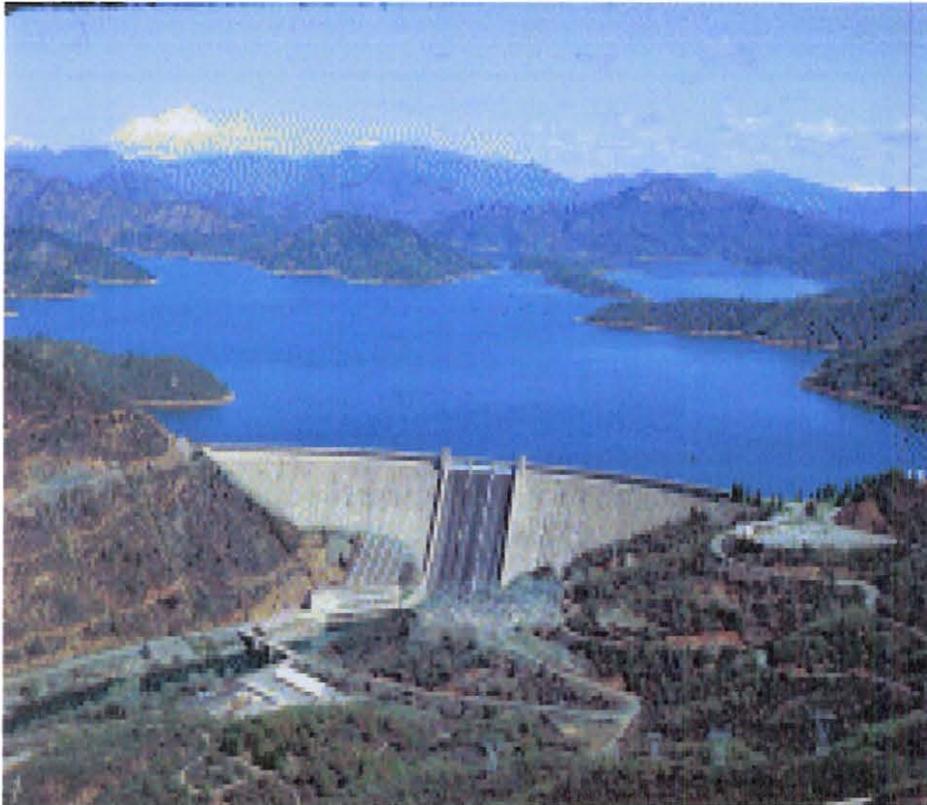


Sacramento River Temperature Task Group



Annual Report of Activities

October 1, 2011, through September 30, 2012

Acronyms:

BiOp	Biological Opinion
BND	Bend Bridge compliance point
BSF	Balls Ferry compliance point
CDFG	California Department of Fish & Game
CDEC	California Data Exchange Center
CVPIA	Central Valley Project Improvement Act
cfs	cubic feet per second
CVP	Central Valley Project
DWR	California Department of Water Resources
EOS	End-of-September
ESA	Endangered Species Act
FWS	U.S. Fish & Wildlife Service
JLF	Jellys Ferry compliance point
maf	million acre feet
NMFS	National Marine Fisheries Service
NASA	National Aeronautics and Space Administration
RBDD	Red Bluff Diversion Dam
Reclamation	U.S. Bureau of Reclamation
RPA	Reasonable and Prudent Alternative
SRTTG	Sacramento River Temperature Task Group
SWRCB	State Water Resources Control Board
taf	thousand acre feet
TCD	temperature control device (Shasta Dam)
TCP	temperature compliance point
WAPA	Western Area Power Administration
WR	Water Rights Order

Chapter 1. Background

This document describes the water year (WY) 2012 actions taken in the upper Sacramento River by the Sacramento River Temperature Task Group (SRTTG) to meet the requirements of NOAA's National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (FWS) biological opinions (BiOps) concerning the Central Valley Project (CVP) and State Water Project (SWP) long-term operations. Full accounting for WY 2012 has not yet been completed; therefore, this report only describes the actions taken in a qualitative format.

