APPENDIX E-**2**

# DOCUMENTATION OF ANALYSIS OF STAND-ALONE INCREASED CANYON DAM SCENARIOS

**July** 201**6**

Upper North Fork Feather River Hydroelectric Project

**Revised** Draft Environmental Impact Report

State Water Resources Control Board
Sacramento, CA

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# Documentation of Analysis of Stand-Alone Increased Canyon Dam Release Scenarios

**Stetson Engineers Inc.**

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## Introduction

Stetson Engineers was tasked with performing supplemental modeling work for the following three alternatives recommended by the State Water Board (SWB) to evaluate effects on river temperature, lake/reservoir habitat, and power generation:

- Alternative 1: Proposed Project plus implementation of thermal curtains at both Prattville and Caribou Intakes (without removal of submerged levees near Prattville Intake) and increased release (to be determined from Alternative 3 below) from Canyon Dam from June 16 to September 15.
- Alternative 2: Proposed Project plus implementation of thermal curtains at both Prattville and Caribou Intakes (without removal of submerged levees near Prattville Intake).
- Alternative 3: Proposed Project plus a specific stand-alone increased release from Canyon Dam covering a range of 250-600 cfs[1] from June 16 to September 15.

Proposed Project includes the 2004 UNFFR Project Settlement Agreement, mandatory conditions, and the FERC staff alternative (i.e., Settlement flows, pulse flows, and recreation flows).

To aid in the selection of a specific stand-alone increased Canyon Dam release in Alternative 3 (250-600 cfs), four releases (i.e., four scenarios); 250 cfs, 350 cfs, 500 cfs, and 600 cfs were proposed by Stetson for analysis. The reasoning for this selection was based on the relationship between increased Canyon Dam release and water temperature reduction benefit at Belden Reservoir for Alternative 4C developed in the Level 3 Study (see Table 2-4 and Figure 2-23a of the Level 3 Report). The relationship is non-linear for July with an inflection point at 500 cfs, and it is Stetson's opinion that this selection provides a reasonably defined representation of the relationship. At the project kickoff meeting held in Sacramento on March 1, 2016, the SWB agreed and approved analysis of the four release scenarios.

[1]According to the PG&E's license application (PG&E 2002), at 700 cfs, the river stage is approximately at bankfull in the lower half of the Seneca Reach near the Seneca Resort and China Bar areas. Flows exceeding about 700 cfs result in over bank flows in this reach, which should, therefore, be avoided. Flows between 600 and 700 cfs begin to mobilize spawning gravel and flows greater than 700 cfs can result in significant movement of streambed materials in the Seneca reach. Based on this information, 600 cfs was judged to be the maximum allowable release out of Canyon Dam for normal operations.

The 250 cfs originally came from the Level 1 & 2 Study, Chapter 4, pages 4-9 to 4-11. It was found that a 250 cfs Canyon Dam release combined with thermal curtains would reduce Belden Reservoir 2002 summertime water temperature to below 20°C.

The purpose of this report is to document the analysis of the four stand-alone Canyon Dam release scenarios (i.e., 250 cfs, 350 cfs, 500 cfs, and 600 cfs) under Alternative 3. From the four release scenarios analyzed herein, the SWB will select a stand-alone Canyon Dam release scenario for Alternative 3. This selected release scenario will also be used in Alternative 1. A subsequent report will be prepared to document the analysis of the three alternatives.

Results of modeling Baseline and "Present Day" conditions are also included in the presentation to provide a basis for comparison. Baseline conditions are those that existed at the time the Notice of Preparation was submitted to the State Clearinghouse (September 1, 2005) and the CEQA scoping process was initiated. The "Present Day" alternative is essentially the alternative proposed by PG&E in its license application (essentially the same as the FERC staff recommended alternative in the EIS). These two conditions were already analyzed in Stetson's Level 3 Report[2].

The Level 3 modeling work for Baseline and "Present Day" conditions and the additional modeling work for the four stand-alone Canyon Dam release scenarios considered the flow releases described below:

***Baseline Conditions:***

CEQA Baseline conditions, for purposes of modeling flow regimes for the UNFFR, were the conditions that existed at the time the Notice of Preparation (NOP) was filed. The NOP for the UNFFR Project was submitted to the State Clearinghouse on September 1, 2005. Accordingly, the Baseline conditions, with respect to flows, were as follows:

- Canyon Dam releases to the Seneca Reach were those that actually existed at the time of the NOP, which were also the required minimum flows (i.e., 35 cfs) under the existing FERC license for the UNFFR Project;
- Belden Dam releases to the Belden Reach were those that actually existed at the time of the NOP, which were also the required minimum flows (i.e., 140 cfs) under the existing FERC license for the UNFFR Project;
- Rock Creek Dam releases to the Rock Creek Reach were those that actually existed at the time of the NOP, which were also those given in the 2000 Relicensing Settlement Agreement for the Rock Creek-Cresta Project for the first 5-year, plus about 30 cfs of leakage;
- Cresta Dam releases to the Cresta Reach were those that actually existed at the time of the NOP, which were also those given in the 2000 Relicensing Settlement

[2] With respect to flows, the "Present Day" condition here is not exactly the same as the "Present Day" condition analyzed in Level 3 Report. The "Present Day" condition analyzed in Level 3 Report assumed the second 5-year releases for Rock Creek and Cresta Dams. The "Present Day" condition herein used the third 5-year releases for Rock Creek and Cresta Dams. The modeling results for the "Present Day" condition in Level 3 Report were updated to reflect this flow change.

Agreement for the Rock Creek-Cresta Project for the first 5-year, plus about 30 cfs of leakage; and,

- Poe Dam releases to the Poe Reach were those that actually existed at the time of the NOP, which were 100 cfs.

***"Present Day" Conditions:***

"Present Day" conditions more accurately reflect the foreseeable future conditions without consideration of the water temperature reduction measures at the UNFFR Project. "Present Day" conditions, with respect to flows, were as follows:

- Canyon Dam releases to the Seneca Reach were those agreed to in the Partial Settlement for the UNFFR Project (see Table 1);
- Belden Dam releases to the Belden Reach were those given in the Partial Settlement for the UNFFR Project (see Table 1);
- Rock Creek Dam releases to the Rock Creek Reach were those given in the proposed changes in the 2014 FERC Order to the 2000 Relicensing Settlement Agreement for the Rock Creek-Cresta Project for the third 5-year (see Table 2);
- Cresta Dam releases to the Cresta Reach were those given in the proposed changes in the 2014 FERC Order to the 2000 Relicensing Settlement Agreement for the Rock Creek-Cresta Project for the third 5-year (see Table 2); and,
- Poe Dam releases to the Poe Reach were those of current operations (about 100 cfs).

***Four Stand-alone Canyon Dam Release Scenarios:***

- Canyon Dam releases to the Seneca Reach were those agreed to in the Partial Settlement for the UNFFR Project, except that the increased Canyon Dam releases to the Seneca Reach from June 16 through September 15 were replaced by each of the four stand-alone release scenarios;
- Belden Dam releases to the Belden Reach were those agreed to in the Partial Settlement for the UNFFR Project;
- Rock Creek Dam releases to the Rock Creek Reach were those given in the proposed changes in the 2014 FERC Order to the 2000 Relicensing Settlement Agreement for the Rock Creek-Cresta Project for the third 5-year;
- Cresta Dam releases to the Cresta Reach were those given in the proposed changes in the 2014 FERC Order to the 2000 Relicensing Settlement Agreement for the Rock Creek-Cresta Project for the third 5-year; and,
- Poe Dam releases to the Poe Reach were those of current operations (about 100 cfs).

**Table 1 Seneca and Belden Instream Flow Release Schedule (cfs)**
**(Draft Settlement Agreement in April 2004, FERC #2105)**

| **Seneca Reach** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Water Year Type | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| Critical Dry | 75 | 75 | 90 | 90 | 90 | 80 | 75 | 60 | 60 | 60 | 60 | 70 |
| Dry | 90 | 100 | 110 | 110 | 110 | 110 | 80 | 70 | 60 | 60 | 60 | 75 |
| Normal | 90 | 100 | 125 | 125 | 125 | 125 | 90 | 80 | 60 | 60 | 60 | 75 |
| Wet | 90 | 100 | 125 | 150 | 150 | 150 | 95 | 80 | 60 | 60 | 60 | 75 |
| **Belden Reach** | | | | | | | | | | | | |
| Water Year Type | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| Critical Dry | 105 | 130 | 170 | 180 | 185 | 90 | 80 | 75 | 75 | 75 | 85 | 90 |
| Dry | 135 | 140 | 175 | 195 | 195 | 160 | 130 | 110 | 100 | 100 | 110 | 115 |
| Normal | 140 | 140 | 175 | 225 | 225 | 225 | 175 | 140 | 140 | 120 | 120 | 120 |
| Wet | 140 | 140 | 180 | 235 | 235 | 225 | 175 | 140 | 140 | 120 | 120 | 120 |

**Tale 2 Rock Creek and Cresta Instream Flow Release Schedule (cfs),**
**FERC #1962**

| | **Rock Creek Reach** | | | | **Cresta Reach** | | | |
|---|---|---|---|---|---|---|---|---|
| Water Year Type | Jun | Jul | Aug | Sep | Jun | Jul | Aug | Sep |
| ***First 5-year*** | | | | | | | | |
| Normal/Wet | 220 | 180 | 180 | 180 | 240 | 220 | 220 | 220 |
| Dry | 175 | 150 | 150 | 150 | 190 | 175 | 175 | 175 |
| Critical Dry | 150 | 150 | 150 | 150 | 140 | 140 | 140 | 140 |
| ***Second 5-year*** | | | | | | | | |
| Normal/Wet | 260 | 260 | 260 | 260 | 325 (500) | 325 | 325 | 325 |
| Dry | 210 | 210 | 210 | 210 | 260 (400) | 260 | 260 | 260 |
| Critical Dry | 150 | 150 | 150 | 150 | 140 | 140 | 140 | 140 |
| ***Third 5-year*** | | | | | | | | |
| Normal/Wet | 390 | 390 | 390 | 390 | 440 (460) | 440 | 440 (350) | 440 (300) |
| Dry | 310 | 310 | 310 | 310 | 350 (400-370) | 350 | 350 (300) | 350 (250) |
| Critical Dry | 150 | 150 | 150 | 150 | 140 | 140 | 140 | 140 |

Note: The numbers in parenthesis for the third 5-year are those given in the changes in the 2014 FERC Order to the 2000 Relicensing Settlement Agreement for the Rock Creek-Cresta Project. The 2014 FERC Order incorporated revised 4(e) conditions in the Rock Creek – Cresta license, FERC Project No. 1962.

**Methods Used in the Additional Modeling Work**

To ensure that all alternatives were analyzed to the same level of detail as in Stetson's Level 3 Report, detailed model simulations were run to develop mean daily water temperature profiles and maximum weekly average water temperature (MWAT) profiles along the bypass reaches for the four stand-alone Canyon Dam release scenarios. Detailed model simulations were run to analyze the effects on cold freshwater habitat in Lake Almanor and Butt Valley Reservoir for the four scenarios. Following is a brief summary of the steps used in the additional modeling work:

1) Long-term (1984-2002) daily hydrologic flow inputs for the Lake Almanor and Butt Valley Reservoir models were generated. These inputs consisted of estimated long-term daily stream inflows and re-operated outflows through the Prattville Intake and the Canyon Dam outlet and Caribou PHs to account for the proposed minimum flow releases during the non-summertime and the increased releases at Canyon Dam during the summertime (e.g., 250 cfs from June 16 through September 15).

2) Mean daily water temperature profile analyses along the bypass reaches for different exceedance levels were performed: Ran the linked MITEMP/ CE-QUAL-W2 daily reservoir water temperature models for Lake Almanor (MITEMP) and Butt Valley Reservoir (CE-QUAL-W2) and the SNTEMP stream temperature models for the bypass reaches, and then post-processed the modeling results.

3) MWAT profile analyses along the bypass reaches for different exceedance levels were performed: Post-processed the 7-day rolling average of the daily output data from (2) above (discharge and water temperature) mixed for the Canyon Dam release and the Caribou #1 and #2 PH discharges to determine the MWAT period for the Belden Reservoir water temperature condition; performed MWAT modeling along the NFFR using the linked SNTEMP stream temperature models for the bypass reaches, and then post-processed the modeling results.

4) Cold freshwater habitat analyses for Lake Almanor and Butt Valley Reservoir were performed using CE-QUAL-W2 models for the years 2000 (normal hydrologic year) and 2001 (critical dry year): Ran the linked Lake Almanor and Butt Valley Reservoir CE-QUAL-W2 models, and then post-processed the modeling results.

**Methods Used in the Annual Foregone Power Generation Loss Analysis**

Annual foregone power generation loss was estimated based on the potential commensurate flow reduction[3] in each respective powerhouse resulting from the particular measure, static head of the powerhouse, and normal operating efficiency of the powerhouse turbines. The following table lists static heads and turbine efficiencies of the UNFFR Project powerhouses that were used in the foregone power generation loss estimates.

**Powerhouse Static Head and Turbine Efficiencies Used in Foregone Power Generation Loss Estimates**

| Powerhouse | Static Head (ft) | Turbine Efficiency | Hydraulic Capacity (cfs) |
|---|---|---|---|
| Butt Valley PH | 362 | 80.6% | 2,118 |
| Caribou #1 PH | 1,151 | 69.1% | 1,114 |
| Caribou #2 PH | 1,150 | 84.2% | 1,464 |
| Oak Flat PH | 137 | 80.1% | 140 |
| Belden PH | 770 | 79.6% | 2,410 |

The following table summarizes 2004 Partial Settlement-required pulse flow releases from Canyon Dam and Belden Forebay Dam in January, February, and March and Belden Reach summertime recreational flows. The effect of one-day pulse flow releases from Canyon Dam and Belden Forebay Dam in January, February, and March on power generation was analyzed, but its effects on river temperature and lake thermal structure were not analyzed[4]. The effect of Belden Reach summertime recreational flows on power generation was analyzed, but its potential beneficial effect on reducing the warming of river temperature was not analyzed since this is of no interest -- the main purpose of the recreational flows is to provide water for kayakers, not to reduce water temperature[5].

[3] Increased releases through Canyon Dam for minimum instream flow and pulse flow releases were matched by commensurate flow reductions through the Butt Valley, Caribou #1, and Caribou #2 powerhouses for power generation in order to maintain target lake/reservoir water levels.

[4] Level 3 SNTEMP river water temperature modeling was performed for the four summer months only (June through September). Lake Almanor MITEMP and Butt Valley Reservoir CE-QUAL-W2 water temperature modeling simulated mean daily water temperatures in the vertical direction and mean daily outflow temperatures beginning March 1 and ending September 30 for each year. January and February were not included in the reservoir modeling period because in these months the reservoirs are not stratified and water temperatures are cold, so pulse flows would have no effect on reservoir water temperature modeling results. Incorporating the one-day March pulse flow into the Lake Almanor MITEMP modeling would require modifying the source code of Lake Almanor MITEMP because a portion of the pulse flow would need to be released from the mid-level gates in addition to the low-level gates that were currently used to model the minimum flows or the increased Canyon Dam releases up to 600 cfs. Modifying MITEMP is impractical. It would be expected that the effect of March pulse flow releases on the lake thermal structure in the summer months would be negligible because in March Lake Almanor is typically not stratified. When the lake is not stratified, lake water temperature would not be affected by the point of release, be it through Canyon Dam or the Prattville intake.

[5] Belden Reach recreational flows would not have an impact on Lake Almanor and Butt Valley Reservoir habitat.

**Pulse Flow Releases from Canyon Dam and Belden Forebay Dam in January, February, and March and Belden Reach Summertime Recreational Flows**

| | Water Year Type | Pulse Flow Releases in Each Month of Jan, Feb, and Mar | | Recreational Flow Releases in Each Month of Jul, Aug, Sep, and Oct | |
|---|---|---|---|---|---|
| | | Flow | Duration | Flow (cfs) | Duration |
| Canyon Dam | Critical Dry | 0 | 0 | - | - |
| | Dry | 0 | 0 | - | - |
| | Normal | 900 cfs | 1 Day | - | - |
| | Wet | 900 cfs | 1 Day | - | - |
| Belden Forebay Dam | Critical Dry | 0 | 0 | 650 cfs | 1 Day |
| | Dry | 0 | 0 | 650 cfs | 2 Days |
| | Normal | 900 cfs | 1 Day | 750 cfs | 2 Days |
| | Wet | 900 cfs | 1 Day | 750 cfs | 2 Days |

The pulse flows and recreational flows are related to water year type. In order to estimate the annual foregone power generation loss, there was a need to know the recurrence frequency of each water year type over the long-term. Over the 19-year modeling analysis period (1984-2002), there were 7 wet years (36.8%), 3 normal years (15.8%), 2 dry years (10.5%), and 7 critical dry years (36.8%).

Following is a brief summary of the steps used in the annual foregone power generation loss analysis:

1) Gather the results of the Level 3 analysis of power generation loss under the "Present Day" condition (i.e., increased minimum flows specified in the Settlement Agreement) relative to the existing condition.

2) Analyze the additional power generation loss due to increased Canyon Dam summertime releases up to 250 cfs, 350 cfs, 500 cfs, and 600 cfs, relative to the "Present Day" condition.

3) Analyze the additional power generation loss due to the required pulse flow releases relative to the "Present Day" condition; conservatively assume the March water temperatures of dam releases from Canyon Dam and Belden Forebay Dam are always lower than 10ºC[6].

4) Analyze the additional power generation loss due to the required Belden Reach recreational flows relative to "Present Day" condition; conservatively assume the boat number per day is greater than 100 every year[7].

[6] The Settlement Agreement states that "No pulse flows will be required in March in the respective reach if two successive days of mean daily water temperature greater than 10 degree C are measured at gages NF-2 (Seneca Reach) or NF-70 (Belden Reach), or if rainbow trout spawning in the Seneca or Belden Reaches are observed and reported to Licensee by CDFG or FS."

[7] The Settlement Agreement states that "If the number of boats per day on the first recreation river flow release day for a month exceeds 100 boats per day, one day of recreation river flow release shall be added to the recreation river flow release schedule in that month the next year."

**Analytical Exhibits**

***Figures 1 - 4***

Mean daily water temperature longitudinal profiles comparing the four stand-alone Canyon Dam release scenarios, Baseline, and "Present Day" for each of June, July, August, and September (4 graph panels on 1 page), for 50%, 25%, 10%, and maximum exceedance levels.

***Tables 3- 6***

Summary tables of mean daily temperature conditions by reach for June, July, August, and September.

***Figures 5 - 8***

Monthly MWAT longitudinal profiles comparing the four stand-alone Canyon Dam release scenarios, Baseline, and "Present Day".

***Tables 7 – 8; Figures 9 – 10***

Lake Almanor thermocline tables and figures, with approximate lake bed elevation at the station shown in the figures.

***Tables 9 – 14; Figures 11 - 16***

Lake Almanor coldwater habitat volume tables and figures.

***Tables 15 – 16; Figures 17 – 18***

Lake Almanor metalimnion surface area tables and figures.

***Tables 17 – 22; Figures 19 – 24***

Butt Valley reservoir coldwater habitat tables and figures.

***Table 23; Figure 25***

Annual foregone power generation loss table and figure.

**Figure 1 Comparison of NFFR Mean Daily Water Temperature Longitudinal Profiles between Alternatives for the Summer Months – 50% Exceedance**

Similar to Figure 2-2 in Level 3 Report

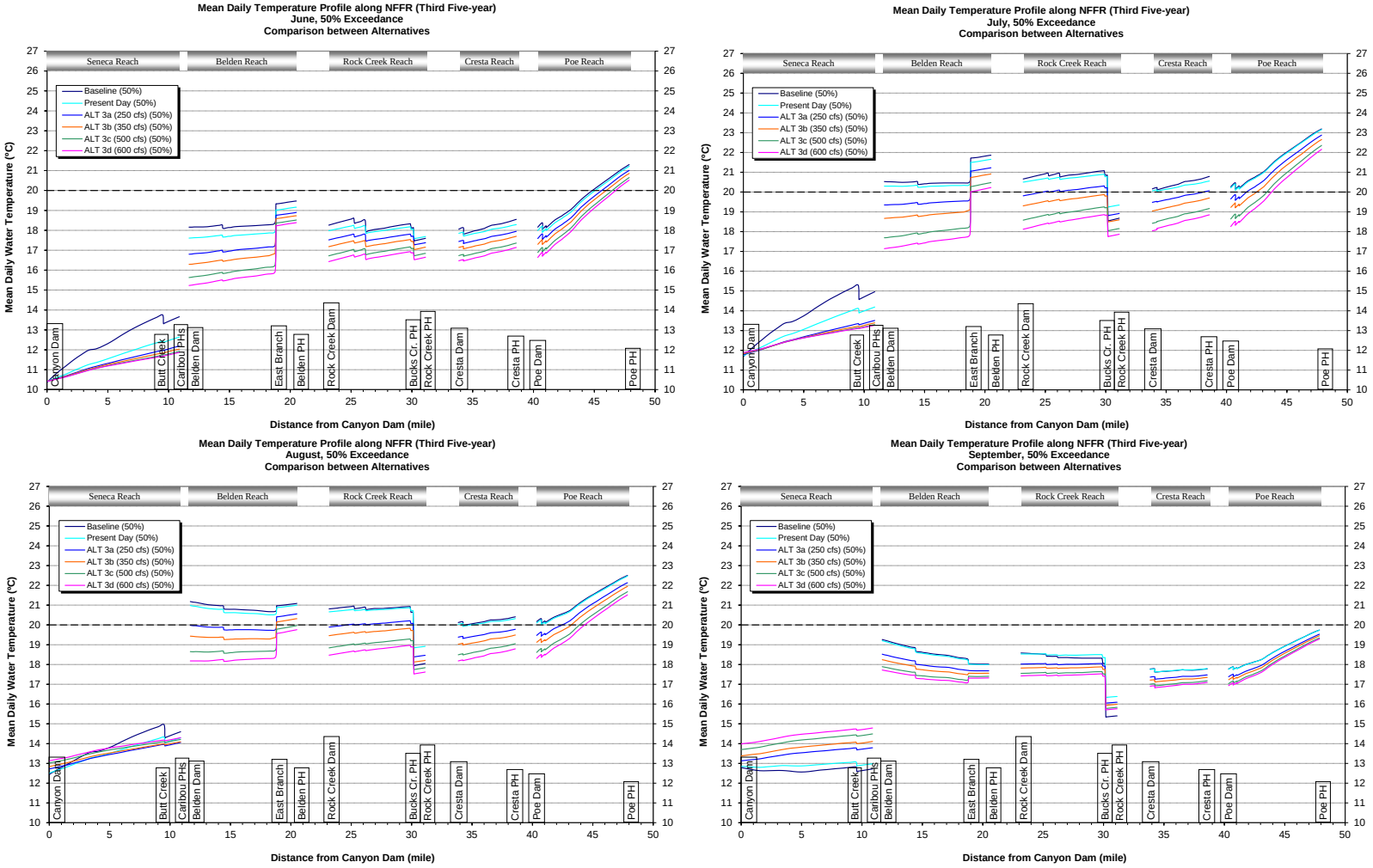

**Figure 2 Comparison of NFFR Mean Daily Water Temperature Longitudinal Profiles between Alternatives for the Summer Months – 25% Exceedance**

