United States Department of the Interior

BUREAU OF RECLAMATION
Mid-Pacific Region
South-Central California Area Office
1243 N Street
Fresno, CA 93721-1813

DEC 17 2019

IN REPLY REFER TO:
SCC-400
2.2.1.06
Cachuma Project

VIA ELECTRONIC MAIL AND U.S. POSTAL SERVICE

Mr. Eric Oppenheimer
Chief Deputy Director
State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95812-0100

Subject: Submittal of Plan in Accordance with Term 18 of Water Rights Order WR-2019-0148

Dear Mr. Oppenheimer:

The Bureau of Reclamation (Reclamation) provides the attached Plan in accordance with Term 18 of the September 17, 2019 State Water Resources Control Board Final Order WR-2019-0148 (Order) for Reclamation' s water rights permits 11308 and 11310 for the Cachuma Project in Santa Barbara County, California.

Reclamation submitted the draft Plan to National Marine Fisheries Service (NMFS) and California Department of Fish and Wildlife (CDFW) on October 30, 2019 and received comments back on December 11 and 12, 2019, respectively, leaving us with a mere five *calendar* days to complete the Plan.

Unfortunately, Reclamation did not have adequate time to complete the Plan in its entirety. Of the 90 days afforded to develop the Plan, the NMFS and CDFW are allotted at least 30 working days, whereas Reclamation is curtailed to the remaining *calendar* clays to review comments and revise the Plan as appropriate.

Reclamation intends to discuss the time constraints further with the Executive Director and/or the Division of Water Rights Deputy Director. Nonetheless and due in part to the Holiday Season, Reclamation will submit a supplement to the Plan before the end of January 2020.

If you have any questions regarding this submittal, please contact Mr. David E. Hyatt, Chief, Resource Management Division at (559) 262-0334, via electronic mail at dhyatt@ usbr.gov, or for the hearing impaired at TTY (800) 877-8339.

Sincerely,

Michael P. Jackson, P. E.
Area Manager

Enclosure
Cachuma Order WR-2019-0148 Term 18 Plan

RECLAMATION
Managing Water in the West

Cachuma Order
WR-2019-0148 Term 18 Plan

— BUREAU OF —
RECLAMATION
Interior Region 10 California-Great Basin
California*, Nevada*, Oregon*
*Partial
South-Central California Area Office

December 2019

Mission Statements

The mission of the Department of the Interior is to conserve and manage the Nation's natural resources and cultural heritage for the benefit and enjoyment of the American people, provide scientific and other information about natural resources and natural hazards to address societal challenges and create opportunities for the American people, and honor the Nation's trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities to help them prosper.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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Attachments

***Reclamation will supplement the Term 18 Plan with our Response to Comments received from NMFS and CDFW.**

Introduction

On September 17, 2019 the State Water Resources Control Board (Water Board) adopted Final Order WR-2019-0148 amending the Bureau of Reclamation (Reclamation) water rights permits 11308 and 11310 for the Cachuma Project in Santa Barbara County, California. Reclamation provides the following Plan in accordance with Term 18 of Order WR-2019-0148 to describe "the measures in place, or that will be implemented to ensure compliance with Terms 15 and 16."

Term 15 of Order WR-2019-0148

Term 15 of the Water Board Order states:

> *Except as otherwise provided in this term and in term 16 below, right holder shall operate and maintain the Cachuma Project and implement conservation measures including but not limited to those described in Revised Section 3 (Proposed Project) of the Biological Assessment for Cachuma Project Operations and the Lower Santa Ynez River, June 2000, taking into consideration the 2013 Biological Assessment with any amendments and the 2016 Draft Biological Opinion, and right holder shall comply with all of the Reasonable and Prudent Measures 5 and 7 through 13, set forth at page 68, and the Terms and Conditions, set forth at pages 70–78, in the National Marine Fisheries Service's (NMFS) Biological Opinion: U.S. Bureau of Reclamation operation and maintenance of the Cachuma Project on the Lower Santa Ynez River in Santa Barbara County, California, September 2000 (2000 Biological Opinion).*

Reclamation considered the proposed measures included in the 2013 Draft Biological Assessment (2013 BA) for the Operation and Maintenance of the Cachuma Project and the 2016 National Marine Fisheries Service (NMFS) draft Biological Opinion (BiOp) for Operation and Maintenance of the Cachuma Project in Santa Barbara County, California (2016 Draft BiOp) which was terminated by NMFS on June 15, 2018. On November 8, 2019, Reclamation reinitiated formal consultation with NMFS and provided a new Biological Assessment for the Operation and Maintenance of the Cachuma Project (2019 BA). Reclamation understands that NMFS is currently reviewing our 2019 BA.

Reclamation will continue to comply with all existing section 7 measures and requirements under NMFS' existing 2000 BiOp until such time as a new BiOp has been received and accepted by Reclamation. Reclamation intends to notify the Executive Director within 30 days of receipt and acceptance of a new and finalized BiOp.

Term 15(a) of Order WR-2019-0148

Term 15(a) of Order WR-2019-0148 requires Reclamation to "release or bypass water to maintain the following Mainstem Rearing instream flows in the Santa Ynez River, as set forth below [in Table 1], at all times."

Table 1 Mainstem Rearing Flows

Reservoir Spill[a] (af)	Lake Storage[b] (af)	Flow (cfs) Requirements at:		
		Highway 154	Alisal Road	Stilling Basin & Long Pool
≥ 20,000	NA	10	1.5[c]	-
< 20,000	≥ 120,000	5	1.5[d]	-
	≥ 30,000 and <120,000	2.5	1.5[d]	-
	< 30,000	-	-	30 af/mo[e]

NA - not applicable

[a]Reservoir spill is calculated cumulatively over the course of the water year (FEIR, Vol. IV, Appendix F, Draft Technical Memorandum No. 5, p. 6), which begins October 1 (FEIR, Vol. IV, Appendix F, Draft Technical Memorandum No. 5, p. 8).

[b]Lake storage is measured on the first day of each month. (FEIR, Vol. IV, Appendix E, Technical Memorandum No. 1, p. 5.)

[c]The specified flow applies only when *Oncorhynchus mykiss* are present.

[d]The specified flow applies only if there was reservoir spill greater than or equal to 20,000 af in the prior water year and *Oncorhynchus mykiss* are present in the Alisal Reach.

[e]When there is less than 30,000 acre feet (af) of total water stored in the reservoir, regardless of origin, right holder shall provide periodic releases of 30 af per month to refresh the Stilling Basin and Long Pool directly downstream of the dam to provide for *Oncorhynchus mykiss (O. mykiss)* rearing in these areas. Less than 30 af per month may be released upon determination by the fishery agencies and the State Water Board that less water is necessary to refresh the Stilling Basin and Long Pool directly downstream of the dam for *Oncorhynchus mykiss* in these areas.

Reclamation plans to continue to provide the required flows in Table 1 of Term 15(a) as they are the same as those required under the 2000 BiOp. Reclamation ensures compliance with these flows at Highway 154 through implementation of Table ES-1 from Stetson Engineers Inc.'s 2011 *Evaluation of Aerial Photos for Monitoring Instream Target Flows in the Highway 154 Reach of Lower Santa Ynez River, California* (Attachment 1). Reclamation will continue to monitor the recommended releases as part of its daily operations. A link to the daily operations log[1] will be provided on Reclamation's publicly accessible South-Central California Area Office (SCCAO) Operations page[2]. Currently, Reclamation is unable to do actual monitoring at Highway 154 due to landowner access issues.

Reclamation in coordination with the Member Units is developing a table similar to Table ES-1 that would recommend maximum releases from Bradbury Dam that would meet required flows at Alisal Road/Alisal Bridge. Until such time as the table is developed and approved by the Executive Director, Reclamation plans to provide and monitor the recommended flows to Alisal Road/Alisal Bridge pursuant to Table 1 of Term 15(a) by implementing Stetson's 2011 *Operating Guidelines for Monitoring Target Flow of 1.5 cfs at Alisal Bridge* (Attachment 2). Monitoring of flows at Alisal Road/Alisal Bridge will continue using the following steps:

1. *Real-Time Flow Monitoring* – There is a United States Geological Survey (USGS) gauge at Alisal Bridge, known as the Solvang Gauge (#11128500), on the Santa Ynez River that

[1] The Lake Cachuma Daily Operations can be found at: https://www.usbr.gov/mp/cvo/vungvari/cchdop.pdf To convert acre-feet total flows released from Bradbury Dam into the Lower Santa Ynez River to meet Highway 154 cubic-feet per second flow requirements - add Hilton Creek releases to Outlet Work releases and divide by 1.98.

[2] SCCAO Operation's page is located at: https://www.usbr.gov/mp/sccao/operations.html.

provides flow data every 15 minutes[3]. Reclamation will use this gauge to monitor for compliance with the 1.5 cfs target. The streambed at Alisal Bridge poses a challenge for providing accurate flow readings from the USGS gauge because the stream path can move from one channel to another and miss the stationary USGS gauge. Reclamation has been and will continue to coordinate closely with USGS to receive instantaneous flow measurements through onsite field checks on an as-needed basis. Reclamation also plans to monitor six upstream locations to assist with early flow detection. The locations are at Meadowlark Pool, Lower Gainey Crossing, and Refugio Bridge for the Refugio Reach and at the Quiota Creek Confluence, one mile above Alisal Bridge, and at Alisal Bridge for the Alisal Reach. Early flow detection will allow dam operators to increase reservoir releases to maintain required flows. Reclamation is currently developing a flow monitoring program that is anticipated to be completed by the end of Spring 2020. Monitoring personnel will include Bradbury Dam operators and COMB biologists. The monitoring program will include specifics on stream discharge measurement methodologies, communication of stream discharge information, and documentation of stream discharge. All of which will be made available on a publicly accessible website.

2. *Releases from Bradbury Dam* – Reclamation will use the decision tree included in Figure 1 of Attachment 2 to help determine the necessary releases to meet the 1.5 cfs target flow at Alisal Road/Alisal Bridge. The process involves early detection, early sustenance release for the 1.5 cfs flow target, real-time monitoring, and real-time adjustments including incremental adjustments and pulse releases.

Term 15(b) of Order WR-2019-0148

Term 15(b) does not require any actions by Reclamation.

Term 15(c) of Order WR-2019-0148

Term 15(c) requires Reclamation to "proceed with rescue efforts within a period necessary to prevent steelhead mortality following any flow interruption of the Hilton Creek Watering System. It also requires that Reclamation "post all flow interruptions of the Hilton Creek Watering System and rescue efforts on a publicly accessible website."

In the event of an interruption in Hilton Creek flows, Reclamation will conduct rescues of *O. mykiss* in Hilton Creek pursuant to the most recent NMFS-reviewed rescue plan (Attachment 3). Reclamation's SCCAO Operations page will provide details on rescue operations conducted in Hilton Creek, and will also provide a link to the California Data Exchange Center (CDEC) for access to Lake Cachuma Operations data.

In addition, Reclamation plans to provide a link on its SCCAO Operations page to the Hilton Creek USGS gage (#11125600)[4] which provides flow data every 15 minutes. Any interruption in Hilton Creek flows can be observed at the USGS website.

[3] The USGS site for the Solvang Gauge can be accessed at the following address: https://waterdata.usgs.gov/nwis/dv/?site_no=11128500&agency_cd=USGS&referred_module=sw
[4] The Hilton Creek USGS gage is available online at the following address: https://waterdata.usgs.gov/nwis/dv/?site_no=11125600&agency_cd=USGS&referred_module=sw

Term 16(a)-16(b) of Order WR-2019-0148

Term 16(a) through 16(b) requires Reclamation to "release or bypass water to meet the Table 2 flows, set forth below, at all times during Wet and Above Normal water year types". The flows in Table 2 would be triggered when the cumulative inflow into Cachuma first reaches 33,707 acre-feet in a water year (beginning on October 1st and ending September 30th of the following year).

Table 2 Flows Required in Wet and Above Normal Water Year Types

Minimum Flow Requirement*	Period of Flow	Purpose of Flow
48 cfs	02/15 to 04/14	Spawning
20 cfs	04/15 to 06/01	Incubation and Rearing
25 cfs	06/02 to 06/09	Emigration
Ramp to 10 cfs by 06/30		
10 cfs	06/30 to 10/01	Rearing and Resident Fish Maintenance
5 cfs	10/01 to 02/15	Resident Fish

*The above flows shall be maintained at both San Lucas and Alisal bridges. These flows may be met with both natural stream flow and releases from Bradbury Dam.

Reclamation plans to adapt the operating guidelines developed by Stetson to meet the Table 2 flow requirements in Term 16. The operating guidelines will be modified as necessary through calibration and adaptive management to achieve the flows required in Table 2. Ramping shall be implemented pursuant to Table 3. Table 3 is the same as Table 1 included in the 2000 BiOp.

Table 3 Reclamation Proposed Water Rights Ramping Schedule

Release Rate (cfs)	Ramping Increment (cfs)	Ramping Frequency (No more than once every)
> 90	25	4 hours
90 to 30	10	4 hours
30 to 10	5	4 hours
10 to 5	2.5	4 hours
5 to 3.5	1.5	4 hours
3.5 to 2.5	1	4 hours

Stetson's 2011 operating guidelines were developed to maintain a target flow of 1.5 cfs at Alisal Bridge; however, Term 16 requires flows at Alisal Bridge ranging from 5 to 48 cfs. Reclamation plans to monitor the Alisal Bridge gage to ensure that required flows are being met. Reclamation will include a link on its SCCAO Operations page to the Solvang Gauge (#11128500) which provides flow data every 15 minutes at Alisal Bridge.

Reclamation is also working on expanding the operating guidelines to assist in meeting the higher Table 2 flows required at San Lucas Bridge (also known as Highway 154 crossing) and Alisal Bridge. Reclamation plans to evaluate the following by the end of Spring 2020:

1. An analysis of Wet and Above Normal water year types and natural stream flow downstream of Bradbury Dam, specifically at the USGS Solvang gauge at Alisal Bridge (#11128500).

2. A review of previous Water Rights 89-18 releases and the resulting flows at Alisal Bridge.
3. An examination of current conditions (i.e. vegetation, obstructions, infiltration, etc.) in the reaches of the Santa Ynez River from Bradbury Dam to Alisal Bridge.
4. An examination of flow conditions at San Lucas Bridge resulting from Water Rights 89-18 releases and storm run-off.
5. An examination of specific periods of flow, minimum flow requirements, and how conditions in the Santa Ynez River affect flow release operations.
6. A dynamic review of the flow release operations conducted to meet Table 2 flows in Water Year 2020 (or the first Wet or Above Normal water year following the adoption of Order WR-2019-0148) and beyond. The review will be used to optimize future operations so that the minimum amount of water needed to consistently meet the Table 2 flow requirements at Alisal Bridge is released from Bradbury Dam.

Term 16(c)-16(e) of Order WR-2019-0148

Term 16(c) through 16(e) describe the protocol required for temporary reductions or terminations of Table 2 flows for the protection of the steelhead in the Santa Ynez River, as determined by the California Department of Fish and Wildlife (CDFW) or NMFS. Reclamation will notify the Executive Director of the Water Board of any changes to Table 2 flows recommended by CDFW or NMFS within the required timeframe via U.S. mail, e-mail, or telephone and will implement the required changes according to the most current operating guidelines. The determination by CDFW or NMFS to temporarily modify Table 2 flows, as well as the required supporting information, would be posted on Reclamation's publicly accessible SCCAO Operations page located at the following address: https://www.usbr.gov/mp/sccao/operations.html.

Term 16(f) of Order WR-2019-0148

Term 16(f) requires Reclamation to "confer with the Member Units to analyze reducing the safe yield of the Cachuma Project" within one year of the adoption of Order WR-2019-0148. Reclamation is further required to notify the Executive Director of the Water Board "in writing of any current or planned reduction to the Cachuma Project's safe yield" within 18 months of the adoption of Order WR-2019-0148.

Reclamation has been in contact with the County of Santa Barbara to schedule a meeting to discuss changes to the safe yield of the Cachuma Project and expects to complete this requirement within one year of adoption of the Order. Reclamation will notify the Executive Director in writing of any changes to the safe yield within 18 months of the adoption of the Order.

Attachment 1:
Table ES-1

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Table ES-1
Recommended Maximum Releases from Lake Cachuma to Meet
Long-Term Target Flows Under Biological Opinion in Highway 154 Reach

Condition:	Cachuma Storage < 120,000 acre-feet and no spill			Cachuma Storage > 120,000 acre-feet and no spill			Spill > 20,000 Acre-Feet		
Month	Highway 154 Bridge Target Flow	Reach Losses and Subflow	Maximum Release from Cachuma	Highway 154 Bridge Target Flow	Reach Losses and Subflow	Maximum Release from Cachuma	Highway 154 Bridge Target Flow	Reach Losses and Subflow	Maximum Release from Cachuma
	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs
January	2.5	0.8	3.3	5.0	0.8	5.8	10.0	0.8	10.8
February	2.5	1.0	3.5	5.0	1.0	6.0	10.0	1.0	11.0
March	2.5	1.1	3.6	5.0	1.1	6.1	10.0	1.1	11.1
April	2.5	2.1	4.6	5.0	2.1	7.1	10.0	2.1	12.1
May	2.5	2.8	5.3	5.0	2.8	7.8	10.0	2.8	12.8
June	2.5	3.3	5.8	5.0	3.3	8.3	10.0	3.3	13.3
July	2.5	3.5	6.0	5.0	3.5	8.5	10.0	3.5	13.5
August	2.5	3.2	5.7	5.0	3.2	8.2	10.0	3.2	13.2
September	2.5	2.6	5.1	5.0	2.6	7.6	10.0	2.6	12.6
October	2.5	1.7	4.2	5.0	1.7	6.7	5.0	1.7	6.7
November	2.5	1.0	3.5	5.0	1.0	6.0	5.0	1.0	6.0
December	2.5	0.8	3.3	5.0	0.8	5.8	5.0	0.8	5.8
Average			**4.5**			**7.0**			**10.7**

Notes:
1) Maximum release is the amount when there are no natural inflows between Bradbury Dam and Highway 154 Bridge and dam seepage. The maximum capacity of the Hilton Creek watering system is about 13 cfs.
2) Actual release will be the maximum release less natural inflows (see Note #3) between Bradbury Dam and Highway 154 Bridge and dam seepage. A minimum of 2 cfs will be maintained in Hilton Creek.
3) Natural inflows determined by the sum of measurements of Hilton Creek (excluding any dam releases) and San Lucas Creek flow plus 14% of the sum to account for the unmeasured drainage areas.
4) If Cachuma storage is below 30,000 acre-feet, releases (flushing flows) from Cachuma will be less than 30 acre-feet/month.