The objectives of the May 15 through October 31 Sacramento River instream temperature criteria are to manage the cold water storage within Shasta Reservoir and make cold water releases from Shasta Reservoir to provide suitable habitat temperatures for winter-run Chinook salmon, spring-run Chinook salmon, California Central Valley steelhead, and the Southern Distinct Population Segment of North American green sturgeon in the Sacramento River between Keswick Dam and Bend Bridge, while retaining sufficient carryover storage to manage for the following year's winter-run Chinook salmon cohort. In addition, to the extent feasible, another objective is to manage for suitable temperatures and stabilize flows for naturally-spawning fall-run/late-fall-run Chinook salmon.

A. Membership

The SRTTG consists of representatives from Reclamation, FWS, NMFS, California Department of Fish and Game (CDFG), State Water Resources Control Board (SWRCB), Western Area Power Administration (WAPA), and the Hoopa Tribe. Other agencies have participated in the past and may be added to the SRTTG, provided existing agencies approve of the addition in membership. SRTTG member agencies and the lead contacts are:

U.S. Bureau of Reclamation (Reclamation)

Thuy Washburn
Russ Yaworsky
Rod Wittler
Stacey Smith

National Marine Fisheries Service (NMFS)

Seth Naman
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Chapter 2. Summary of Actions and Results

The purpose of the SRTTG is to provide advice to Reclamation on managing water temperatures downstream of CVP reservoirs in the Sacramento River, Trinity River and Clear Creek. The SRTTG deals with the short-term operational aspects of reservoir management such as coordinating real-time operations. The Clear Creek Technical Team plans and implements long-term restoration actions and reports on such things as pulse flows, gravel augmentation, and channel forming flow required in the NMFS 2009 Biological Opinion (BiOp). It also coordinates monitoring for these actions. The SRTTG reports on the temperature requirements as specified in the State Water Resource Control Board (SWRCB) Water Rights Order (WR) 90-5 and also the required actions described in NMFS' 2009 reasonable and prudent alternative (RPA) with 2011 amendments. Both groups coordinate their actions with the B2 Interagency Team which manages the use of CVPIA (b)2 water in CVP reservoirs.

The SRTTG advises the U.S. Bureau of Reclamation (Reclamation) on the best course of action to take to implement Water Rights Order 90-5 to establish a temperature compliance point (TCP) for winter-run Chinook salmon, depending on carryover storage, water year type, and fish distribution. The SRTTG used historical data, the latest modeled water temperatures, operator experience, and the latest biological data available to adaptively manage water releases from Shasta, Trinity and Whiskeytown Reservoirs. In many years, it is not possible to attain 56° Fahrenheit (F) at Bend Bridge, and the SRTTG will advise that the TCP be established further upstream. This was the case in 2009, 2010 and 2011. A salmon decision process was used as initial guidance in prioritizing actions.

There were eight SRTTG meetings/calls on: 4/19/12, 5/24/12, 6/8/12, 6/13/12, 6/28/12, 7/26/12, 8/23/12, and 9/27/12. The first 2 meetings discussed operational forecasts and water temperature modeling results for the year in the Sacramento River, Trinity River, and Clear Creek. A draft

temperature control plan to the SWRCB was reviewed. The next meetings dealt with operational issues, forecasting, and the need to adjust the TCP on the Sacramento River based on near real-time monitoring information and variations from average meteorological conditions (note: historical averages are used for tributary flows where gauges are not maintained).

A. Sacramento River

RPA Action I.2.1. Shasta Operation Performance Measures

Action: The following long-term performance measures shall be attained. Reclamation shall track performance and report to NMFS at least every 5 years. If there is significant deviation from these performance measures over a 10-year period, measured as a running average, which is not explained by hydrological cycle factors (*e.g.*, extended drought), then Reclamation shall reinitiate consultation with NMFS.