Similar to Figure 2-3 in Level 3 Report

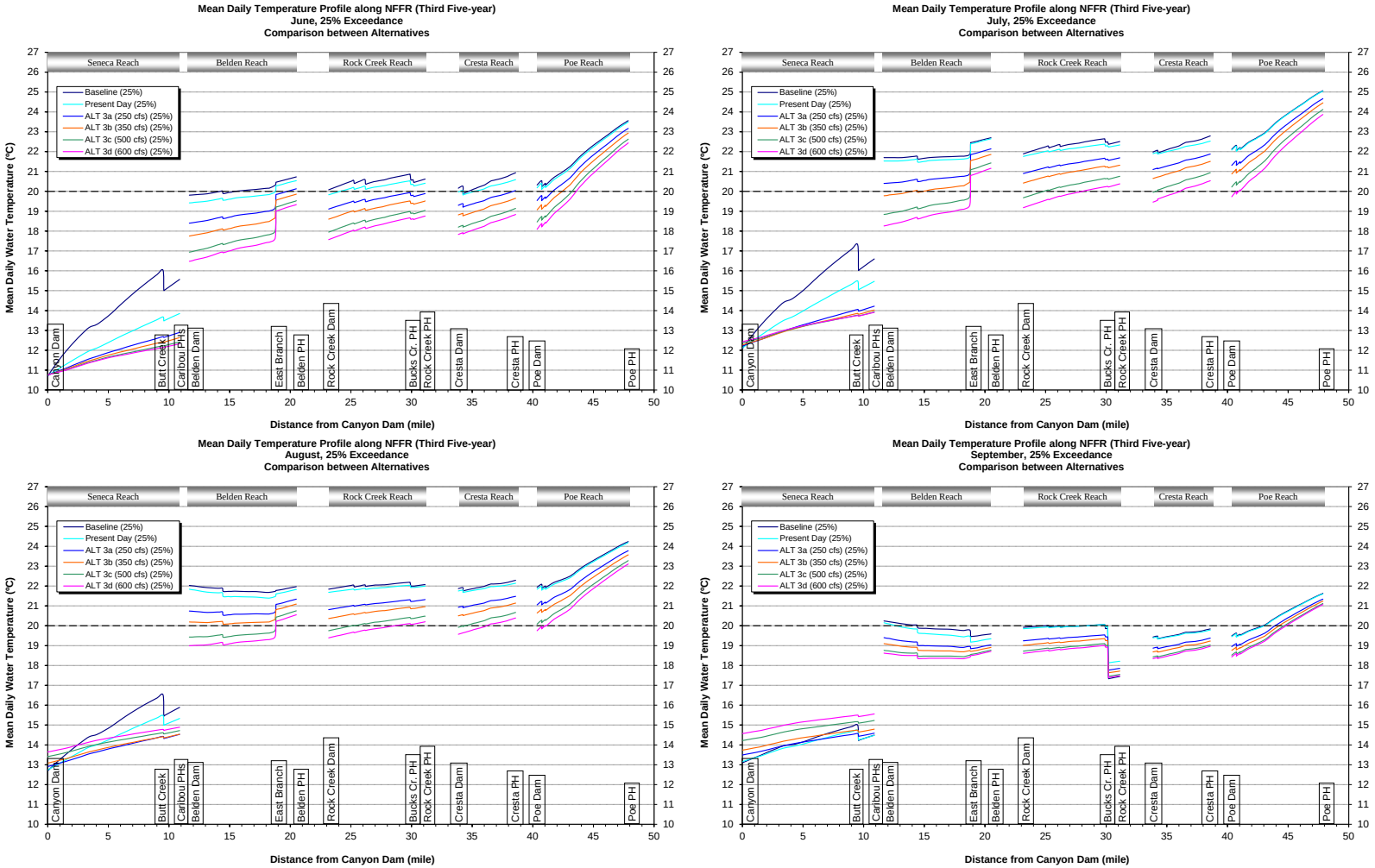

**Figure 3 Comparison of NFFR Mean Daily Water Temperature Longitudinal Profiles between Alternatives for the Summer Months – 10% Exceedance**

Similar to Figure 2-4 in Level 3 Report

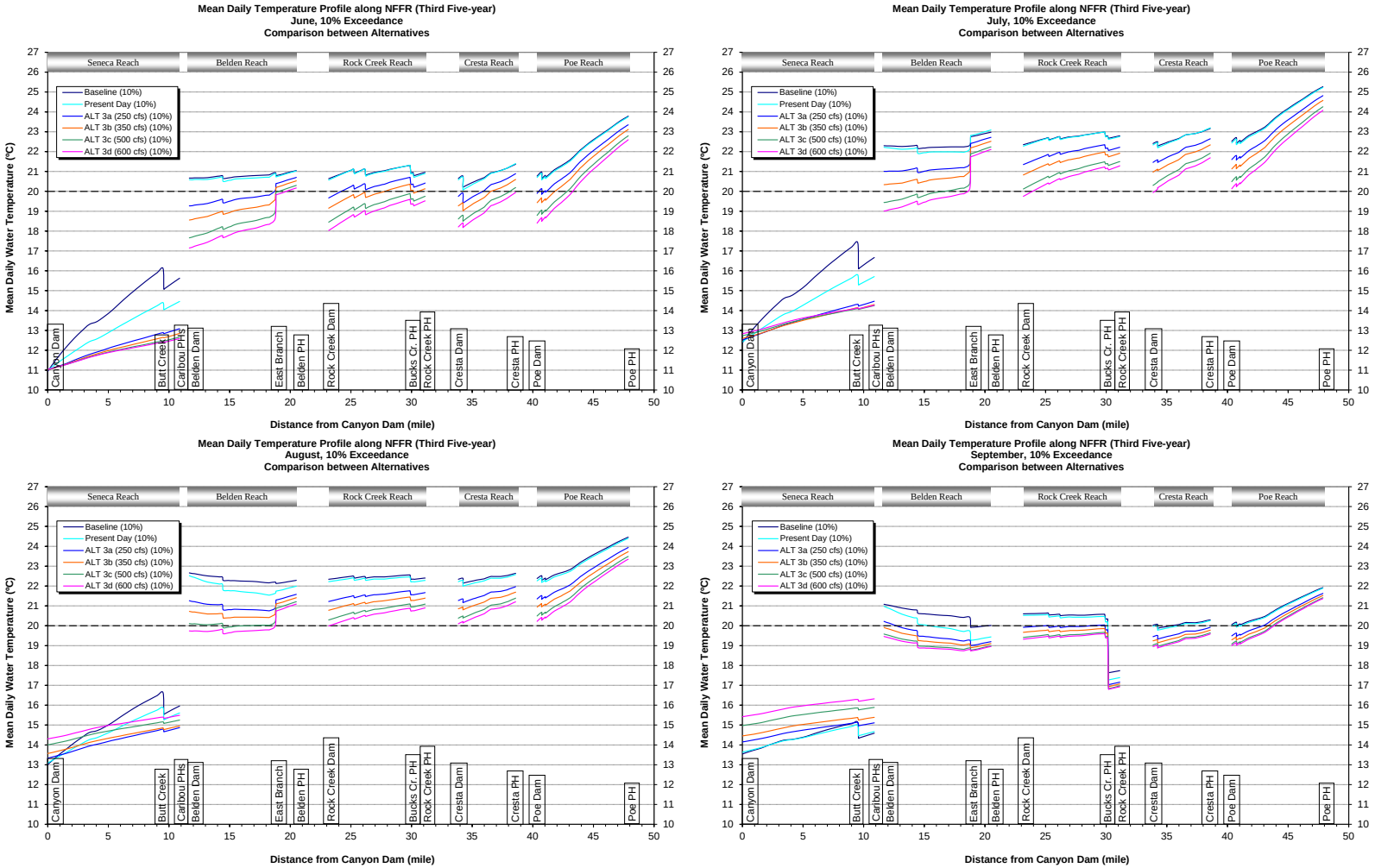

**Figure 4 Comparison of NFFR Mean Daily Water Temperature Longitudinal Profiles between Alternatives for the Summer Months – Maximum**

Similar to Figure 2-5 in Level 3 Report

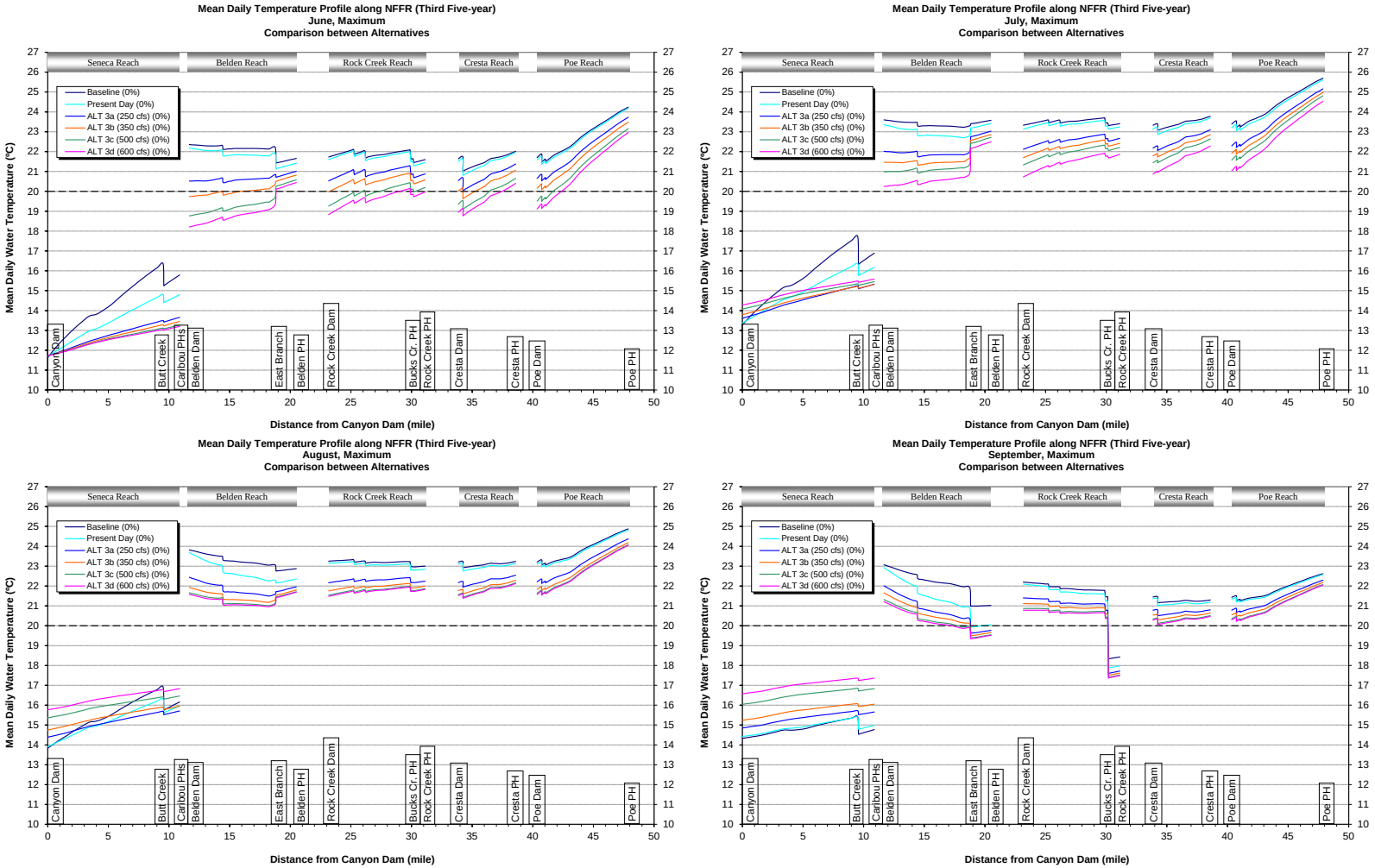

**Table 3 Summary of Mean Daily Water Temperature Profiles for Different Alternatives - June**

Similar to Table 2-3a in Level 3 Report

| Alt. | Exceedence Level | Belden Reach (Reach length = 8.8 miles) | | Rock Creek Reach (Reach length = 7.9 miles) | | Cresta Reach (Reach length = 4.7 miles) | | Poe Reach (Reach length = 7.5 miles) | |
|---|---|---|---|---|---|---|---|---|---|
| | | Reach Length That Exceeds 20°C (mile) | Temperature Range along the Reach | Reach Length That Exceeds 20°C (mile) | Temperature Range along the Reach | Reach Length That Exceeds 20°C (mile) | Temperature Range along the Reach | Reach Length That Exceeds 20°C (mile) | Temperature Range along the Reach |
| **Baseline** | Maximum | Entire reach | 21.4-22.4°C | Entire reach | 21.5-22.1°C | Entire reach | 21.1-22.0°C | Entire reach | 21.4-24.2°C |
| | 10% Exceedence | Entire reach | 20.7-21.0°C | Entire reach | 20.6-21.3°C | Entire reach | 20.2-21.4°C | Entire reach | 20.6-23.8°C |
| | 25% Exceedence | 5.3 | 19.8-20.7°C | Entire reach | 20.1-20.9°C | 4.2 | 19.9-20.9°C | Entire reach | 20.2-23.5°C |
| | 50% Exceedence | 0 | 18.2-19.5°C | 0 | 17.5-18.6°C | 0 | 17.8-18.6°C | 2.9 | 18.0-21.3°C |
| **Present Day** | Maximum | Entire reach | 21.1-22.2°C | Entire reach | 21.3-22.1°C | Entire reach | 20.8-22.0°C | Entire reach | 21.4-24.2°C |
| | 10% Exceedence | Entire reach | 20.5-21.0°C | Entire reach | 20.6-21.3°C | Entire reach | 20.1-21.4°C | Entire reach | 20.6-23.8°C |
| | 25% Exceedence | 1.7 | 19.4-20.5°C | 7.0 | 19.8-20.5°C | 3.6 | 19.8-20.6°C | Entire reach | 20.1-23.5°C |
| | 50% Exceedence | 0 | 17.6-19.2°C | 0 | 17.6-18.3°C | 0 | 17.7-18.3°C | 2.8 | 17.9-21.2°C |
| **Alternative 3a (250 cfs)** | Maximum | Entire reach | 20.4-21.0°C | Entire reach | 20.5-21.3°C | Entire reach | 20.0-21.4°C | Entire reach | 20.5-23.7°C |
| | 10% Exceedence | 1.8 | 19.3-20.7°C | 6.9 | 19.7-20.7°C | 2.7 | 19.4-20.9°C | 7.0 | 19.9-23.4°C |
| | 25% Exceedence | 0.7 | 18.4-20.1°C | 0 | 19.1-19.9°C | 0.2 | 19.2-20.0°C | 6.2 | 19.5-23.2°C |
| | 50% Exceedence | 0 | 16.8-18.9°C | 0 | 17.3-17.8°C | 0 | 17.3-18.0°C | 2.3 | 17.5-21.0°C |
| **Alternative 3b (350 cfs)** | Maximum | 4.6 | 19.7-20.8°C | 7.9 | 20.0-20.9°C | 3.7 | 19.6-21.1°C | Entire reach | 20.1-23.5°C |
| | 10% Exceedence | 1.7 | 18.6-20.5°C | 2.9 | 19.2-20.4°C | 2.1 | 19.0-20.6°C | 6.1 | 19.4-23.1°C |
| | 25% Exceedence | 0 | 17.8-19.9°C | 0 | 18.6-19.5°C | 0 | 18.8-19.7°C | 5.4 | 19.1-22.9°C |
| | 50% Exceedence | 0 | 16.3-18.7°C | 0 | 17.0-17.5°C | 0 | 17.1-17.7°C | 1.9 | 17.3-20.9°C |
| **Alternative 3c (500 cfs)** | Maximum | 1.7 | 18.8-20.6°C | 3.8 | 19.3-20.4°C | 2.2 | 19.1-20.7°C | 6.2 | 19.5-23.2°C |
| | 10% Exceedence | 1.5 | 17.7-20.3°C | 0 | 18.5-19.9°C | 0.5 | 18.5-20.2°C | 5.0 | 18.8-22.8°C |
| | 25% Exceedence | 0 | 16.9-19.5°C | 0 | 18.0-19.0°C | 0 | 18.2-19.1°C | 4.7 | 18.5-22.6°C |
| | 50% Exceedence | 0 | 15.6-18.5°C | 0 | 16.7-17.2°C | 0 | 16.7-17.4°C | 1.4 | 16.9-20.7°C |
| **Alternative 3d (600 cfs)** | Maximum | 1.7 | 18.2-20.4°C | 0.9 | 18.8-20.2°C | 1.1 | 18.8-20.4°C | 5.5 | 19.1-23.0°C |
| | 10% Exceedence | 0.8 | 17.2-20.2°C | 0 | 18.0-19.6°C | 0 | 18.2-20.0°C | 4.6 | 18.4-22.6°C |
| | 25% Exceedence | 0 | 16.5-19.3°C | 0 | 17.6-18.8°C | 0 | 17.8-18.8°C | 4.3 | 18.1-22.4°C |
| | 50% Exceedence | 0 | 15.2-18.4°C | 0 | 16.4-16.9°C | 0 | 16.5-17.1°C | 1.1 | 16.6-20.5°C |

Notes:

The State Water Board has determined that the Seneca Reach is not impaired for water temperature, therefore it is excluded from this table.

The length of the lower Belden Reach below East Branch = 1.6 miles.

The length of the lower Rock Creek Reach below Bucks Creek = 1.2 miles.

**Table 4 Summary of Mean Daily Water Temperature Profiles for Different Alternatives - July**

Similar to Table 2-3b in Level 3 Report

| Alt. | Exceedence Level | Belden Reach (Reach length = 8.8 miles) | | Rock Creek Reach (Reach length = 7.9 miles) | | Cresta Reach (Reach length = 4.7 miles) | | Poe Reach (Reach length = 7.5 miles) | |
|---|---|---|---|---|---|---|---|---|---|
| | | Reach Length That Exceeds 20°C (mile) | Temperature Range along the Reach | Reach Length That Exceeds 20°C (mile) | Temperature Range along the Reach | Reach Length That Exceeds 20°C (mile) | Temperature Range along the Reach | Reach Length That Exceeds 20°C (mile) | Temperature Range along the Reach |
| **Baseline** | Maximum | Entire reach | 23.2-23.6°C | Entire reach | 23.3-23.7°C | Entire reach | 23.1-23.8°C | Entire reach | 23.3-25.7°C |
| | 10% Exceedence | Entire reach | 22.2-23.0°C | Entire reach | 22.4-23.0°C | Entire reach | 22.3-23.2°C | Entire reach | 22.5-25.3°C |
| | 25% Exceedence | Entire reach | 21.7-22.7°C | Entire reach | 21.9-22.7°C | Entire reach | 22.0-22.8°C | Entire reach | 22.1-25.1°C |
| | 50% Exceedence | Entire reach | 20.4-21.9°C | 6.9 | 18.6-21.1°C | Entire reach | 20.1-20.8°C | Entire reach | 20.2-23.2°C |
| **Present Day** | Maximum | Entire reach | 22.7-23.4°C | Entire reach | 23.1-23.6°C | Entire reach | 22.9-23.7°C | Entire reach | 23.1-25.6°C |
| | 10% Exceedence | Entire reach | 21.9-23.0°C | Entire reach | 22.3-23.0°C | Entire reach | 22.2-23.2°C | Entire reach | 22.4-25.2°C |
| | 25% Exceedence | Entire reach | 21.5-22.7°C | Entire reach | 21.8-22.4°C | Entire reach | 21.9-22.5°C | Entire reach | 22.0-25.1°C |
| | 50% Exceedence | Entire reach | 20.2-21.7°C | 7.0 | 19.2-20.9°C | Entire reach | 20.0-20.6°C | Entire reach | 20.1-23.2°C |
| **Alternative 3a (250 cfs)** | Maximum | Entire reach | 21.8-23.0°C | Entire reach | 22.1-22.9°C | Entire reach | 22.1-23.1°C | Entire reach | 22.2-25.2°C |
| | 10% Exceedence | Entire reach | 21.0-22.7°C | Entire reach | 21.4-22.4°C | Entire reach | 21.5-22.7°C | Entire reach | 21.6-24.8°C |
| | 25% Exceedence | Entire reach | 20.4-22.1°C | Entire reach | 20.9-21.7°C | Entire reach | 21.1-21.9°C | Entire reach | 21.3-24.7°C |
| | 50% Exceedence | 1.7 | 19.4-21.2°C | 5.3 | 18.8-20.3°C | 0.5 | 19.5-20.1°C | 6.2 | 19.6-22.9°C |
| **Alternative 3b (350 cfs)** | Maximum | Entire reach | 21.3-22.9°C | Entire reach | 21.7-22.6°C | Entire reach | 21.7-22.9°C | Entire reach | 21.9-25.0°C |
| | 10% Exceedence | Entire reach | 20.3-22.5°C | Entire reach | 20.8-22.0°C | Entire reach | 21.0-22.3°C | Entire reach | 21.1-24.6°C |
| | 25% Exceedence | 6.1 | 19.8-21.9°C | Entire reach | 20.4-21.3°C | Entire reach | 20.7-21.5°C | Entire reach | 20.9-24.5°C |
| | 50% Exceedence | 1.7 | 18.7-20.9°C | 0 | 18.5-19.9°C | 0 | 19.0-19.7°C | 5.4 | 19.2-22.7°C |
| **Alternative 3c (500 cfs)** | Maximum | Entire reach | 20.9-22.7°C | Entire reach | 21.3-22.3°C | Entire reach | 21.4-22.6°C | Entire reach | 21.6-24.8°C |
| | 10% Exceedence | 3.9 | 19.4-22.2°C | Entire reach | 20.1-21.5°C | Entire reach | 20.3-21.9°C | Entire reach | 20.5-24.3°C |
| | 25% Exceedence | 1.7 | 18.8-21.4°C | 6.3 | 19.7-20.8°C | 4.5 | 20.0-20.9°C | Entire reach | 20.2-24.1°C |
| | 50% Exceedence | 1.7 | 17.7-20.5°C | 0 | 18.0-19.3°C | 0 | 18.4-19.2°C | 4.5 | 18.6-22.4°C |
| **Alternative 3d (600 cfs)** | Maximum | Entire reach | 20.3-22.5°C | Entire reach | 20.7-21.9°C | Entire reach | 20.9-22.3°C | Entire reach | 21.0-24.5°C |
| | 10% Exceedence | 2.0 | 19.0-22.1°C | 7.2 | 19.8-21.3°C | 4.6 | 19.9-21.7°C | Entire reach | 20.1-24.1°C |
| | 25% Exceedence | 1.7 | 18.3-21.2°C | 3.1 | 19.2-20.4°C | 2.5 | 19.5-20.5°C | 6.9 | 19.7-23.9°C |
| | 50% Exceedence | 1.7 | 17.1-20.2°C | 0 | 17.8-18.9°C | 0 | 18.0-18.9°C | 4.1 | 18.3-22.2°C |

Notes:

The State Water Board has determined that the Seneca Reach is not impaired for water temperature, therefore it is excluded from this table.

The length of the lower Belden Reach below East Branch = 1.6 miles.

The length of the lower Rock Creek Reach below Bucks Creek = 1.2 miles.