Attachment 2:
Operating Guidelines for Monitoring Target Flow of 1.5 cfs at Alisal Bridge

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STETSON ENGINEERS INC.

TECHNICAL MEMORANDUM

2171 E. Francisco Blvd., Suite K • San Rafael, California • 94901
TEL: (415) 457-0701 FAX: (415) 457-1638 E-mail: alis@stetsonengineers.com

TO: Bureau of Reclamation
Fresno, California

DATE: August 17, 2011

FROM: Ali Shahroody and Curtis Lawler

JOB NO: 1815-1

RE: Operating Guidelines for Maintaining Target Flow of 1.5 CFS at Alisal Bridge

The purpose of this memorandum is to provide guidelines for the operations at Bradbury Dam for maintaining the 1.5 cfs target flow at the Alisal Bridge during spill years with greater than 20,000 acre-feet of spill and the first year after such spill years. The following guidelines include coordination between agencies directly involved with the target flows including Cachuma Conservation Release Board (CCRB), U.S. Bureau of Reclamation (Reclamation), U.S. Geological Survey (USGS), Central Coast Water Authority (CCWA), and Cachuma Project Biology Staff (CPBS).

I. Background

The Biological Opinion (BO) issued by the National Marine Fisheries Service (NMFS, 2000) and the Lower Santa Ynez River Fish Management Plan (FMP) (Santa Ynez River Technical Advisory Committee, 2000) establish the long-term flow targets for the lower Santa Ynez River, as shown in Table 1. According to the BO and FMP, in years when Lake Cachuma spills 20,000 acre-feet or more, a target flow of 10 cfs will be maintained at the Highway 154 Bridge. Reclamation shall also provide a target flow of 1.5 cfs at the Alisal Bridge during spill years with greater than 20,000 acre-feet of spill and the first year after such spill years if steelhead/rainbow trout are present within the Alisal Reach. In years when Lake Cachuma does not spill or spills less than 20,000 acre-feet, the Highway 154 target flow will be determined at the start of each month based on reservoir storage: 5.0 cfs when storage is greater than 120,000 acre-feet and 2.5 cfs when storage is less than 120,000 acre-feet. Periodic releases to refresh the Stilling Basin and Long Pool below Bradbury Dam will be made when storage is less than 30,000 acre-feet. In addition, the BO requires a 2 cfs minimum flow in Hilton Creek as part of the Terms and Conditions to implement reasonable and prudent measure No. 2.

The original intention in establishing the 1.5 cfs target flow at the Alisal Bridge was based on an increase in fish populations in spill years and the year after spill. The BO states that "The available steelhead presence data indicates steelhead are found in the Alisal Reach in 4 out of the 5 years surveyed, or 80% of years. The years when nearly all of the observed steelhead were present were spill years or the year directly after a spill year." (NMFS, 2000)

Table 1

LONG-TERM MAINSTEM SANTA YNEZ RIVER REARING TARGET FLOWS

Lake Cachuma Storage	Reservoir Spill	Target Flow	Target Site
> 120,000 AF	Spill > 20,000 AF	10 cfs	Highway 154 Bridge
> 120,000 AF	Spill > 20,000 AF	1.5 cfs*	Alisal Road Bridge**
> 120,000 AF	Spill <20,000 AF or No Spill	5 cfs	Highway 154 Bridge
< 120,000 AF	No Spill	2.5 cfs	Highway 154 Bridge
<30,000 AF	No Spill	Periodic Release; ≤30AF per month	Stilling Basin and Long Pool

**When steelhead rainbow trout are present in the Alisal Reach.*
***This target flow will also apply to the water year immediately following a spill year (spill > 20,000 AF). Water year extends from October 1 through September 30.*

Source: NMFS, 2000 and Santa Ynez River Technical Advisory Committee, 2000.

The long-term BO releases for fish started after Lake Cachuma spilled in 2005. Spills for the period 2005 - 2008 were reported in acre-feet as follows (Reclamation, 2005 through 2008):

2005	260,078
2006	62,869
2007	0
2008	22,994

Because these spills were greater than 20,000 acre-feet and steelhead/rainbow trout were present in the Refugio and Alisal reaches (CPBS, 2007), the 1.5 cfs target flow was in effect for water years 2005, 2006, 2008, and the water year after the spills, 2007. Similarly, the 1.5 cfs target flow is in effect for water year 2009. In 2007, there was difficulty in maintaining the 1.5 cfs flow at the Alisal Bridge and fish mortalities were reported to NMFS (CPBS, 2007). Hence, there is a need for operating guidelines to maintain the minimum flow of 1.5 cfs at the Alisal Bridge during the designated periods.

II. Operating Guidelines for Maintaining 1.5 CFS Target Flow at Alisal Bridge

The approach to maintain the target flow at the Alisal Bridge is different than the method used to meet target flows at the Highway 154 Bridge. The Highway 154 Reach has private property restrictions; whereas, the Refugio and Alisal reaches have more variable conditions and field staff have unrestricted access. Therefore, real-time surface water flow monitoring at several locations in the Refugio and Alisal reaches should be the central component in maintaining the 1.5 cfs target flow. The operating guidelines for maintaining 1.5 cfs at the Alisal Bridge can be divided into four steps:

1. Real-Time Flow Monitoring;
2. Monitoring Beaver Dam Effects and Possible Removal;
3. Releases from Bradbury Dam; and
4. Post-Release Evaluation and Reporting.

It is recommended that the Reclamation and CPBS meet in April of each year of more than 20,000 acre-feet of spill and the first year after such spill year to plan for possible flow supplementation from Lake Cachuma using the outlet works, in addition to the HCWS in order to meet the 1.5 cfs flow target at the Alisal Bridge. CPBS should also report on the presence of steelhead/rainbow trout in the Refugio and Alisal reaches at this time.

It is important to note that some aspects of the above steps can be modified as necessary over time through calibration and adaptive management.

Step 1: Real-Time Flow Monitoring

The key parameters for tracking flow conditions in order to meet the target flow of 1.5 cfs at the Alisal (Solvang) Bridge include: (1) real-time flows in the Santa Ynez River at Solvang Bridge (USGS Gage ID No. 11128500); (2) USGS weekly instantaneous flow measurements at the Solvang Bridge; (3) CPBS weekly instantaneous flow measurements at three locations in the Refugio Reach (i.e. Meadowlark Pool, Lower Gainey Crossing, and Refugio Bridge) and at three locations in the Alisal Reach (i.e. Quiota Creek confluence, one mile above Alisal Bridge, and Alisal Bridge); (4) weekly inventory of beaver pool locations and dam heights, and (5) observations for unexpected increases in the Long Pool staff gage readings (USGS Gage ID 11126000) which would indicate beaver dam activity. Reclamation should be alerted once flows

at any of the six locations in the Refugio and Alisal Reaches fall below an early detection level that triggers an increase in the release from Lake Cachuma as discussed in Step 3.

Because the real-time flow rates in the Santa Ynez River at the Solvang Bridge affect the rate and timing of releases from Lake Cachuma, it is recommended to continue the arrangement with the USGS to calibrate the Solvang gage once a week and make weekly instantaneous flow measurements.

Six locations for weekly flow measurements are recommended to get a better representation of flow conditions in the entire length of the Refugio and Alisal Reaches. The exact locations chosen to measure surface flows should be based on the following criteria:

- Sites are evenly distributed by about a mile apart (total length of Refugio and Alisal reaches is about 7.5 miles);
- Avoid braided or heavily aggraded portions of the channels where surface flow conditions may not occur or flow measurements would be inaccurate; and
- Reliable water quality probe information can be collected at the sites.

The six recommended locations on the Santa Ynez River mainstem include the Meadowlark Pool (CPBS ID No. LSYR-5.4), Lower Gainey Crossing (LSYR-6.4), Refugio Bridge (LSYR-7.8), Quiota Creek confluence (LSYR-8.4), one mile above Alisal Bridge (LSYR-9.7), and Alisal Bridge (LSYR-10.5). As the channel structure changes due to large storm events, sites may become braided and no longer provide appropriate monitoring conditions. Therefore, monitoring locations for the 1.5 cfs target flow may need to be changed over time based upon the channel geomorphology.

Step 2: Monitoring Beaver Dams Effects and Possible Removal

Because the magnitude of the target flow level (1.5 cfs) at Alisal Bridge is small, even small beaver dams, particularly in combination with other small beaver dams, can affect flows in the mainstem. Beaver dams might impede flows needed to maintain residual pools further downstream. Multiple beaver dams could have the effect of significantly reducing the low flows in the downstream area. Therefore, the weekly monitoring of beaver pool locations and dam height is proposed as part of the real-time monitoring in Step 1. Sharp increases in the staff gage reading in the USGS Long Pool gage (11126000) typically indicate beaver dam activities. It is also recommended that a management practice that includes clearing beaver dams be developed by the CPBS and reviewed by the Adaptive Management Committee (AMC).

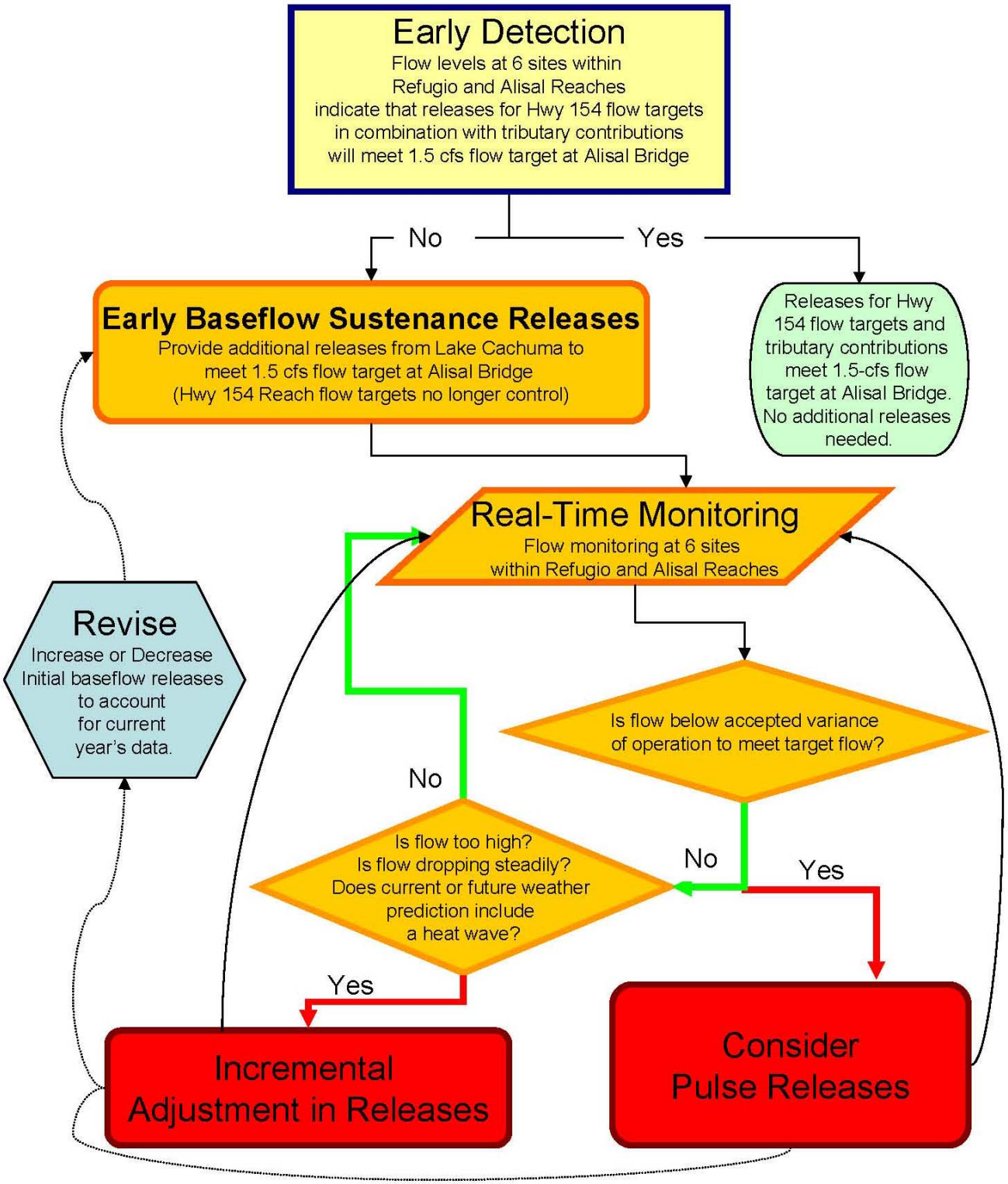
Step 3: Releases from Bradbury Dam

Figure 1 summarizes the decision tree for releases from Lake Cachuma to maintain the 1.5 cfs flow target. The process involves early detection (Section A), early sustenance releases for the 1.5 cfs flow target (Section B), real-time monitoring, and real-time adjustments including incremental adjustments and pulse releases (Section C).

A. Early detection

The goal of early detection is to determine whether or not there will be enough tributary contributions in combination with the releases for Highway 154 flow targets to meet the 1.5 cfs flow target at the Alisal Bridge. Often there is sufficient surface and subsurface flows from tributaries between the Highway 154 Bridge and Alisal Bridge in combination with releases at Bradbury Dam to meet the Highway 154 flow targets (10 cfs in the spill year of greater than 20,000 AF and 5 cfs in the year after) to meet the 1.5 cfs flow target at the Alisal Bridge. For example, Figure 2 shows that in spill years 2005 and 2006, there was enough water from the tributaries in combination with releases for the Highway 154 target to meet the 1.5 cfs flow target at the Alisal Bridge. Figure 3 shows that even in the early part of one of the driest years on record (WY 2007), the flow target of 1.5 cfs was still being met without additional releases for the period from October 2006 through March 2007 (six months). However, Figure 4 shows that the flow fell below 1.5 cfs at the Alisal Bridge starting in April 2007 and became progressively worse in May and June 2007, until a pulse flow (refreshing flow) was initiated at 70 cfs from Lake Cachuma on June 24, 2007.

Figure 1. Decision Tree for Releases from Lake Cachuma to Maintain 1.5 cfs Flow Target in Spill Years with more than 20,000 acre-feet of Spill and First Year after such Spill Years*



*Note: Decision tree only applies when steelhead rainbow trout are present in the Refugio and Alisal Reaches.