Measured as a 10-year running average, performance measures for temperature compliance points during summer season shall be:

- Meet Clear Creek Compliance point 95 percent of time
- Meet Balls Ferry Compliance point 85 percent of time
- Meet Jelly's Ferry Compliance point 40 percent of time
- Meet Bend Bridge Compliance point 15 percent of time

Result: The end-of-April storage was 4.4 MAF. The TCP started out at Jellys Ferry and then moved to Balls Ferry on April 16, 2012. After further temperature study and discussions, at the May 24, 2012, SRTTG meeting, the group agreed to having the TCP moved to Bend Bridge.

RPA Action I.2.2. Fall Actions, Keswick Releases (November – February)

Action: Depending on EOS carryover storage and hydrology, Reclamation shall develop and implement a Keswick release schedule, and reduce deliveries and exports as detailed below.

RPA Action I.2.2 A. EOS Storage at 2.4 MAF or Above

Action: A workgroup shall consider and the following criteria by November 1 each year in developing a Keswick release schedule:

- 1) Need for flood control space: A maximum 3.25 MAF end-of-November storage is necessary to maintain space in Shasta Reservoir for flood control.
- 2) Need for stable Sacramento River level/stage to increase habitat for optimal spring-run and fall-run redds/egg incubation and minimization of redd dewatering and juvenile stranding.
- 3) Need/recommendation to implement USFWS' Delta smelt Fall X2 action as determined by the Habitat Study Group formed in accordance with the 2008 Delta smelt Opinion.

Result: Since EOS storage in Shasta was above 2.4 MAF the above criteria applied.

RPA Action I.2.3. February Forecast Keswick Releases (March – May 15)

Action: NMFS reviews forecast and allocations for consistency with temperature management. Reclamation must maintain a TCP not in excess of 56°F between Balls Ferry and Bend Bridge between April 15 and May 15.

RPA Action I.2.3.B Implementation Procedures if February Forecast, Based on 90 Percent Hydrology, Shows that Only Balls Ferry Compliance or 2.2 MAF EOS, but Not Both, Is Achievable

- 1) On or before February 15, Reclamation shall reduce Keswick releases to 3,250 cfs, unless NMFS concurs on an alternative release schedule. This reduction shall be maintained until a flow schedule is developed per procedures below.
- 2) In coordination with NMFS, by March 1, Reclamation shall develop an initial monthly Keswick release schedule, based on varying hydrology of 50 percent, 70 percent, and 90 percent (similar in format to the fall and winter action implementation procedures – see table above). These schedules shall be used as guidance for monthly updates and consultations.
- 3) Based on this guidance, Reclamation shall consult with NMFS monthly on Keswick releases. Reclamation shall submit a projected forecast, including monthly average release schedules and temperature compliance point to NMFS every month, within 7 business days of receiving the DWR runoff projections for that month. Within 3 business days of receiving this information from Reclamation, NMFS will review the draft schedule for consistency with the criteria below and provide written recommendations to Reclamation.
- 4) The initial monthly Keswick release schedule, and subsequent monthly updates, shall be developed based on the following criteria and including the following actions:
 - a) Maintain minimum monthly average flows necessary to meet nondiscretionary delivery obligations and legal requirements.
 - b) Provide for flow-related biological needs of spring life stages of all species covered by this Opinion in the Sacramento River and Delta, to the greatest extent possible.
 - c) If operational changes are necessary to meet Delta outflow, X2, or other legal requirements during this time, then:
 - CVP/SWP Delta combined exports shall be curtailed to 2,000 cfs if necessary to meet legal requirements while maintaining a 3,250 cfs Keswick Dam release (or other planned release based on biological needs of species); and
 - if it is necessary to curtail combined exports to values more restrictive than 2000 cfs in order to meet Delta outflow, X2, or other legal requirements, then Reclamation and DWR shall, as an overall strategy, first, increase releases from Oroville or Folsom Dam; and
 - in general, Reclamation shall increase releases from Keswick Dam as a last resort.
 - Based on improvements in updated monthly hydrology, this restriction may be relaxed, with NMFS' concurrence.