**Table 5 Summary of Mean Daily Water Temperature Profiles for Different Alternatives - August**

Similar to Table 2-3c in Level 3 Report

| Alt. | Exceedence Level | Belden Reach (Reach length = 8.8 miles) | | Rock Creek Reach (Reach length = 7.9 miles) | | Cresta Reach (Reach length = 4.7 miles) | | Poe Reach (Reach length = 7.5 miles) | |
|---|---|---|---|---|---|---|---|---|---|
| | | Reach Length That Exceeds 20°C (mile) | Temperature Range along the Reach | Reach Length That Exceeds 20°C (mile) | Temperature Range along the Reach | Reach Length That Exceeds 20°C (mile) | Temperature Range along the Reach | Reach Length That Exceeds 20°C (mile) | Temperature Range along the Reach |
| **Baseline** | Maximum | Entire reach | 22.8-23.8°C | Entire reach | 23.0-23.3°C | Entire reach | 22.9-23.2°C | Entire reach | 23.1-24.9°C |
| | 10% Exceedence | Entire reach | 22.1-22.7°C | Entire reach | 22.3-22.6°C | Entire reach | 22.2-22.6°C | Entire reach | 22.3-24.5°C |
| | 25% Exceedence | Entire reach | 21.7-22.0°C | Entire reach | 21.8-22.2°C | Entire reach | 21.8-22.3°C | Entire reach | 21.9-24.2°C |
| | 50% Exceedence | Entire reach | 20.7-21.2°C | 6.9 | 18.0-20.9°C | Entire reach | 20.0-20.4°C | Entire reach | 20.1-22.5°C |
| **Present Day** | Maximum | Entire reach | 22.2-23.7°C | Entire reach | 22.8-23.2°C | Entire reach | 22.8-23.1°C | Entire reach | 23.0-24.8°C |
| | 10% Exceedence | Entire reach | 21.5-22.5°C | Entire reach | 22.2-22.5°C | Entire reach | 22.0-22.6°C | Entire reach | 22.2-24.4°C |
| | 25% Exceedence | Entire reach | 21.4-21.8°C | Entire reach | 21.7-22.0°C | Entire reach | 21.7-22.1°C | Entire reach | 21.8-24.2°C |
| | 50% Exceedence | Entire reach | 20.5-21.0°C | 7.0 | 18.8-20.9°C | 4.0 | 19.9-20.3°C | Entire reach | 20.0-22.5°C |
| **Alternative 3a (250 cfs)** | Maximum | Entire reach | 21.5-22.4°C | Entire reach | 22.2-22.4°C | Entire reach | 22.0-22.6°C | Entire reach | 22.1-24.4°C |
| | 10% Exceedence | Entire reach | 20.8-21.6°C | Entire reach | 21.2-21.8°C | Entire reach | 21.2-22.0°C | Entire reach | 21.3-23.9°C |
| | 25% Exceedence | Entire reach | 20.5-21.3°C | Entire reach | 20.8-21.3°C | Entire reach | 20.9-21.5°C | Entire reach | 21.1-23.8°C |
| | 50% Exceedence | 1.7 | 19.7-20.6°C | 5.3 | 18.4-20.2°C | 0 | 19.3-19.8°C | 5.4 | 19.4-22.1°C |
| **Alternative 3b (350 cfs)** | Maximum | Entire reach | 21.2-21.9°C | Entire reach | 21.8-22.1°C | Entire reach | 21.6-22.3°C | Entire reach | 21.8-24.2°C |
| | 10% Exceedence | Entire reach | 20.4-21.4°C | Entire reach | 20.8-21.5°C | Entire reach | 20.8-21.7°C | Entire reach | 20.9-23.7°C |
| | 25% Exceedence | Entire reach | 20.1-21.1°C | Entire reach | 20.4-21.0°C | Entire reach | 20.5-21.1°C | Entire reach | 20.6-23.6°C |
| | 50% Exceedence | 1.7 | 19.3-20.3°C | 0 | 18.1-19.8°C | 0 | 19.0-19.5°C | 4.7 | 19.1-22.0°C |
| **Alternative 3c (500 cfs)** | Maximum | Entire reach | 21.0-21.7°C | Entire reach | 21.5-22.0°C | Entire reach | 21.4-22.2°C | Entire reach | 21.6-24.1°C |
| | 10% Exceedence | 6.7 | 19.9-21.2°C | Entire reach | 20.3-21.1°C | Entire reach | 20.4-21.4°C | Entire reach | 20.5-23.5°C |
| | 25% Exceedence | 1.7 | 19.4-20.8°C | 5.9 | 19.8-20.5°C | 4.2 | 19.9-20.7°C | Entire reach | 20.1-23.3°C |
| | 50% Exceedence | 0 | 18.6-20.0°C | 0 | 17.8-19.3°C | 0 | 18.5-19.1°C | 4.0 | 18.6-21.7°C |
| **Alternative 3d (600 cfs)** | Maximum | Entire reach | 21.0-21.7°C | Entire reach | 21.5-21.9°C | Entire reach | 21.4-22.1°C | Entire reach | 21.5-24.1°C |
| | 10% Exceedence | 1.7 | 19.6-21.1°C | 7.9 | 20.0-20.9°C | Entire reach | 20.1-21.2°C | Entire reach | 20.2-23.4°C |
| | 25% Exceedence | 1.7 | 19.0-20.6°C | 2.5 | 19.4-20.2°C | 2.4 | 19.6-20.4°C | 6.8 | 19.8-23.1°C |
| | 50% Exceedence | 0 | 18.2-19.8°C | 0 | 17.5-19.0°C | 0 | 18.2-18.8°C | 3.5 | 18.3-21.5°C |

Notes:

The State Water Board has determined that the Seneca Reach is not impaired for water temperature, therefore it is excluded from this table.

The length of the lower Belden Reach below East Branch = 1.6 miles.

The length of the lower Rock Creek Reach below Bucks Creek = 1.2 miles.

**Table 6 Summary of Mean Daily Water Temperature Profiles for Different Alternatives - September**

Similar to Table 2-3d in Level 3 Report

| Alt. | Exceedence Level | Belden Reach (Reach length = 8.8 miles) | | Rock Creek Reach (Reach length = 7.9 miles) | | Cresta Reach (Reach length = 4.7 miles) | | Poe Reach (Reach length = 7.5 miles) | |
|---|---|---|---|---|---|---|---|---|---|
| | | Reach Length That Exceeds 20°C (mile) | Temperature Range along the Reach | Reach Length That Exceeds 20°C (mile) | Temperature Range along the Reach | Reach Length That Exceeds 20°C (mile) | Temperature Range along the Reach | Reach Length That Exceeds 20°C (mile) | Temperature Range along the Reach |
| **Baseline** | Maximum | Entire reach | 21.0-23.1°C | 6.9 | 18.3-22.2°C | Entire reach | 21.2-21.5°C | Entire reach | 21.2-22.6°C |
| | 10% Exceedence | Entire reach | 20.0-21.1°C | 6.9 | 17.6-20.6°C | 3.0 | 19.8-20.3°C | Entire reach | 20.0-21.9°C |
| | 25% Exceedence | 2.7 | 19.5-20.2°C | 1.3 | 17.3-20.1°C | 0 | 19.4-19.8°C | 4.8 | 19.5-21.6°C |
| | 50% Exceedence | 0 | 18.0-19.3°C | 0 | 15.4-18.6°C | 0 | 17.6-17.8°C | 0 | 17.8-19.7°C |
| **Present Day** | Maximum | 7.9 | 19.9-22.9°C | 7.0 | 17.9-22.1°C | Entire reach | 21.0-21.4°C | Entire reach | 21.2-22.6°C |
| | 10% Exceedence | 3.7 | 19.3-21.0°C | 7.0 | 17.3-20.6°C | 2.6 | 19.8-20.3°C | 7.2 | 19.9-21.9°C |
| | 25% Exceedence | 1.0 | 19.2-20.2°C | 1.4 | 18.1-20.1°C | 0 | 19.3-19.8°C | 4.8 | 19.4-21.6°C |
| | 50% Exceedence | 0 | 18.0-19.2°C | 0 | 16.3-18.5°C | 0 | 17.6-17.8°C | 0 | 17.7-19.7°C |
| **Alternative 3a (250 cfs)** | Maximum | 7.1 | 19.6-22.0°C | 7.0 | 17.6-21.4°C | Entire reach | 20.5-20.8°C | Entire reach | 20.7-22.3°C |
| | 10% Exceedence | 1.0 | 19.0-20.2°C | 1.3 | 17.0-20.0°C | 0 | 19.3-19.9°C | 5.0 | 19.5-21.6°C |
| | 25% Exceedence | 0 | 18.8-19.4°C | 0 | 17.8-19.5°C | 0 | 18.9-19.4°C | 4.0 | 19.0-21.3°C |
| | 50% Exceedence | 0 | 17.7-18.5°C | 0 | 16.1-18.1°C | 0 | 17.3-17.5°C | 0 | 17.4-19.5°C |
| **Alternative 3b (350 cfs)** | Maximum | 7.1 | 19.5-21.7°C | 7.0 | 17.5-21.1°C | Entire reach | 20.3-20.6°C | Entire reach | 20.5-22.2°C |
| | 10% Exceedence | 0 | 18.9-19.9°C | 0 | 16.9-19.9°C | 0 | 19.1-19.8°C | 4.5 | 19.3-21.5°C |
| | 25% Exceedence | 0 | 18.7-19.1°C | 0 | 17.6-19.4°C | 0 | 18.7-19.2°C | 3.6 | 18.8-21.2°C |
| | 50% Exceedence | 0 | 17.5-18.2°C | 0 | 15.9-17.9°C | 0 | 17.1-17.4°C | 0 | 17.2-19.5°C |
| **Alternative 3c (500 cfs)** | Maximum | 6.0 | 19.4-21.3°C | 7.0 | 17.4-20.9°C | Entire reach | 20.1-20.5°C | Entire reach | 20.3-22.1°C |
| | 10% Exceedence | 0 | 18.8-19.6°C | 0 | 16.8-19.7°C | 0 | 19.0-19.6°C | 4.2 | 19.1-21.4°C |
| | 25% Exceedence | 0 | 18.4-18.8°C | 0 | 17.5-19.1°C | 0 | 18.4-19.0°C | 3.2 | 18.5-21.1°C |
| | 50% Exceedence | 0 | 17.2-17.9°C | 0 | 15.8-17.6°C | 0 | 16.9-17.2°C | 0 | 17.0-19.3°C |
| **Alternative 3d (600 cfs)** | Maximum | 5.6 | 19.4-21.2°C | 7.0 | 17.4-20.8°C | Entire reach | 20.1-20.5°C | Entire reach | 20.2-22.1°C |
| | 10% Exceedence | 0 | 18.7-19.5°C | 0 | 16.8-19.6°C | 0 | 18.9-19.6°C | 4.0 | 19.0-21.4°C |
| | 25% Exceedence | 0 | 18.3-18.7°C | 0 | 17.4-19.0°C | 0 | 18.3-19.0°C | 3.0 | 18.4-21.1°C |
| | 50% Exceedence | 0 | 17.1-17.7°C | 0 | 15.7-17.5°C | 0 | 16.8-17.1°C | 0 | 16.9-19.3°C |

Notes:

The State Water Board has determined that the Seneca Reach is not impaired for water temperature, therefore it is excluded from this table.

The length of the lower Belden Reach below East Branch = 1.6 miles.

The length of the lower Rock Creek Reach below Bucks Creek = 1.2 miles.

**Figure 5 Comparison of Monthly (Jul, Aug, Sep) and Annual MWAT Longitudinal Profiles between Alternatives – 50% Exceedance**

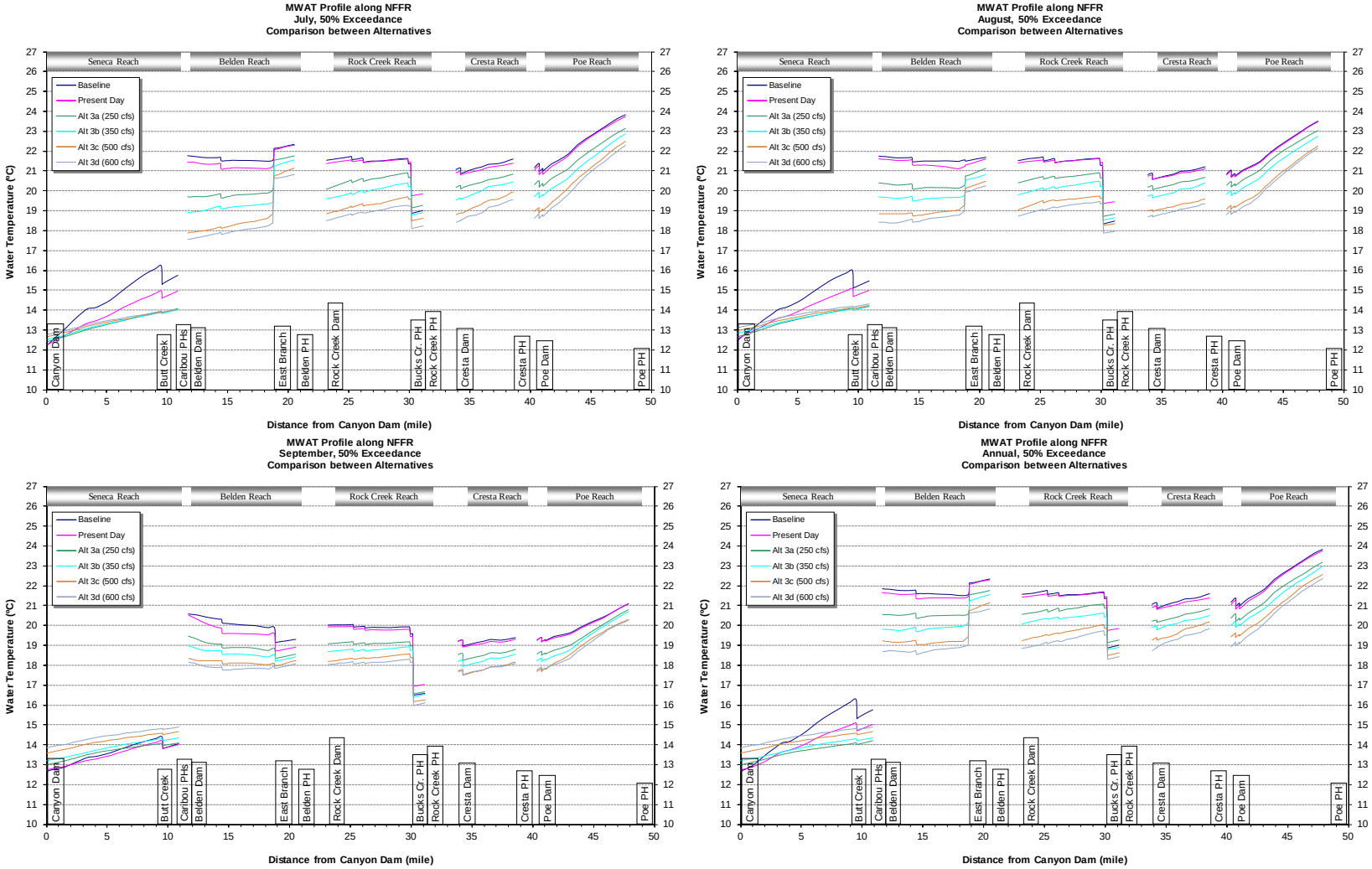

**Figure 6 Comparison of Monthly (Jul, Aug, Sep) and Annual MWAT Longitudinal Profiles between Alternatives – 25% Exceedance**

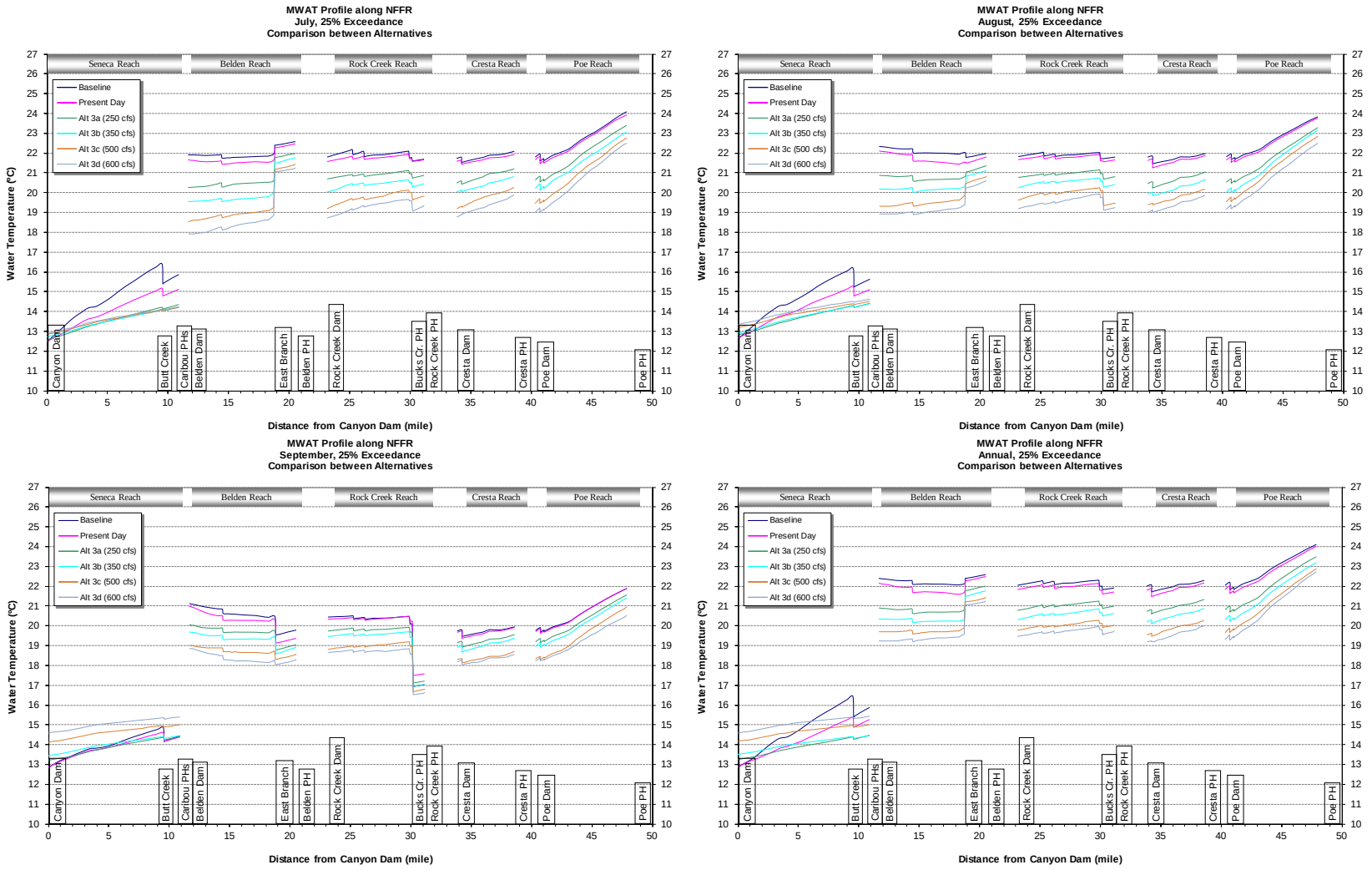

**Figure 7 Comparison of Monthly (Jul, Aug, Sep) and Annual MWAT Longitudinal Profiles between Alternatives – 10% Exceedance**

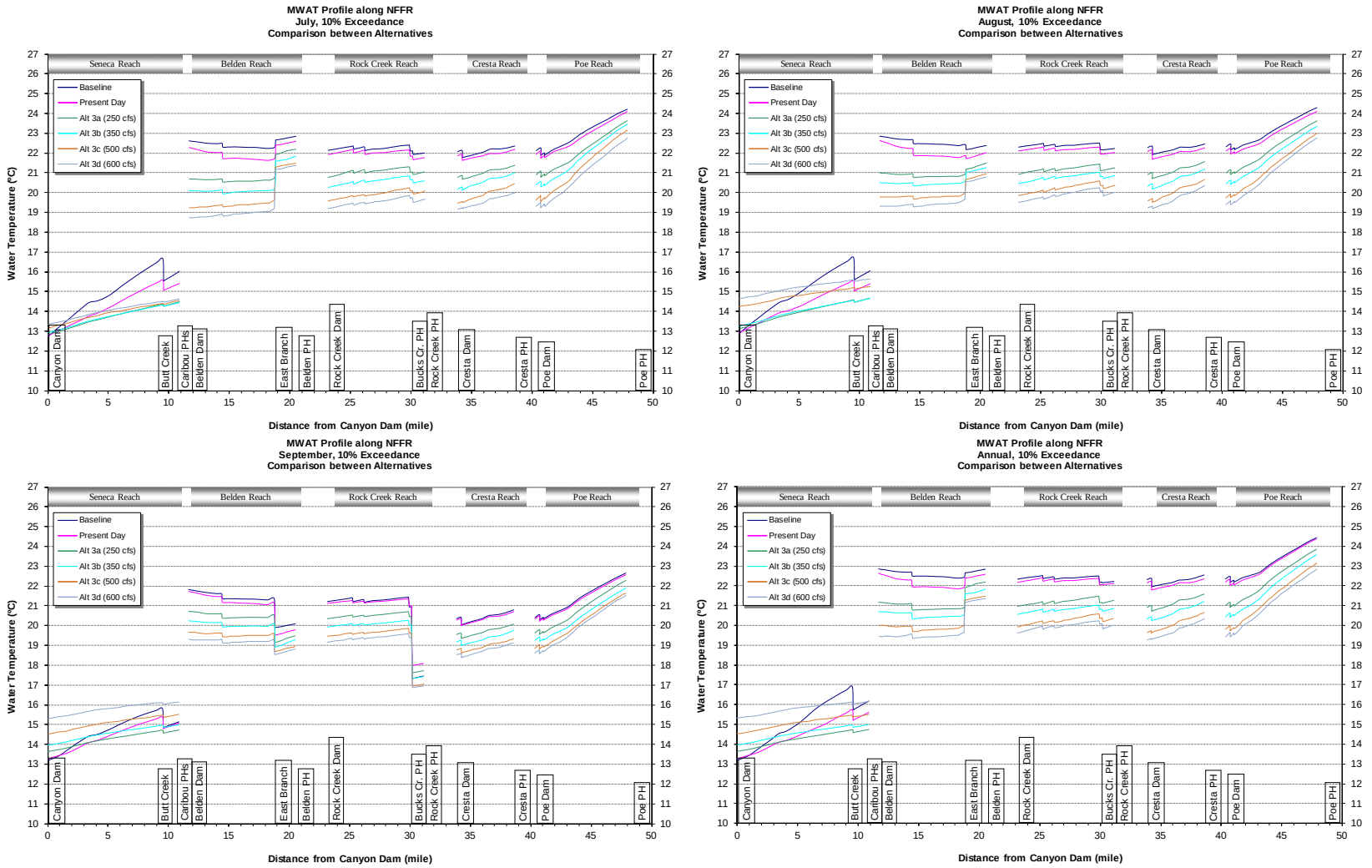

**Figure 8 Comparison of Monthly (Jul, Aug, Sep) and Annual MWAT Longitudinal Profiles between Alternatives – Maximum**

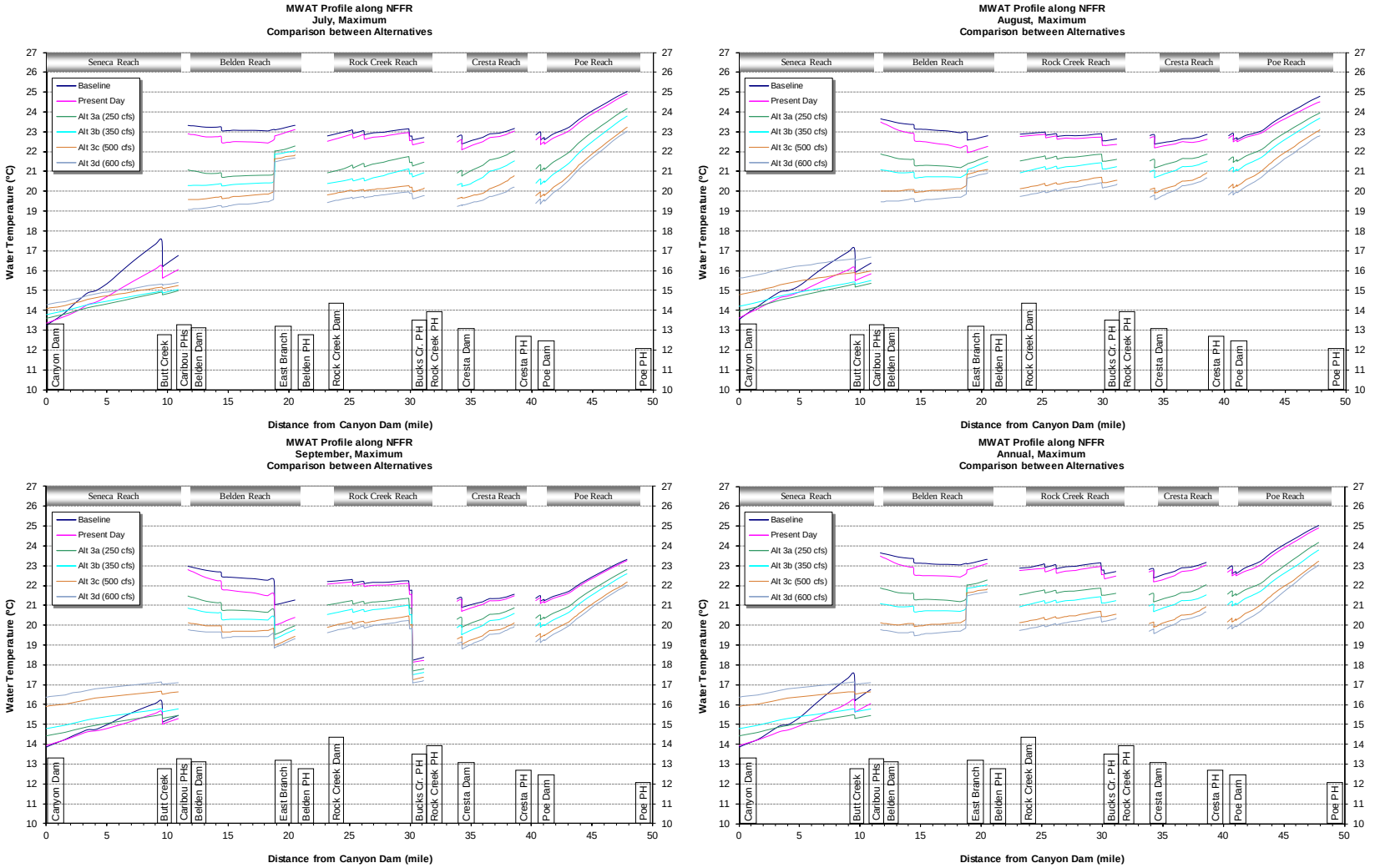

**Table 7 Summary of Simulated Lake Almanor Thermocline Elevation for Different Alternatives and Change in Thermocline Elevation Relative to Baseline Condition (2000, Normal Hydrologic Year)**

