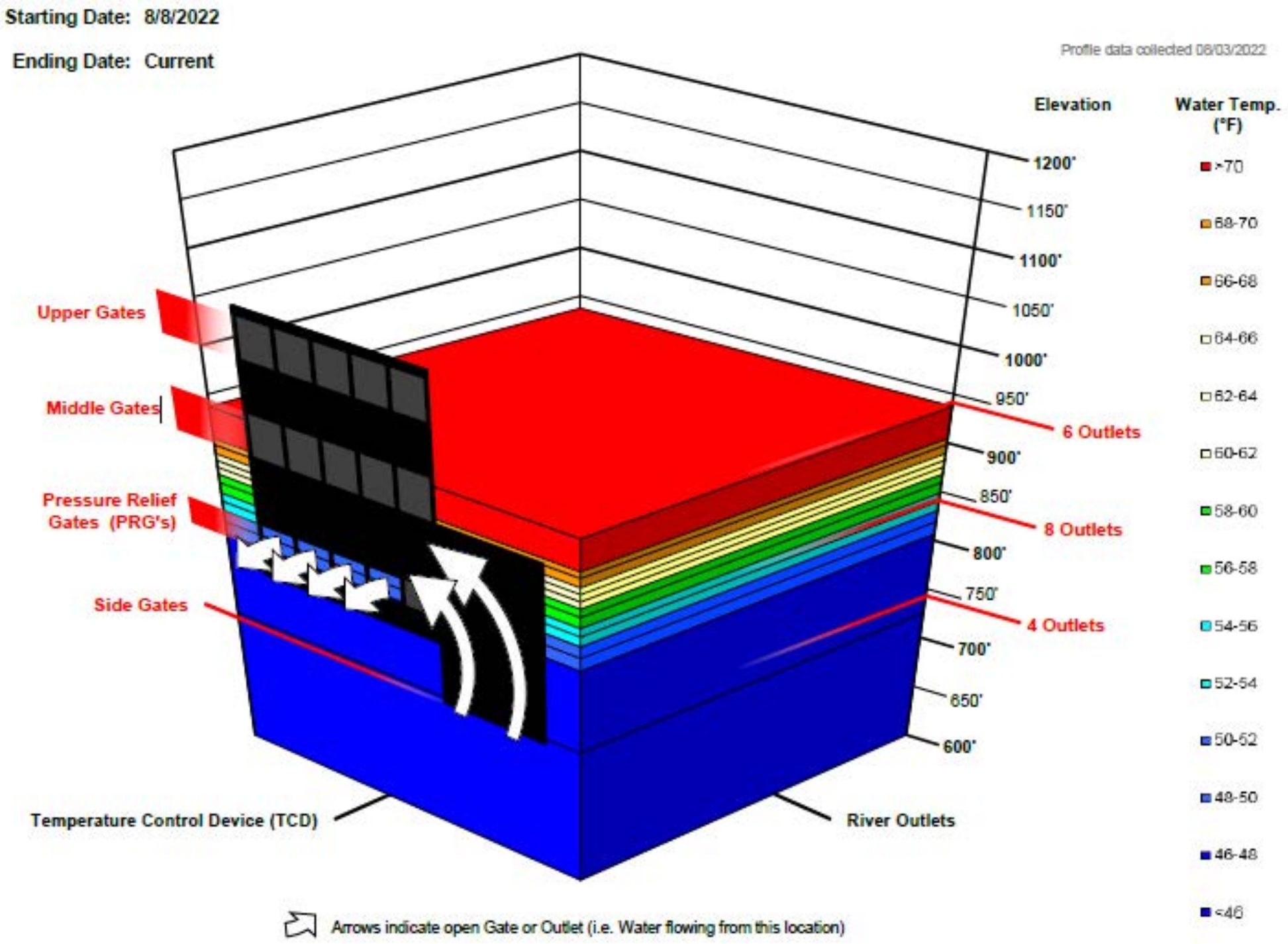
Access to the upper gates early in the temperature management season is critical for overall cold water pool conservation and downstream temperature management thorough the season. If the upper gates are limited by hydraulic constraints and are inaccessible in the spring period, temperature management challenges can be significant.