Results: Reclamation maintained a minimum Jellys Ferry TCP during this time period. Keswick releases were ramping down to conserve storage, starting on March 13, 2012, and Keswick releases were able to come down to 3,250 cfs. Starting April 16, 2012, the new TCP was moved down to Balls Ferry.

RPA Action 1.2.4. Keswick Release Schedule (May 15 –October)

Action: Reclamation shall develop and implement an annual Temperature Management Plan by May 15 to manage the cold water supply within Shasta Reservoir and make cold water releases from Shasta Reservoir and Spring Creek to provide suitable temperatures for listed species, and, when feasible, fall-run.

Reclamation shall manage operations to achieve daily average water temperatures in the Sacramento River between Keswick Dam and Bend Bridge as follows:

1) Not in excess of 56°F at compliance locations between Balls Ferry and Bend Bridge from May 15 through September 30 for protection of winter-run, and not in excess of 56°F at the same compliance locations between Balls Ferry and Bend Bridge from October 1 through October 31 for protection of mainstem spring run, whenever possible.

2) Reclamation shall operate to a final Temperature Management Plan starting May 15 and ending October 31.

3) As part of the adaptive management process, and in coordination with NMFS, by March 2010, Reclamation shall fund an independent modeler to review these procedures and the recommendations of the Calfed Science Panel report on temperature management and recommend specific refinements to these procedures to achieve optimal temperature management.

Results: The SRTTG recommended a TCP at Balls Ferry until June 1, and then Jellys Ferry until September 30. Starting October 1, 2012, the TCP was moved back up to Balls Ferry. Reclamation maintained 56°F at the TCP from May 15 – present.

Chapter 3. Summary of Operations

Initial carryover storage in Shasta Reservoir was 3.34 MAF at the beginning of water year 2012, and the year was classified as a “below normal” followed by a wet year and 3 years of drought. Releases out of Keswick Dam were reduced from the beginning of the year to get down to the minimum release to conserve storage. Starting February 8, 2012, Keswick releases were at the minimum releases but had go back up to meet Delta outflow requirements. On March 20, 2012, Keswick releases were brought back down to the minimum of 3,250 cfs. . During the time frame of May 11, 2012 to June 3, 2012, high Keswick releases were made for Wilkin’s Slough operations for both temperature operations and Delta outflow requirements.

The TCP started out at Jellys Ferry at the beginning of the temperature control season. On April 16, 2012, the TCP was moved up to Balls Ferry. After several discussions in the SRTTG meetings, the TCP was moved back up to Jellys Ferry. The 2011 Independent Panel Report stated that, “the TCP at Bend Bridge, which is required to be met only 15% of the time (i.e., 1.5 yrs out of 10), has not been met in either this or the previous year. If the TCP at this location was not met in WY2011 – one of the least challenging years in terms of available reservoir storage – it seems unlikely that it can be met in any year.” In consideration of that comment, and storage in Shasta Reservoir being similar to that in 2012 at the time, the SRTTG recommended that the TCP be moved to Bend Bridge. After a few temperature exceedances at Bend Bridge, Reclamation did additional modeling, which indicated that although Shasta Reservoir volume was similar to that in 2011, there was approximately 300,000 taf less cold water volume in 2012. Therefore, the SRTTG subsequently recommended that the TCP be changed to Jellys Ferry. The TCP remained at Jellys Ferry until October 1, 2012. During this summer, the temperatures were met except for 3 days. On June 1, 2012, the temperature was 56.5°F and on June 2, 2012, the temperature was 56.6°F. When the TCP is moved to a new location, it is very difficult to control during the transitional periods between compliance points. On June 13, 2012, the temperature at Jellys Ferry was 56.2°F. Overall, the temperature operation for this water year was successful.