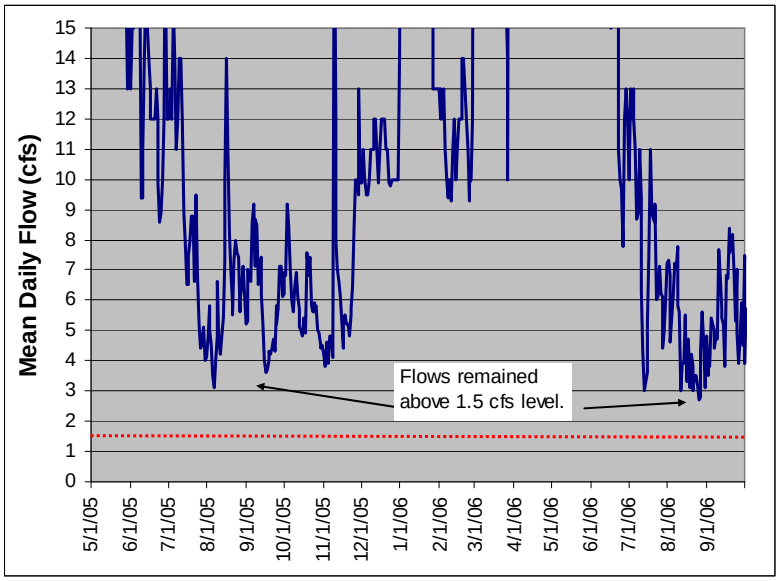


Figure 2. Mean Daily Flows at Solvang Gage in Spill Years, 2005 and 2006

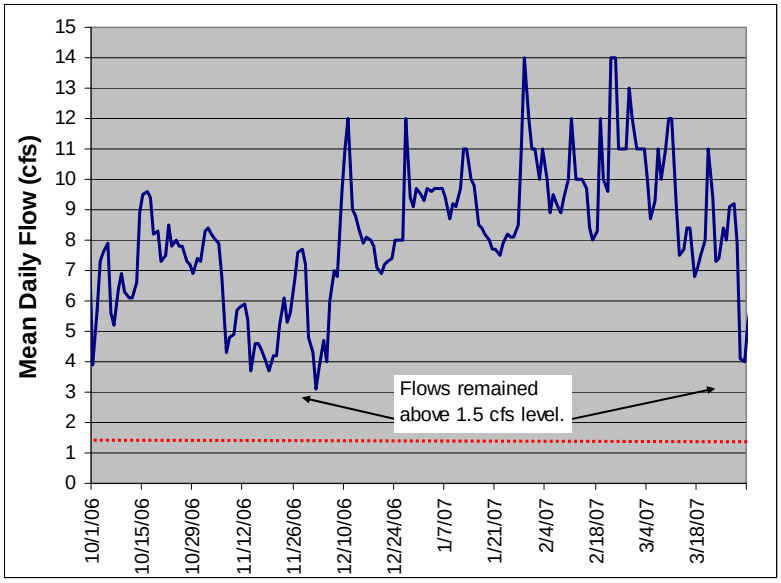


Figure 3. Mean Daily Flows at Solvang Gage in Year After Spill, Oct 2006 -March 2007

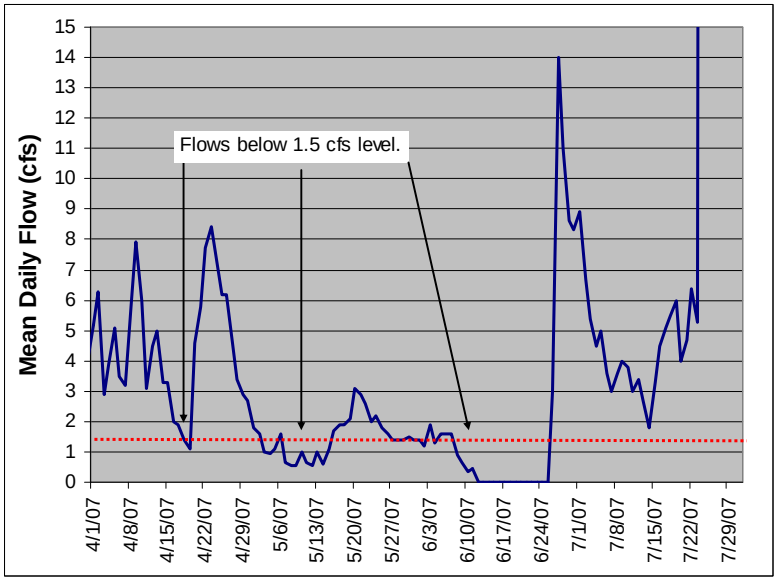


Figure 4. Mean Daily Flows at Solvang Gage in Year After Spill, April 2007 –July 2007

Figure 5 shows flows at the Solvang gage in April 2007 in comparison with April 2005 and 2006. Flows in April 2007 indicate much lower tributary flow and subflow contributions than in April 2005 and 2006. The summers of 2005 and 2006 did not need additional releases to meet the 1.5 cfs flow target at the Alisal Bridge. The low tributary contributions in April 2007 were followed by dry stream conditions in May and June 2007. Table 2 compares the minimum daily flows for each month in 2005, 2006, and 2007. Table 2 also includes a recommendation for an early detection when tributary flows are no longer able to maintain the 1.5 cfs flow target in combination with the releases for the Highway 154 flow target. This recommendation for an early detection flow can be adjusted based on additional information collected in the future. This recommendation is based upon the historical minimum flow observed in any month and the known consequence relating to maintaining the 1.5 cfs target flow as shown in Figures 2 through 4. For example, the minimum daily flow in April 2007 was less than the early detection level of 5.0 cfs, indicating that additional releases should be made at Bradbury Dam to support the 1.5 cfs target flow at the Alisal Bridge. This early detection indicates that releases at Bradbury Dam will no longer be controlled by the Highway 154 target flow but the Alisal Bridge target flow throughout the remainder of the water year. Early detection will trigger early baseflow releases as discussed in the next section.

Figure 5. Flows During Months of April at USGS Solvang Gage

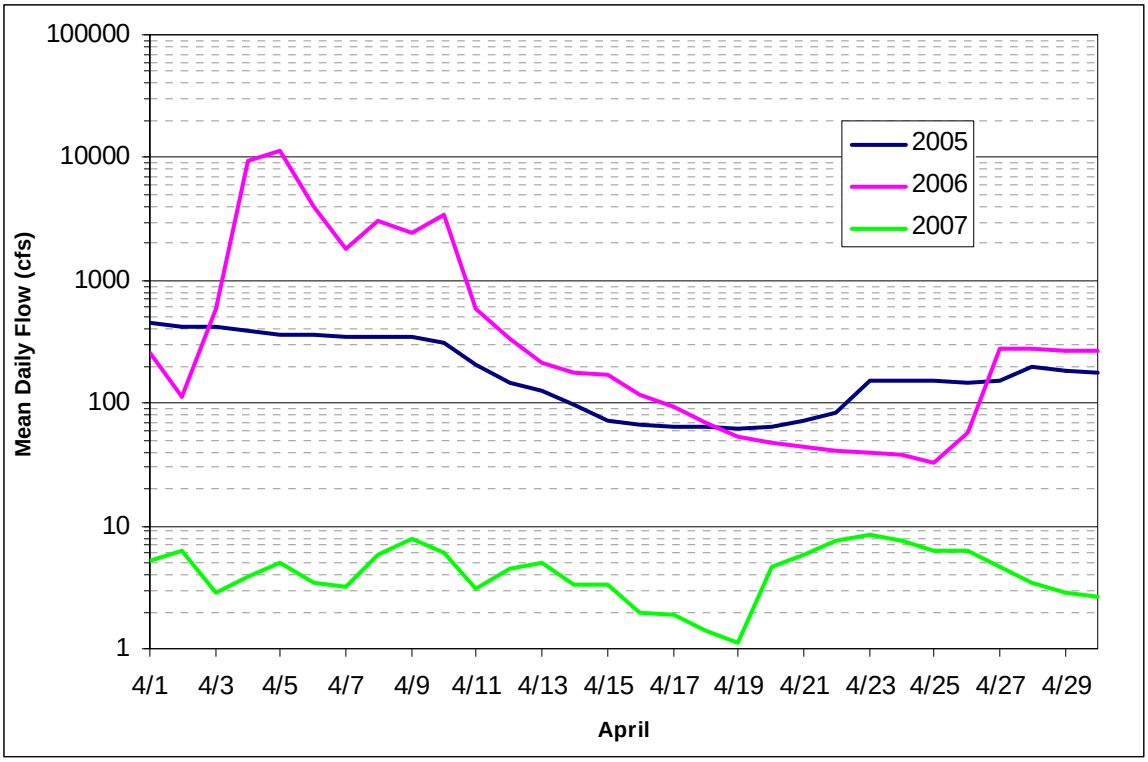


Table 2. Minimum Daily Flows Measured at Alisal Bridge in 2005-2007 and Recommended Early Detection Flows

	Measured Minimum Daily Flows (cfs) Water Year			Flow Levels for Recommended Early Detection [1]
	2005	2006	2007	(cfs)
October	na	4.4	3.9	3.0
November	na	3.8	3.7	3.0
Dec-March	na	9.3	3.1	3.0
April	63.0	33.0	1.1	5.0
May	13.0	19.0	0.5	5.0
June	8.6	7.8	na	4.0
July	4.0	3.0	na	3.0
August	3.1	2.7	na	3.0
September	3.6	3.5	na	3.0

1 Spot flow measurement at Alisal Bridge, daily flow at the USGS Solvang real-time gage (adjusted by spot flow measurements) or other designated sites in the Refugio and Alisal Reaches is initially designated a flow level for the recommended early detection and initiating the decision tree (Figure 1). These early detection triggers can be modified in the future and differentiated by site as more data is gained.

na Not applicable.

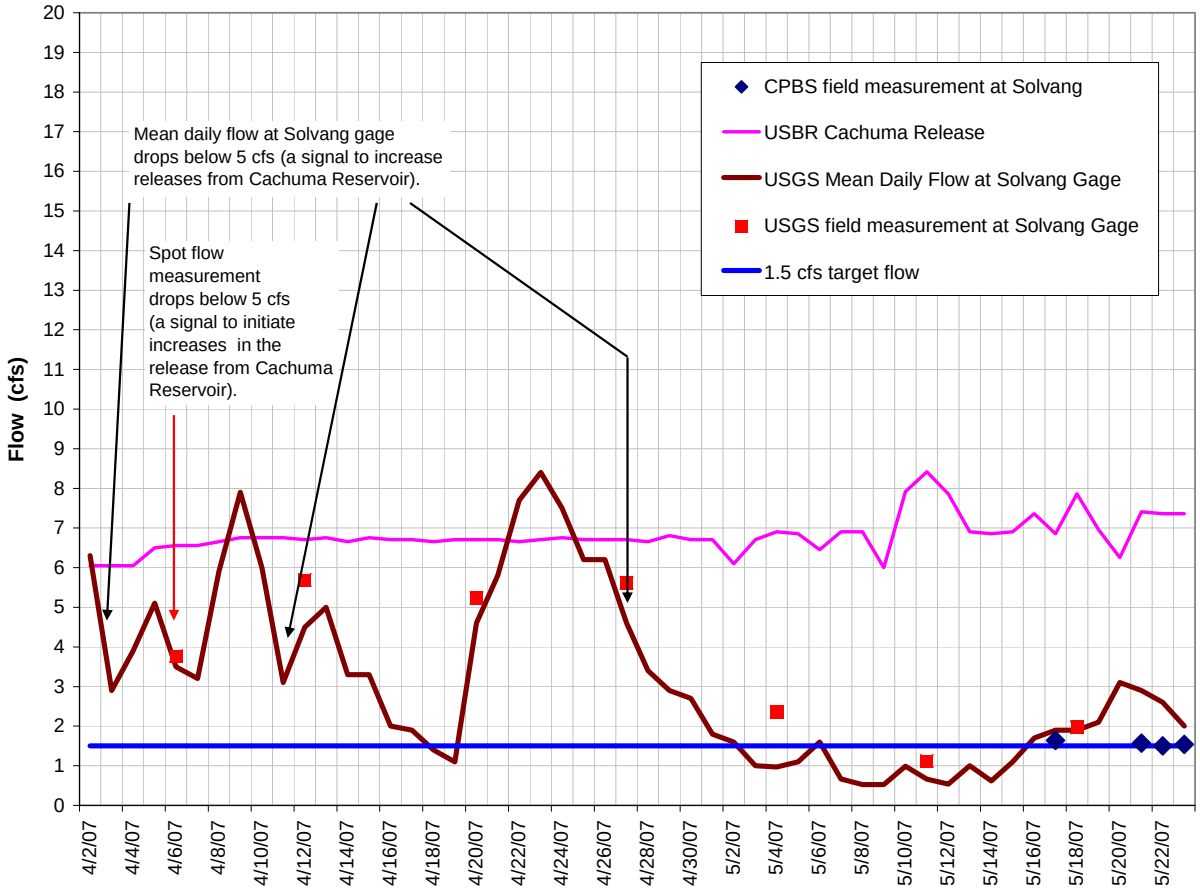
When using the USGS Solvang Gage data, an adjustment should be applied based on the difference between the latest instantaneous ("spot flow") measurement and the corresponding 15-minute reading. Table 2 shows flow levels for early detection which will be refined over time as more experience is gained. Once information is gained on the other five flow monitoring sites in the Refugio and Alisal reaches, the early detection flow levels can be varied amongst the measurement sites in order to strengthen the overall early detection process.

Two examples are provided below to explain why the proposed flow levels in Table 2 were chosen. Figure 2 shows the daily flows at the USGS Solvang gage in 2005 and 2006. The daily flows at the Solvang gage were above 3 cfs, except for 1 day in August 2006, which is why an early detection flow level of 3 cfs is chosen for the summer months (July-September) as shown in Table 2. In these spill years (2005 and 2006), additional releases from Lake Cachuma were not needed to maintain the 1.5 cfs flow target at the Alisal Bridge.

Figure 6 shows the mean daily and spot flow measurements made in 2007, a year after a spill of more than 20,000 acre-feet in 2006. Using the early detection for the flow levels proposed in Table 2, releases from Lake Cachuma would have been increased during the first part of April due to both the daily flow and spot measurement at the Alisal Bridge receding below 5 cfs on April 3, 2007. Actual increases in the release from Lake Cachuma began on May 24, 2007

(about 52 days later) which was too late to maintain the needed flow for meeting the Alisal target.

Figure 6
Mean Daily and Spot Flow Measurements at Solvang Gage in 2007



B. Early Baseflow Sustenance

Dam operators and CPBS should be notified immediately once a measured flow has fallen below the flow level for an early detection. Depending upon the current flow in the HCWS, this would most likely trigger additional releases using the outlet works. If the outlet works are used for the additional releases, initial coordination must also include Reclamation (dam tenders) notifying the Central Coast Water Authority (CCWA) to temporarily reduce or stop delivering State Water Project (SWP) water through the outlet works if there is a conflict with either the 50% limitation or 100% limitation. The 50% mixing conflict may occur under limited conditions. There would be a conflict with the 50% mixing limitation when CCWA is making a full delivery (22 cfs) and releases are within the range of 25 to 45 cfs. The BO states that "CCWA water will not exceed 50% of the total rate of releases to the river" and "CCWA water will not be mixed into the waters of

the Santa Ynez River during the months of December through June unless flow is discontinuous in the mainstem." Another concern of using the outlet works is the temperature of the CCWA water. The BO states that "Reclamation and CCWA have agreed that this water will not enter the stilling basin with a temperature over 18 degrees Celsius."

Because the target flow of 1.5 cfs is small, there is very little room for margin of error. Furthermore, due to the long distance between Bradbury Dam and Alisal Bridge (about 10.5 miles with lag-time/travel-time varying from 16 hours to 5 days), an additional factor of reliability should be included as part of maintaining the target flow. Also, hourly fluctuations in flow due to evapotranspiration and groundwater demand could result in the flow to fall below the target level, if flows are attempted to be maintained at exactly 1.5 cfs. Initially, twice the target flow level of 1.5 cfs should be used as a guide to maintain the target flow. Therefore, it is proposed that 3.0 cfs be the "operational" target flow for the Refugio and Alisal Reaches, once the early detection of declining tributary contributions has been signaled. Flows at the Alisal Bridge should then be maintained in the range of 1.5 to 5.0 cfs through a combination of increased early baseflow releases from Lake Cachuma to account for expected seasonal increase in temperatures, small incremental adjustments, and pulse flow releases. Water for the releases is provided from the 3.0-foot surcharge and the Project supply. To the extent that actual operations would require more releases than envisioned under the BO, it would result in an increased impact to the Project yield.

Table 3 provides a recommendation for the early baseflow sustenance releases. Table 3 also shows the maximum releases for meeting the Highway 154 targets in a spill year greater than 20,000 af and the subsequent year (Stetson, 2004). If the flow level for the early detection has not been reached (Table 2), releases from Lake Cachuma should be regulated, first, to meet the Highway 154 Reach targets (either 10 cfs in the spill year or 5 cfs in the subsequent year). Once the flow level for the early detection has been reached, the releases should then be set to meet the greater of the releases to meet the Highway 154 or Alisal/Refugio targets. In a year after a spill, the releases are always set to meet the Alisal/Refugio target flow (1.5 cfs). In a spill year, the releases for meeting the Highway 154 target flow is greater than the releases for meeting the Alisal target for the months of January through May and smaller during the months of June through September. Table 3 is based on no releases under WR 89-18. This is generally true in spill years. In the year following the spill, there could be water rights releases (WR 89-18) which are operated conjunctively to reduce the releases shown in Table 3.

This recommendation for the baseflow releases is based partly on the relative increase in evaporation as the summer progresses as shown in Figure 7 and also the experiences in 2007 and 2008 as shown in Figure 8 and Figure 9, respectively. The source of data used for the monthly Cachuma pan evaporation is the Santa Ynez River Hydrology Model (SYRHM) and the model takes into account the pan-to-lake monthly factor. The increase in baseflow releases generally agrees with the seasonal increase in lake evaporation.

Figure 8 shows that once a steady state flow condition was reached by July 4th 2007, a release of about 17 cfs from Lake Cachuma was able to keep the flow above the 1.5 cfs target flow in one of the driest years on record. Figure 8 also shows that there is a good relationship (balance) between the recommended baseflows for April through June compared to the pulse flow release that was needed in late June, 2007. The difference between the recommended releases and actual releases for the period April 3 – June 23, 2007 was about 560 acre-feet. The requirement for the pulse release for the period June 24 – July 3, 2007 was about 460 acre-feet.

Figure 9 shows that the target flows of 1.5 cfs at Alisal Bridge were generally maintained throughout 2008 except for about 7 days near the end of June 2008. Starting June 20, 2008, flows at Alisal Bridge dipped below 1.5 cfs with the releases of 12 cfs from Bradbury Dam in the preceding 10 days. Releases from the dam were then raised to 15 cfs on June 20. A pulsed release was necessary at that point which raised the flows above 1.5 cfs on June 27th. An early baseflow sustenance release of 14 cfs in early June in tandem with more monitoring of flow conditions in the Refugio and Alisal reaches could have prevented the flows from dipping below 1.5 cfs. Fortunately, the flows in June 2008 did not go completely dry, which occurred for about two weeks in June 2007. As more experience is gained it is expected that the early flow sustenance releases recommended in Table 3 can be refined. Even then, the releases from the dam must be handled on a real-time basis for incremental adjustments as shown in Figure 1. Each water year will require different adjustments as hydrologic conditions vary from one year to another.