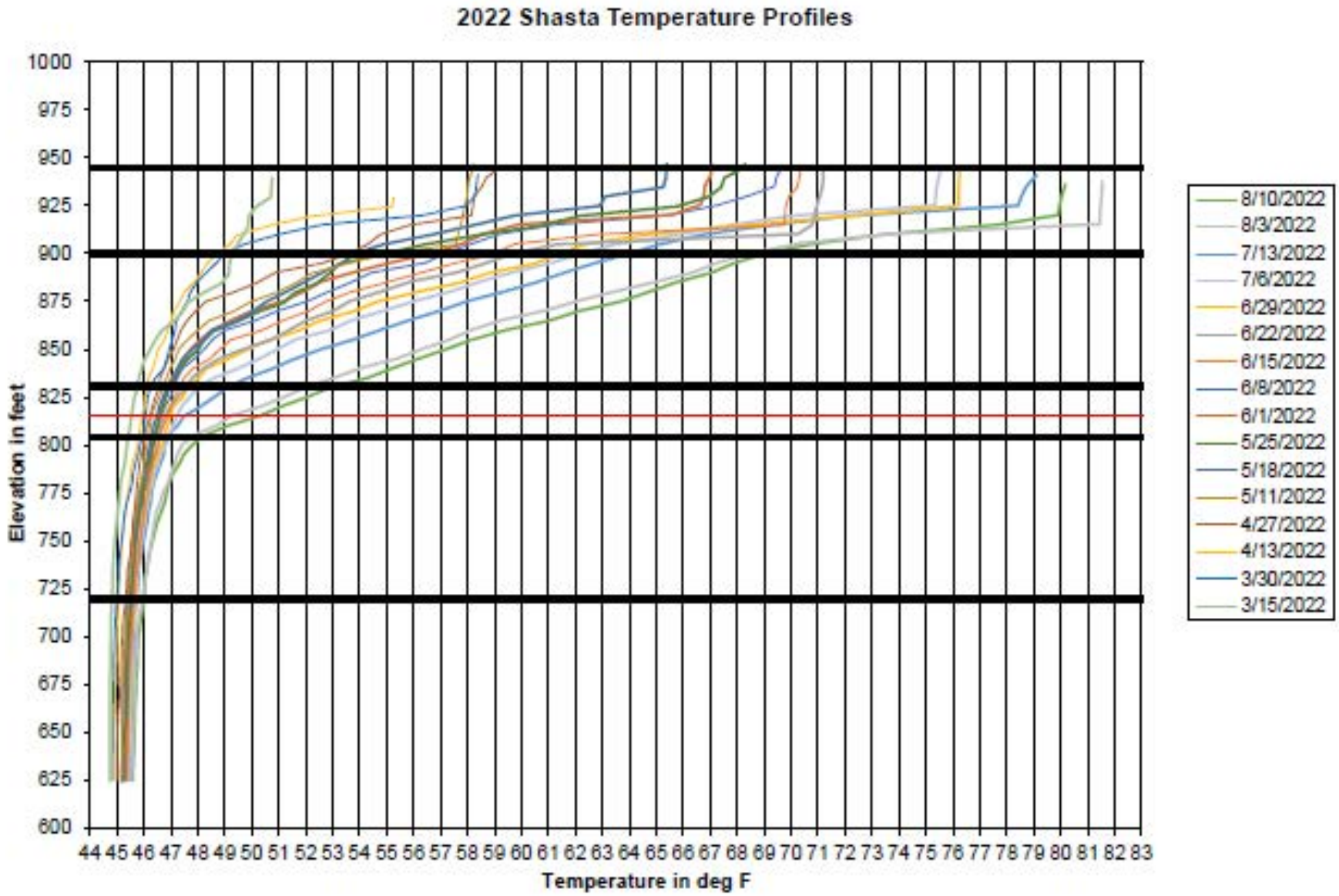
Shasta Dam and Outlet Facilities with Corresponding Elevation and Storage Information