When comparing TCP between Jellys Ferry and Bend Bridge during the summer months of June, July, August and September, temperatures at the two TCP were very similar. For the month of June, 56°F was met 90% for the month and 3 days were not met. This happened primarily due to large temperature fluctuations, which often occur during transitions between seasons. At Bend Bridge for the month of June, 56°F was met 80% for the month and 6 days were not met. For the month of July, all days were met at Jelly’s Ferry and only 1 day had exceeded at Bend Bridge by one tenth of a degree (56.1°F). For the month of August, all days were met at Jellys Ferry and 5 days (84%) were exceeded at Bend Bridge. Lastly, for the month of September, all days were met at Jellys Ferry and Bend Bridge. Overall, the water temperatures at both Jelly’s Ferry and Bend Bridge are very similar.

In addition, throughout the temperature control season, representatives from the SRTTG utilized the Sacramento River Temperature Forecasting and Decision Support Tool, developed by the NMFS-Southwest Fisheries Science Center (SWFSC). The intention for this pilot year was to utilize the model in tandem with the Reclamation’s temperature model to forecast water temperatures, and also assist in TCD operations to meet the temperature criterion. Unexpected results were coordinated with NMFS-SWFSC to determine whether there were issues with the model that needed to be fixes/adjusted. Issues identified during SRTTG meetings regarding the use of NMFS-SWFSC’s temperature model included: (1) the model utilizes releases from Keswick Dam, as opposed to Shasta Dam, so does not have the current capability of estimating water temperature increases in Keswick Reservoir; and (2) the current 3-day forecast does not allow much time for Reclamation to adjust its operations.

Chapter 4. Summary of Fisheries

Many years, there is a tension between complying with NMFS' RPA actions to meeting water temperature needs for winter-run and spring-run Chinook salmon through October 31, and stabilizing flows to minimize redd dewatering of fall-run Chinook salmon, and later, late fall-run Chinook salmon. Depending on the water year type, and end of September carryover storage in Shasta Reservoir, Reclamation may need to reduce releases out of Keswick Dam immediately following the temperature control season, on November 1. Last year was no exception, especially in consideration of an above normal water year type, followed by a dry fall. For example, there is considerable dewatering of fall-run redds that are spawned at 7,000 cfs if flows drop to 5,000 cfs or 4,000 cfs. Frequent interagency meetings through the B2IT and multiple fishery agency meetings occurred throughout the fall, winter, and spring to discuss and recommend operations of Shasta Reservoir, to minimize the potential for fall-run redd dewatering, in consideration of any impact of the higher releases on Shasta Reservoir for temperature management in the summer for winter-run Chinook salmon.

The attached table 1 provides a summary of aerial redd surveys for water year 2012. For winter-run Chinook salmon, a total of 261 redds were observed, with 1 redd identified in the downstream most reach of Highway 44 Br. to Airport Rd. Br. The TCP was established further downstream to provide as much habitat as possible for the spawning population. The last aerial survey on August 22 did not detect any winter-run redds. These data were reported out during the August 23 SRTTG meeting, and part of the discussion at that meeting was the consideration of stabilizing flows on the upper Sacramento River for fall-run spawning. The 2010 Independent Review Panel report stated that "The temperature compliance points were qualitatively related to the distribution of winter-run Chinook. It is not known why the compliance point was established downstream (Jelly's Ferry) when aerial redd surveys in 2010 indicated redds were upstream of Airport Road Bridge." As a result, the fisheries agencies recommended to Reclamation that the TCP be moved upstream from Jellys Ferry to Balls Ferry starting on October 1. The recommendation also included reducing releases out of Keswick Dam in order to stabilize flows for fall-run Chinook salmon spawning.