Similar to Table 3-4 in Level 3 Report

| Date | Water Surface Elevation | Simulated Thermocline Elevation (feet in USGS Datum) | | | | | | Change in Thermocline Elevation Relative to Baseline Condition (ft) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Baseline** | **Present Day** | **Alt 3a** (250 cfs) | **Alt 3b** (350 cfs) | **Alt 3c** (500 cfs) | **Alt 3d** (600 cfs) | **Present Day** | **Alt 3a** (250 cfs) | **Alt 3b** (350 cfs) | **Alt 3c** (500 cfs) | **Alt 3d** (600 cfs) |
| 5/15/2000 | 4,500.2 | | | | | | | | | | | |
| 6/7/2000 | 4,500.3 | 4,473.8 | 4,473.8 | 4,473.8 | 4,473.8 | 4,473.8 | 4,473.8 | 0 | 0 | 0 | 0 | 0 |
| **6/22/2000** | 4,500.1 | 4,480.3 | 4,480.3 | 4,480.3 | 4,480.3 | 4,480.3 | 4,480.3 | 0 | 0 | 0 | 0 | 0 |
| 7/7/2000 | 4,499.5 | 4,463.9 | 4,463.9 | 4,463.9 | 4,463.9 | 4,463.9 | 4,463.9 | 0 | 0 | 0 | 0 | 0 |
| **7/20/2000** | 4,497.2 | 4,467.2 | 4,467.2 | 4,467.2 | 4,463.9 | 4,463.9 | 4,463.9 | 0 | 0 | -3 | -3 | -3 |
| 8/7/2000 | 4,496.2 | 4,467.2 | 4,467.2 | 4,467.2 | 4,467.2 | 4,467.2 | 4,467.2 | 0 | 0 | 0 | 0 | 0 |
| **8/17/2000** | 4,493.9 | 4,460.7 | 4,460.7 | 4,460.7 | 4,460.7 | 4,460.7 | 4,460.7 | 0 | 0 | 0 | 0 | 0 |
| 9/7/2000 | 4,492.9 | 4,454.1 | 4,454.1 | 4,450.8 | 4,450.8 | 4,450.8 | 4,447.5 | 0 | -3 | -3 | -3 | -7 |
| **9/28/2000** | 4,490.3 | 4,454.1 | 4,454.1 | 4,450.8 | 4,450.8 | 4,450.8 | 4,447.5 | 0 | -3 | -3 | -3 | -7 |
| 10/15/2000 | 4,489.6 | 4,444.3 | 4,441.0 | 4,441.0 | 4,441.0 | 4,441.0 | 4,441.0 | -3 | -3 | -3 | -3 | -3 |

Notes: 1) The bold dates have observed profiles.

2) The blank data on May 15, 2000 indicate that the lake did not have apparent thermocline on that day.

**Figure 9 Comparison of Simulated Lake Almanor Thermocline Elevation for Different Alternatives (2000, Normal Hydrologic Year)**

Similar to Figure 3-8 in Level 3 Report

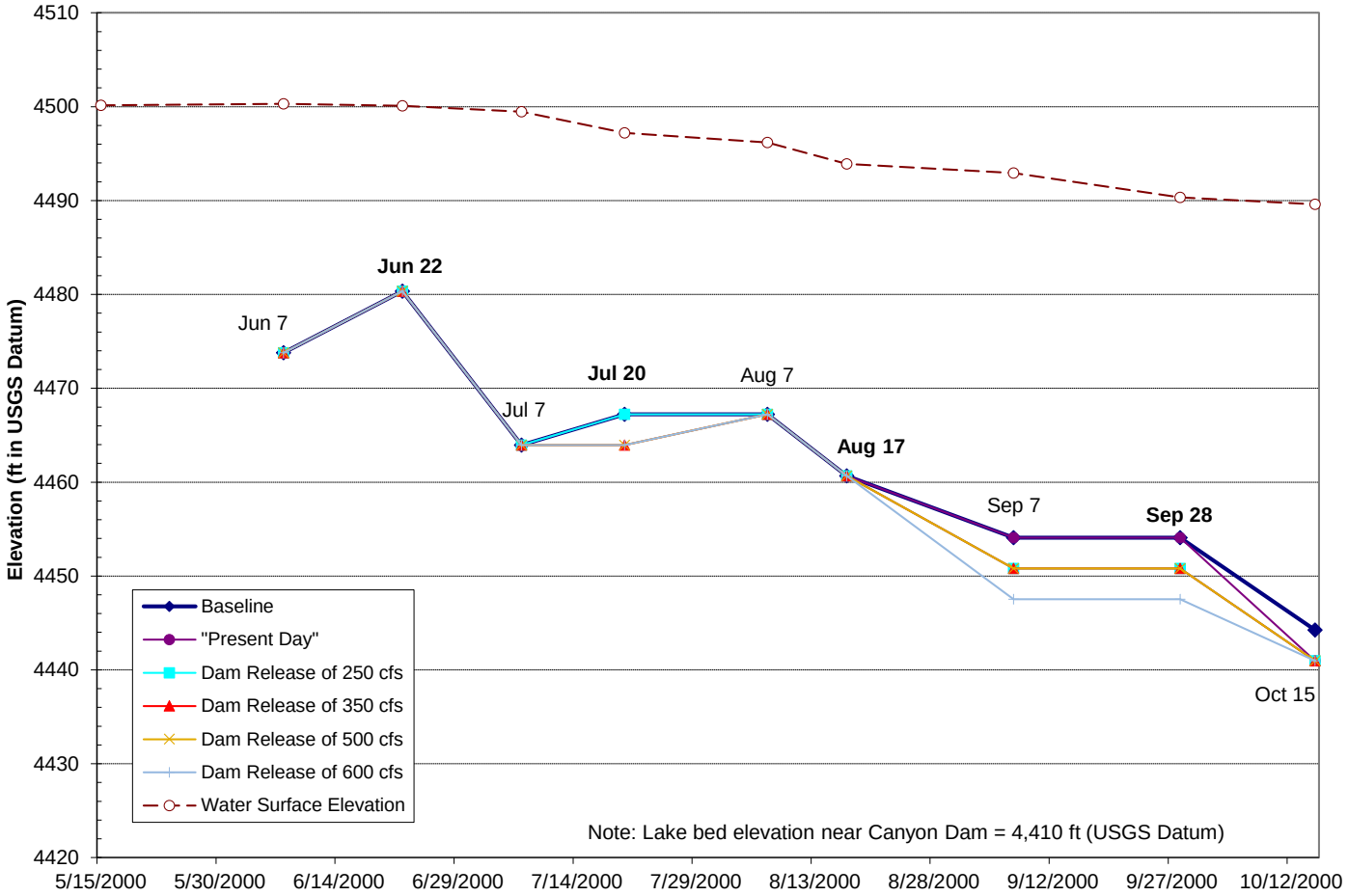

**Table 8 Summary of Simulated Lake Almanor Thermocline Elevation for Different Alternatives and Change in Thermocline Elevation Relative to Baseline Condition (2001, Critical Dry Year)**

Similar to Table 3-5 in Level 3 Report

| Date | Water Surface Elevation | Simulated Thermocline Elevation (feet in USGS Datum) | | | | | | Change in Thermocline Elevation Relative to Baseline Condition (ft) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Baseline** | **Present Day** | **Alt 3a** (250 cfs) | **Alt 3b** (350 cfs) | **Alt 3c** (500 cfs) | **Alt 3d** (600 cfs) | **Present Day** | **Alt 3a** (250 cfs) | **Alt 3b** (350 cfs) | **Alt 3c** (500 cfs) | **Alt 3d** (600 cfs) |
| 5/15/2001 | 4,487.6 | 4,450.8 | 4,450.8 | 4,450.8 | 4,450.8 | 4,450.8 | 4,450.8 | 0 | 0 | 0 | 0 | 0 |
| **6/6/2001** | 4,487.8 | 4,467.2 | 4,467.2 | 4,467.2 | 4,467.2 | 4,467.2 | 4,467.2 | 0 | 0 | 0 | 0 | 0 |
| 6/22/2001 | 4,487.5 | 4,470.5 | 4,470.5 | 4,470.5 | 4,470.5 | 4,470.5 | 4,470.5 | 0 | 0 | 0 | 0 | 0 |
| **7/10/2001** | 4,486.9 | 4,457.4 | 4,457.4 | 4,454.1 | 4,454.1 | 4,454.1 | 4,454.1 | 0 | -3 | -3 | -3 | -3 |
| 7/20/2001 | 4,486.6 | 4,463.9 | 4,463.9 | 4,463.9 | 4,463.9 | 4,463.9 | 4,463.9 | 0 | 0 | 0 | 0 | 0 |
| **8/9/2001** | 4,484.3 | 4,457.4 | 4,457.4 | 4,457.4 | 4,457.4 | 4,457.4 | 4,457.4 | 0 | 0 | 0 | 0 | 0 |
| 8/17/2001 | 4,484.0 | 4,457.4 | 4,457.4 | 4,457.4 | 4,454.1 | 4,454.1 | 4,454.1 | 0 | 0 | -3 | -3 | -3 |
| **9/12/2001** | 4,483.6 | 4,444.3 | 4,444.3 | 4,441.0 | 4,441.0 | 4,441.0 | 4,437.7 | 0 | -3 | -3 | -3 | -7 |
| 9/28/2001 | 4,483.2 | 4,447.5 | 4,444.3 | 4,444.3 | 4,441.0 | 4,437.7 | 4,437.7 | -3 | -3 | -7 | -10 | -10 |
| 10/15/2001 | 4,480.8 | 4,427.9 | 4,424.6 | 4,421.3 | 4,421.3 | 4,421.3 | 4,418.0 | -3 | -7 | -7 | -7 | -10 |

Note: The bold dates have observed profiles.

**Figure 10 Comparison of Simulated Lake Almanor Thermocline Elevation for Different Alternatives (2001, Critical Dry Year)**

Similar to Figure 3-9 in Level 3 Report

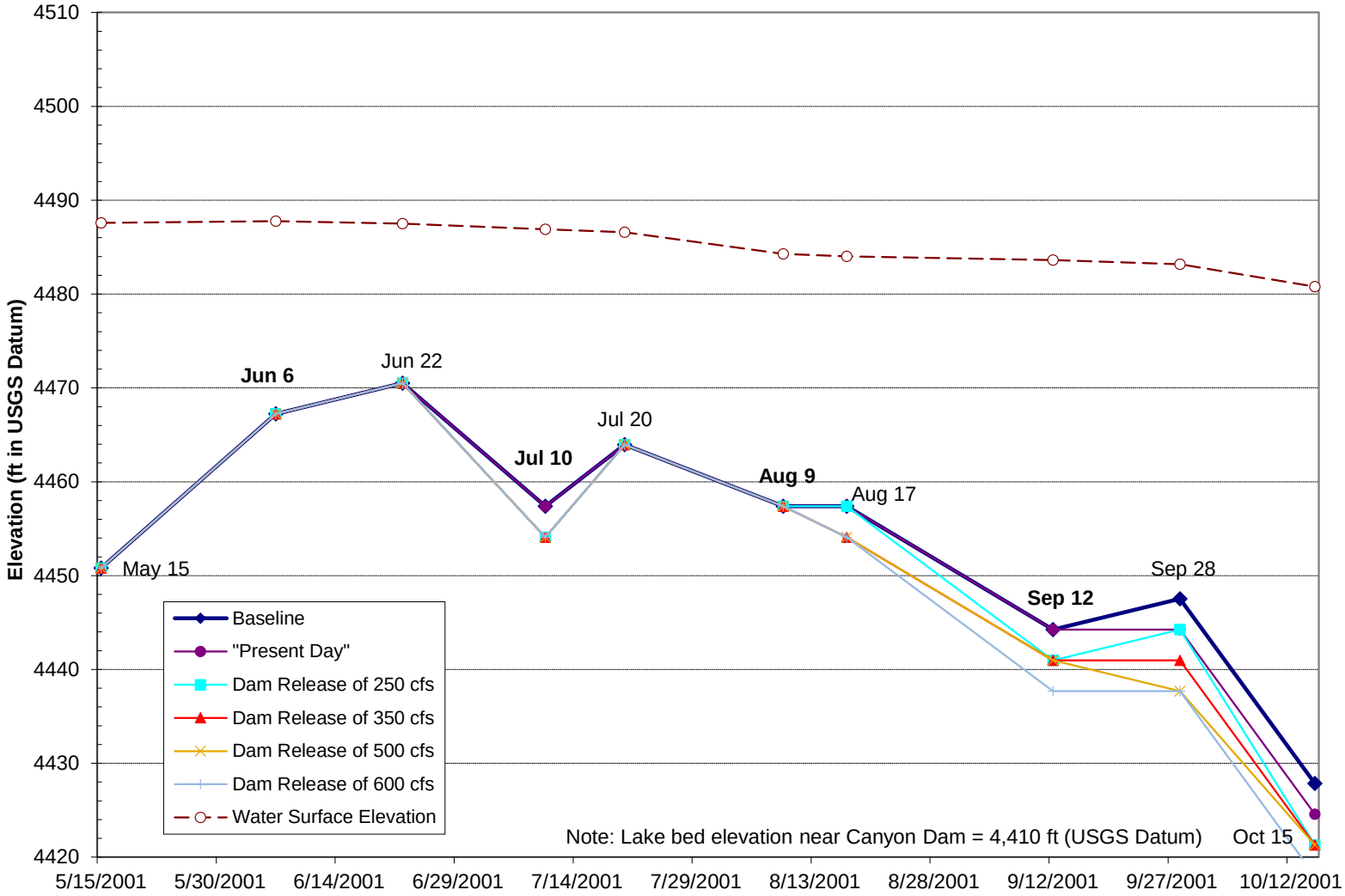

**Table 9 Summary of Simulated Lake Almanor Habitat Volume (acre-ft) Having Water Temperature ≤ 20°C and DO ≥ 5 mg/L for Different Alternatives and Change in Habitat Volume Relative to Baseline Condition (2000, Normal Hydrologic Year)**

Similar to Table 3-2a in Level 3 Report

| Date | Total Reservoir Storage on Date (acre-ft) | Simulated Habitat Volume (acre-ft) | | | | | | Change in Habitat Volume Relative to Baseline Condition (acre-ft) | | | | | % Change in Habitat Volume Relative to Baseline Condition | | | | | % of Habitat Volume to Total Reservoir Storage on Date | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Baseline | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Baseline | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) |
| May 15 | 1,011,490 | 993,600 | 989,670 | 989,670 | 989,670 | 989,670 | 989,670 | -3,930 | -3,930 | -3,930 | -3,930 | -3,930 | -0.4% | -0.4% | -0.4% | -0.4% | -0.4% | 98% | 98% | 98% | 98% | 98% | 98% |
| June 7 | 1,015,410 | 876,500 | 874,470 | 874,470 | 874,470 | 874,470 | 874,470 | -2,030 | -2,030 | -2,030 | -2,030 | -2,030 | -0.2% | -0.2% | -0.2% | -0.2% | -0.2% | 86% | 86% | 86% | 86% | 86% | 86% |
| **Jun 22** | 1,010,250 | 452,400 | 449,750 | 449,590 | 449,420 | 450,660 | 451,440 | -2,650 | -2,810 | -2,980 | -1,740 | -960 | -0.6% | -0.6% | -0.7% | -0.4% | -0.2% | 45% | 45% | 45% | 44% | 45% | 45% |
| July 7 | 993,780 | 216,200 | 214,940 | 215,150 | 214,750 | 215,570 | 216,050 | -1,260 | -1,050 | -1,450 | -630 | -150 | -0.6% | -0.5% | -0.7% | -0.3% | -0.1% | 22% | 22% | 22% | 22% | 22% | 22% |
| **Jul 20** | 938,020 | 145,600 | 143,790 | 145,050 | 144,970 | 145,470 | 145,990 | -1,810 | -550 | -630 | -130 | 390 | -1.2% | -0.4% | -0.4% | -0.1% | 0.3% | 16% | 15% | 15% | 15% | 16% | 16% |
| Aug 7 | 913,180 | 65,000 | 63,690 | 63,640 | 62,940 | 63,580 | 62,720 | -1,310 | -1,360 | -2,060 | -1,420 | -2,280 | -2.0% | -2.1% | -3.2% | -2.2% | -3.5% | 7% | 7% | 7% | 7% | 7% | 7% |
| **Aug 17** | 859,160 | 44,400 | 40,910 | 40,340 | 39,430 | 38,120 | 38,120 | -3,490 | -4,060 | -4,970 | -6,280 | -6,280 | -7.9% | -9.1% | -11.2% | -14.1% | -14.1% | 5% | 5% | 5% | 5% | 4% | 4% |
| Sep 7 | 836,720 | 636,600 | 639,480 | 648,070 | 652,820 | 662,670 | 667,790 | 2,880 | 11,470 | 16,220 | 26,070 | 31,190 | 0.5% | 1.8% | 2.5% | 4.1% | 4.9% | 76% | 76% | 77% | 78% | 79% | 80% |
| **Sep 28** | 777,330 | 607,400 | 609,130 | 617,770 | 622,120 | 630,890 | 636,610 | 1,730 | 10,370 | 14,720 | 23,490 | 29,210 | 0.3% | 1.7% | 2.4% | 3.9% | 4.8% | 78% | 78% | 79% | 80% | 81% | 82% |
| Oct 15 | 761,020 | 676,200 | 678,940 | 690,860 | 692,620 | 697,770 | 706,870 | 2,740 | 14,660 | 16,420 | 21,570 | 30,670 | 0.4% | 2.2% | 2.4% | 3.2% | 4.5% | 89% | 89% | 91% | 91% | 92% | 93% |

Note: The bold dates have observed profiles.

**Figure 11 Comparison of Simulated Lake Almanor Habitat Volume Having Water Temperature ≤ 20°C and DO ≥ 5 mg/L for Different Alternatives (2000, Normal Hydrologic Year)**

Similar to Figure 3-4a in Level 3 Report

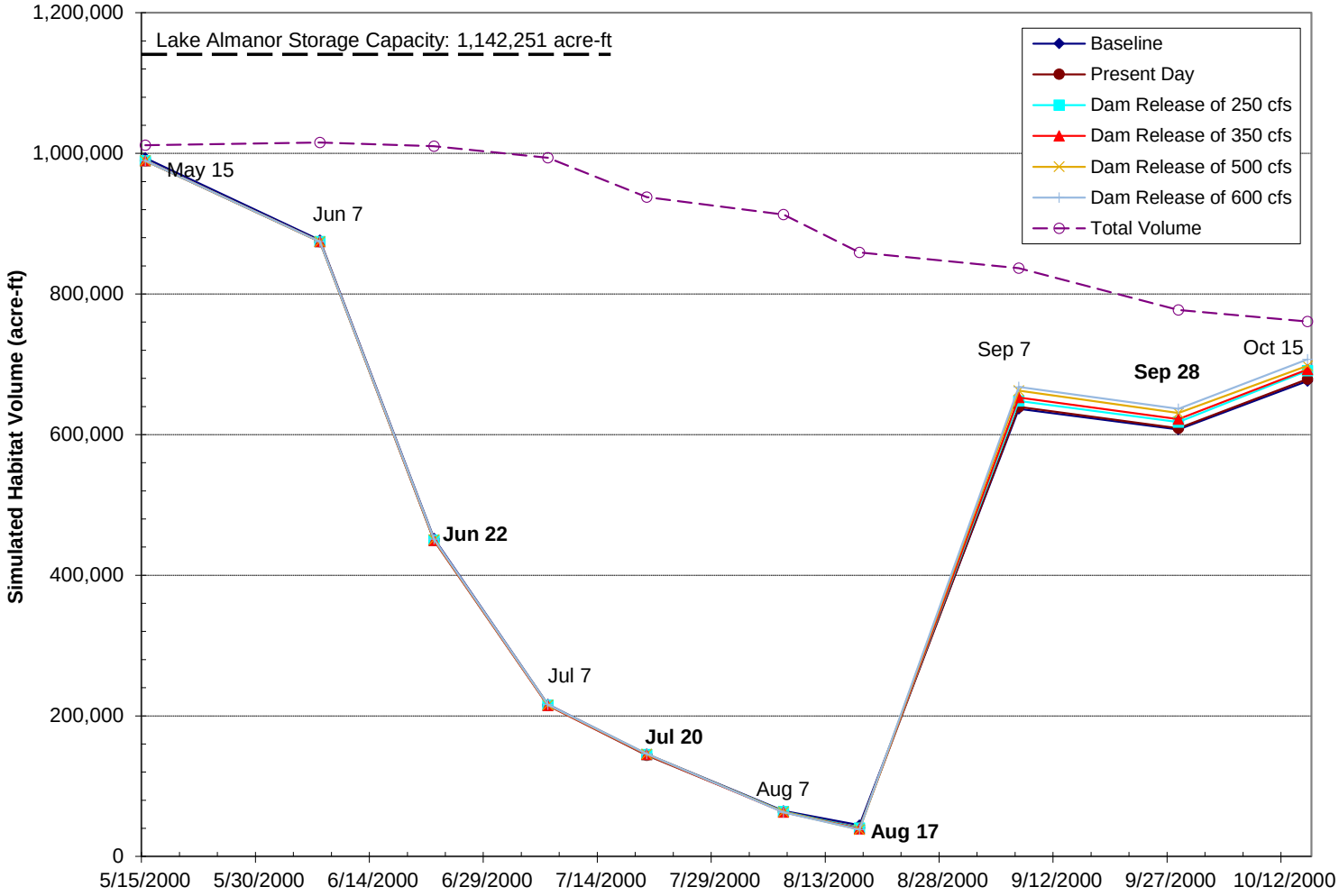

**Table 10 Summary of Simulated Lake Almanor Habitat Volume (acre-ft) Having Water Temperature ≤ 21°C and DO ≥ 5 mg/L for Different Alternatives and Change in Habitat Volume Relative to Baseline Condition (2000, Normal Hydrologic Year)**

Similar to Table 3-2b in Level 3 Report

| Date | Total Reservoir Storage on Date (acre-ft) | Simulated Habitat Volume (acre-ft) | | | | | | Change in Habitat Volume Relative to Baseline Condition (acre-ft) | | | | | % Change in Habitat Volume Relative to Baseline Condition | | | | | % of Habitat Volume to Total Reservoir Storage on Date | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Baseline | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Baseline | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) |
| May 15 | 1,011,490 | 993,550 | 989,670 | 989,670 | 989,670 | 989,670 | 989,670 | -3,880 | -3,880 | -3,880 | -3,880 | -3,880 | -0.4% | -0.4% | -0.4% | -0.4% | -0.4% | 98% | 98% | 98% | 98% | 98% | 98% |
| June 7 | 1,015,410 | 876,510 | 874,470 | 874,470 | 874,470 | 874,470 | 874,470 | -2,040 | -2,040 | -2,040 | -2,040 | -2,040 | -0.2% | -0.2% | -0.2% | -0.2% | -0.2% | 86% | 86% | 86% | 86% | 86% | 86% |
| **Jun 22** | 1,010,250 | 669,500 | 659,150 | 659,570 | 659,230 | 659,210 | 659,960 | -10,350 | -9,930 | -10,270 | -10,290 | -9,540 | -1.5% | -1.5% | -1.5% | -1.5% | -1.4% | 66% | 65% | 65% | 65% | 65% | 65% |
| July 7 | 993,780 | 584,410 | 585,350 | 584,750 | 584,850 | 585,340 | 586,130 | 940 | 340 | 440 | 930 | 1,720 | 0.2% | 0.1% | 0.1% | 0.2% | 0.3% | 59% | 59% | 59% | 59% | 59% | 59% |
| **Jul 20** | 938,020 | 228,530 | 223,930 | 224,050 | 223,380 | 222,460 | 222,500 | -4,600 | -4,480 | -5,150 | -6,070 | -6,030 | -2.0% | -2.0% | -2.3% | -2.7% | -2.6% | 24% | 24% | 24% | 24% | 24% | 24% |
| Aug 7 | 913,180 | 97,120 | 95,040 | 96,220 | 95,380 | 96,150 | 95,720 | -2,080 | -900 | -1,740 | -970 | -1,400 | -2.1% | -0.9% | -1.8% | -1.0% | -1.4% | 11% | 10% | 11% | 10% | 11% | 10% |
| **Aug 17** | 859,160 | 69,040 | 66,590 | 65,080 | 64,390 | 63,570 | 63,770 | -2,450 | -3,960 | -4,650 | -5,470 | -5,270 | -3.5% | -5.7% | -6.7% | -7.9% | -7.6% | 8% | 8% | 8% | 7% | 7% | 7% |
| Sep 7 | 836,720 | 636,600 | 639,480 | 648,070 | 652,820 | 662,670 | 667,790 | 2,880 | 11,470 | 16,220 | 26,070 | 31,190 | 0.5% | 1.8% | 2.5% | 4.1% | 4.9% | 76% | 76% | 77% | 78% | 79% | 80% |
| **Sep 28** | 777,330 | 607,380 | 609,130 | 617,770 | 622,120 | 630,890 | 636,610 | 1,750 | 10,390 | 14,740 | 23,510 | 29,230 | 0.3% | 1.7% | 2.4% | 3.9% | 4.8% | 78% | 78% | 79% | 80% | 81% | 82% |
| Oct 15 | 761,020 | 676,160 | 678,940 | 690,860 | 692,620 | 697,770 | 706,870 | 2,780 | 14,700 | 16,460 | 21,610 | 30,710 | 0.4% | 2.2% | 2.4% | 3.2% | 4.5% | 89% | 89% | 91% | 91% | 92% | 93% |

Note: The bold dates have observed profiles.