Table 3. Recommended Early Flow Sustenance Releases from Lake Cachuma for 1.5 cfs Targets at Highway 154 and Alisal Bridges[1]

	Maximum Release from Lake Cachuma to Meet Highway 154 Reach Targets		Recommended Early Flow Sustenance Releases for 1.5 cfs Target in Refugio and Alisal Reaches[3]
	Spill >20,000 af	Year After Spill[2]	
	cfs	cfs	cfs
October	na	6.7	12.0
November	na	6.0	10.0 / 8.0 [4)]
December	na	5.8	6.0
January	10.8	5.8	6.0
February	11.0	6.0	6.0
March	11.1	6.1	6.0
April	12.1	7.1	9.0
May	12.8	7.8	12.0
June	13.3	8.3	14.0
July	13.5	8.5	16.0
August	13.2	8.2	16.0
September	12.6	7.6	16.0 / 12.0 [5)]

1) Highway 154 releases are from Stetson, 2010, "Evaluation of Aerial Photos for Monitoring Instream Target Flows in the Highway 154 Reach of Lower Santa Ynez River, California ". These releases include HCWS and outlet works.
2) Cachuma storage greater than 120,000 acre-feet. The target flow at Highway 154 in a year after a spill is reduced from 10 cfs to 5 cfs.
3) Sustenance releases come into effect only after flow level for early detection is reached.
4) Release initially 10.0 cfs for November 1-15 and then 8.0 cfs for Nov.16-30.
5) Release initially 16.0 cfs for September 1-15 and then 12.0 cfs for Sept. 16-30.
na Not applicable.

Figure 7
Recommended Monthly Releases for 1.5 cfs Flow Target at Alisal Bridge

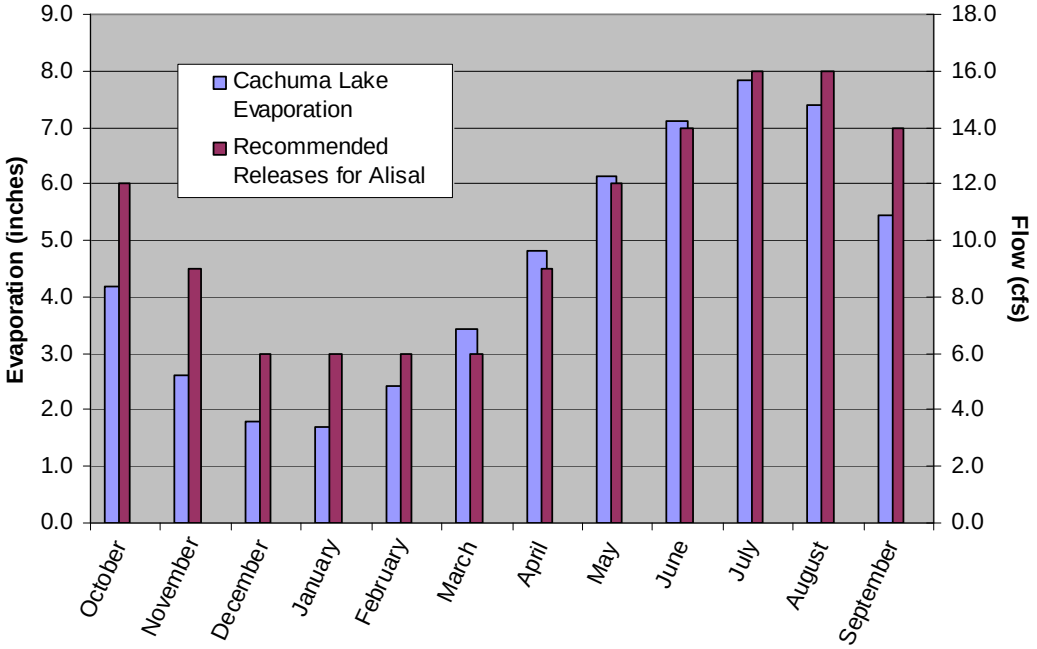


Figure 8
Example of Recommended Monthly Releases for 1.5 cfs Target Flow at Alisal Bridge in 2007

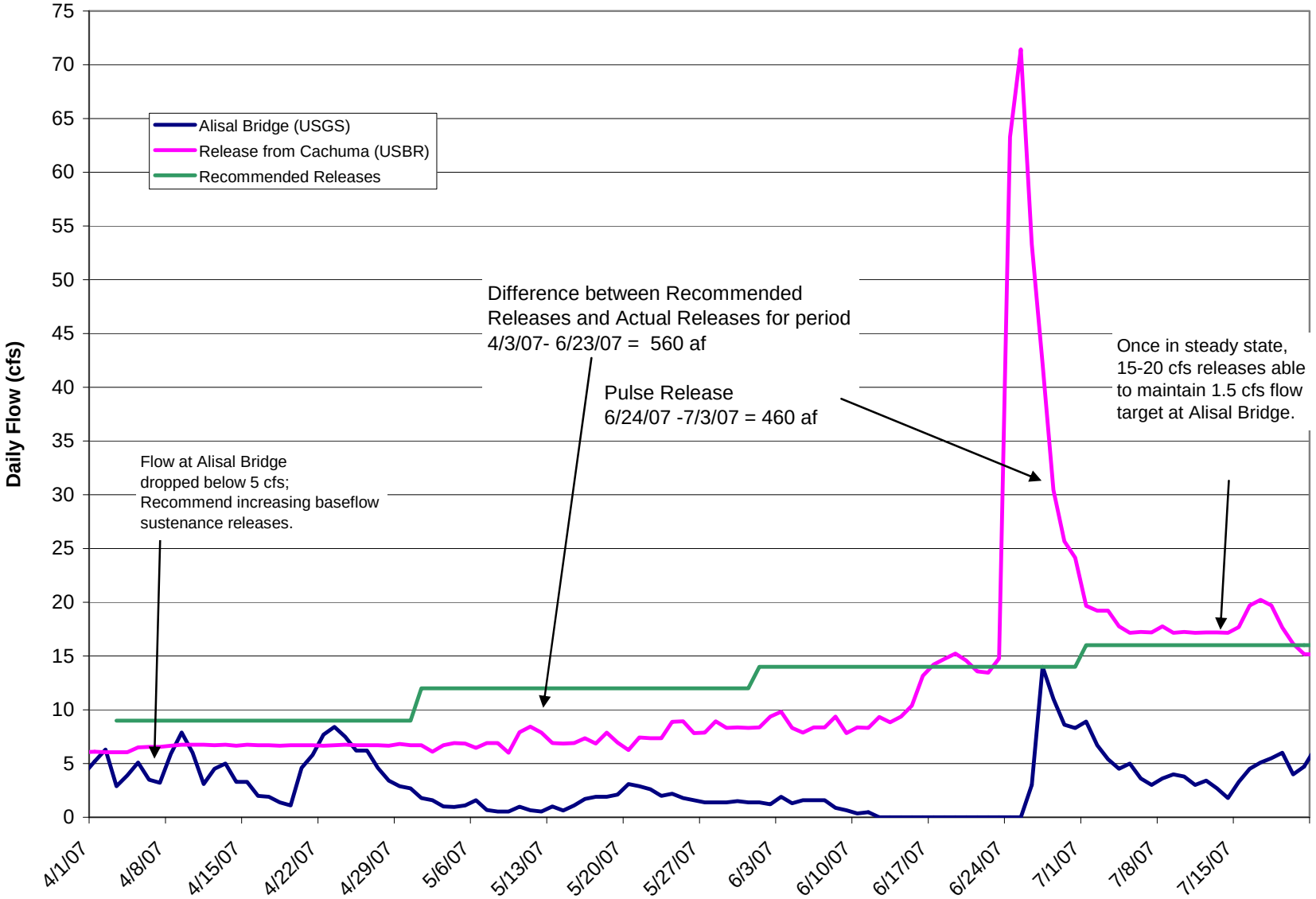
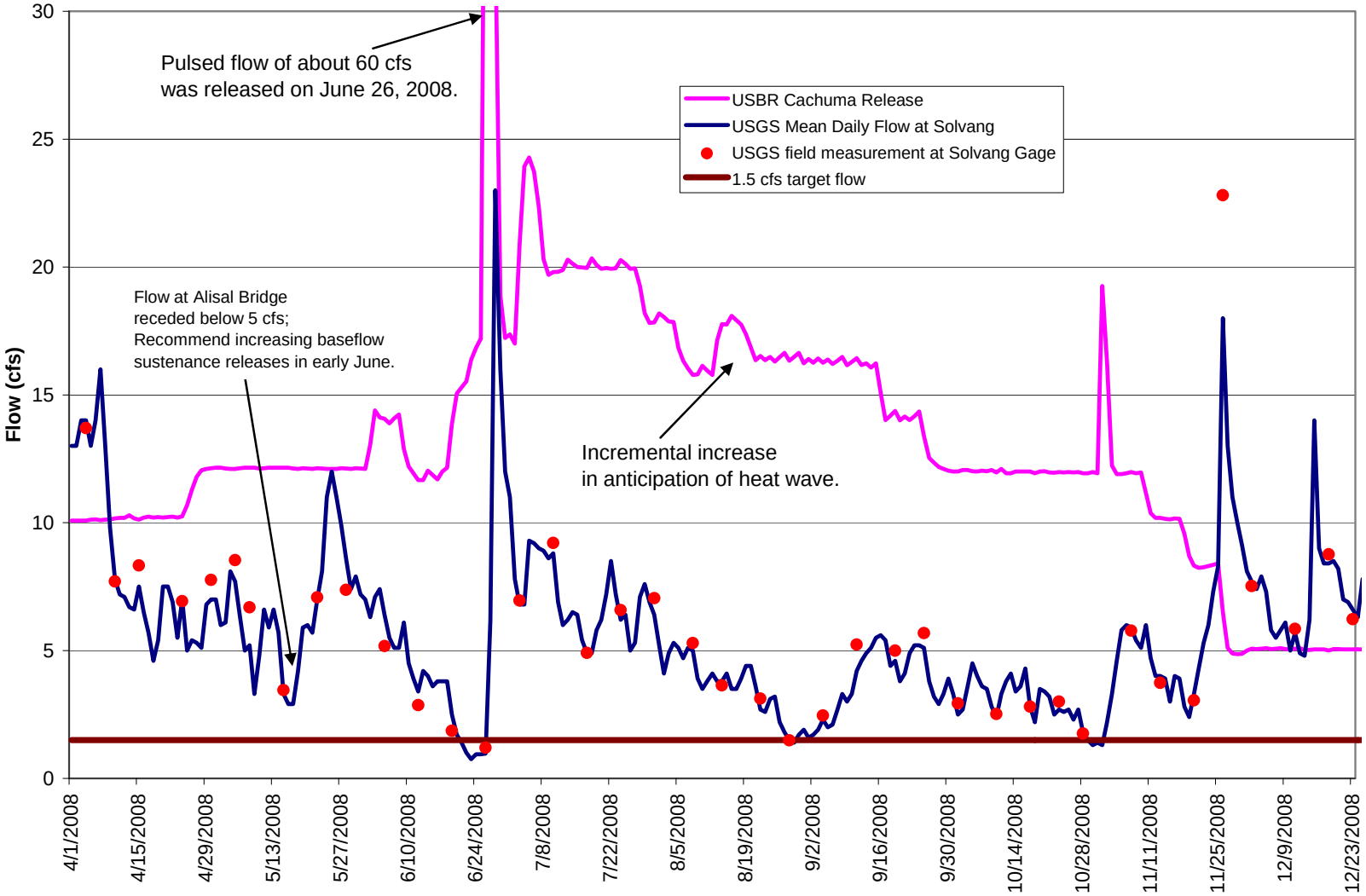


Figure 9
Summary of Flow Data for 1.5 cfs Target Flow at Alisal Bridge in 2008



*Note: 2008 was a spill year greater than 20,000 af, so flow targets at the 154 Bridge would control releases until about June.

C. Real-Time Monitoring, Release Adjustments, and Pulse Releases

Increases or decreases in releases (other than the planned early baseflow releases) will be based on real-time monitoring at the six locations described in Step 1. The effect of any change in the release should first be noticed at the Meadowlark Pool location, and likewise at each succeeding monitoring location downstream including the Alisal Bridge location. The initial increase in baseflow releases will be adjusted up or down depending upon the flow behavior at the six monitoring locations with respect to the operational target flow (recommended at 3 cfs) with accepted variance (recommended from 1.5 to 5 cfs). In general, there will be two types of adjustments, small incremental changes or a pulse flow release (Figure 1).

If the flow at Alisal Bridge is above the accepted variance of the operational target flow (5 cfs), then small decrements (1 to 2 cfs/day) in the release from Lake Cachuma should be made. The release should not be decreased below the maintenance release for the target flows at the Highway 154 Bridge (either 10 cfs in the spill year or 5 cfs in the subsequent year) as shown in Table 3. If the flow is within the accepted variance of the operational target flow (1.5 to 5 cfs) but appears to be decreasing or the weather is currently or forecasted to experience a heat wave (temperatures in high 90s or 100s for several days) the releases from Lake Cachuma may need to be increased by small increments (1 to 2 cfs/day).

If the flow at the Alisal Bridge is below the accepted variance of the operational target flow (1.5 cfs), a pulse flow release should be undertaken as soon as possible, similar to those implemented in June 2007 and June 2008. The release should be made through the outlet works at a relatively high initial rate (40-70 cfs) in order to refresh the residual pools quickly, but not at such a rate that passes too much flow beyond the Alisal Bridge location. Also, beaver dams should be breached by the CPBS to the extent accessible under these conditions. The pulse flow is provided from the 3.0-foot surcharge and the Project.

Step 4: Post-Release Evaluation and Reporting

In summary, the initial increase in releases from Lake Cachuma to maintain the 1.5 cfs flow target is based on data from recent years (2005, 2006 and 2007) when the long-term mainstem target flows were in effect. As more data are collected, these changes in release can be adaptively managed to increase efficiency and effectiveness. More data is needed on the spot measurements at the six monitoring locations including the Alisal Bridge. In years of more than

40,000 acre-feet of spill and depending on time and period of spill, it is expected that tributary contributions in combination with the releases for the Highway 154 Reach will most likely maintain the 1.5 cfs target flow in the Alisal reach. A year following a spill year (spill > 20,000 af) or a year with small spill will require additional releases from Lake Cachuma to meet the target flow beyond the Highway 154 reach. Once the flow at the Alisal Bridge falls below the early detection flow level (Table 2), the early baseflow sustenance releases should be started (Table 3). These early detection flow levels and early sustenance releases will most likely need some degree of fine tuning as the season progresses. The adjustments could include small incremental changes in release or a relatively high pulse flow release, depending upon the real-time monitoring at the six flow monitoring locations.

An evaluation of the overall efficiency and effectiveness of the operation for maintaining the 1.5 cfs flow target in the Refugio and Alisal reaches should be conducted annually. The real-time adjustments made during that year can be reviewed and used to revise the early detection flow levels and flows. CPBS should write the annual report and evaluate the performance of the 1.5 cfs target flow maintenance operation. The early detection flow levels and sustenance flow releases can be adjusted in the future as more data is collected.

III. REFERENCES

Cachuma Project Biology Staff. October 1, 2007. Incident Report to NMFS, steelhead/rainbow trout mortalities at Alisal Road Bridge.

National Marine Fisheries Service (NMFS). 2000. Biological Opinion. U.S. Bureau of Reclamation operation and maintenance of the Cachuma Project on the Santa Ynez River in Santa Barbara County, California. September 8, 2000.

Santa Ynez River Technical Advisory Committee (SYRTAC). 2000. Lower Santa Ynez River Fish Management Plan. Volumes I and II. Prepared for the Santa Ynez River Consensus Committee, Santa Barbara, CA. Final Report. October 2, 2000.

Stetson Engineers. 2004. Evaluation of Outflows and Inflows Between Bradbury Dam and Highway 154 Bridge.

U.S. Bureau of Reclamation. 2005 through 2008. Monthly Santa Ynez Downstream Users Accounting.

Introduction

On September 17, 2019 the State Water Resources Control Board (Water Board) adopted Final Order WR-2019-0148 amending the Bureau of Reclamation's (Reclamation's) water rights permits 11308 and 11310 for the Cachuma Project in Santa Barbara, California. Reclamation provides the following Plan in accordance with Term 18 of Order WR-2019-0148 to describe "the measures in place, or that will be implemented to and 16."

NMFS-1

Commented [NMFS1]: What follows in regard to ensuring compliance with Term 15 is solely directed at Terms 15(a) implementing Table 1 *Mainstem Rearing Flows* and 15(c) regarding Hilton Creek Water System interruptions.

However, Term 15 is much broader; it requires Reclamation to implement conservation measures including but not limited to those described in Revised Section 3 (Proposed Action) of the Biological Assessment for Cachuma Project Operations and the Lower Santa Ynez River, June 2000, taking into consideration the 2013 Biological Assessment with any amendments and the 2016 Draft Biological Opinion. Yet, Reclamation does not identify any such conservation measures and the measures to ensure implementation.

Term 15 also requires Reclamation to comply with all of the Reasonable and Prudent Measures (RPM) 5 and 7 through 13, set forth at page 68, and the Terms and Conditions, set forth at pages 70-78, in NMFS' September 8, 2000, biological opinion. Yet, Reclamation does not describe the measures to ensure compliance with these RPMs and terms and conditions.

The Term 18 Plan should include how Reclamation intends to implement conservation measures and comply with RPMs and terms and conditions in NMFS' September 8, 2000, biological opinion as required in Term 15 and described above in this comment pending conclusion of reinitiated formal consultation under the ESA.

Term 15(a) of Order WR-2019-0148

Term 15(a) of Order WR-2019-0148 requires Reclamation to "release or bypass water to maintain the following Mainstem Rearing instream flows in the Santa Ynez River, as set forth below [in Table 1] at all times." The flows in Table 1 are also required for Reclamation's continued compliance with the *Biological Opinion for the operation and maintenance of the Cachuma Project on the Santa Ynez River in Santa Barbara County, California* issued by the National Marine Fisheries Service (NMFS) in 2000 (2000 BiOp).