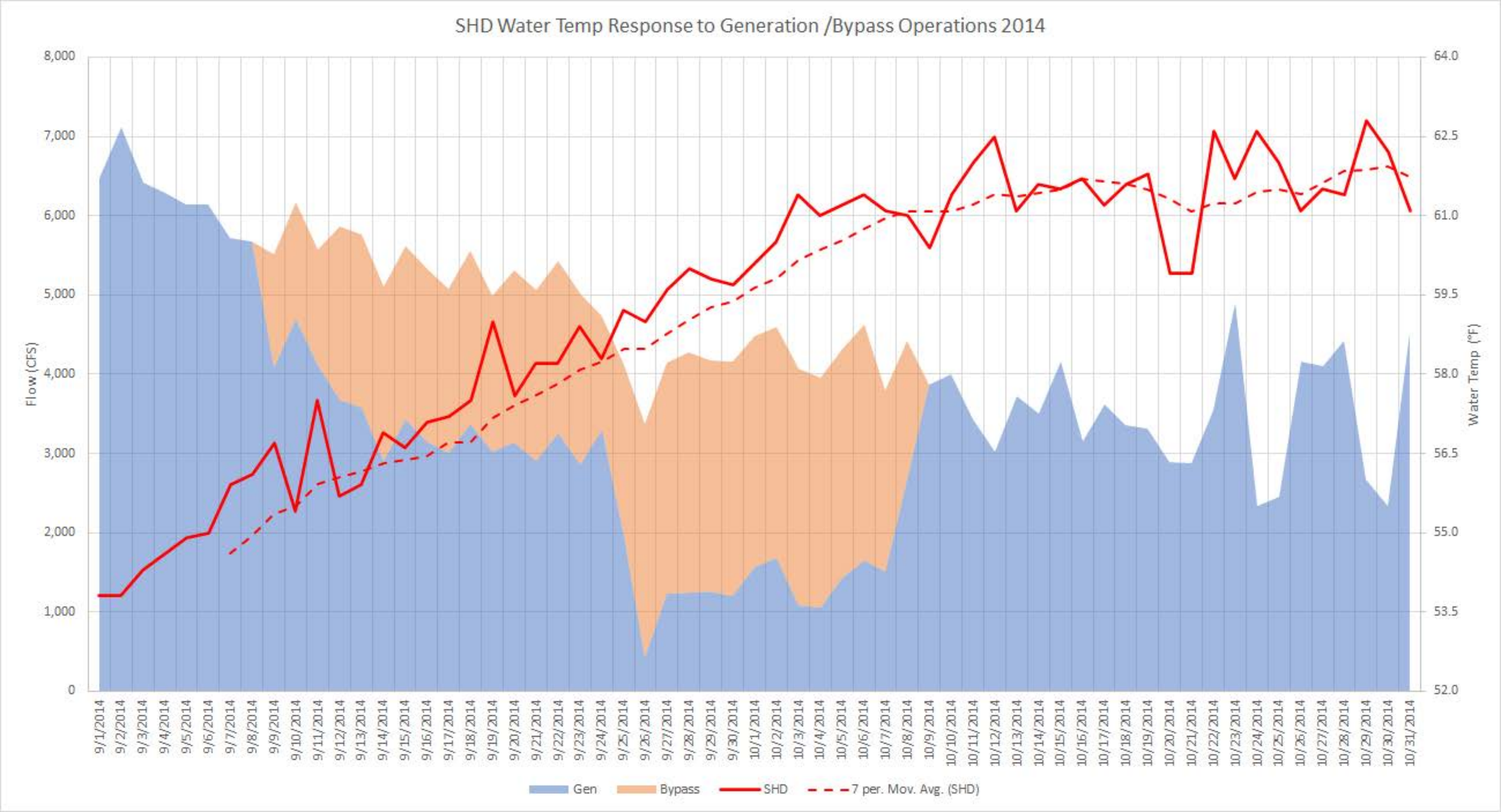


Note: Not to Scale. All elevations and corresponding storage in feet above mean sea level and million acre-feet (MAF).

Shasta TCD Configuration




2022 Shasta Temperature Profiles
Elevation in feet
1000
975
950
925
900
875
850
825
800
775
750
725
700
675
650
625
600
44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83
Temperature in deg F
8/10/2022
8/3/2022
7/13/2022
7/6/2022
6/29/2022
6/22/2022
6/15/2022
6/8/2022
6/1/2022
5/25/2022
5/18/2022
5/11/2022
4/27/2022
4/13/2022
3/30/2022
3/15/2022


SHD Water Temp Response to Generation /Bypass Operations 2014
Flow (CFS)
Water Temp (°F)
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
64.0
62.5
61.0
59.5
58.0
56.5
55.0
53.5
52.0
9/1/2014
9/2/2014
9/3/2014
9/4/2014
9/5/2014
9/6/2014
9/7/2014
9/8/2014
9/9/2014
9/10/2014
9/11/2014
9/12/2014
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9/15/2014
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10/20/2014
10/21/2014
10/22/2014
10/23/2014
10/24/2014
10/25/2014
10/26/2014
10/27/2014
10/28/2014
10/29/2014
10/30/2014
10/31/2014
Gen
Bypass
SHD
7 per. Mov. Avg. (SHD)