**Figure 12 Comparison of Simulated Lake Almanor Habitat Volume Having Water Temperature ≤ 21°C and DO ≥ 5 mg/L for Different Alternatives (2000, Normal Hydrologic Year)**

Similar to Figure 3-4b in Level 3 Report

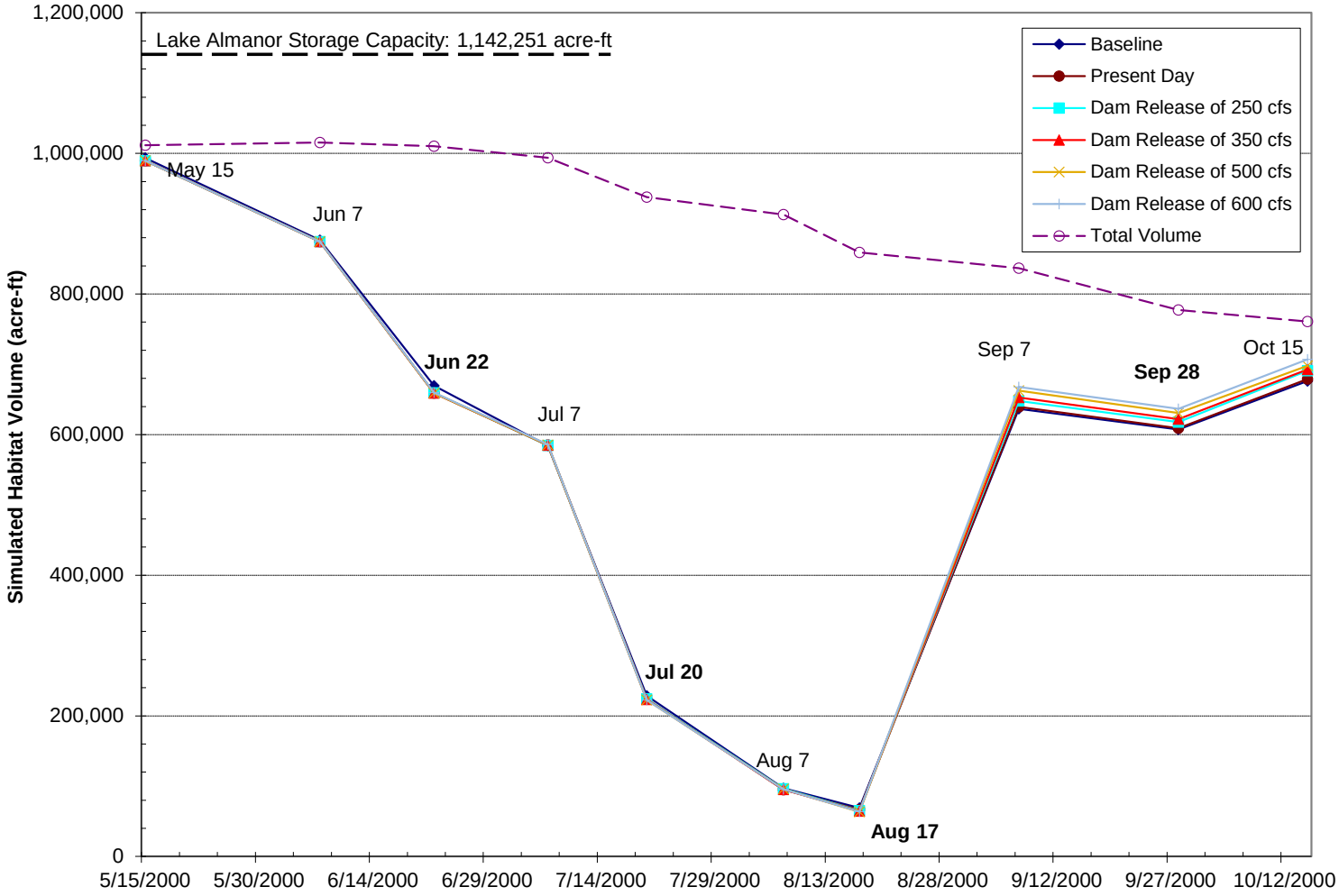

**Table 11 Summary of Simulated Lake Almanor Habitat Volume (acre-ft) Having Water Temperature ≤ 22°C and DO ≥ 5 mg/L for Different Alternatives and Change in Habitat Volume Relative to Baseline Condition (2000, Normal Hydrologic Year)**

Similar to Table 3-2c in Level 3 Report

| Date | Total Reservoir Storage on Date (acre-ft) | Simulated Habitat Volume (acre-ft) | | | | | | Change in Habitat Volume Relative to Baseline Condition (acre-ft) | | | | | % Change in Habitat Volume Relative to Baseline Condition | | | | | % of Habitat Volume to Total Reservoir Storage on Date | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Baseline | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Baseline | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) |
| May 15 | 1,011,490 | 993,550 | 989,670 | 989,670 | 989,670 | 989,670 | 989,670 | -3,880 | -3,880 | -3,880 | -3,880 | -3,880 | -0.4% | -0.4% | -0.4% | -0.4% | -0.4% | 98% | 98% | 98% | 98% | 98% | 98% |
| June 7 | 1,015,410 | 876,510 | 874,470 | 874,470 | 874,470 | 874,470 | 874,470 | -2,040 | -2,040 | -2,040 | -2,040 | -2,040 | -0.2% | -0.2% | -0.2% | -0.2% | -0.2% | 86% | 86% | 86% | 86% | 86% | 86% |
| **Jun 22** | 1,010,250 | 798,650 | 798,700 | 798,830 | 798,830 | 800,200 | 800,960 | 50 | 180 | 180 | 1,550 | 2,310 | 0.0% | 0.0% | 0.0% | 0.2% | 0.3% | 79% | 79% | 79% | 79% | 79% | 79% |
| July 7 | 993,780 | 743,860 | 745,570 | 748,180 | 749,220 | 751,890 | 753,320 | 1,710 | 4,320 | 5,360 | 8,030 | 9,460 | 0.2% | 0.6% | 0.7% | 1.1% | 1.3% | 75% | 75% | 75% | 75% | 76% | 76% |
| **Jul 20** | 938,020 | 632,400 | 631,140 | 635,330 | 636,320 | 638,920 | 640,820 | -1,260 | 2,930 | 3,920 | 6,520 | 8,420 | -0.2% | 0.5% | 0.6% | 1.0% | 1.3% | 67% | 67% | 68% | 68% | 68% | 68% |
| Aug 7 | 913,180 | 144,170 | 143,320 | 146,180 | 145,240 | 147,190 | 146,790 | -850 | 2,010 | 1,070 | 3,020 | 2,620 | -0.6% | 1.4% | 0.7% | 2.1% | 1.8% | 16% | 16% | 16% | 16% | 16% | 16% |
| **Aug 17** | 859,160 | 458,170 | 440,650 | 430,230 | 419,520 | 412,760 | 401,170 | -17,520 | -27,940 | -38,650 | -45,410 | -57,000 | -3.8% | -6.1% | -8.4% | -9.9% | -12.4% | 53% | 51% | 50% | 49% | 48% | 47% |
| Sep 7 | 836,720 | 636,600 | 639,480 | 648,070 | 652,820 | 662,670 | 667,790 | 2,880 | 11,470 | 16,220 | 26,070 | 31,190 | 0.5% | 1.8% | 2.5% | 4.1% | 4.9% | 76% | 76% | 77% | 78% | 79% | 80% |
| **Sep 28** | 777,330 | 607,380 | 609,130 | 617,770 | 622,120 | 630,890 | 636,610 | 1,750 | 10,390 | 14,740 | 23,510 | 29,230 | 0.3% | 1.7% | 2.4% | 3.9% | 4.8% | 78% | 78% | 79% | 80% | 81% | 82% |
| Oct 15 | 761,020 | 676,160 | 678,940 | 690,860 | 692,620 | 697,770 | 706,870 | 2,780 | 14,700 | 16,460 | 21,610 | 30,710 | 0.4% | 2.2% | 2.4% | 3.2% | 4.5% | 89% | 89% | 91% | 91% | 92% | 93% |

Note: The bold dates have observed profiles.

**Figure 13 Comparison of Simulated Lake Almanor Habitat Volume Having Water Temperature ≤ 22°C and DO ≥ 5 mg/L for Different Alternatives (2000, Normal Hydrologic Year)**

Similar to Figure 3-4c in Level 3 Report

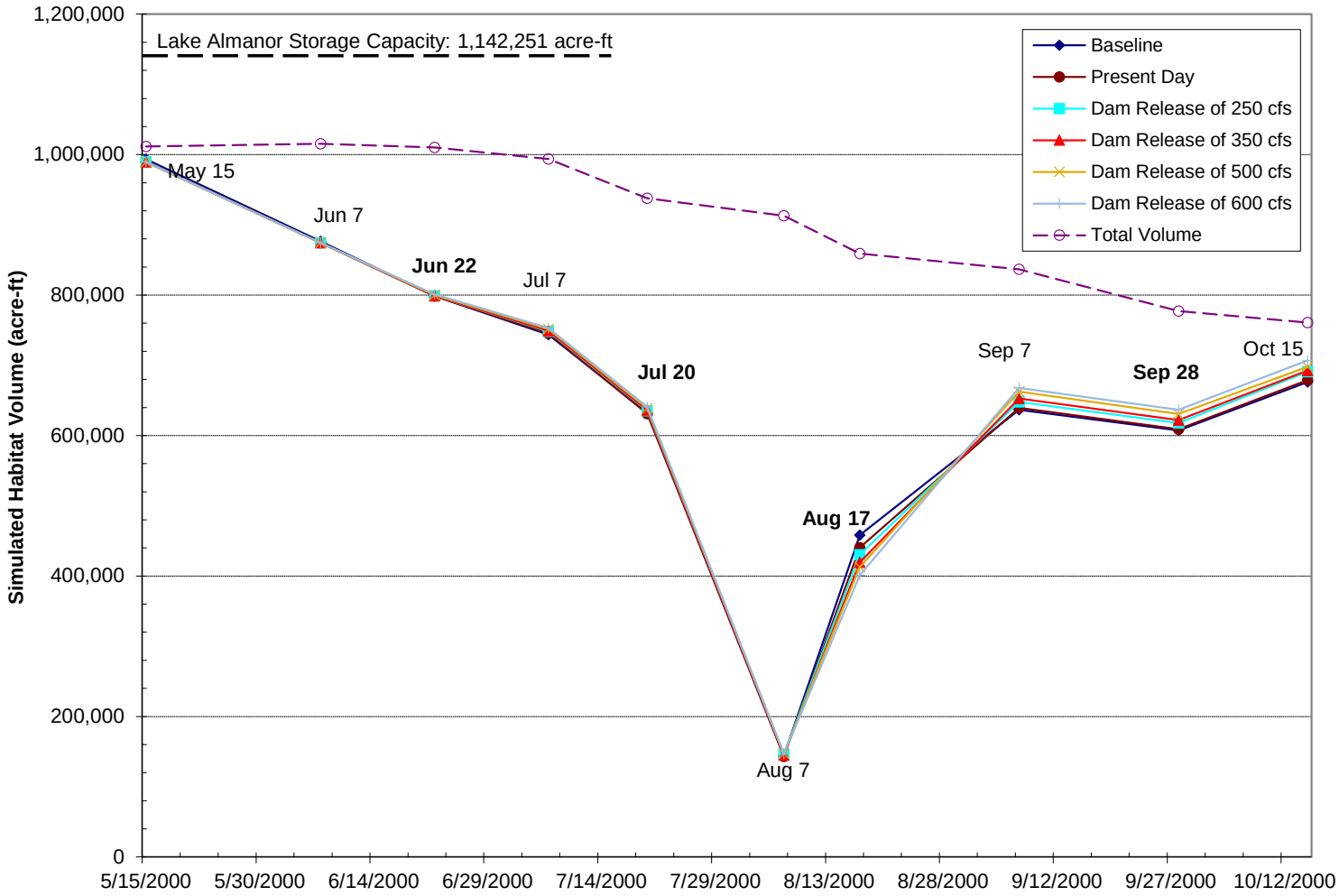

**Table 12 Summary of Simulated Lake Almanor Habitat Volume (acre-ft) Having Water Temperature ≤ 20°C and DO ≥ 5 mg/L for Different Alternatives and Change in Habitat Volume Relative to Baseline Condition (2001, Critical Dry Year)**

Similar to Table 3-3a in Level 3 Report

| Date | Total Reservoir Storage on Date (acre-ft) | Simulated Habitat Volume (acre-ft) | | | | | | Change in Habitat Volume Relative to Baseline Condition (acre-ft) | | | | | % Change in Habitat Volume Relative to Baseline Condition | | | | | % of Habitat Volume to Total Reservoir Storage on Date | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Baseline | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Baseline | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) |
| May 15 | 717,310 | 712,230 | 709,010 | 709,010 | 709,010 | 709,010 | 709,010 | -3,220 | -3,220 | -3,220 | -3,220 | -3,220 | -0.5% | -0.5% | -0.5% | -0.5% | -0.5% | 99% | 99% | 99% | 99% | 99% | 99% |
| **June 6** | 721,260 | 588,900 | 585,970 | 585,970 | 585,970 | 585,970 | 585,970 | -2,930 | -2,930 | -2,930 | -2,930 | -2,930 | -0.5% | -0.5% | -0.5% | -0.5% | -0.5% | 82% | 81% | 81% | 81% | 81% | 81% |
| Jun 22 | 715,340 | 210,900 | 207,400 | 207,890 | 207,300 | 208,810 | 207,960 | -3,500 | -3,010 | -3,600 | -2,090 | -2,940 | -1.7% | -1.4% | -1.7% | -1.0% | -1.4% | 29% | 29% | 29% | 29% | 29% | 29% |
| **July 10** | 702,590 | 85,420 | 82,720 | 83,010 | 83,160 | 82,860 | 82,540 | -2,700 | -2,410 | -2,260 | -2,560 | -2,880 | -3.2% | -2.8% | -2.6% | -3.0% | -3.4% | 12% | 12% | 12% | 12% | 12% | 12% |
| Jul 20 | 695,920 | 40,870 | 39,070 | 38,480 | 36,530 | 36,280 | 35,680 | -1,800 | -2,390 | -4,340 | -4,590 | -5,190 | -4.4% | -5.8% | -10.6% | -11.2% | -12.7% | 6% | 6% | 6% | 5% | 5% | 5% |
| **Aug 9** | 648,010 | 360 | 0 | 0 | 0 | 0 | 0 | -360 | -360 | -360 | -360 | -360 | -100.0% | -100.0% | -100.0% | -100.0% | -100.0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Aug 17 | 642,460 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | - | - | - | - | - | 0% | 0% | 0% | 0% | 0% | 0% |
| **Sep 12** | 634,800 | 490,230 | 493,040 | 483,230 | 466,840 | 446,610 | 415,220 | 2,810 | -7,000 | -23,390 | -43,620 | -75,010 | 0.6% | -1.4% | -4.8% | -8.9% | -15.3% | 77% | 78% | 76% | 74% | 70% | 65% |
| Sep 28 | 625,800 | 543,700 | 545,630 | 558,740 | 560,510 | 537,210 | 538,100 | 1,930 | 15,040 | 16,810 | -6,490 | -5,600 | 0.4% | 2.8% | 3.1% | -1.2% | -1.0% | 87% | 87% | 89% | 90% | 86% | 86% |
| Oct 15 | 578,400 | 544,160 | 541,910 | 544,280 | 544,110 | 543,900 | 544,120 | -2,250 | 120 | -50 | -260 | -40 | -0.4% | 0.0% | 0.0% | 0.0% | 0.0% | 94% | 94% | 94% | 94% | 94% | 94% |

Note: The bold dates have observed profiles.

**Figure 14 Comparison of Simulated Lake Almanor Habitat Volume Having Water Temperature ≤ 20°C and DO ≥ 5 mg/L for Different Alternatives (2001, Critical Dry Year)**

Similar to Figure 3-5a in Level 3 Report

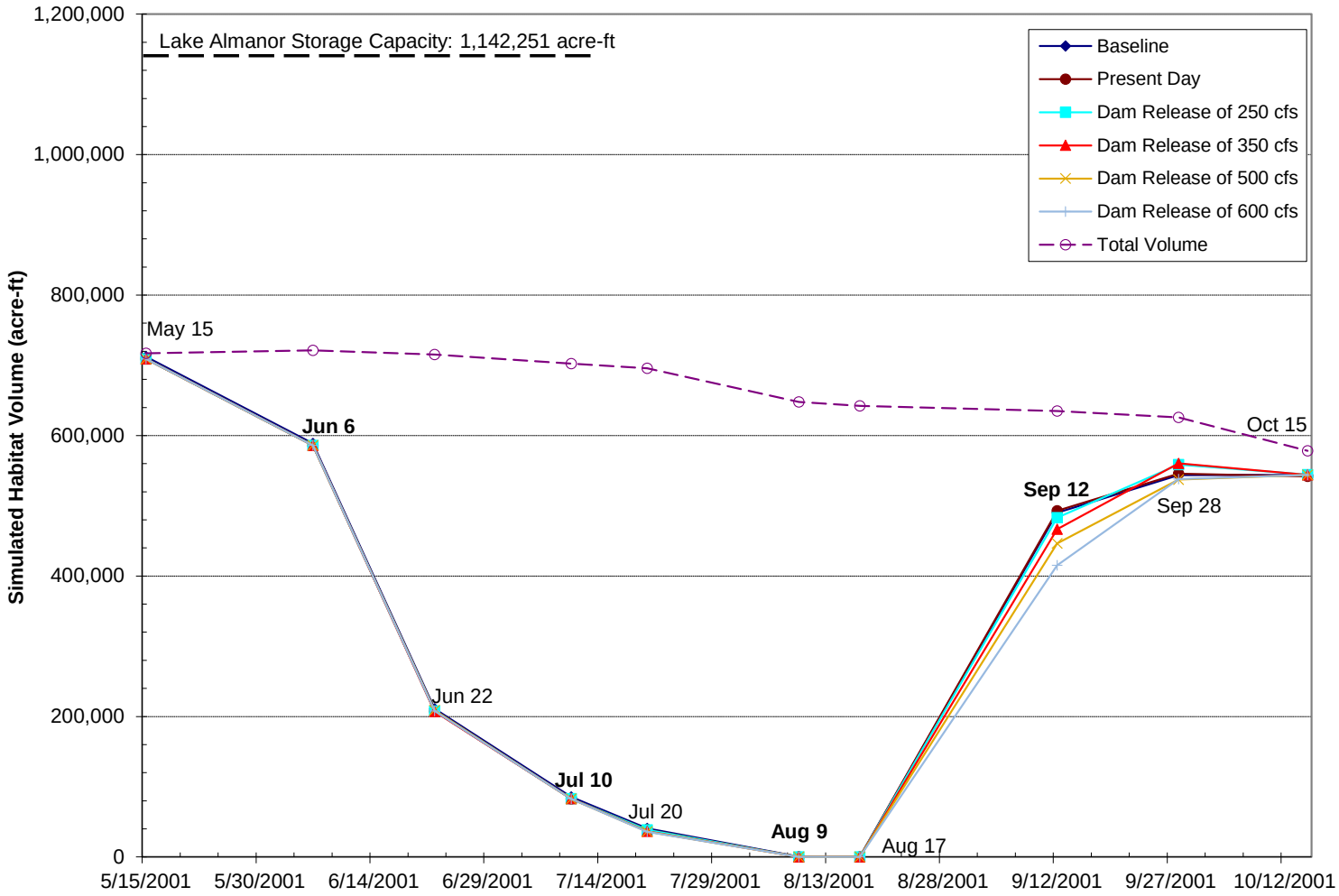

**Table 13 Summary of Simulated Lake Almanor Habitat Volume (acre-ft) Having Water Temperature ≤ 21°C and DO ≥ 5 mg/L for Different Alternatives and Change in Habitat Volume Relative to Baseline Condition (2001, Critical Dry Year)**

Similar to Table 3-3b in Level 3 Report

| Date | Total Reservoir Storage on Date (acre-ft) | Simulated Habitat Volume (acre-ft) | | | | | | Change in Habitat Volume Relative to Baseline Condition (acre-ft) | | | | | % Change in Habitat Volume Relative to Baseline Condition | | | | | % of Habitat Volume to Total Reservoir Storage on Date | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Baseline | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Baseline | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) |
| May 15 | 717,310 | 712,230 | 709,010 | 709,010 | 709,010 | 709,010 | 709,010 | -3,220 | -3,220 | -3,220 | -3,220 | -3,220 | -0.5% | -0.5% | -0.5% | -0.5% | -0.5% | 99% | 99% | 99% | 99% | 99% | 99% |
| **June 6** | 721,260 | 588,900 | 585,970 | 585,970 | 585,970 | 585,970 | 585,970 | -2,930 | -2,930 | -2,930 | -2,930 | -2,930 | -0.5% | -0.5% | -0.5% | -0.5% | -0.5% | 82% | 81% | 81% | 81% | 81% | 81% |
| Jun 22 | 715,340 | 326,300 | 324,330 | 325,540 | 325,260 | 327,160 | 326,720 | -1,970 | -760 | -1,040 | 860 | 420 | -0.6% | -0.2% | -0.3% | 0.3% | 0.1% | 46% | 45% | 46% | 45% | 46% | 46% |
| **July 10** | 702,590 | 137,960 | 134,360 | 135,170 | 135,490 | 135,650 | 135,790 | -3,600 | -2,790 | -2,470 | -2,310 | -2,170 | -2.6% | -2.0% | -1.8% | -1.7% | -1.6% | 20% | 19% | 19% | 19% | 19% | 19% |
| Jul 20 | 695,920 | 74,230 | 73,060 | 73,210 | 71,930 | 71,400 | 70,700 | -1,170 | -1,020 | -2,300 | -2,830 | -3,530 | -1.6% | -1.4% | -3.1% | -3.8% | -4.8% | 11% | 10% | 11% | 10% | 10% | 10% |
| **Aug 9** | 648,010 | 51,900 | 49,850 | 47,950 | 45,040 | 41,650 | 40,080 | -2,050 | -3,950 | -6,860 | -10,250 | -11,820 | -3.9% | -7.6% | -13.2% | -19.7% | -22.8% | 8% | 8% | 7% | 7% | 6% | 6% |
| Aug 17 | 642,460 | 23,260 | 20,250 | 16,760 | 15,130 | 9,620 | 8,470 | -3,010 | -6,500 | -8,130 | -13,640 | -14,790 | -12.9% | -27.9% | -35.0% | -58.6% | -63.6% | 4% | 3% | 3% | 2% | 1% | 1% |
| **Sep 12** | 634,800 | 505,370 | 509,840 | 522,240 | 525,370 | 536,390 | 541,300 | 4,470 | 16,870 | 20,000 | 31,020 | 35,930 | 0.9% | 3.3% | 4.0% | 6.1% | 7.1% | 80% | 80% | 82% | 83% | 84% | 85% |
| Sep 28 | 625,800 | 543,700 | 545,630 | 558,740 | 560,510 | 537,210 | 538,100 | 1,930 | 15,040 | 16,810 | -6,490 | -5,600 | 0.4% | 2.8% | 3.1% | -1.2% | -1.0% | 87% | 87% | 89% | 90% | 86% | 86% |
| Oct 15 | 578,400 | 544,160 | 541,910 | 544,280 | 544,110 | 543,900 | 544,120 | -2,250 | 120 | -50 | -260 | -40 | -0.4% | 0.0% | 0.0% | 0.0% | 0.0% | 94% | 94% | 94% | 94% | 94% | 94% |

Note: The bold dates have observed profiles.