Table 1 Mainstem Rearing Flows

Reservoir Spill[a] (af)	Lake Storage[b] (af)	Flow (cfs) Requirements at:		
		Highway 154	*Alisal Road*	*Stilling Basin & Long Pool*
≥ 20,000	NA	10	1.5[c]	-
< 20,000	≥ 120,000	5	1.5[d]	-
	≥ 30,000 and < 120,000	2.5	1.5[d]	-
	< 30,000	-	-	30 af/mo[e]

NA - not applicable

[a]Reservoir spill is calculated cumulatively over the course of the water year (FEIR, Vol. IV, Appendix F, Draft Technical Memorandum No. 5, p. 6), which begins October 1 (FEIR, Vol. IV, Appendix F, Draft Technical Memorandum No. 5, p. 8).

[b]Lake storage is measured on the first day of each month. (FEIR, Vol. IV, Appendix E, Technical Memorandum No. 1, p. 5.)

[c]The specified flow applies only when *Oncorhynchus mykiss* are present.

[d]The specified flow applies only if there was reservoir spill greater than or equal to 20,000 af in the prior water year and *Oncorhynchus mykiss* are present in the Alisal Reach.

[e]When there is less than 30,000 acre feet (af) of total water stored in the reservoir, regardless of origin, right holder shall provide periodic releases of 30 af per month to refresh the Stilling Basin and Long Pool directly downstream of the dam to provide for *Oncorhynchus mykiss (O. mykiss)* rearing in these areas. Less than 30 af per month may be released upon determination by the fishery agencies and the State Water Board that less water is necessary to refresh the Stilling Basin and Long Pool directly downstream of the dam for *Oncorhynchus mykiss* in these areas.

Attachment 3:
Cachuma Project
Fish Rescue Plan

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LOWER SANTA YNEZ RIVER FISH RESCUE PROGRAM

PREPARED FOR:

Bureau of Reclamation
South-Central California Area Office
1243 N Street
Fresno, CA 93721

PREPARED BY:

Cachuma Conservation Release Board; Santa Ynez River Water Conservation District, Improvement District #1; and Santa Ynez River Water Conservation District

November 2019

Cachuma Conservation Release Board; Santa Ynez River Water Conservation District, Improvement District #1; and Santa Ynez River Water Conservation District. October 2019. *Santa Ynez River Fish Rescue Program*. Prepared for Bureau of Reclamation, Fresno, CA.

Contents

Acronyms and Abbreviations

°C	degrees Celsius
CDFW	California Department of Fish and Wildlife
ESA	Endangered Species Act
LSYR	Lower Santa Ynez River
NMFS	National Marine Fisheries Service
Project	Cachuma Project
Reclamation	Bureau of Reclamation

Chapter 1
Rescue Program Purpose and Need

1.1 Introduction

This document presents the Fish Rescue Program that will be implemented as part of the Cachuma Project (Project). Endangered Southern California steelhead (*Oncorhynchus mykiss*) are known to occur in the Lower Santa Ynez River (LSYR) watershed downstream of Bradbury Dam. This plan outlines procedures to rescue and relocate steelhead from the LSYR and its tributaries below Bradbury Dam to reduce or eliminate the potential for steelhead stranding in low-flow years when stream reaches may naturally run dry, during maintenance events that may cause low flows or cessation of flows, during emergency shut-down of Project operations, or during ramping of water releases from the Project. This plan also describes a proposed Fish Rescue Facility, which would house rescued *O. mykiss* temporarily, in times of severe or prolonged drought when suitable habitat in the LSYR watershed is unavailable for supporting *O. mykiss*. Fish rescues may be essential to reduce the potential adverse effects of stranding *O. mykiss.* Stranding may be caused by natural conditions or by Project-related actions. Low flows are characteristic of Southern California streams during droughts.

1.2 Fish Rescue

Stream flows in the Santa Ynez River watershed are dependent upon precipitation and are affected by the local Mediterranean climate, which is typical of the Southern California region. The climate is characterized by high summer temperatures and general lack of summer rainfall. This combination causes many streams to dry up completely or support very low flows during the summer and early fall. These factors can cause water temperatures and dissolved oxygen concentrations to reach levels that are lethal to steelhead. Both historically and expected in the future, natural low summer flows in the LSYR mainstem and in the lower portions of tributaries to the LSYR result in steelhead habitat fragmentation or desiccation, stranding and killing *O. mykiss* and other fish.

Historically, before construction of Bradbury Dam, most of the mainstem below Gibraltar Dam typically ran dry between May and July of most years (Shapovalov 1944). The California Department of Fish and Game (now called California Department of Fish and Wildlife [CDFW]) undertook large-scale steelhead rescues below Gibraltar Dam during the 1930s and 1940s. Steelhead rescues were typically made over approximately 28 miles in the LSYR mainstem between what is now the Highway 154 Bridge and Gibraltar Dam. The only mainstem refuge habitats available were isolated large pools and a few miles of stream near Solvang that stayed wetted due to natural spring seepage. Occasionally, rescues were also conducted on tributaries (Shapovalov 1944).

Currently, as a result of local climate, natural conditions may necessitate fish rescues. During summer months or dry years, steelhead are forced into smaller and potentially isolated pools as water levels recede. In the LSYR and its tributaries, pools may dry up altogether, or the water quality of these pools may become unsuitable or lethal conditions for steelhead due to high water temperatures and low dissolved oxygen concentrations.

In addition, steelhead in the LSYR have the potential to be affected by natural and anthropogenic environmental catastrophes. Compared to their northern counterparts, Southern California steelhead, which occupy the southern edge of the geographic range for steelhead, are subjected to a higher frequency and greater severity of natural cataclysmic events. This is evidenced by the fires and debris flows that occurred recently in the Santa Ynez River and Ventura River in 2018. In addition, the LSYR mainstem and tributaries are near urban centers and are crossed by multiple roads. These multiple road crossings bring with them the potential for anthropogenic disasters such as oil or chemical spills that may enter the stream channel, disrupt habitat, and result in mortalities. Fish rescue efforts could be required following such cataclysmic events.

In addition to being influenced by precipitation, stream flows in the LSYR mainstem and Hilton Creek are supported by water releases from the Project, which provide increased over-summering habitat in the upper mainstem reaches and in Hilton Creek via the Hilton Creek Watering System. Recently, the Bureau of Reclamation (Reclamation) constructed the Hilton Creek Emergency Backup System to provide greater reliability of the flow releases in Hilton Creek. Reclamation implements ramping during water release reductions to avoid stranding fish.

While improvements to the Hilton Creek Watering System and implementation of the Emergency Backup System make Hilton Creek flow interruptions much less likely, there remains some potential for fish rescue in Hilton Creek or the LSYR mainstem if flow releases fail or must be shut down for emergency or maintenance activities, or if ramping rates are not met or are not successful in avoiding stranding.

Reclamation has also proposed a flow regime to assist in management of predatory, non-native fish populations in the mainstem of the LSYR. There has been a proliferation of non-native nuisance and predatory species in response to perennial flows being released from Lake Cachuma under the 2000 biological opinion (Cachuma Operation and Maintenance Board 2008–2016). Increasing abundance of beaver dams may impede *O. mykiss* passage on the mainstem and create ponded habitat advantageous to non-native predatory species, such as largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieu*), channel catfish (*Ictalurus punctatus*), and green sunfish (*Lepomis cyanellus*). These fish species can prey on juvenile *O. mykiss* during their rearing and outmigration phases.

The proposed flow regime more closely mimics historic flow conditions that had previously restricted beaver use of the LSYR. In critically dry periods, water releases for fish would be restricted to 30 acre-feet per month to maintain *O. mykiss* refugia habitat in Hilton Creek. While some of this release may also maintain refugia in the upper portion of the Highway 154 Reach, the majority of the Highway 154 Reach and most of the Refugio and Alisal reaches would be allowed to temporarily dewater, mimicking natural conditions prior to the construction of the Cachuma Project. The periodic dry-back would dewater the river habitat supporting populations of non-native predatory fish. Reduction in the abundance of predatory fish is expected to benefit *O. mykiss* migration and survival when instream flows are reestablished; in subsequent normal and wet periods, the *O. mykiss* are expected to have a head start in population increase before predatory fish populations reestablish. While conditions in the mainstem river are generally unfavorable for *O. mykiss* during critically dry periods, there is a potential that dewatering actions could result in stranding of *O. mykiss*, necessitating a rescue effort.

1.3 Fish Rescue Facility

Lessons learned during the 2012–2016 drought indicate that the proposed water management strategy should be supplemented with the ability to rescue and relocate *O. mykiss* at risk of loss due to drying refugia (Cachuma Operations and Maintenance Board 2008–2016). As the severity of the 2012–2016 drought intensified and the mainstem river and its tributaries dried, the Local Interests and Reclamation pursued authority to capture and relocate *O. mykiss* at risk of stranding in the Alisal Reach. No authority was granted. One of the issues was that there was a lack of suitable habitat remaining in the LSYR due to the historic drought and no facilities were available that could hold the fish for later return to the river (see Adaptive Management Committee Reports 2014–2015). Climate change predictions (Langridge 2018; Bedsworth et al. 2018; Swain et al. 2018) indicate that, in the future, severe droughts are likely to be more frequent and more extreme. To avoid repeating the harm to steelhead populations experienced during the 2012–2016 drought and to support other rescue and relocation efforts, a rescue facility is being proposed for construction. The facility will be capable of holding *O. mykiss* through drought periods when habitat conditions in the LSYR watershed preclude moving rescued *O. mykiss* to other areas of the mainstem river or tributaries. Fish would be held and reared in the facility until conditions allow for return to the watershed.

The anadromous population of *O. mykiss* in the LSYR is likely fewer than 100 returning adults each year (M. Capelli pers. comm. 2003, *cited in* Good et al. 2005). Trapping of returning anadromous adults has generally documented only zero to four adults annually (LSYR monitoring program results from 2000–2017), with a peak of 16 adults observed in 2008. Therefore, population abundance and effective population size[1] is quite low in the LSYR.

Estimates based on genetic analysis suggest 11 to 61 spawning adults (mean=28.2) for Salsipuedes Creek and 17 to 131 spawning adults (mean=50.5) in Hilton Creek (Garza and Clemento 2008) prior to the extremely low 2015 water year. With such a small effective population size, the LSYR steelhead population is highly vulnerable to potential extirpation from catastrophic events such as the 2017/18 Thomas fire and subsequent debris flow and sediment loading in streams used by *O. mykiss*. A rescue facility would provide a safe haven for steelhead in times of drought, and for fish from areas affected by fire or exposed to potential debris flows.

Rescue facilities can reduce the likelihood of extinction by collecting fish that otherwise would have experienced mortality. The rescue of these fish would act to protect and retain population genetic diversity associated with anadromy and other characteristics that promote life history variability (McElhany et al. 2000; NMFS 2012). The release of the rescued *O. mykiss* will contribute to a reduced extinction risk by increasing the total abundance of fish (above conditions that would have occurred without the rescue facility), providing a buffer against catastrophic events. Re-released rescued fish could also increase production and the total abundance of successful spawners and safeguard the proportion of anadromous alleles in the population.

The Local Interests and Reclamation view the rescue facility as an integral part of the revised water management strategy. The facility is not intended to be a conservation hatchery; rather, it is intended to function as a safe repository for rescued *O. mykiss* in times of extreme or prolonged

[1] The effective population size (Ne) can be generally thought of as the number of individuals that contribute offspring to the next generation and is generally smaller than the absolute population size (N). It is a basic parameter in many models in population genetics (NMFS 2012).

drought. However, this facility is consistent with one of the goals of a conservation hatchery described in the Southern California Steelhead Recovery Plan (NMFS 2012):

> Conservation hatcheries can be used for a number of recovery related purposes, including: 1) providing a means to preserve local populations faced with immediate extirpation as a result of catastrophic events such as wildfires, toxic spills, dewatering of watercourses.

This document describes a plan for housing *O. mykiss* in a rescue facility during times of drought or other perturbations, such as forest fires and debris flows, that render the existing habitat uninhabitable.

Chapter 2
Fish Rescue Protocol

2.1 Monitoring

Streamflow and temperature data are available from U.S. Geological Survey stream gages in Hilton Creek, Salsipuedes Creek, and the mainstem of the LSYR to provide near real-time hydrologic conditions. Water quality sondes and pressure transducers will also be deployed and spot flow measurements will also be recorded throughout study reaches in the LSYR watershed to monitor streamflow and water quality conditions during the over-summering season. If flows are observed receding to levels where stranding may occur or water quality parameters are approaching levels potentially lethal to steelhead, a fish rescue may be initiated. Monitoring also includes Reclamation monitoring of the HCWS and EBS for release interruption or emergency shutdown, at which time a fish rescue would be initiated as necessary.

2.2 Agency Requirements

Both CDFW and NMFS will be notified in the event of a possible fish stranding or other preemptive rescue event. These agencies will be contacted by Reclamation following onsite monitoring and observations of a qualified biologist.

Historically, fish rescues have typically been a last resort because in the past, long-term survival of rescued fish was unknown. In addition, drought conditions have been considered important to natural selection. Another concern for actions in the past was that introducing rescued fish into a planned area has unknown consequences (NMFS 2009). Many of these concerns can be alleviated with implementation of the Fish Rescue Facility.

Reclamation will adhere to the reporting requirements for fish rescue plans that have been previously established by NMFS (Reclamation 1998), which include:

1. A specific description of the removal/relocation activities performed
2. The number of steelhead removed from the Project area and the number transferred to each relocation site
3. The number of steelhead that died or were injured during the removal/relocation
4. A description of any problems encountered during the Project or when implementing special conditions
5. Any effect of the Project on steelhead that was not previously considered

2.3 Rescue

The following protocol will guide all fish rescue efforts:

- The fishery biologist will provide an onsite briefing to all Project personnel before any action is implemented. The briefing will include a description of steelhead and its habitat, steelhead protections provided by the Endangered Species Act (ESA), approved capture techniques and protocols, and the terms and conditions of the incidental take statement.
- The number of biologists required for the rescue effort will be determined based on the amount of habitat to be covered and fish rescue techniques to be used.
- The fish rescue operations will be preferentially initiated in the morning to coincide with cooler water temperatures and may cease if water temperatures exceed 18 degrees Celsius (°C) unless it is determined rescue is more protective. Qualified biologists will patrol the dewatering area to capture and relocate stranded native fishes, with an emphasis on rescuing *O. mykiss*.
- Fish collection will be conducted in a manner to minimize handling time and stress. A combination of seining, dip-netting, and hand capture may be utilized for rescue efforts. If the site is too deep to seine, biologists will use dip nets until water conditions are conducive to seining.
- Captured fish and stream water will be placed in holding containers with portable aerators, then transferred to live wells onshore where fish will be sorted, if necessary, into native fish (to be relocated) versus non-native fish (to be euthanized). Multiple containers will be used to reduce crowding during collection and transfer. *O. mykiss* young-of-the-year will be held in a separate container from larger *O. mykiss* to prevent predation. Water temperature and oxygen levels will be monitored in live wells during holding with thermometers and dissolved oxygen meters. Temperature will be managed to within plus or minus 2° C of ambient water temperature to reduce stress to the fish and avoid thermal shock. The live well aeration system will be started prior to placing fish to ensure that suitable oxygen levels are present during the adjustment period
- Transport of native species to release points or the Fish Rescue Facility will be conducted in an efficient manner and coordinated with ongoing collection activities to minimize holding time. Native species will be transported in live wells to the predetermined release locations. The temperature of the transport water will be adjusted to be within 2° C of the ambient temperature of the receiving area water before release.
- All captured fish will be identified to species. Data sheets will be used to record the species, number of fish, life stage, size class, and fish condition prior to, upon, and after collection. A summary report will be submitted to CDFW and NMFS following relocation activities. Metrics from fish would be recorded from a subset of fish given fish and ambient conditions. If conditions preclude detailed inventory, a list of the species present and an estimation of their abundance will be documented along with their disposition (i.e., released, transferred to Fish Rescue Facility, mortality, reason for mortality, euthanized, salvaged). Information recorded will include ambient site conditions, photo-documentation of collection sites, collection and handling methods, mortality or injury, and transport conditions.

- All non-native and invasive species will be euthanized per the guidance of CDFW. After non-native aquatic species have been euthanized, they will be disposed of properly so as not to create a public nuisance or health hazard.
- All *O. mykiss* mortalities will be retained and delivered to NMFS.

Chapter 3
Fish Rescue Facility

3.1 Fish Rescue Facility and Rearing Management Plan Development

This chapter provides the framework for the development of a Fish Rescue Facility and Rearing Management Plan. Specifics of the rescue facility will be developed and refined with an advisory committee of knowledgeable scientists and agency personnel (e.g., CDFW, NMFS Fisheries Science Centers, U.S. Fish and Wildlife Service, Reclamation) and augmented with local expertise from Reclamation staff and local water agency experts. The envisioned process is patterned after NMFS's process for developing protocols for a conservation hatchery facility. Although the rescue facility is not a propagation facility, temporarily housing wild fish in this facility would require the same careful management to safeguard these fish and preserve the wild character of the rescued *O. mykiss*.

Specific plans would be developed for a rescue facility that would house *O. mykiss* after their rescue when native habitat elsewhere is unsuitable for release. The development of specifications and protocols for designing this facility were based on the process outlined in NMFS 2012.

- **Step 1** is development of the Rescue Facility Plan with the advisory committee using the concepts and considerations identified in NMFS's *Southern California Steelhead Recovery Plan* (NMFS 2012) and by the California Hatchery Scientific Review Group in its independent review of California hatcheries (California Hatchery Scientific Review Group 2012), and concepts and considerations discussed in this document. Step 1 would include a preliminary facility layout, facility management details, release strategy, facility location (potential locations have already been identified), identification of water and power sources, a wastewater disposal strategy, fish release strategy, a cost estimate of sufficient detail to develop an operating plan for the facility; and identification of the facility construction, management, and operations funding source.
- **Step 2** includes refinements to the facility design, facility management, an updated estimate for construction and operation costs of the rescue facility, and an environmental review of the proposed plan. Salmon and steelhead holding facility programs that operate in regions with ESA-listed populations need to be evaluated and permitted through the federal government to ensure compliance with the ESA.
- **Step 3** is completion of 100-percent design plans and specifications and delivery of a final cost estimate for the rescue facility described in the plan (e.g., acclimation ponds, holding areas, feeding considerations), operation and maintenance costs, and monitoring and evaluation costs.