Table 1. Aerial redds counts of fall-run, late fall-run, and winter-run Chinook salmon in Water Year 2012

Water Year 2012 Aerial Redd Counts (New redds only)

NUMBER OF NEW REDDS VIEWED BY AERIAL OBSERVATION:														
DATE	5/17/2012	5/23/2012	5/31/2012	6/6/2012	6/13/2012	6/21/2012	7/3/2012	7/17/2012	7/25/2012	8/1/2012	8/8/2012	8/22/2012	2012	
Aircraft	helo													
Visibility	fair	fair	good	good	fair-good	fair	fair	poor	excellent	excellent	excellent	excellent		
FLOW from Keswick	10,503	10,503	9,498	10,477	10,969	12,427	14,259	14,126	14,286	14,253	13,315		TOTALS	
Race	Winter	% Dist.												
Keswick to A.C.I.D. Dam.	5	2	11	15	16	13	29	6	61	10	5	0	173	66.3%
A.C.I.D. Dam to Highway 44 Bridge	1	1	1	2	12	20	21	8	19	2	0	0	87	33.3%
Highway 44 Br. to Airport Rd. Br.	0	0	0	0	1	0	0	0	0	0	0	0	1	0.4%
Airport Rd. Br. to Balls Ferry Br	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Balls Ferry Br. to Battle Creek	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Battle Creek to Jellys Ferry Br	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Jellys Ferry Br. to Bend Bridge	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Bend Bridge to Red Bluff Diversion Dam	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Red Bluff Diversion Dam to Tehama Br.	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Tehama Br. To Woodson Bridge	0	0	0	n/s	0	0	0	0	0	0	0	0	0	0.0%
Woodson Bridge to Hamilton City Br	n/s	0	0.0%											
Hamilton City Bridge to Ord Ferry Br	n/s	0	0.0%											
Ord Ferry Br. To Princeton Ferry.	n/s	0	0.0%											
TOTALS	6	3	12	17	29	33	50	14	80	12	5	0	261	100.0%

Water Year 2012 Aerial Redd Counts (New redds only)

NUMBER OF NEW REDDS VIEWED BY AERIAL OBSERVATION:													
DATE	10/27/2011	11/10/2011	12/28/2011	1/11/2012	2/3/2012	2/24/2012	4/19/2012						
Aircraft	plane	plane	plane	plane	plane	plane	plane						
Visibility	fair	poor	poor-fair	fair	fair-good	fair-good	poor						
FLOW from Keswick	7,030	7,006	4,980	4,699	3,717	4,989	4,508						
Race	Fall	Fall	Late-Fall	Late-fal	Late-fal	Late-fal	Late-fal						
Keswick to A.C.I.D. Dam.	43	42	28	44	66	57	3						
A.C.I.D. Dam to Highway 44 Bridge	0	0	0	0	3	0	1						
Highway 44 Br. to Airport Rd. Br.	0	7	0	0	4	5	0						
Airport Rd. Br. to Balls Ferry Br	29	24	0	3	14	5	0						
Balls Ferry Br. to Battle Creek	11	8	0	0	2	0	0						
Battle Creek to Jellys Ferry Br	23	25	6	0	3	0	0						
Jellys Ferry Br. to Bend Bridge	3	3	0	0	0	0	0						
Bend Bridge to Red Bluff Diversion Dam	2	3	0	0	0	0	0						
Red Bluff Diversion Dam to Tehama Br.	13	12	1	0	0	0	0						
Tehama Br. To Woodson Bridge	1	2	0	0	0	0	0						
Woodson Bridge to Hamilton City Br	0	0	0	0	0	0	0						
Hamilton City Bridge to Ord Ferry Br	0	0	0	0	0	0	0						
Ord Ferry Br. To Princeton Ferry.	0	0	0	0	0	0	0						
TOTALS	125	126	35	47	92	67	4						