**Figure 15 Comparison of Simulated Lake Almanor Habitat Volume Having Water Temperature ≤ 21°C and DO ≥ 5 mg/L for Different Alternatives (2001, Critical Dry Year)**

Similar to Figure 3-5b in Level 3 Report

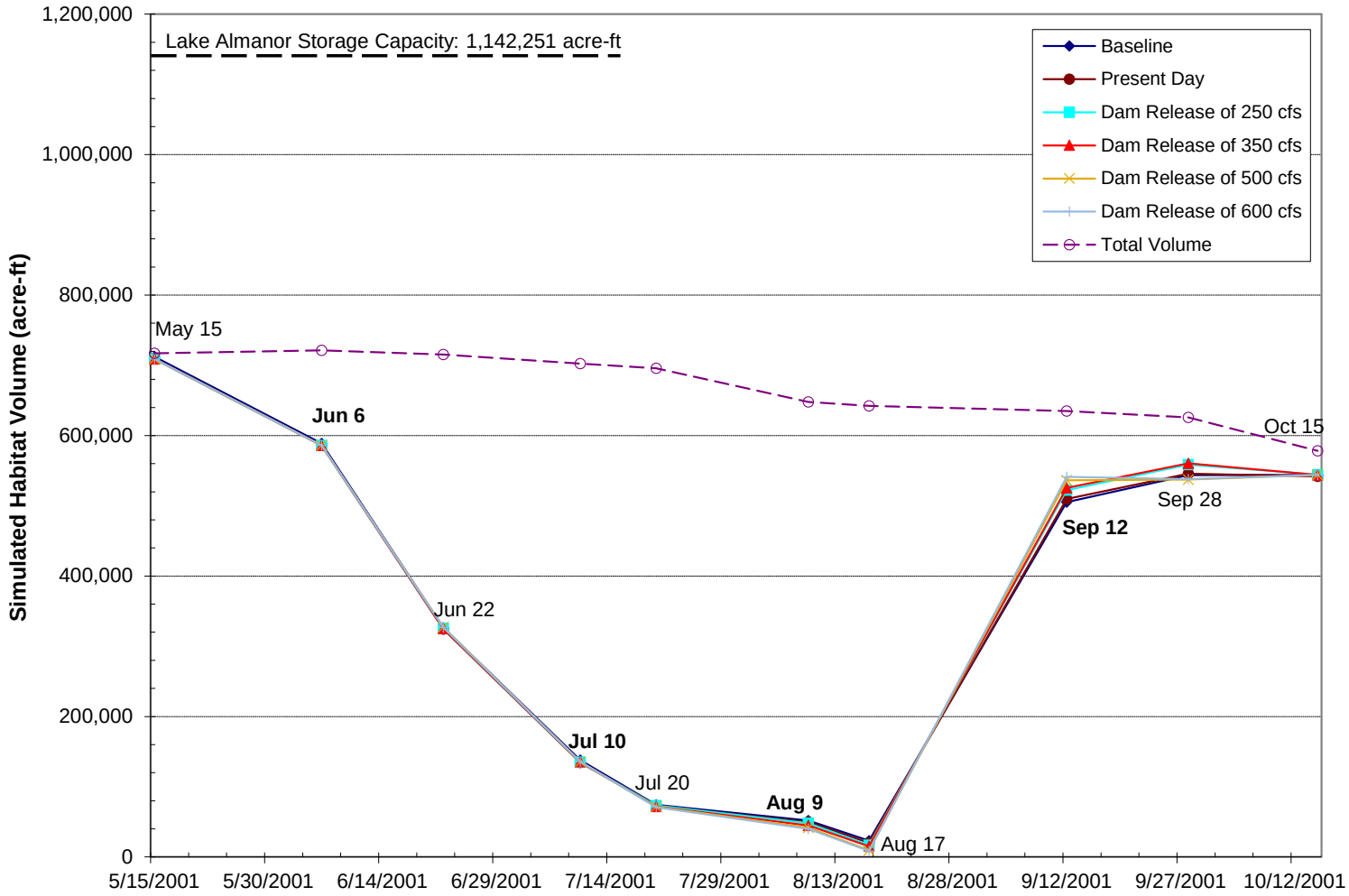

**Table 14 Summary of Simulated Lake Almanor Habitat Volume (acre-ft) Having Water Temperature ≤ 22°C and DO ≥ 5 mg/L for Different Alternatives and Change in Habitat Volume Relative to Baseline Condition (2001, Critical Dry Year)**

Similar to Table 3-3c in Level 3 Report

| Date | Total Reservoir Storage on Date (acre-ft) | Simulated Habitat Volume (acre-ft) | | | | | | Change in Habitat Volume Relative to Baseline Condition (acre-ft) | | | | | % Change in Habitat Volume Relative to Baseline Condition | | | | | % of Habitat Volume to Total Reservoir Storage on Date | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Baseline | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Baseline | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) |
| May 15 | 717,310 | 712,230 | 709,010 | 709,010 | 709,010 | 709,010 | 709,010 | -3,220 | -3,220 | -3,220 | -3,220 | -3,220 | -0.5% | -0.5% | -0.5% | -0.5% | -0.5% | 99% | 99% | 99% | 99% | 99% | 99% |
| **June 6** | 721,260 | 588,900 | 585,970 | 585,970 | 585,970 | 585,970 | 585,970 | -2,930 | -2,930 | -2,930 | -2,930 | -2,930 | -0.5% | -0.5% | -0.5% | -0.5% | -0.5% | 82% | 81% | 81% | 81% | 81% | 81% |
| Jun 22 | 715,340 | 544,990 | 542,240 | 543,780 | 543,850 | 546,120 | 546,020 | -2,750 | -1,210 | -1,140 | 1,130 | 1,030 | -0.5% | -0.2% | -0.2% | 0.2% | 0.2% | 76% | 76% | 76% | 76% | 76% | 76% |
| **July 10** | 702,590 | 427,730 | 428,850 | 433,040 | 433,300 | 436,950 | 435,070 | 1,120 | 5,310 | 5,570 | 9,220 | 7,340 | 0.3% | 1.2% | 1.3% | 2.2% | 1.7% | 61% | 61% | 62% | 62% | 62% | 62% |
| Jul 20 | 695,920 | 420,180 | 421,170 | 423,580 | 421,310 | 422,300 | 420,400 | 990 | 3,400 | 1,130 | 2,120 | 220 | 0.2% | 0.8% | 0.3% | 0.5% | 0.1% | 60% | 61% | 61% | 61% | 61% | 60% |
| **Aug 9** | 648,010 | 160,750 | 153,060 | 154,130 | 154,110 | 150,300 | 149,590 | -7,690 | -6,620 | -6,640 | -10,450 | -11,160 | -4.8% | -4.1% | -4.1% | -6.5% | -6.9% | 25% | 24% | 24% | 24% | 23% | 23% |
| Aug 17 | 642,460 | 282,590 | 254,640 | 196,430 | 165,040 | 142,950 | 128,900 | -27,950 | -86,160 | -117,550 | -139,640 | -153,690 | -9.9% | -30.5% | -41.6% | -49.4% | -54.4% | 44% | 40% | 31% | 26% | 22% | 20% |
| **Sep 12** | 634,800 | 505,370 | 509,840 | 522,240 | 525,370 | 536,390 | 541,300 | 4,470 | 16,870 | 20,000 | 31,020 | 35,930 | 0.9% | 3.3% | 4.0% | 6.1% | 7.1% | 80% | 80% | 82% | 83% | 84% | 85% |
| Sep 28 | 625,800 | 543,700 | 545,630 | 558,740 | 560,510 | 537,210 | 538,100 | 1,930 | 15,040 | 16,810 | -6,490 | -5,600 | 0.4% | 2.8% | 3.1% | -1.2% | -1.0% | 87% | 87% | 89% | 90% | 86% | 86% |
| Oct 15 | 578,400 | 544,160 | 541,910 | 544,280 | 544,110 | 543,900 | 544,120 | -2,250 | 120 | -50 | -260 | -40 | -0.4% | 0.0% | 0.0% | 0.0% | 0.0% | 94% | 94% | 94% | 94% | 94% | 94% |

Note: The bold dates have observed profiles.

**Figure 16 Comparison of Simulated Lake Almanor Habitat Volume Having Water Temperature ≤ 22°C and DO ≥ 5 mg/L for Different Alternatives (2001, Critical Dry Year)**

Similar to Figure 3-5c in Level 3 Report

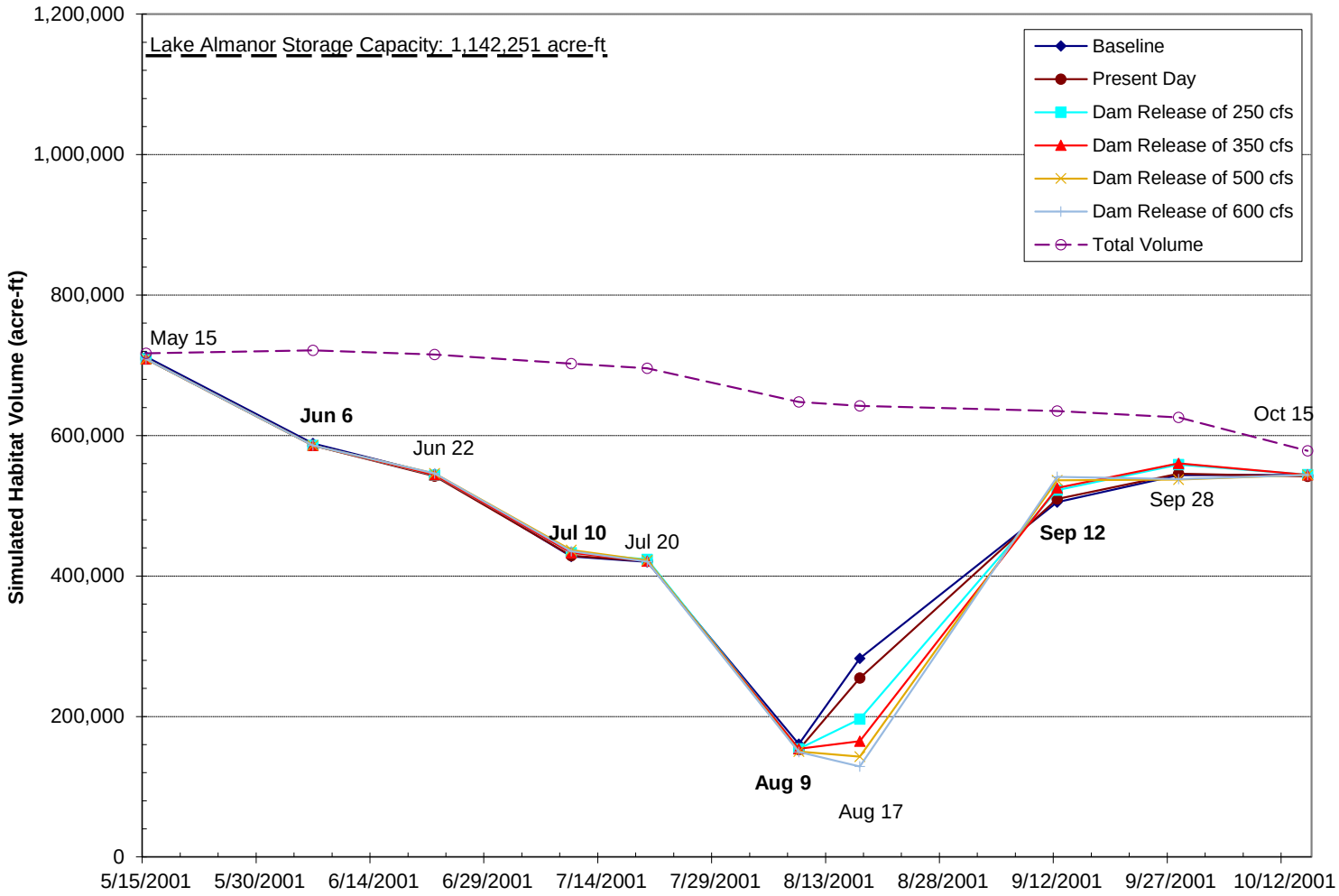

**Table 15 Summary of Simulated Lake Almanor Metalimnion Surface Area (acre) for Different Alternatives and Change in Thermocline Surface Area Relative to Baseline Condition (2000, Normal Hydrologic Year)**

Similar to Table 3-6 in Level 3 Report

| Date | Lake Surface Area on Date (acre) | Simulated Metalimnion Surface Area (acre) | | | | | | Change in Metalimnion SA Relative to Baseline Condition (acre) | | | | | % Change in Metalimnion SA Relative to Baseline Condition | | | | | % of Metalimnion SA to Total Lake SA on Date | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Baseline | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Baseline | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) |
| May 15 | 25,280 | | | | | | | | | | | | | | | | | | | | | | |
| June 7 | 25,330 | 17,320 | 17,320 | 17,320 | 17,320 | 17,320 | 17,320 | 0 | 0 | 0 | 0 | 0 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 68% | 68% | 68% | 68% | 68% | 68% |
| **Jun 22** | 25,260 | 19,370 | 19,370 | 19,370 | 19,370 | 19,370 | 19,370 | 0 | 0 | 0 | 0 | 0 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 77% | 77% | 77% | 77% | 77% | 77% |
| July 7 | 25,030 | 14,220 | 14,220 | 14,220 | 14,220 | 14,220 | 14,220 | 0 | 0 | 0 | 0 | 0 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 57% | 57% | 57% | 57% | 57% | 57% |
| **Jul 20** | 24,240 | 15,080 | 15,080 | 15,080 | 14,220 | 14,220 | 14,220 | 0 | 0 | -860 | -860 | -860 | 0.0% | 0.0% | -5.7% | -5.7% | -5.7% | 62% | 62% | 62% | 59% | 59% | 59% |
| Aug 7 | 23,890 | 15,080 | 15,080 | 15,080 | 15,080 | 15,080 | 15,080 | 0 | 0 | 0 | 0 | 0 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 63% | 63% | 63% | 63% | 63% | 63% |
| **Aug 17** | 23,140 | 13,460 | 13,460 | 13,460 | 13,460 | 13,460 | 13,460 | 0 | 0 | 0 | 0 | 0 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 58% | 58% | 58% | 58% | 58% | 58% |
| Sep 7 | 22,830 | 11,560 | 11,560 | 10,410 | 10,410 | 10,410 | 9,210 | 0 | -1,150 | -1,150 | -1,150 | -2,350 | 0.0% | -9.9% | -9.9% | -9.9% | -20.3% | 51% | 51% | 46% | 46% | 46% | 40% |
| **Sep 28** | 22,020 | 11,560 | 11,560 | 10,410 | 10,410 | 10,410 | 9,210 | 0 | -1,150 | -1,150 | -1,150 | -2,350 | 0.0% | -9.9% | -9.9% | -9.9% | -20.3% | 52% | 52% | 47% | 47% | 47% | 42% |
| Oct 15 | 21,790 | 7,900 | 6,540 | 6,540 | 6,540 | 6,540 | 6,540 | -1,360 | -1,360 | -1,360 | -1,360 | -1,360 | -17.2% | -17.2% | -17.2% | -17.2% | -17.2% | 36% | 30% | 30% | 30% | 30% | 30% |

Notes: 1) The bold dates have observed profiles.

2) The blank data on May 15, 2000 indicate that the lake did not have apparent thermocline on that day.

**Figure 17 Comparison of Simulated Lake Almanor Metalimnion Surface Area for Different Alternatives (2000, Normal Hydrologic Year)**

Similar to Figure 3-10 in Level 3 Report

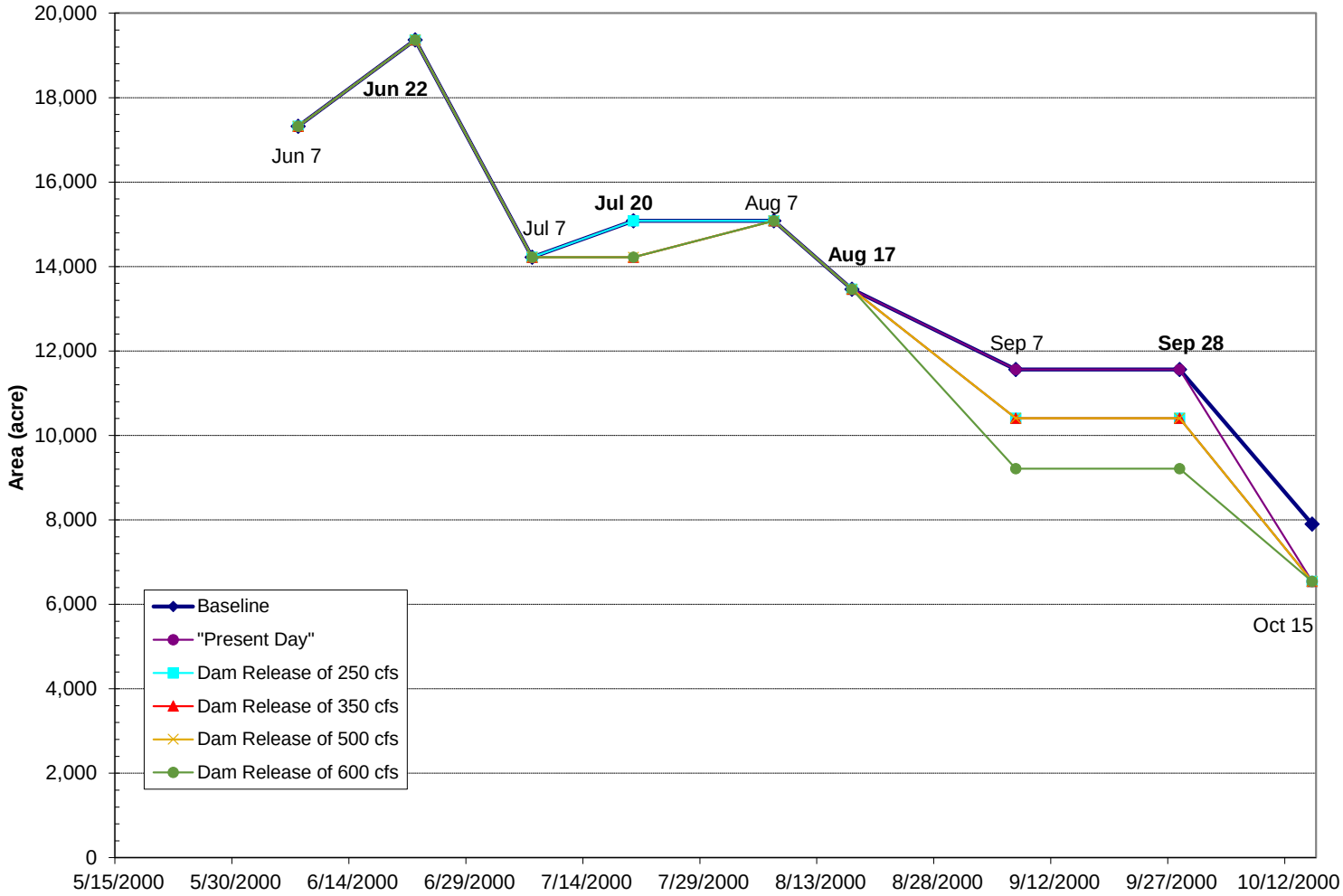

**Table 16 Summary of Simulated Lake Almanor Metalimnion Surface Area (acre) for Different Alternatives and Change in Thermocline Surface Area Relative to Baseline Condition (2001, Critical Dry Year)**

Similar to Table 3-7 in Level 3 Report

| Date | Lake Surface Area on Date (acre) | Simulated Metalimnion Surface Area (acre) | | | | | | Change in Metalimnion SA Relative to Baseline Condition (acre) | | | | | % Change in Metalimnion SA Relative to Baseline Condition | | | | | % of Metalimnion SA to Total Lake SA on Date | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Baseline | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Baseline | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) |
| May 15 | 21,190 | 10,410 | 10,410 | 10,410 | 10,410 | 10,410 | 10,410 | 0 | 0 | 0 | 0 | 0 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 49% | 49% | 49% | 49% | 49% | 49% |
| June 7 | 21,240 | 15,080 | 15,080 | 15,080 | 15,080 | 15,080 | 15,080 | 0 | 0 | 0 | 0 | 0 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 71% | 71% | 71% | 71% | 71% | 71% |
| **Jun 22** | 21,160 | 16,150 | 16,150 | 16,150 | 16,150 | 16,150 | 16,150 | 0 | 0 | 0 | 0 | 0 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 76% | 76% | 76% | 76% | 76% | 76% |
| July 7 | 20,980 | 12,610 | 12,610 | 11,560 | 11,560 | 11,560 | 11,560 | 0 | -1,050 | -1,050 | -1,050 | -1,050 | 0.0% | -8.3% | -8.3% | -8.3% | -8.3% | 60% | 60% | 55% | 55% | 55% | 55% |
| **Jul 20** | 20,890 | 14,220 | 14,220 | 14,220 | 14,220 | 14,220 | 14,220 | 0 | 0 | 0 | 0 | 0 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 68% | 68% | 68% | 68% | 68% | 68% |
| Aug 7 | 20,220 | 12,610 | 12,610 | 12,610 | 12,610 | 12,610 | 12,610 | 0 | 0 | 0 | 0 | 0 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 62% | 62% | 62% | 62% | 62% | 62% |
| **Aug 17** | 20,150 | 12,610 | 12,610 | 12,610 | 11,560 | 11,560 | 11,560 | 0 | 0 | -1,050 | -1,050 | -1,050 | 0.0% | 0.0% | -8.3% | -8.3% | -8.3% | 63% | 63% | 63% | 57% | 57% | 57% |
| Sep 7 | 20,040 | 7,900 | 7,900 | 6,540 | 6,540 | 6,540 | 5,070 | 0 | -1,360 | -1,360 | -1,360 | -2,830 | 0.0% | -17.2% | -17.2% | -17.2% | -35.8% | 39% | 39% | 33% | 33% | 33% | 25% |
| **Sep 28** | 19,910 | 9,210 | 7,900 | 7,900 | 6,540 | 5,070 | 5,070 | -1,310 | -1,310 | -2,670 | -4,140 | -4,140 | -14.2% | -14.2% | -29.0% | -45.0% | -45.0% | 46% | 40% | 40% | 33% | 25% | 25% |
| Oct 15 | 19,230 | 510 | 420 | 360 | 360 | 360 | 300 | -90 | -150 | -150 | -150 | -210 | -17.6% | -29.4% | -29.4% | -29.4% | -41.2% | 3% | 2% | 2% | 2% | 2% | 2% |

Note: The bold dates have observed profiles.