Upon completion of the above process and approval by NMFS and CDFW, the plan will be implemented, including construction and testing of the facility.

The California Hatchery Scientific Review Group provides three principles to guide its review and recommendations for California hatchery programs applicable to the proposed rescue facility for the Santa Ynez River.

1. Well-defined goals upon which to base decision points, evaluate criteria, and way alternatives

2. Scientific defensibility to arrive at the best alternatives and provide the rationale for actions
3. Informed decision-making and adaptive management informed and modified by continuous evaluation of success at meeting hatchery program goals, changing circumstances, and new scientific information

These principles would serve to guide the development of a rescue facility to provide refuge in time of drought, fires, or debris flows or other perturbation threatening steelhead populations and their habitats. The Fish Rescue Facility and Rearing Management Plan is anticipated to take two years to finalize after issuance of the Cachuma Project Biological Opinion. Facility construction is anticipated to take two to four years after final Rescue Facility and Rearing Management Plan adoption and after completion of CEQA/NEPA.

Chapter 4
Rescue Facility Key Elements

4.1 Enriched Environments

The facility would use methods to mimic wild conditions and promote retention of natural behaviors to avoid domestication of rescued fish. Retention of natural behaviors should lead to higher survival rates when fish are released. The facility would have the following habitat complexity features incorporated into the holding vessels:

- Natural environmental features such as overhead cover and in-stream structures and substrates to retain development of body camouflage coloration in juvenile fish. The artificial rearing habitat would simulate release habitats to the extent possible using substrates such as sand, gravel, or painted patterns that mimic natural LSYR and/or tributary conditions. In-stream structures would be created by suspending small, defoliated trees in rearing vessels occupying 30 to 60 percent of the surface area. Stream-side cover would be created by suspending camouflage nets about three feet above the water surface along the margins of the vessels.
- Appropriately positioned feed delivery systems that condition fish to orient properly to the current. Variable water-flow velocities in rearing vessels would enhance fish ability to exercise and escape predators.
- Rearing densities would mimic more natural spatial distributions: a density index of approximately 0.20 pound per cubic foot per inch of fish. High densities would be avoided, as they could trigger disease outbreaks, such as bacterial kidney disease.

4.2 Temperatures

Southern California steelhead are likely able to better survive outside the temperature ranges observed in studies of their northern counterparts due to their evolution in a warmer and more unpredictable environment (Moyle et al. 2008). This adaptation provides a selective advantage in the warmer streams found in Southern California. To ensure this adaptive advantage is preserved in facility-housed fish, temperature monitoring data from LSYR tributaries will be used to develop the initial conceptual model for facility operation.

4.3 Rescue Facility Infrastructure

Any facility location must have several key infrastructure elements in place or capable of being put in place to be viable: space, water, power, access, and security. These elements are discussed in greater detail below.

4.3.1 Space

A facility location must have adequate space for the facility structures, parking, and storage. The facility layout and operations must also consider the biosecurity[2] of the rearing program and provide provisions to prevent any transfer of disease from different sources.

4.3.2 Water

A facility must have a reliable source of clean water for rearing of fish. We assumed that rearing water can be obtained either from the river, wells, or other sources that may be possible depending on the location. Water resources are at a premium in the LSYR; therefore, all water used in a facility would result in no net loss of water to the watershed. Facility overflow water would be returned to the environment near the point of extraction. Depending on the water temperature and water volume requirements, the amount of water used in the facility would be minimized. Techniques such as recycling rearing water and temperature control can be integrated into the bioprogram to match life-stage targets. As is standard, most fishery rearing facilities are considered a non-consumptive use if water is returned to the source of supply (although permits would be required for such discharges to address diseases, nutrients, and other water quality issues). A common gas-stabilization headtank, with column aerators, would be incorporated into the system where the water supply is only pumped once and stabilized to the atmospheric pressure for proper gas saturation.

Before outmigration, juvenile steelhead imprint on chemical signatures associated with their natal streams, which guide their homing migrations as adults. Imprinting in salmonids may occur at multiple life history stages. Olfactory imprinting is known to occur during parr-smolt transformation (Dittman et al. 1995, Nevitt and Dittman 1999); however, current research suggests that imprinting may also occur at multiple other pre-smolt imprinting periods (Nevitt and Dittman 1999). To maximize imprinting opportunity for rescued fish, juvenile steelhead should experience the odors of their natal system at various times and physiological states to assure that natal stream odor recognition is imprinted.

At the rescue facility, water from the LSYR would provide the majority of water used for rearing, allowing smolt imprinting to the LSYR and reducing straying to other Southern California watersheds.

For the rescue facility, it is assumed that fish-rearing water would not be reused but discharged back to the source, with applicable permits, through the rearing cycle for better disease control. If needed, when the actual site water supply limitations are known, a reuse scenario can be integrated into the project infrastructure and operations.

4.3.3 Power

Facility power consumption would depend on the site characteristics relative to the amount of water to be pumped, treated, and distributed. Primary three-phase power is preferred to meet the

[2] Biosecurity refers to facility design and established practices that minimize the risk of introducing an infectious disease or cross contamination and spreading it to fish at a facility. It follows three principles: (1) reduce risk of pathogen introduction to the facility, (2) reduce risk of pathogen spread throughout the facility, and (3) reduce conditions within a facility that increase susceptibility to infection and disease.

power needs of the facility. Single-phase primary power would limit the choice of electrical equipment that would be required, mainly the water supply pumps and any water tempering. The costs for extending any three- or single-phase primary power to a site can be substantial, and alternative power delivery should be considered for the selected site if not immediately available. Power availability and the type of power available, as well as backup power options, would be assessed for consideration of the preferred site.

4.3.4 Access

Adequate roads and access points are required for vehicular access to the facility. This includes large trucks and heavy construction equipment that could be needed for facility construction and for potential tanker truck transport of rescued fish.

4.3.5 Security

The facility must be secured against public access and vandalism. Locations that are out of sight and away from public venues are preferred. Installation of security fencing may be required, and the location should have space and allowances for these and for any fish transfer biosecurity needs.

Fencing and other exclusion measures would be incorporated to exclude birds and other wildlife that could prey on fish in the rearing facilities.

4.3.6 Biosecurity

Biosecurity is an important concern in that fish and personnel may be coming from different places in the watershed and should not come in contact with the rescued fish at the central rescue facility. In addition, when different stocks are reared at the rescue facility, separation of space and water would be provided. Disinfection of vehicles and personnel and disposal of disinfectant or contaminated wash water are standard rearing facility procedures that would be implemented. A contingency plan for dealing with a disease outbreak, should one occur, would be developed for the rescue facility.

Chapter 5
References

Bedsworth, L., D. Cayan, G. Franco, L. Fisher, and S. Ziaja. (California Governor's Office of Planning and Research, Scripps Institution of Oceanography, California Energy Commission, California Public Utilities Commission). 2018. Statewide Summary Report. California's Fourth Climate Change Assessment. Publication number: SUMCCCA4-2018-013.

Bureau of Reclamation (Reclamation). 1998. *Hilton Creek Fish Rescue Plan*.

Cachuma Operation and Maintenance Board. 2008–2016. Annual Monitoring Reports.

California Hatchery Scientific Review Group. 2012. *California Hatchery Review Report*. Prepared for the U.S. Fish and Wildlife Service and Pacific States Marine Fisheries Commission. June 2012. 100 pp. Available: http://cahatcheryreview.com/wp-content/uploads/2012/08/CA%20Hatchery%20Review%20Report%20Final%207-31-12.pdf.

Dittman, A. H., T. P. Quinn, and G. A. Nevitt. 1995. Timing of imprinting to natural and artificial odors by coho salmon (*Oncorhynchus kisutch*). *Canadian Journal of Fisheries and Aquatic Sciences* 53:434–442.

Garza, J. C., and A. Clemento. 2008. *Population genetic structure of* Oncorhynchus mykiss *in the Santa Ynez River, California*. Prepared for the Cachuma Conservation Release Board. Final Report. August 2008. 55 pp.

Good, T. P., R. S. Waples, and P. Adams (editors). 2005. *Updated status of federally listed ESUs of West Coast salmon and steelhead*. U.S. Department of Commerce. NOAA Tech. Memo. NMFS-NWFSC-66, 598 pp.

Langridge, R. 2018. *Central Coast Summary Report.* California's Fourth Climate Change Assessment. University of California, Santa Cruz. Publication number: SUM-CCCA4-2018-006.

McElhany, P., M. Ruckelshaus, M. J. Ford, T. Wainwright, and E. Bjorkstedt. 2000. *Viable salmonid populations and the recovery of evolutionarily significant units*. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-42. Northwest Fisheries Center, Seattle, Washington.

Moyle, P. B., J. A. Israel, and S. E. Purdy. 2008. *Salmon, Steelhead, and Trout in California: Status of an Emblematic Fauna*. UC Davis Center for Watershed Sciences; Davis, California.

National Marine Fisheries Service (NMFS). 2009. 2009 and 2010 Interagency Fish Rescue Strategy. CDFG NMFS, USFWS.

National Marine Fisheries Service (NMFS). 2012. *Southern California Steelhead Recovery Plan*. Southwest Region, Protected Resources Division, Long Beach, California. January 2012.

Nevitt, G., and A. Dittman. 1999. A new model for olfactory imprinting in salmon. *Integrative Biology* No. 1: 215–223.

Shapovalov, L. 1944. Preliminary Report on the Fisheries of the Santa Ynez River System, Santa Barbara County, California. California Department of Fish and Game. 22p.

Swain, D. L., B. Langenbrunner, J. D. Neelin, and A. Hall. 2018. Increasing precipitation volatility in twenty-first-century California. *Nature Climate Change* 8(5):427–433.

Attachment 4:
NMFS and CDFW
Comments on Draft Term 18 Plan

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[EXTERNAL] Reclamation's Draft Cachuma Order WR-2019-0148 Term 18 Plan

Darren Brumback - NOAA Federal <darren.brumback@noaa.gov>

Wed 12/11/2019 8:29 AM

To: JACKSON, MICHAEL P. <MJackson@usbr.gov>
Cc: Hyatt, David E <dhyatt@usbr.gov>; Emerson, Rain L <remerson@usbr.gov>; Dellith, Chris <chris_dellith@fws.gov>; Mary Larson <Mary.Larson@wildlife.ca.gov>

1 attachments (3 MB)

11DEC2019_Cachuma Project WR-2019-0148_DB.pdf;

Good morning Michael,
Hope you are well. Attached is an advanced copy of NMFS' comments on the subject plan to assist your team with revisions.

Darren

--
Darren Brumback
Fisheries Biologist
NOAA Fisheries West Coast Region
U.S. Department of Commerce
Office: 562-980-4060

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

December 11, 2019

Michael Jackson
U.S. Bureau of Reclamation
1243 N Street
Fresno, California 93721-1813

Re: National Marine Fisheries Service Comments on U.S. Bureau of Reclamation's Draft Cachuma Order WR-2019-0148 Term 18 Plan

Dear Mr. Jackson:

Thank you for submitting to NOAA's National Marine Fisheries Service (NMFS) the U.S. Bureau of Reclamation (Reclamation)'s Draft Cachuma Order WR-2019-0148 Term 18 Plan (Draft Plan) for NMFS' review and comment on October 30, 2019. The Draft Plan is a requirement of the California State Water Resources Control Board's (Board) September 17, 2019, adopted Order WR 2019-0148 amending the U.S. Bureau of Reclamation's water right permits 11308 and 11310 for the Cachuma Project on the Santa Ynez River, Santa Barbara County, California.

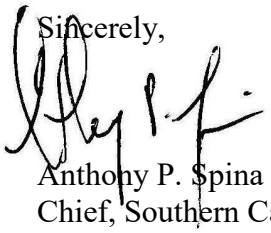
Reclamation has submitted the Draft Plan to NMFS per requirements of the Order. Having completed the review, NMFS has enclosed the following items for your reference and use:

- The Draft Plan, with our comments and recommendations for revision embedded therein;
- A copy of a NMFS-Reclamation communication, and attachment, dated March 14, 2017; and,
- Reclamation's October 2015 Cachuma Project Fish Rescue Plan

The information provided herein solely represents NMFS' technical assistance to Reclamation in regard to certain terms of the Board's Order WR 2019-0148. Accordingly, the enclosed comments and recommendations should in no way be interpreted as endorsement for the instream flow targets specified in the Board's Order (i.e., Table 1 and 2) or the Draft Plan's compliance with the requirements of the Endangered Species Act and associated implementing regulations.

We look forward to future coordination regarding Reclamation's compliance with the Board's Order WR 2019-0148. Should you have a question regarding the information contained in this letter or enclosure, please contact Darren Brumback at (562) 980-4060.

Sincerely,



Anthony P. Spina
Chief, Southern California Branch
California Coastal Office

Enclosures

cc: Mary Larson, California Department of Fish and Wildlife
Chris Dellith, U.S. Fish and Wildlife Service
Administrative file: 151422SWR2010PR00316

RECLAMATION
Managing Water in the West

DRAFT

Cachuma Order
WR-2019-0148 Term 18 Plan

U.S. Department of the Interior
Bureau of Reclamation
South Central California Area Office
Fresno, California

October 2019

Mission Statements

The mission of the Department of the Interior is to conserve and manage the Nation's natural resources and cultural heritage for the benefit and enjoyment of the American people, provide scientific and other information about natural resources and natural hazards to address societal challenges and create opportunities for the American people, and honor the Nation's trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities to help them prosper.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Table of Contents

Attachments

Introduction

On September 17, 2019 the State Water Resources Control Board (Water Board) adopted Final Order WR-2019-0148 amending the Bureau of Reclamation's (Reclamation's) water rights permits 11308 and 11310 for the Cachuma Project in Santa Barbara, California. Reclamation provides the following Plan in accordance with Term 18 of Order WR-2019-0148 to describe "the measures in place, or that will be implemented to and 16."

NMFS-1

Commented [NMFS1]: What follows in regard to ensuring compliance with Term 15 is solely directed at Terms 15(a) implementing Table 1 *Mainstem Rearing Flows* and 15(c) regarding Hilton Creek Water System interruptions.

However, Term 15 is much broader; it requires Reclamation to implement conservation measures including but not limited to those described in Revised Section 3 (Proposed Action) of the Biological Assessment for Cachuma Project Operations and the Lower Santa Ynez River, June 2000, taking into consideration the 2013 Biological Assessment with any amendments and the 2016 Draft Biological Opinion. Yet, Reclamation does not identify any such conservation measures and the measures to ensure implementation.

Term 15 also requires Reclamation to comply with all of the Reasonable and Prudent Measures (RPM) 5 and 7 through 13, set forth at page 68, and the Terms and Conditions, set forth at pages 70-78, in NMFS' September 8, 2000, biological opinion. Yet, Reclamation does not describe the measures to ensure compliance with these RPMs and terms and conditions.

The Term 18 Plan should include how Reclamation intends to implement conservation measures and comply with RPMs and terms and conditions in NMFS' September 8, 2000, biological opinion as required in Term 15 and described above in this comment pending conclusion of reinitiated formal consultation under the ESA.

Term 15(a) of Order WR-2019-0148

Term 15(a) of Order WR-2019-0148 requires Reclamation to "release or bypass water to maintain the following Mainstem Rearing instream flows in the Santa Ynez River, as set forth below [in Table 1] at all times." The flows in Table 1 are also required for Reclamation's continued compliance with the *Biological Opinion for the operation and maintenance of the Cachuma Project on the Santa Ynez River in Santa Barbara County, California* issued by the National Marine Fisheries Service (NMFS) in 2000 (2000 BiOp).

Table 1 Mainstem Rearing Flows

Reservoir Spill[a] (af)	Lake Storage[b] (af)	Flow (cfs) Requirements at:		
		Highway 154	*Alisal Road*	*Stilling Basin & Long Pool*
≥ 20,000	NA	10	1.5[c]	-
< 20,000	≥ 120,000	5	1.5[d]	-
	≥ 30,000 and < 120,000	2.5	1.5[d]	-
	< 30,000	-	-	30 af/mo[e]

NA - not applicable

[a]Reservoir spill is calculated cumulatively over the course of the water year (FEIR, Vol. IV, Appendix F, Draft Technical Memorandum No. 5, p. 6), which begins October 1 (FEIR, Vol. IV, Appendix F, Draft Technical Memorandum No. 5, p. 8).

[b]Lake storage is measured on the first day of each month. (FEIR, Vol. IV, Appendix E, Technical Memorandum No. 1, p. 5.)

[c]The specified flow applies only when *Oncorhynchus mykiss* are present.

[d]The specified flow applies only if there was reservoir spill greater than or equal to 20,000 af in the prior water year and *Oncorhynchus mykiss* are present in the Alisal Reach.

[e]When there is less than 30,000 acre feet (af) of total water stored in the reservoir, regardless of origin, right holder shall provide periodic releases of 30 af per month to refresh the Stilling Basin and Long Pool directly downstream of the dam to provide for *Oncorhynchus mykiss (O. mykiss)* rearing in these areas. Less than 30 af per month may be released upon determination by the fishery agencies and the State Water Board that less water is necessary to refresh the Stilling Basin and Long Pool directly downstream of the dam for *Oncorhynchus mykiss* in these areas.