**Figure 18 Comparison of Simulated Lake Almanor Metalimnion Surface Area for Different Alternatives (2001, Critical Dry Year)**

Similar to Figure 3-11 in Level 3 Report

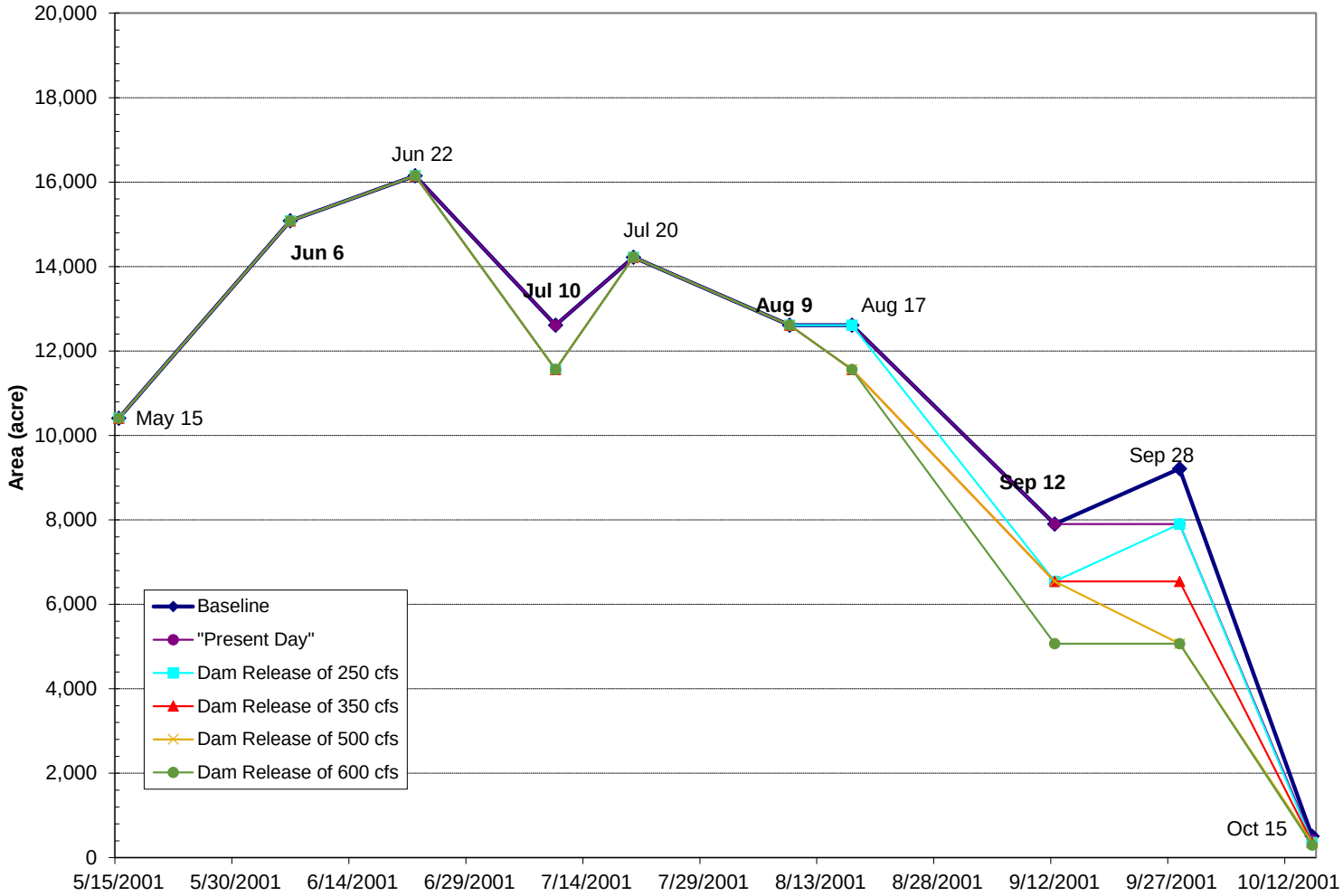

**Table 17 Summary of Simulated Butt Valley Reservoir Habitat Volume (acre-ft) Having Water Temperature ≤ 20°C and DO ≥ 5 mg/L for Different Alternatives and Change in Habitat Volume Relative to Baseline Condition**
**(2000, Normal Hydrologic Year)**
Similar to Table 3-8a in Level 3 Report

| Date | Total Reservoir Storage on Date (acre-ft) | Simulated Habitat Volume (acre-ft) | | | | | | Change in Habitat Volume Relative to Baseline Condition (acre-ft) | | | | | % Change in Habitat Volume Relative to Baseline Condition | | | | | % of Habitat Volume to Total Reservoir Storage on Date | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Baseline | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Baseline | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) |
| May 15 | 34,270 | 33,980 | 31,930 | 31,930 | 31,930 | 31,930 | 31,930 | -2,050 | -2,050 | -2,050 | -2,050 | -2,050 | -6.0% | -6.0% | -6.0% | -6.0% | -6.0% | 99% | 93% | 93% | 93% | 93% | 93% |
| June 7 | 33,790 | 31,420 | 29,350 | 29,350 | 29,350 | 29,350 | 29,350 | -2,070 | -2,070 | -2,070 | -2,070 | -2,070 | -6.6% | -6.6% | -6.6% | -6.6% | -6.6% | 93% | 87% | 87% | 87% | 87% | 87% |
| **Jun 22** | 32,410 | 24,190 | 23,440 | 22,730 | 22,110 | 21,310 | 20,520 | -750 | -1,460 | -2,080 | -2,880 | -3,670 | -3.1% | -6.0% | -8.6% | -11.9% | -15.2% | 75% | 72% | 70% | 68% | 66% | 63% |
| July 7 | 36,790 | 33,510 | 32,110 | 31,340 | 31,230 | 30,490 | 29,750 | -1,400 | -2,170 | -2,280 | -3,020 | -3,760 | -4.2% | -6.5% | -6.8% | -9.0% | -11.2% | 91% | 87% | 85% | 85% | 83% | 81% |
| **Jul 20** | 37,390 | 17,690 | 17,340 | 16,120 | 15,210 | 13,890 | 13,080 | -350 | -1,570 | -2,480 | -3,800 | -4,610 | -2.0% | -8.9% | -14.0% | -21.5% | -26.1% | 47% | 46% | 43% | 41% | 37% | 35% |
| Aug 7 | 37,190 | 2,970 | 4,530 | 3,590 | 3,220 | 2,420 | 1,580 | 1,560 | 620 | 250 | -550 | -1,390 | 52.5% | 20.9% | 8.4% | -18.5% | -46.8% | 8% | 12% | 10% | 9% | 7% | 4% |
| **Aug 17** | 38,570 | 2,170 | 2,040 | 660 | 290 | 80 | 70 | -130 | -1,510 | -1,880 | -2,090 | -2,100 | -6.0% | -69.6% | -86.6% | -96.3% | -96.8% | 6% | 5% | 2% | 1% | 0% | 0% |
| Sep 7 | 41,260 | 41,090 | 40,270 | 40,170 | 40,090 | 39,970 | 38,380 | -820 | -920 | -1,000 | -1,120 | -2,710 | -2.0% | -2.2% | -2.4% | -2.7% | -6.6% | 100% | 98% | 97% | 97% | 97% | 93% |
| **Sep 28** | 34,710 | 34,600 | 32,710 | 32,610 | 32,510 | 32,350 | 32,250 | -1,890 | -1,990 | -2,090 | -2,250 | -2,350 | -5.5% | -5.8% | -6.0% | -6.5% | -6.8% | 100% | 94% | 94% | 94% | 93% | 93% |

Note: The bold dates have observed profiles.

**Figure 19 Comparison of Simulated Butt Valley Reservoir Habitat Volume Having Water Temperature ≤ 20°C and DO ≥ 5 mg/L for Different Alternatives (2000, Normal Hydrologic Year)**

Similar to Figure 3-14a in Level 3 Report

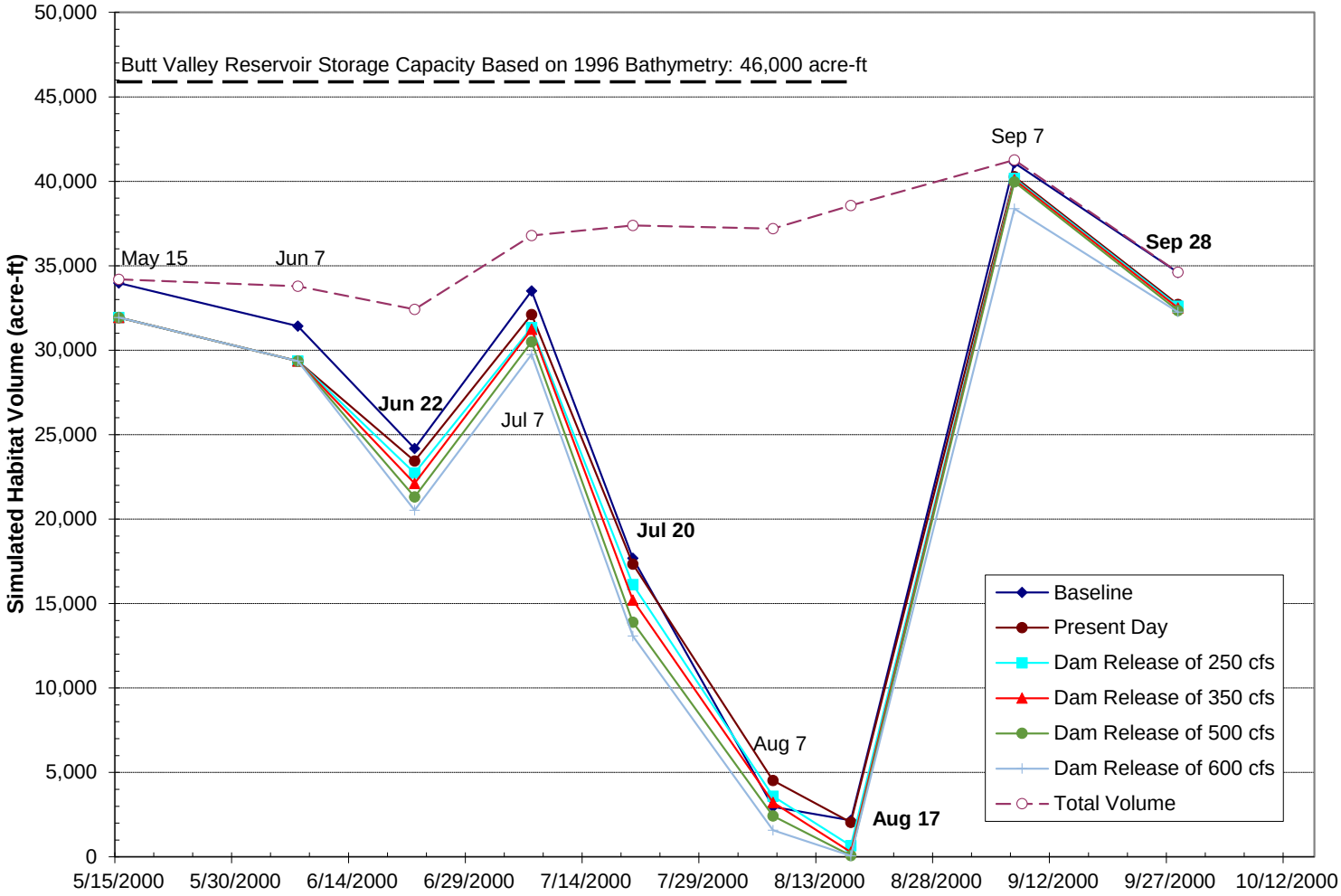

**Table 18 Summary of Simulated Butt Valley Reservoir Habitat Volume (acre-ft) Having Water Temperature ≤ 21°C and DO ≥ 5 mg/L for Different Alternatives and Change in Habitat Volume Relative to Baseline Condition**
**(2000, Normal Hydrologic Year)**
Similar to Table 3-8b in Level 3 Report

| Date | Total Reservoir Storage on Date (acre-ft) | Simulated Habitat Volume (acre-ft) | | | | | | Change in Habitat Volume Relative to Baseline Condition (acre-ft) | | | | | % Change in Habitat Volume Relative to Baseline Condition | | | | | % of Habitat Volume to Total Reservoir Storage on Date | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Baseline | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Baseline | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) |
| May 15 | 34,270 | 33,980 | 31,930 | 31,930 | 31,930 | 31,930 | 31,930 | -2,050 | -2,050 | -2,050 | -2,050 | -2,050 | -6.0% | -6.0% | -6.0% | -6.0% | -6.0% | 99% | 93% | 93% | 93% | 93% | 93% |
| June 7 | 33,790 | 31,420 | 29,350 | 29,350 | 29,350 | 29,350 | 29,350 | -2,070 | -2,070 | -2,070 | -2,070 | -2,070 | -6.6% | -6.6% | -6.6% | -6.6% | -6.6% | 93% | 87% | 87% | 87% | 87% | 87% |
| **Jun 22** | 32,410 | 28,400 | 28,080 | 27,680 | 27,260 | 26,610 | 25,850 | -320 | -720 | -1,140 | -1,790 | -2,550 | -1.1% | -2.5% | -4.0% | -6.3% | -9.0% | 88% | 87% | 85% | 84% | 82% | 80% |
| July 7 | 36,790 | 34,380 | 32,160 | 31,550 | 31,740 | 31,790 | 31,730 | -2,220 | -2,830 | -2,640 | -2,590 | -2,650 | -6.5% | -8.2% | -7.7% | -7.5% | -7.7% | 93% | 87% | 86% | 86% | 86% | 86% |
| **Jul 20** | 37,390 | 32,360 | 31,440 | 31,060 | 30,650 | 30,290 | 29,870 | -920 | -1,300 | -1,710 | -2,070 | -2,490 | -2.8% | -4.0% | -5.3% | -6.4% | -7.7% | 87% | 84% | 83% | 82% | 81% | 80% |
| Aug 7 | 37,190 | 16,340 | 14,850 | 13,340 | 12,520 | 11,030 | 9,890 | -1,490 | -3,000 | -3,820 | -5,310 | -6,450 | -9.1% | -18.4% | -23.4% | -32.5% | -39.5% | 44% | 40% | 36% | 34% | 30% | 27% |
| **Aug 17** | 38,570 | 34,170 | 34,600 | 32,940 | 31,460 | 28,500 | 25,180 | 430 | -1,230 | -2,710 | -5,670 | -8,990 | 1.3% | -3.6% | -7.9% | -16.6% | -26.3% | 89% | 90% | 85% | 82% | 74% | 65% |
| Sep 7 | 41,260 | 41,090 | 40,270 | 40,170 | 40,090 | 39,970 | 38,380 | -820 | -920 | -1,000 | -1,120 | -2,710 | -2.0% | -2.2% | -2.4% | -2.7% | -6.6% | 100% | 98% | 97% | 97% | 97% | 93% |
| **Sep 28** | 34,710 | 34,600 | 32,710 | 32,610 | 32,510 | 32,350 | 32,250 | -1,890 | -1,990 | -2,090 | -2,250 | -2,350 | -5.5% | -5.8% | -6.0% | -6.5% | -6.8% | 100% | 94% | 94% | 94% | 93% | 93% |

Note: The bold dates have observed profiles.

**Figure 20 Comparison of Simulated Butt Valley Reservoir Habitat Volume Having Water Temperature ≤ 21°C and DO ≥ 5 mg/L for Different Alternatives (2000, Normal Hydrologic Year)**

Similar to Figure 3-14b in Level 3 Report

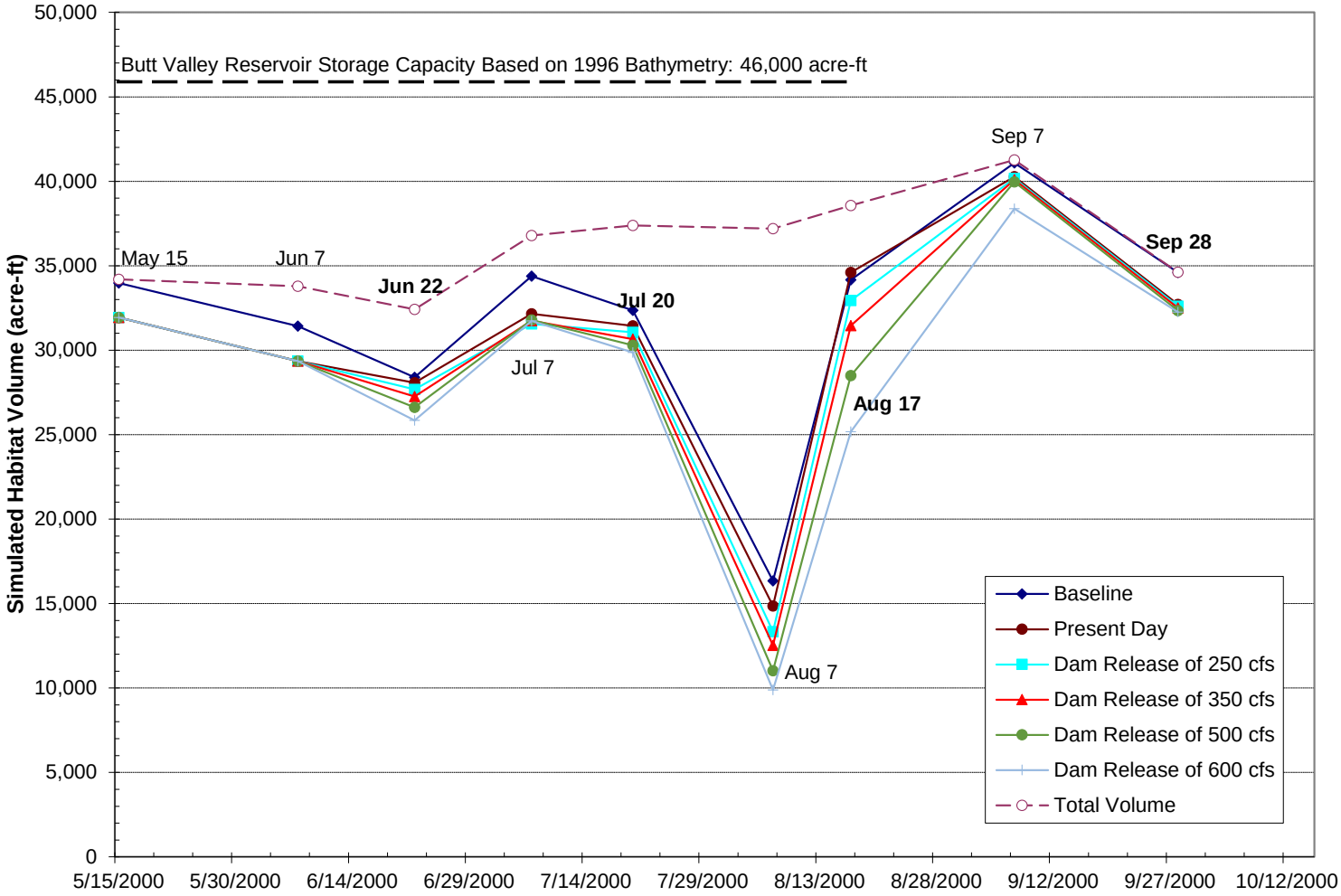

**Table 19 Summary of Simulated Butt Valley Reservoir Habitat Volume (acre-ft) Having Water Temperature ≤ 22°C and DO ≥ 5 mg/L for Different Alternatives and Change in Habitat Volume Relative to Baseline Condition**
**(2000, Normal Hydrologic Year)**
Similar to Table 3-8c in Level 3 Report

| Date | Total Reservoir Storage on Date (acre-ft) | Simulated Habitat Volume (acre-ft) | | | | | | Change in Habitat Volume Relative to Baseline Condition (acre-ft) | | | | | % Change in Habitat Volume Relative to Baseline Condition | | | | | % of Habitat Volume to Total Reservoir Storage on Date | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Baseline | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Baseline | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) |
| May 15 | 34,270 | 33,980 | 31,930 | 31,930 | 31,930 | 31,930 | 31,930 | -2,050 | -2,050 | -2,050 | -2,050 | -2,050 | -6.0% | -6.0% | -6.0% | -6.0% | -6.0% | 99% | 93% | 93% | 93% | 93% | 93% |
| June 7 | 33,790 | 31,420 | 29,350 | 29,350 | 29,350 | 29,350 | 29,350 | -2,070 | -2,070 | -2,070 | -2,070 | -2,070 | -6.6% | -6.6% | -6.6% | -6.6% | -6.6% | 93% | 87% | 87% | 87% | 87% | 87% |
| **Jun 22** | 32,410 | 29,980 | 29,300 | 29,230 | 29,140 | 29,020 | 28,860 | -680 | -750 | -840 | -960 | -1,120 | -2.3% | -2.5% | -2.8% | -3.2% | -3.7% | 93% | 90% | 90% | 90% | 90% | 89% |
| July 7 | 36,790 | 34,380 | 32,160 | 31,550 | 31,740 | 31,790 | 31,730 | -2,220 | -2,830 | -2,640 | -2,590 | -2,650 | -6.5% | -8.2% | -7.7% | -7.5% | -7.7% | 93% | 87% | 86% | 86% | 86% | 86% |
| **Jul 20** | 37,390 | 33,340 | 32,570 | 32,320 | 32,010 | 31,870 | 31,610 | -770 | -1,020 | -1,330 | -1,470 | -1,730 | -2.3% | -3.1% | -4.0% | -4.4% | -5.2% | 89% | 87% | 86% | 86% | 85% | 85% |
| Aug 7 | 37,190 | 32,420 | 30,210 | 29,190 | 28,400 | 26,660 | 24,690 | -2,210 | -3,230 | -4,020 | -5,760 | -7,730 | -6.8% | -10.0% | -12.4% | -17.8% | -23.8% | 87% | 81% | 78% | 76% | 72% | 66% |
| **Aug 17** | 38,570 | 36,120 | 36,200 | 35,630 | 35,280 | 35,140 | 35,050 | 80 | -490 | -840 | -980 | -1,070 | 0.2% | -1.4% | -2.3% | -2.7% | -3.0% | 94% | 94% | 92% | 91% | 91% | 91% |
| Sep 7 | 41,260 | 41,090 | 40,270 | 40,170 | 40,090 | 39,970 | 38,380 | -820 | -920 | -1,000 | -1,120 | -2,710 | -2.0% | -2.2% | -2.4% | -2.7% | -6.6% | 100% | 98% | 97% | 97% | 97% | 93% |
| **Sep 28** | 34,710 | 34,600 | 32,710 | 32,610 | 32,510 | 32,350 | 32,250 | -1,890 | -1,990 | -2,090 | -2,250 | -2,350 | -5.5% | -5.8% | -6.0% | -6.5% | -6.8% | 100% | 94% | 94% | 94% | 93% | 93% |

Note: The bold dates have observed profiles.