To ensure compliance with Term 15(a), Reclamation would implement the recommended flows from Bradbury Dam as prescribed by the most current operating guidelines. Currently, Reclamation is implementing Table ES-1 from Stetson Engineers Inc.'s (Stetson's) 2011 *Evaluation of Aerial Photos for Monitoring Instream Target Flows in the Highway 154 Reach of Lower Santa Ynez River, California* for 2000 BiOp, and Table 1, flows to Highway 154 (Attachment 1), and is implementing Stetson's 2011 *Operating Guidelines for Monitoring Target Flow of 1.5 cfs at Alisal Bridge* for 2000 BiOp, and Table 1, flows to Alisal Bridge (Attachment 2).

For example, in water years when the reservoir spills more than 20,000 acre feet, Table 1 requires flows of 10 cubic feet per second (cfs) at Highway 154 and 1.5 cfs at Alisal Road (when *O. mykiss* are present). Table ES-1 requires releases ranging from 10.8 to 13.5 cfs from Bradbury Dam, depending on the month of the release, to meet the 10 cfs requirement at the Highway 154 Bridge.

Operations for meeting the 1.5 cfs flow requirement at Alisal Bridge are conducted in accordance with Stetson's 2011 *Operating Guidelines for Monitoring Target Flow of 1.5 cfs at Alisal Bridge* (Attachment 2) and can be divided into the following three steps:

1. *Real-Time Flow Monitoring* – There is a United States Geological Survey (USGS) gauge at Alisal Bridge, known as the Solvang Gauge (#11128500), on the Santa Ynez River that provides flow data every 15 minutes. Reclamation will use this gauge to monitor for compliance with the 1.5 cfs target. The USGS site for the Solvang Gauge can be accessed at the following address: https://waterdata.usgs.gov/nwis/dv/?site_no=11128500&agency_cd=USGS&referred_module=sw

   NMFS-3

   The streambed at Alisal Bridge poses a challenge for providing accurate flow readings from the USGS gauge because the stream path can move from one channel to another and miss the stationary USGS gauge. It is expected that USGS will monitor the gauge location and provide an instantaneous flow measurement weekly.

   Monitoring at six upstream locations will be implemented to help with early flow The locations are at Meadowlark Pool, Lower Gainey Crossing, and Refugio Bridge for the Refugio Reach and at the Quiota Creek Confluence, one mile above Alisal Bridge, and at Alisal Bridge for the Alisal Reach. Early flow detection will allow dam operators to increase reservoir releases to maintain target flows.

   NMFS-4

2. *Releases from Bradbury Dam* – Reclamation will use a decision tree (Figure 1 *in* Attachment 2), developed by Stetson, to help determine the necessary releases to meet the 1.5 cfs target flow at Alisal Bridge. The process involves early detection, early

   NMFS-5

NMFS-2

Commented [NMFS2]: The description and example below refers only to monitoring the 1.5 cfs Alisal Road/Bridge instream flow target. Term 15 Table 1 includes instream flow targets at the Hwy 154 Bridge (2.5 and 5 cfs) apart from Alisal Road/Bridge flow target. Reclamation should also describe how it proposes to ensure compliance with the Hwy 154 Bridge flow targets.

To this end, Term 25 of the Order requires Reclamation to maintain publically-accessible continuous river flow measurements at the Hwy 154 Bridge to document compliance with the terms of the water right permit. Therefore, although Term 15 does not specifically refer to Term 25, Reclamation should consider incorporating compliance with Term 25 into the Term 18 Plan regarding this issue.

Commented [NMFS3]: Is this intended to mean or say that Reclamation expects the USGS to conduct weekly field measurements for the purpose of corroborating real-time (e.g., 15-minute) discharge data and calibrating stage-discharge rating curves?

Has Reclamation coordinated with the USGS to ensure this frequency of conducting field measurements or intend to do so? For instance, does Reclamation's contract with USGS for monitoring river/stream discharge in the lower Santa Ynez River establish the frequency for conducting field measurements and calibrating stage-discharged rating curves?

Reclamation should clarified the Term 18 Plan here to answer these questions.

Commented [NMFS4]: Please incorporate the following:
(1) Identify who will conduct this monitoring (e.g., Reclamation, USGS, other agency, consultant, other) and required or relevant knowledge and experience in measuring and monitoring stream discharge;
(2) Describe the protocol or methodology to be applied, including frequency of monitoring;
(3) Define the process and procedures for ensuring timely delivery of information to Bradbury Dam operators and process and timing for adjusting water releases from Bradbury Dam;
(4) Describe the timing and format for making this monitoring data, and any associated water releases, available to SWRCB, CDFW, and NMFS.

Commented [NMFS5]: We suggest including the actual decision tree in the
Term 18 Plan, rather than incorporating by reference.

sustenance release for the 1.5 cfs flow target, real-time monitoring, and real-time adjustments including incremental adjustments and pulse releases.

3. *Post-Release Evaluation and Reporting* – Each year presents different operating conditions on the Santa Ynez River to meet the 1.5 cfs target flow at Alisal Bridge. Released flows at Bradbury Dam and the resulting flows at Alisal Bridge shall be examined periodically to further refine releases to meet the flow requirements at Alisal Bridge.

Term 15(c) of Order WR-2019-0148

NMFS-6

Term 15(c) requires Reclamation to "proceed with rescue efforts within a period necessary to prevent steelhead mortality following any flow interruption of the Hilton Creek Watering System. It also requires that Reclamation "post all flow interruptions of the Hilton Creek Watering System and rescue efforts on a publicly accessible website."

The Hilton Creek USGS gauge (#11125600) provides flow data every 15 minutes and is publicly accessible online at the following address: https://waterdata.usgs.gov/nwis/dv/?site_no=11125600&agency_cd=USGS&referred_module=sw

NMFS-7

Any interruption in Hilton Creek flows can be observed at the USGS website provided above.

In the event of an interruption in Hilton Creek flows, Reclamation will conduct rescues of *O. mykiss* in Hilton Creek pursuant to the most ~~recent~~ current NMFS-reviewed rescue plan. The most recent NMFS-reviewed Cachuma Project fish rescue plan is provided as Attachment 3.

Reclamation's South-Central California Area Office (SCCAO) Operations page will provide details on rescue operations conducted in Hilton Creek, and will also provide a link to the California Data Exchange Center (CDEC) for access to Lake Cachuma Operations data. This information can be publicly accessed at the following address: https://www.usbr.gov/mp/sccao/operations.html

NMFS-8

Term 16(a)-16(b) of Order WR-2019-0148

Term 16(a) through 16(b) requires Reclamation to "release or bypass water to meet the Table 2 flows, set forth below, at all times during Wet and Above Normal water year types". The flows in Table 2 would be triggered when the cumulative inflow into Cachuma first reaches ~~33,307~~33,707 acre feet in a water year (beginning on October 1st and ending September 30th of the following year).

NMFS-9

Commented [NMFS6]: Reclamation should incorporate recommendations provided in the November 28, 2016, draft biological opinion, including Reasonable and Prudent Measure 3, and Terms and Conditions and proposed revisions provided to Reclamation in an e-mail and attachment dated March 14, 2017 (enclosed).

Commented [NMFS7]: Reclamation provided Attachment 3 on December 4, 2019: *Cachuma Project Fish Rescue Plan* dated July 29, 2015. Attachment 3 is not the "most recent NMFS-reviewed Cachuma Project fish rescue plan." Reclamation submitted a version to NMFS dated October 2015 (enclosed) in support of formal consultation under the Endangered Species Act, which NMFS reviewed as part of the consultation leading to NMFS' November 28, 2016, draft biological opinion.

Although Reclamation withdrew that request for consultation, we recommend Reclamation incorporate, as appropriate, recommendations contained in the November 28, 2016, draft biological opinion Reasonable and Prudent Measure 6 and Terms & Conditions and proposed revisions provided to Reclamation in an e-mail and attachment dated March 14, 2017 (enclosed).

Commented [NMFS8]: Please identify when this information would be posted relative to an incident.

Also, under reasonable and prudent measure 12 of the September 8, 2000, biological opinion for the Cachuma Project, Reclamation is required to immediately notify NMFS in the event of an interruption in Hilton Creek flows (i.e., water releases). Reclamation has notified NMFS via phone messages or e-mail or both shortly after detection of an interruption (within hours). Reclamation's notification to NMFS and timing of such notification should be specified in the Term 18 Plan.

Commented [NMFS9]: Because cumulative inflow into Cachuma Reservoir is not expected to reach ≥33,707 acre-feet for several months after October 1 during "above normal" and "wet" water years, initiating or continuing Table 2 instream-flow targets is unlikely to occur for several months after October 1. Instead, instream-flow targets default to Table 1 of the Order on October 1.

This will cause about 15 miles or more of the Santa Ynez River to be dewatered on or shortly after October 1 when the preceding water year was "wet" or "above normal." The amount and quality of steelhead habitat in the river reach that remains wetted will be appreciably reduced. The loss of steelhead habitat and take of steelhead is expected to exceed the effects and amount of take analyzed in the September 8, 2000, biological opinion for the Cachuma Project.

Therefore, Reclamation should propose operations (water releases) in the Term 18 Plan for the purpose of avoiding or minimizing habitat loss and potential stranding and death of steelhead when transitioning from one water year to the next .

Table 2 Flows Required in Wet and Above Normal Water Year Types

Minimum Flow Requirement*	Period of Flow	Purpose of Flow
48 cfs	02/15 to 04/14	Spawning
20 cfs	04/15 to 06/01	Incubation and Rearing
25 cfs	06/02 to 06/09	Emigration
Ramp to 10 cfs by 06/30		
10 cfs	06/30 to 10/01	Rearing and Resident Fish Maintenance
5 cfs	10/01 to 02/15	Resident Fish

*The above flows shall be maintained at both San Lucas and Alisal bridges. These flows may be met with both natural stream flow and releases from Bradbury Dam.

At present, Reclamation will adapt the operating guidelines developed by Stetson to meet the Table 2 flow requirements at the San Lucas Bridge (Highway 154 Bridge) and Alisal Bridge. The operating guidelines will be modified as necessary through calibration and adaptive management to achieve the flows required in Table 2.

A study is currently being developed to determine the releases required from Bradbu meet the Table 2 flow requirements at San Lucas Bridge and Alisal Bridge. Stetson's operating guidelines were developed to maintain a target flow of 1.5 cfs at Alisal Bridge; however, Term 16 of Order WR-2019-0148 requires flows at Alisal Bridge ranging fr cfs. Reclamation is working on expanding the operating guidelines to meet the higher Table 2 target flows required at San Lucas Bridge and Alisal Bridge.

The study to modify the operating guidelines will include:

1. An analysis of Wet and Above Normal water year types and natural stream flow downstream of Bradbury Dam, specifically at the USGS Solvang gauge at Alisal Bridge (#11128500).
2. A review of previous Water Rights 89-18 releases and the resulting flows at Alisal Bridge.
3. An examination of current conditions (i.e. vegetation, obstructions, infiltration, etc.) in the reaches of the Santa Ynez River from Bradbury Dam to Alisal Bridge.
4. An examination of flow conditions at San Lucas Bridge resulting from Water Rights 89-18 releases and storm run-off
5. An examination of specific periods of flow, minimum flow requirements, and how conditions in the Santa Ynez River affect flow release operations.
6. A dynamic review of the flow release operations conducted to meet Table 2 flows in water year 2020 (or the first Wet or Above Normal water year following the adoption of Order WR-2019-0148) and beyond. The review will be used to optimize future

NMFS-10

Commented [NMFS10]: Reclamation should include a water-release ramping protocol (rate of increase and decrease) for transitioning between flow targets (e.g., 48 cfs to 20 cfs minimum flow target). For instance, water-release ramping schedules proposed and implemented under previous ESA consultations.

NMFS-11

Commented [NMFS11]: When does Reclamation intend/expect to complete this study? We recommend including the date for completion in this Plan.

operations so that the minimum amount of water needed to consistently meet the Table 2 flow requirements at Alisal Bridge is released from Bradbury Dam.

Term 16(c)-16(e) of Order WR-2019-0148

NMFS-12

Term 16(c) through 16(e) describe the protocol required for temporary reductions or terminations of Table 2 flows for the protection of the steelhead in the Santa Ynez River, as determined by the California Department of Fish and Wildlife (CDFW) or NMFS. Reclamation will notify the Executive Director of the Water Board of any changes to Table 2 flows recommended by CDFW or NMFS within the required timeframe via U.S. mail, e-mail, or telephone and will implement the required changes according to the most current operating guidelines. The determination by CDFW or NMFS to temporarily modify Table 2 flows, as well as the required supporting information, would be posted on Reclamation's publicly accessible SCCAO Operations page located at the following address: https://www.usbr.gov/mp/sccao/operations.html

Term 16(f) of Order WR-2019-0148

Term 16(f) requires Reclamation to "confer with the Member Units to analyze reducing the safe yield of the Cachuma Project" within one year of the adoption of Order WR-2019-0148. Reclamation is further required to notify the Executive Director of the Water Board "in writing of any current or planned reduction to the Cachuma Project's safe yield" within 18 months of the adoption of Order WR-2019-0148.

Reclamation has been in contact with the County of Santa Barbara to schedule a meeting to discuss changes to the safe yield of the Cachuma Project and expects to complete this requirement by the September 17, 2020 deadline. Reclamation will notify the Executive Director of the Water Board in writing of any changes to the safe yield by the March 17, 2021 deadline.

Commented [NMFS12]: Will this study include an analysis of groundwater pumping effects and water-right release criteria (i.e., WR 89-18)? Because groundwater pumping can affect the amount and distribution of surface water and, consequently, the rates of water releases necessary to maintain instream flow targets, Reclamation should incorporate these elements in this analysis.

Darren Brumback - NOAA Federal <darren.brumback@noaa.gov>

Re: Action Items form 2/22/2017 Meeting on Cachuma Draft BiOp

1 message

Darren Brumback - NOAA Federal <darren.brumback@noaa.gov> Tue, Mar 14, 2017 at 3:32 PM
To: "Buck, Lisa" <lbuck@usbr.gov>
Cc: "Emerson, Rain" <remerson@usbr.gov>, NED GRUENHAGEN <ngruenhagen@usbr.gov>, David Hyatt <dhyatt@usbr.gov>, Duane Stroup <dstroup@usbr.gov>, Darren Brumback <darren.brumback@noaa.gov>

Hello All,
Attached are my responses to the items assigned.
Can you provide me an update when you expect to respond to other items.
Thanks,
Darren.

On Thu, Mar 2, 2017 at 7:46 AM, Buck, Lisa <lbuck@usbr.gov> wrote:

> Hi Rain,
>
> I had just a few action items to add to the list (see track-changes)
>
> thank you,
>
> -Lisa

On Wed, Mar 1, 2017 at 5:11 PM, Emerson, Rain <remerson@usbr.gov> wrote:

> My apologies for not getting these out to the group sooner. It has been a hectic last couple of weeks. Attached are my draft Action Items from our last meeting. Please take a look and let me know if there was anything I missed. I will then finalize and send out.
>
> On the first item, I am working on getting a track change version of NMFS' action items back to Darren once I get feedback from the Reclamation team.
>
> Rain L. Emerson, M.S.
> *Supervisory Natural Resources Specialist*
> Bureau of Reclamation, South-Central California Area Office
> 1243 N Street, Fresno, CA 93721
> Work Ph: 559-487-5196
> Cell Ph: 559-353-4032

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Lisa Buck
Wildlife Biologist
U.S. Department of the Interior
Bureau of Reclamation
1243 N Street
Fresno, CA 93721
Phone: (559) 487-5262
Email: lbuck@usbr.gov

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Darren Brumback
Fisheries Biologist
NOAA Fisheries West Coast Region
U.S. Department of Commerce
Office: 562-980-4060

NOAA FISHERIES
West Coast Region

Action Items for February 22_DRB_March 14, 2017.docx
15K

Action Items for February 22, 2017 Meeting with NMFS on Cachuma DRAFT BiOp:

1. Rain will track change action items from previous meeting to include our additions.
2. Schedule next meeting
3. Chlorine – Reclamation to check on what happens during O&M draining
4. Reclamation to provide Settling Parties comments next week (5 business days)
5. Define and describe the parameters that control our releases from the reservoir (whose water is it) – what are the constraints e.g., permit conditions etc. (looking at T&C 1(a)2). Constrain flexibility for water rights releases, fish releases, flood releases, etc. "other water" – e.g. non-Project water.
6. Darren to look at Table 2-13 regarding "dry gaps in river" and water rights releases "flexibility" (what he is looking at avoiding and how Table 2-13 may address this concern)
    a. D. Brumback 3/14/2017: Implementing Table 2-13 water releases is expected to alleviate most situations of the SYR drying between Bradbury Dam and Solvang as has occurred in past (i.e., extensive sections of severally degraded water quality or completely dry and then re-watered from water-rights releases). However, similar situations may occur when flow targets are adjusted for consecutive dry years (≥5 cfs at Hwy 154) resulting in reduced habitat quantity and quality. Therefore, the value of preparing and implementing a process for coordinating and conducting water releases during these times remains.
7. Darren to look at "compensatory release" especially at higher release levels re: T&C 3(b)
    a. D. Brumback 3/14/2017: I recall the record supporting 2 cfs as the flow threshold for habitat; therefore, I can incorporate 2 cfs into T&C 3(b) (e.g., Reclamation shall release water at a rate no less than 2 cfs to avoid stranding of steelhead…). Reclamation is welcome propose a different threshold based on supporting evidence to inform modifying this T&C.
8. A threshold to replace the term "appreciably reduce" will be defined for T&C 3
    a. D. Brumback 3/14/2017: "Appreciably" can probably be deleted because of the 2 cfs criterion.
9. Darren will adjust T&C 3 to make it clear that it was intended to be inclusive of all Hilton Creek systems, not just the original Hilton Creek Watering System
    a. D. Brumback 3/14/2017: The following or similar will be added to T&C 3(a): The Hilton Creek Water System includes all past and future modification to the system (e.g., Emergency Backup System).
10. Reclamation to provide clarifying language/information regarding capabilities for total Hilton Creek watering system (maximum down to drought operations) – temporary alternative sources, e.g. ramping down – add language regarding "normal operations" vs "critical drought operations". What occurs/needed for testing of the systems and what are the capabilities of the rest of the systems (original to all the backups).
11. Reclamation will discuss non-native fish removal with the State (CDFW) to see about getting approval for this action
12. Reclamation to look at language in T&C 5 and what was previously provided to NMFS for Critical Drought Operations and see if there are areas to clarify
13. Darren to add language to T&C 6 regarding recent fish training requirements.
    a. D. Brumback 3/14/2017: The following or something similar will be added to T&C 6(b): At least two local biologists designated by Reclamation for conducting

fish rescues shall receive training and remain up to date in current electrofishing safety and practices (training example to be provided).

Next meeting – March 15, 2017 10am.

ENCLOSURE 5

RECLAMATION
Managing Water in the West

Cachuma Project
Fish Rescue Plan

Cachuma Project
Santa Barbara, California

U.S. Department of the Interior
Bureau of Reclamation
South Central California Area Office
Fresno, California

October 2015

Mission Statements

The mission of the Department of the Interior is to protect and manage the Nation's natural resources and cultural heritage; provide scientific and other information about those resources; and honor its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Cachuma Project
Fish Rescue Plan

Cachuma Project
Santa Barbara, California

Prepared by:

United States Department of the Interior
Bureau of Reclamation
Mid-Pacific Region
South-Central California Area Office
Fresno, California

Introduction and Objectives

The fish rescue plan prepared for, and submitted with, the 2013 Biological Assessment for the Cachuma Project (Appendix 2-C: Lower Santa Ynez River Fish Rescue Plan 2014), has been updated and expanded for the pending Biological Opinion on the Operation and Maintenance of the Cachuma Project (BiOp). The following updated Fish Rescue Plan (Plan) covers potential future needs for fish rescues which could be required for situations including, but not limited to: critical drought conditions, potential drought operations, standard Project operation in the Lower Santa Ynez River basin and streams crossed by the South Coast Conduit, Hilton Creek Watering System (HCWS) and/or Hilton Creek Emergency Backup System interruptions or failures, diminishing stream flow, degrading water quality conditions, contaminant spills, fish enhancement projects, and project monitoring/trapping efforts, etc., and for activities associated with the Proposed Actions to be covered through Reclamation's ongoing consultations with NMFS including those on the Operation and Maintenance of the Cachuma Project. Reclamation will coordinate with NMFS on a case by case basis to determine the need for implementing fish rescue operations.

Action Area

The Action Area for fish rescue and release comprises all stream/river reaches downstream of Bradbury Dam and at South Coast Conduit stream crossings.

Cachuma Project Fish Rescue Plan

The Cachuma Project Fish Rescue Plan includes the following elements:

Personnel: The Fish Rescue Team will be comprised of qualified and approved fisheries biologists or other staff from NMFS, California Department of Fish and Wildlife (CDFW), COMB Fisheries Division, contractors, or other approved entities. The current Fish Rescue Team and their points of contact are listed in Attachment A.

Equipment: To assure that the fish rescue equipment is available when needed, after each deployment it will be inventoried, cleaned and/or sterilized (as needed), examined for functionality, and stored. Holding and rescue containers will be distributed and staged in appropriate locations prior to initiating a fish rescue. Ice in containers (separate bags) will be onsite to cool water in the event of elevated temperatures in the holding tanks. Portable aerators will also be available to maintain holding tank dissolved oxygen (DO) concentration at acceptable levels.

Meeting Point: When a fish rescue operation is required, the meeting point will vary depending on the location of the incident and need. If the operation is located downstream of the Highway 154 Bridge, the meeting point will be designated on a case by case basis depending on location of the rescue. When a fish rescue is located just downstream of Bradbury Dam, the team will meet at the entrance gate to the Dam off of

Highway 154. During the initial meeting, the team will review safety procedures, receive an orientation of the site, review the CDFW/NMFS protocols, identify and locate creek landmarks and the sequence of the habitats of concern, identify relocation sites, and review the general procedure before fish rescues commence.

Water Quality: Water quality monitoring will be performed using portable, handheld, multi-parameter water quality meters. Measurements of water temperature, DO concentration, and specific conductance [conductivity] will be conducted prior to a fish rescue to evaluate conditions and prepare for the rescue. Once rescue operations are underway, additional water quality data will be gathered to determine appropriate settings for electro-fishing, to determine what measures may be needed to provide appropriate conditions in holding and transfer tanks, and to assure relocation sites have adequate conditions.

Prioritization: In the event of a required fish rescue operation, prioritization of areas to be rescued will be determined for each event. The Fish Rescue Team will prioritize rescues considering the best available information and/or past experience, *Oncorhynchus mykiss* (*O. mykiss*) densities, and habitats at highest risk of drying out. If available, data on fish distribution will be provided to the Fish Rescue Team prior to initiating the rescue in order to facilitate further prioritization.

Fish Rescue Methodology: Fish rescues will be conducted using various equipment including, but not limited to: dip-nets, seines, electro-fishers, buckets, coolers, and aerators. The electro-fishers will be operated by trained CDFW or NMFS staff with assistance from other rescuers. In order to prevent smolts from imprinting on out-of-basin water during rescue operations, if possible, water for the transport containers will be taken from the creek/river from which the fish are being rescued, or from within the same watershed. Once rescued, fish will be transported expeditiously to pre-determined relocation sites in containers with lids to prevent loss from the transport container. Multiple containers will be used to reduce crowding during collection and transfer. When possible, *O. mykiss* young of the year will be held separately from larger individuals to prevent loss from predation. Transport container water temperature and DO will be monitored during holding. Temperature will be managed to within plus or minus 2°C of ambient water temperature to reduce stress to the fish and avoid thermal shock.

Electrofishing is often the most effective means of capturing and relocating fish. Electrofishing will be conducted to the extent practical according to the NMFS Electrofishing Guidelines (NMFS 2000b). However, the guidelines dictate that no electrofishing should occur when water temperatures are above 18°C or are expected to rise above this temperature prior to concluding the electrofishing survey. In addition, studies by NMFS scientists indicate that no electrofishing should occur in California

coastal basins when conductivity is above 359 µS/cm. When faced with a scenario where fish rescue using electrofishing is required in order to save as many individuals as possible, departure from water temperature and conductivity guidelines may be necessary rather than allowing fish to succumb to poor water quality or reduced flow conditions. In situations where very high turbidity prohibits visually locating stunned fish, or unsafe electrofishing conditions for the rescue crew exist, or when temperatures are unexpectedly high and above the guideline's limit, electrofishing may not be feasible and rescues will be conducted using seines, dip nets, and/or other suitable methods.

Blocking Seines: After fish have been rescued, blocking seines may be installed to prohibit fish from moving back into areas of potential stranding; for example, this may be necessary during pump system repair and/or testing operation when increased flow in Hilton Creek may result in brief moments of stream connectivity from the Upper Release Point (URP) and Lower Release Point (LRP) to the Lower Santa Ynez River mainstem and Long Pool. Blocking seines (1/8-inch mesh) would be placed to prevent fish from accessing the most vulnerable areas for fish stranding.

Relocation Sites: Depending on ambient stream and riparian corridor conditions, etc. the Fish Rescue Team will identify relocation sites during the pre-rescue meeting. Depending upon conditions these sites may vary year to year, month to month, and site to site. Sites will be selected based on the best information available. Sites will be selected considering the presence of favorable habitat conditions including, but not limited to: suitable water quality, habitat structure for refuge, carrying capacity, numbers of native and/or non-native predatory aquatic organisms, and habitat persistence or sustainability. If no suitable relocation sites are believed to exist in the watershed from which the fish are being rescued, out of basin sites or temporary holding areas (e.g. CDFW fish hatcheries) may be used with authorization from NMFS and CDFW.

Relocation sites for fish rescue and relocation operations conducted in the Highway 154 Reach and/or Hilton Creek areas will be selected depending on the anticipated duration of the interruption of flows and/or conditions, including drought, that reduce flows to the creek and downstream into the Highway 154 Reach. If the interruption or decrease in flow rate is anticipated to be short (1-12 hours), rescued fish will be relocated to suitable refuge habitat within close proximity, preferably in Reach 4 of Hilton Creek where deep refuge pool habitat exists (Figure 1). If the interruption is expected to be greater than 12 hours, there is reason not to relocate the fish to these locations, and CDFW and NMFS agree to an alternate site, fish will be relocated out of Hilton Creek to habitats in relatively close proximity on Reclamation property (listed in order of priority) (Figure 2): 1) the Lower Santa Ynez River Long Pool and 2) the Lower Santa Ynez River mainstem just downstream of Long Pool. Any fish rescues downstream of the Long Pool will be

released into the Long Pool or up into Hilton Creek depending on dam flow releases and the carrying capacity of the identified release habitat.

Although releasing fish into the Stilling Basin is currently not recommended due to frequent adverse water quality conditions and the presence of non-native aquatic predators, the Stilling Basin may become an more suitable relocation site in the future (e.g. post 89-18 Water Rights Releases).

In the case of a fish rescue and relocation operation in streams crossed by the South Coast Conduit, rescued fish will be relocated to suitable refuge habitats within close proximity, preferably in the same creek from which the fish were rescued. If this is not possible, fish will be relocated within the same watershed. If no suitable relocation sites exist within the watershed where fish are being rescued, fish may be relocated to a nearby watershed, or if none are available then suitable temporary holding areas (e.g. CDFW fish hatcheries) may be used with authorization from NMFS and CDFW.

Figure 1: Hilton Creek reaches; Reach 6 is normally dry outside of the wet season

Figure 2: Fish Rescue Relocation Sites near Hilton Creek

Mortalities: Unless otherwise instructed by NMFS, all *O. mykiss* mortalities will be collected, measured for fork-length, photographed, sampled for tissue and scales, and individually bagged, then stored in a freezer. Sampling will follow standard protocol procedures. Reclamation, or its contractor, will hold the collected mortalities until NMFS representatives can arrange to take custody of the carcasses.

California Red-legged Frogs: No California red-legged frogs (CRLF, *Rana draytonii*) have been observed within the Lower Santa Ynez River mainstem or Hilton Creek areas since monitoring began in the mid-1990s. CRLF have been observed in the Quiota, Salsipuedes, and El Jaro Creeks. In areas where CRLF may be present, biologists who are experienced and authorized by the United States Fish and Wildlife Service (USFWS) will be on hand during fish rescues to identify CRLF in all life stages. If CRLF are found during a fish rescue operation the observation(s) will be documented, CRLF will not be captured and/or relocated, and Reclamation will report the documented occurrence(s) to the USFWS and the CDFW. The biologist who made the observation will be responsible for documenting the occurrence in the California Natural Diversity Database.

Post-rescue Monitoring: For several days after the rescued fish are released all relocation sites will be visually monitored (either from the bank or while snorkeling) to determine if any post-rescue mortality occurs or if additional rescue(s) are required.

Reporting: Data collected during these rescues (including, but not limited to: pictures, copies of field notes/logs, data sheets, water quality data, fish counts, etc.) will be provided to Reclamation, and Reclamation will provide a detailed technical report to NMFS following the completion of a fish rescue or post-rescue mortality event.

Predator Species Removal: As time permits, non-native predatory fish or other aquatic species may be removed in the Lower Santa Ynez River mainstem, where accessible, to reduce predation at potential release points for rescued *O. mykiss*. Based on site conditions at the time of rescue, targeted removal of non-native predatory aquatic species (including fish) may be undertaken in specific areas where relocation is planned or just prior to the release of rescued fish. Non-native predators including fish and other aquatic species captured during the rescue operations will be removed and dispatched. Any prickly sculpin (*Cottus asper*) rescued will be transported in separate buckets to avoid predation by *O. mykiss* and will be released in a separate location.

References

NMFS, 2000a. Cachuma Project Biological Opinion, U.S. Bureau of Reclamation Operation and Maintenance of the Cachuma Project on the Santa Ynez River in Santa Barbara County, California. National Marine Fisheries Service, Southwest Region.

NMFS, 2000b. Guidelines for Electrofishing Water Containing Salmonids Listed Under the Endangered Species Act. National Marine Fisheries Service (NMFS-NOAA).

SYRTAC, 2000. Lower Santa Ynez River Fish Management Plan. Santa Ynez River Technical Advisory Committee, prepared for the Santa Ynez River Consensus Committee, Santa Barbara, CA.

Reclamation, 1998. Hilton Creek Fish Rescue Plan. U.S. Bureau of Reclamation; Fresno, CA.
Reclamation, 1999. Biological Assessment for Cachuma Project Operations and the Lower Santa Ynez River. Prepared for the National Marine Fisheries Service, U.S. Bureau of Reclamation, Fresno, CA.

Attachment A: Fish Rescue Team Points of Contact

Agency	Name	Phone Number
Reclamation	Ned Gruenhagen	(559)487-5227 (559) 284-2735 (559) 392-3958
NMFS	Darren Brumback	(562) 980-4060
COMB		
Fisheries Division Manager	Tim Robinson	(805) 687-4011x215 (805) 689-8586
Project Biologists	Scott Engblom	(805) 216-5135
	Scott Volan	(805) 407-0931

[EXTERNAL] Re: WR Order 2019-148

Larson, Mary@Wildlife <Mary.Larson@wildlife.ca.gov>

Thu 12/12/2019 10:45 AM

To: Emerson, Rain L <remerson@usbr.gov>; Buck, Lisa E <lbuck@usbr.gov>; Hyatt, David E <dhyatt@usbr.gov>
Cc: JACKSON, MICHAEL P. <MJackson@usbr.gov>; Wilson, Erinn@Wildlife <Erinn.Wilson@wildlife.ca.gov>

1 attachments (14 KB)
BOR Draft Plan - Order WR-2019-0148.xlsx;

Good Morning

The Department's comments to the above referenced plan are attached as an excel spreadsheet. Hopefully this format will make addressing our comments easier.

Let me know if you have any ques ons about what we have provided.

Mary Larson

California Department of Fish and Wildlife Comments on the US Bureau of Reclamation's Draft Cachuma Order WR-2019-0148 Term 18 Plan

CDFW Comment Number	Page #	Section	paragraph #/bullet	comment	
1	1	Introduction	1	As a planning document that is responsive to the state board's order, the introduction should include all direct given by the Board as well as the constrains (e.g. reasonal and prudent measures).	CDFW-1
2	1	Introduction	2	the introduction should describe in more detail the documents that will be used to inform the plan. However it should also be recognized that this is a standalone document. The reader should not have to searchr all of the referenced literature in order to understand what is being proposed and why.	CDFW-2
3	2	Term 15(a)	throughout	Table references need to be clarified to avoid confusion. Suggest adding in WR Order 2019-0148 in title of table to distiguish it from BiOp and other referenced tables with the same enumerator.	CDFW-3
4	2	"	Bullet 1	Due to issues with this USGS gauge, we support the independent verification of the flows at this gauge at set intervals proceeding and following storm events. Additionally, information on who will perform these measurements and with what type of equipment should be included.	CDFW-4
5	2	"	Bullet 2	the decision tree from the Stetson Report (08/17/2011) should be incorporated within the plan.	CDFW-5
6	3	Term 15(a)	Bullet 3	This section lacks details. There should be a decription of what data will be collected and how it will be evaluated so as to inform potential changes to the release schedule. Additionally, a timeline for when the evaluation report will be given to the Water Board, CDFW and NMFS, what will be included in that report is important and how it will be transmitted to the agencies.	CDFW-6
7		Term 15(b)		While this is not part of the plan, it would be helpful to have an updated status report on the barriers that were identified in the Biological Assessment of the Cachuma Project Operations and the Lower Santa Ynez River, June 2000. This could be included as an appendix to the plan. it would help that agencies to know what has been accomplished from the BA and what is still left to be dealt with.	CDFW-7
8	3	Term 15(c)	3	The current NMFS-reviewed rescue plan should be incorporated in full within the plan.	CDFW-8

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9	3	Term 15(c)	3	A paragraph should be included on rescue notification that includes the Department of Fish and Wildlife -South Coast Region fisheries staff for those times when NFMS personnel are not reachable. This recommendation is based on the Department's involvement in a number of rescue/relocation events as a result of flow interruptions into Hilton Creek.	CDFW-9
10	3	Term 16(a)-16(b)	3	cummulative flows of 33,707 not 33,307.	CDFW-10
11	5	Term 16(c)-16(e)	throughout	The actual language from the Order should be incorporated into this document. Also the plan should include details about the type of data that will be necessary to determine if steelhead are at risk as well as who will be responsible for collecting this information. It is not clear if the Water Boards intent was for CDFW to collect this information independently or be dependent on the Bureau of Reclamation.	CDFW-11
12	5	Term 16(f)	1	will NMFS and CDFW be invited to participate in the safe yield reduction discussions?	CDFW-12
13		Attachment 2, page 4	1	Those sections of the Stetson report dated 08-17-2011 that are relavent to this plan should be incorporated in whole or part into the main body of this Plan for ease of use with the exception of Step 2 of that document relative to beaver dam removal. The Department of Fish and Game does not believe that the presence of beavers pose a threat to passage. should data be presented that shows otherwise, the Department will reconsider it position.	CDFW-13
14		Attachment 3, pages 1 and 8	4	CDFW is mentioned as an entity that will be involved in possibly rescue events, it would be advisable to add the CDFW Senior Fisheries Biologist and steelhead biologist (Kyle Evans) to the attached table A: Fish Rescue Points of Contact so that we have sufficient notice to assist if needed.	CDFW-14