**Figure 21 Comparison of Simulated Butt Valley Reservoir Habitat Volume Having Water Temperature ≤ 22°C and DO ≥ 5 mg/L for Different Alternatives (2000, Normal Hydrologic Year)**

Similar to Figure 3-14c in Level 3 Report

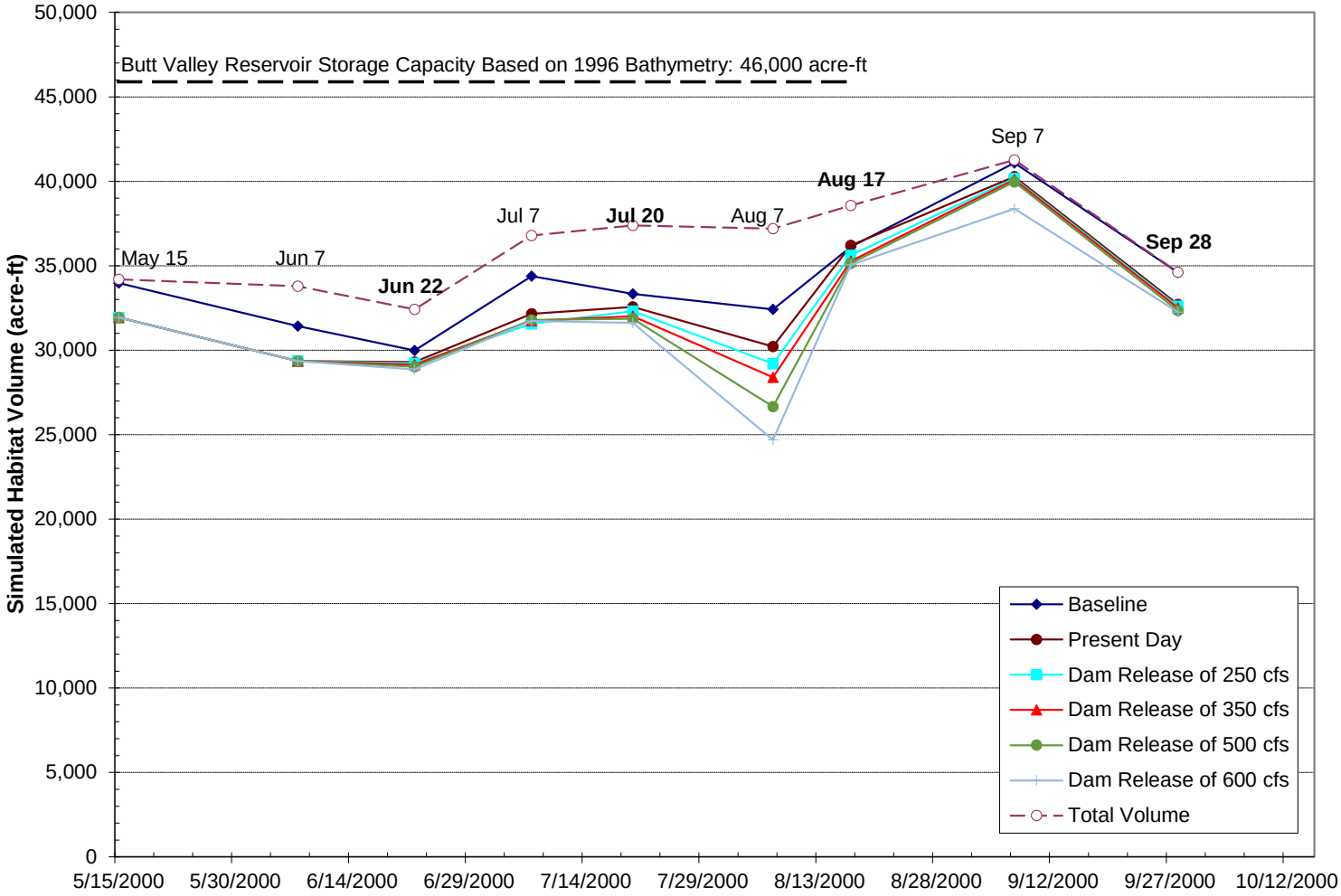

**Table 20 Summary of Simulated Butt Valley Reservoir Habitat Volume (acre-ft) Having Water Temperature ≤ 20°C and DO ≥ 5 mg/L for Different Alternatives and Change in Habitat Volume Relative to Baseline Condition**
**(2001, Critical Dry Year)**
Similar to Table 3-9a in Level 3 Report

| Date | Total Reservoir Storage on Date (acre-ft) | Simulated Habitat Volume (acre-ft) | | | | | | Change in Habitat Volume Relative to Baseline Condition (acre-ft) | | | | | % Change in Habitat Volume Relative to Baseline Condition | | | | | % of Habitat Volume to Total Reservoir Storage on Date | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Baseline | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Baseline | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) |
| May 15 | 38,210 | 38,160 | 38,150 | 38,150 | 38,150 | 38,150 | 38,150 | -10 | -10 | -10 | -10 | -10 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 100% | 100% | 100% | 100% | 100% | 100% |
| **June 6** | 41,400 | 39,550 | 39,110 | 39,110 | 39,110 | 39,110 | 39,110 | -440 | -440 | -440 | -440 | -440 | -1.1% | -1.1% | -1.1% | -1.1% | -1.1% | 96% | 94% | 94% | 94% | 94% | 94% |
| Jun 22 | 39,840 | 15,660 | 17,450 | 16,590 | 16,210 | 15,530 | 15,040 | 1,790 | 930 | 550 | -130 | -620 | 11.4% | 5.9% | 3.5% | -0.8% | -4.0% | 39% | 44% | 42% | 41% | 39% | 38% |
| **July 11** | 40,530 | 5,290 | 5,100 | 5,230 | 5,240 | 5,340 | 5,260 | -190 | -60 | -50 | 50 | -30 | -3.6% | -1.1% | -0.9% | 0.9% | -0.6% | 13% | 13% | 13% | 13% | 13% | 13% |
| Jul 20 | 40,490 | 1,040 | 990 | 1,180 | 1,480 | 1,790 | 1,760 | -50 | 140 | 440 | 750 | 720 | -4.8% | 13.5% | 42.3% | 72.1% | 69.2% | 3% | 2% | 3% | 4% | 4% | 4% |
| Aug 7 | 36,840 | 0 | 0 | 0 | 960 | 2,640 | 1,410 | 0 | 0 | 960 | 2,640 | 1,410 | - | - | - | - | - | 0% | 0% | 0% | 3% | 7% | 4% |
| **Aug 20** | 34,980 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | - | - | - | - | - | 0% | 0% | 0% | 0% | 0% | 0% |

Note: The bold dates have observed profiles.

**Figure 22 Comparison of Simulated Butt Valley Reservoir Habitat Volume Having Water Temperature ≤ 20°C and DO ≥ 5 mg/L for Different Alternatives (2001, Critical Dry Year)**

Similar to Figure 3-15a in Level 3 Report

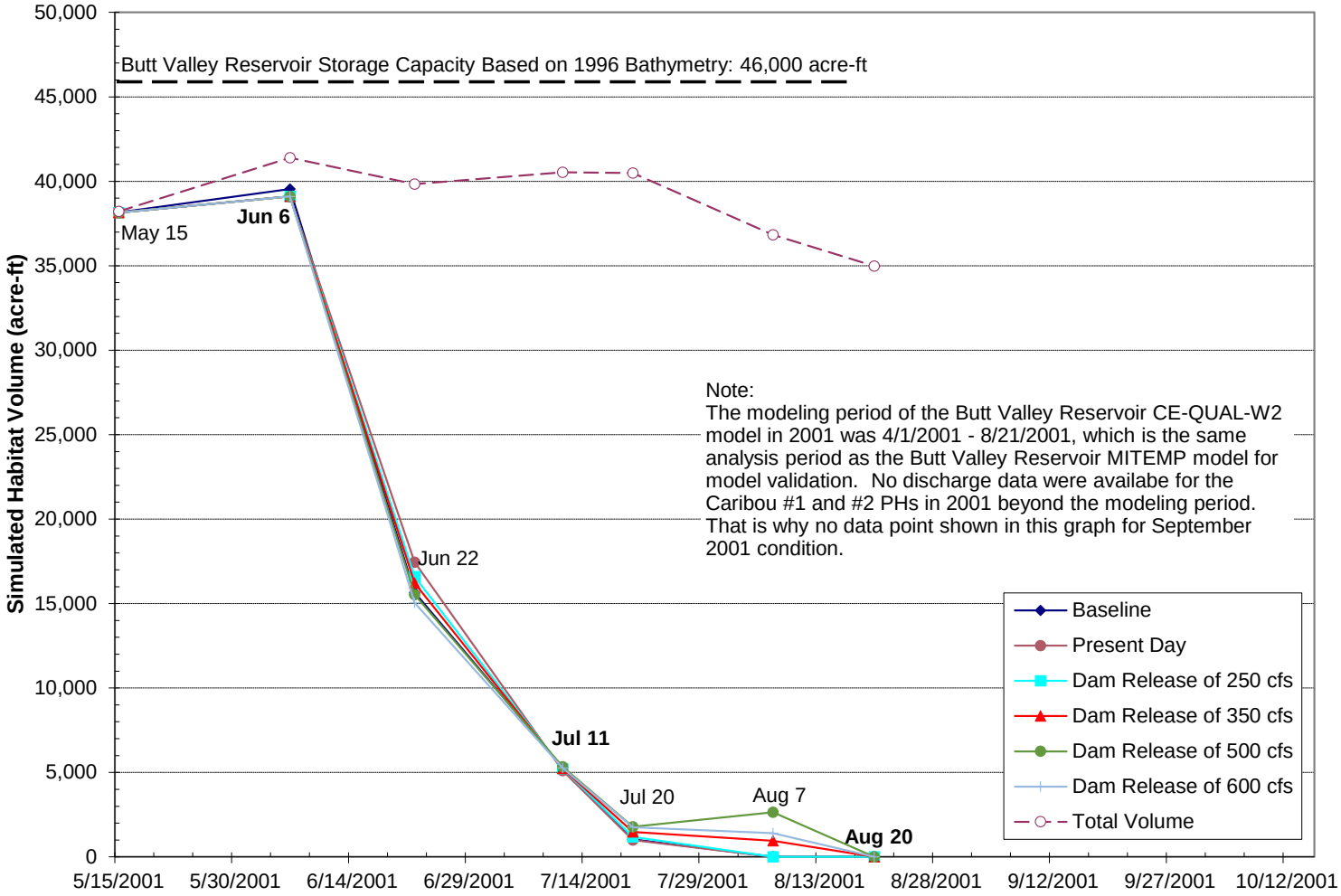

**Table 21 Summary of Simulated Butt Valley Reservoir Habitat Volume (acre-ft) Having Water Temperature ≤ 21°C and DO ≥ 5 mg/L for Different Alternatives and Change in Habitat Volume Relative to Baseline Condition**
**(2001, Critical Dry Year)**
Similar to Table 3-9b in Level 3 Report

| Date | Total Reservoir Storage on Date (acre-ft) | Simulated Habitat Volume (acre-ft) | | | | | | Change in Habitat Volume Relative to Baseline Condition (acre-ft) | | | | | % Change in Habitat Volume Relative to Baseline Condition | | | | | % of Habitat Volume to Total Reservoir Storage on Date | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Baseline | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Baseline | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) |
| May 15 | 38,210 | 38,160 | 38,150 | 38,150 | 38,150 | 38,150 | 38,150 | -10 | -10 | -10 | -10 | -10 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 100% | 100% | 100% | 100% | 100% | 100% |
| **June 6** | 41,400 | 40,220 | 39,430 | 39,430 | 39,430 | 39,430 | 39,430 | -790 | -790 | -790 | -790 | -790 | -2.0% | -2.0% | -2.0% | -2.0% | -2.0% | 97% | 95% | 95% | 95% | 95% | 95% |
| Jun 22 | 39,840 | 24,890 | 24,860 | 24,210 | 23,920 | 23,230 | 22,600 | -30 | -680 | -970 | -1,660 | -2,290 | -0.1% | -2.7% | -3.9% | -6.7% | -9.2% | 62% | 62% | 61% | 60% | 58% | 57% |
| **July 11** | 40,530 | 14,980 | 13,850 | 12,580 | 11,810 | 10,840 | 10,100 | -1,130 | -2,400 | -3,170 | -4,140 | -4,880 | -7.5% | -16.0% | -21.2% | -27.6% | -32.6% | 37% | 34% | 31% | 29% | 27% | 25% |
| Jul 20 | 40,490 | 10,870 | 7,510 | 6,610 | 6,240 | 5,890 | 5,320 | -3,360 | -4,260 | -4,630 | -4,980 | -5,550 | -30.9% | -39.2% | -42.6% | -45.8% | -51.1% | 27% | 19% | 16% | 15% | 15% | 13% |
| Aug 7 | 36,840 | 210 | 130 | 120 | 2,990 | 4,050 | 2,820 | -80 | -90 | 2,780 | 3,840 | 2,610 | -38.1% | -42.9% | 1323.8% | 1828.6% | 1242.9% | 1% | 0% | 0% | 8% | 11% | 8% |
| **Aug 20** | 34,980 | 910 | 1,140 | 400 | 810 | 1,210 | 720 | 230 | -510 | -100 | 300 | -190 | 25.3% | -56.0% | -11.0% | 33.0% | -20.9% | 3% | 3% | 1% | 2% | 3% | 2% |

Note: The bold dates have observed profiles.

**Figure 23 Comparison of Simulated Butt Valley Reservoir Habitat Volume Having Water Temperature ≤ 21°C and DO ≥ 5 mg/L for Different Alternatives (2001, Critical Dry Year)**

Similar to Figure 3-15b in Level 3 Report

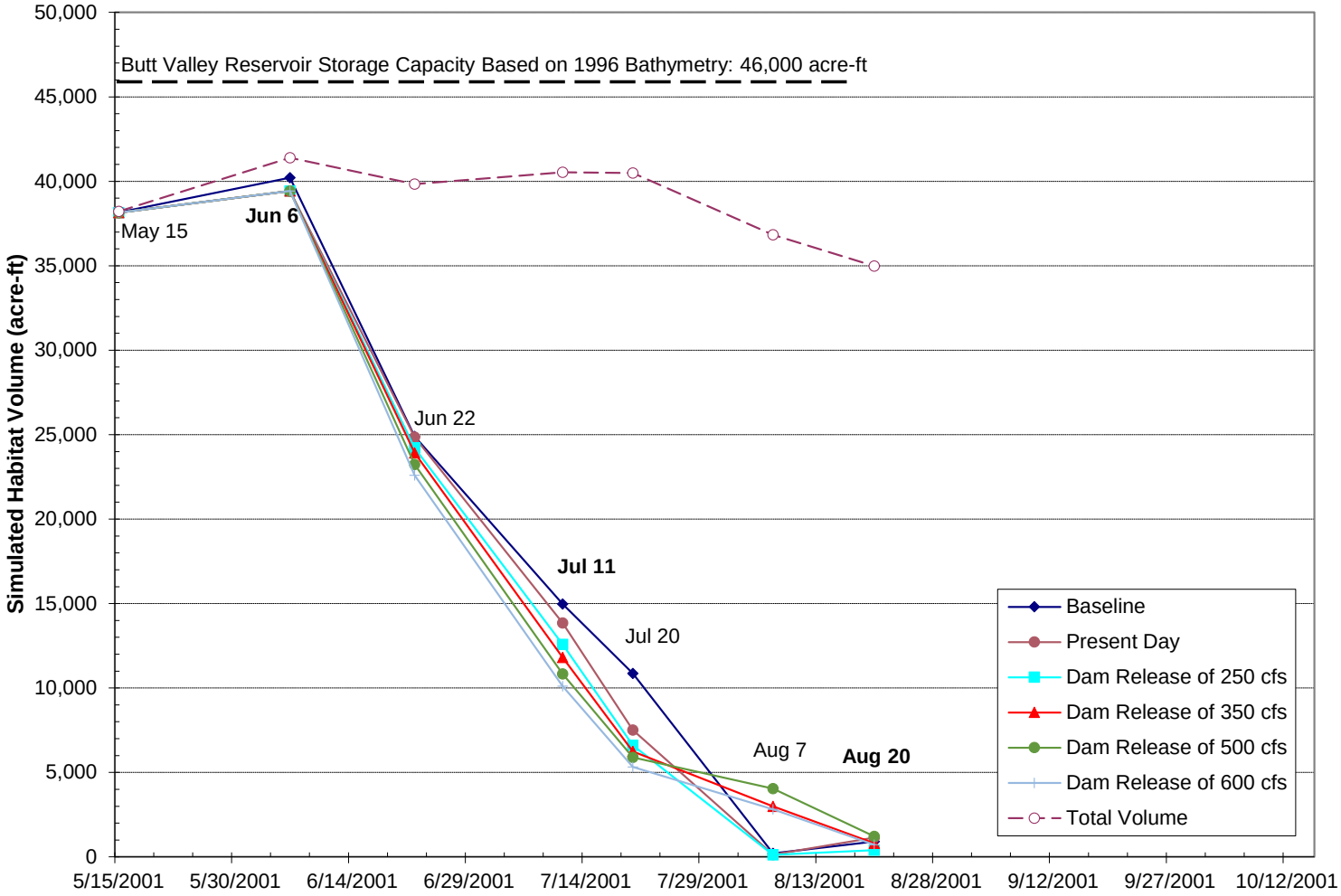

**Table 22 Summary of Simulated Butt Valley Reservoir Habitat Volume (acre-ft) Having Water Temperature ≤ 22°C and DO ≥ 5 mg/L for Different Alternatives and Change in Habitat Volume Relative to Baseline Condition**
**(2001, Critical Dry Year)**
Similar to Table 3-9c in Level 3 Report

| Date | Total Reservoir Storage on Date (acre-ft) | Simulated Habitat Volume (acre-ft) | | | | | | Change in Habitat Volume Relative to Baseline Condition (acre-ft) | | | | | % Change in Habitat Volume Relative to Baseline Condition | | | | | % of Habitat Volume to Total Reservoir Storage on Date | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Baseline | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) | Baseline | Present Day | Alt 3a (250 cfs) | Alt 3b (350 cfs) | Alt 3c (500 cfs) | Alt 3d (600 cfs) |
| May 15 | 38,210 | 38,160 | 38,150 | 38,150 | 38,150 | 38,150 | 38,150 | -10 | -10 | -10 | -10 | -10 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 100% | 100% | 100% | 100% | 100% | 100% |
| **June 6** | 41,400 | 40,220 | 39,430 | 39,430 | 39,430 | 39,430 | 39,430 | -790 | -790 | -790 | -790 | -790 | -2.0% | -2.0% | -2.0% | -2.0% | -2.0% | 97% | 95% | 95% | 95% | 95% | 95% |
| Jun 22 | 39,840 | 35,140 | 32,840 | 32,620 | 32,580 | 32,450 | 32,290 | -2,300 | -2,520 | -2,560 | -2,690 | -2,850 | -6.5% | -7.2% | -7.3% | -7.7% | -8.1% | 88% | 82% | 82% | 82% | 81% | 81% |
| **July 11** | 40,530 | 37,560 | 36,860 | 36,010 | 34,880 | 32,730 | 30,500 | -700 | -1,550 | -2,680 | -4,830 | -7,060 | -1.9% | -4.1% | -7.1% | -12.9% | -18.8% | 93% | 91% | 89% | 86% | 81% | 75% |
| Jul 20 | 40,490 | 35,920 | 35,530 | 34,390 | 33,330 | 31,250 | 26,980 | -390 | -1,530 | -2,590 | -4,670 | -8,940 | -1.1% | -4.3% | -7.2% | -13.0% | -24.9% | 89% | 88% | 85% | 82% | 77% | 67% |
| Aug 7 | 36,840 | 21,110 | 17,390 | 14,180 | 14,570 | 15,810 | 13,130 | -3,720 | -6,930 | -6,540 | -5,300 | -7,980 | -17.6% | -32.8% | -31.0% | -25.1% | -37.8% | 57% | 47% | 38% | 40% | 43% | 36% |
| **Aug 20** | 34,980 | 31,210 | 31,040 | 28,900 | 28,280 | 26,370 | 23,250 | -170 | -2,310 | -2,930 | -4,840 | -7,960 | -0.5% | -7.4% | -9.4% | -15.5% | -25.5% | 89% | 89% | 83% | 81% | 75% | 66% |

Note: The bold dates have observed profiles.

**Figure 24 Comparison of Simulated Butt Valley Reservoir Habitat Volume Having Water Temperature ≤ 22°C and DO ≥ 5 mg/L for Different Alternatives (2001, Critical Dry Year)**

Similar to Figure 3-15c in Level 3 Report

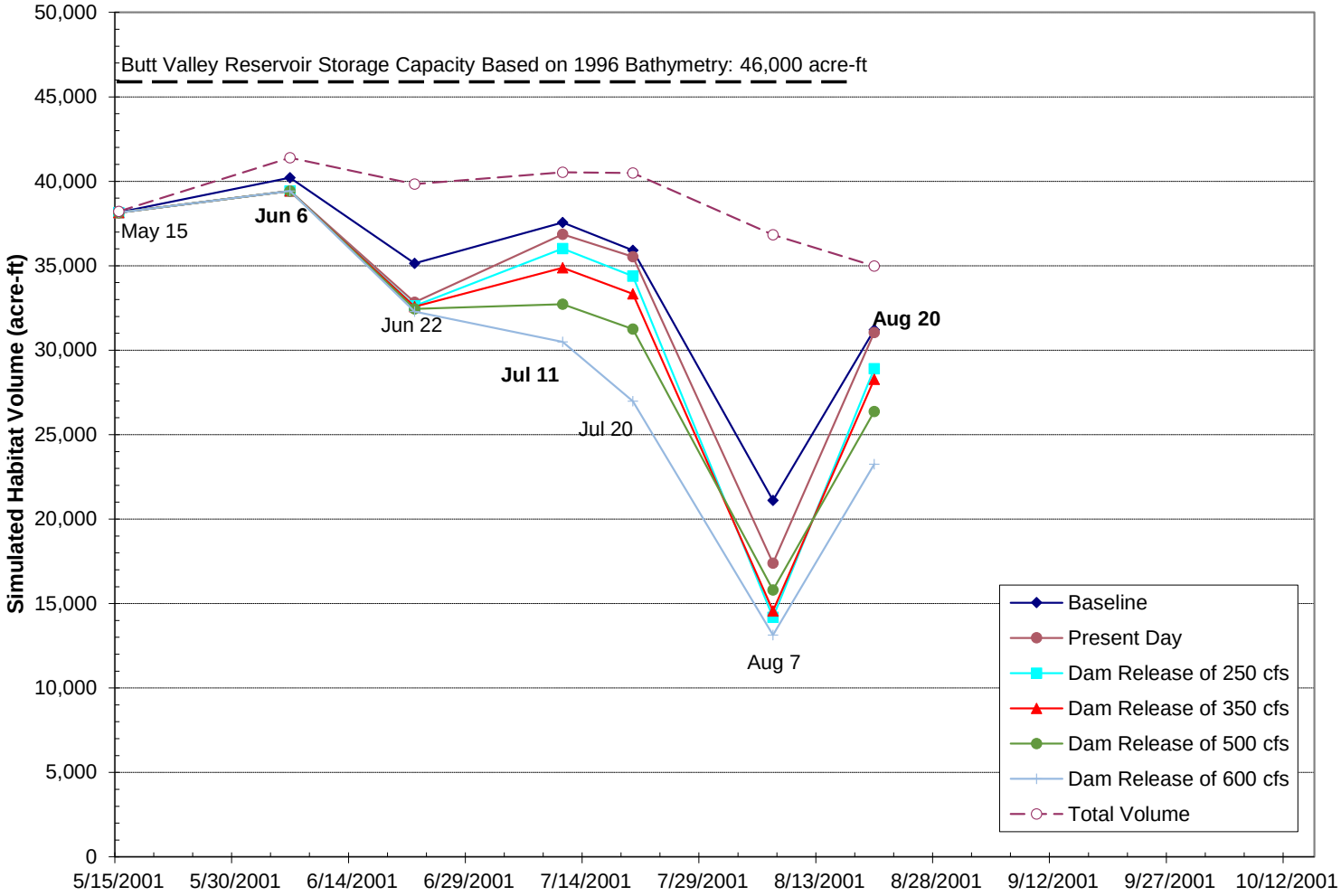

**Table 23 Estimated Annual Foregone Power Generation Loss (GWh/Year)**

| Alternative | Power Generation Loss due to Increased Minimum Flow Releases Given in the Settlement Agreement | Power Generation Loss due to Increased Canyon Dam Releases (in Jun 16 to Sep 15) for Water Temperature Reduction | Power Generation Loss due to Required Pulse Flow Releases at Canyon Dam and Belden Forebay Dam | Power Generation Loss due to Required Summertime Recreational Flow Releases at Belden Forebay Dam | Total Power Generation Loss |
|---|---|---|---|---|---|
| **Present Day** | 47.94 | - | 9.05 | 4.71 | 61.70 |
| **Alt 3a (250 cfs)** | 47.94 | 37.89 | 9.05 | 4.71 | 99.59 |
| **Alt 3b (350 cfs)** | 47.94 | 60.26 | 9.05 | 4.71 | 121.96 |
| **Alt 3c (500 cfs)** | 47.94 | 93.83 | 9.05 | 4.71 | 155.53 |
| **Alt 3d (600 cfs)** | 47.94 | 116.20 | 9.05 | 4.71 | 177.90 |

**Figure 25 Estimated Annual Foregone Power Generation Loss**