

## State Water Resources Control Board Cachuma Project Hearing

### Surrebuttal Testimony of Charles H. Hanson

#### Qualifications

Certified Fishery Biologist

B.Sc., M.Sc., Ph.D in fishery science

More than 35 years of experience with salmonids, including steelhead

Conducted fishery investigation on the Santa Ynez River since 1993

NMFS Central Valley Salmonid Recovery Team

USFWS Native Delta Fish Recovery Team

Expert testimony in 2003 SWRCB Santa Ynez Water Right Hearing

#### Issues Raised by Dr. W. Trush and D. Brumback in Rebuttal Testimony

***Issue:** Steelhead population status and trends in the Santa Ynez River are inconsistent with the FEIR's conclusion that flows implemented under the NMFS 2000 Biological Opinion will support continued survival of *O. mykiss* in the Santa Ynez River. Review and analysis of data demonstrate that flows implemented under the 2000 BO will threaten the continued survival of the Santa Ynez River steelhead population.*

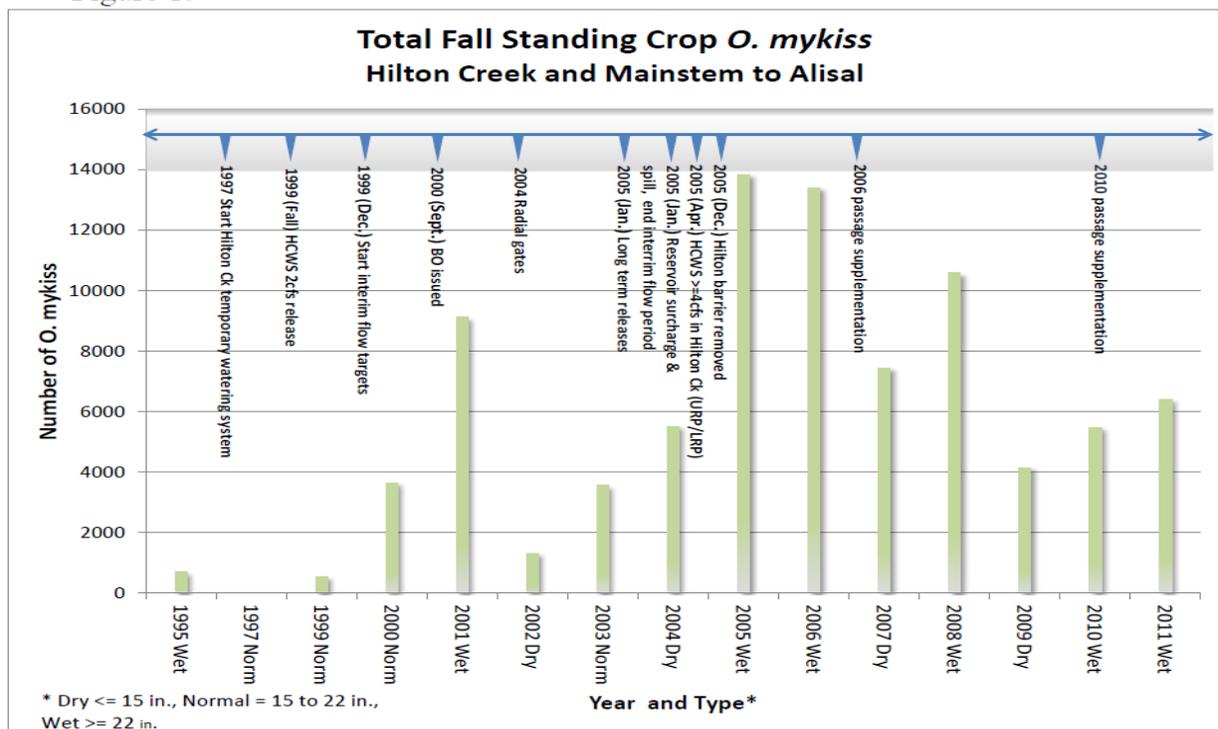
#### Response

The Santa Ynez River Fish Management Plan includes a variety of actions designed to benefit *O. mykiss* that include, but are not limited to, instream flows. The Lower Santa Ynez River Fish Management Plan (August 2000) was used as the basis for the Biological Assessment developed by the Bureau of Reclamation and subsequent NMFS Biological Opinion, and all were incorporated into the FEIR's analysis of alternatives. Key elements of the Fish Management Plan incorporated into the 2000 BO and, subsequently, the alternatives analyzed in the FEIR include:

- Expansion of access to suitable habitat in the mainstem and tributaries (spatial diversity);
- Removal of passage barriers and impediments;
- Expansion of habitat in Hilton Creek using supplemental water supplies provided from Cachuma Project reservoir storage;
- Instream flows for spawning and juvenile rearing downstream of Bradbury Dam in concert with hydrologic conditions and constraints for sustainable instream flows within Hilton Creek and the mainstem;
- Instream flow supplementation for adult and juvenile migration in the mainstem in concert with watershed hydrologic conditions; and
- Fishery monitoring and evaluation.

Results of fishery monitoring conducted since 1995 demonstrate that, in contrast to the assertion by Dr. Trush that the program has not resulted in an increase in *O. mykiss* abundance, the available scientific data show the program has resulted in increased access by *O. mykiss* to suitable habitat, successful migration, successful reproduction, juvenile growth and juvenile survival resulting in increased *O. mykiss* abundance. Results of routine snorkel surveys within the mainstem and tributaries conducted each fall demonstrate the increase in *O. mykiss* abundance that has occurred since implementation of the program (Figure 1).

Figure 1.



The 2000 NMFS BO concluded that the instream flows and other actions implemented on the lower Santa Ynez River would not result in jeopardy to resident or anadromous *O. mykiss*. Results of intensive monitoring have shown only two occasions when Cachuma Project operations conducted under the NMFS BO resulted in direct mortality to *O. mykiss*. During the 2006 spill year and the year following (2007) the 1.5 cfs instream flow requirement at Alisal Bridge was triggered under the NMFS BO, three *O. mykiss* were stranded when a downstream pool became dewatered in 2007. As a direct result of this single event water management operations were modified to increase the release of water from Bradbury Dam to ensure that instream flows are sufficient to protect *O. mykiss* inhabiting the Alisal management reach. On a second occasion (2006) increased releases were made from the reservoir in response to anticipated storm activity within the watershed. The operational reduction in releases of water resulted in stranding *O. mykiss* in the mainstem. As a result of this incident, ramping rate criteria were established that are now applied to reservoir spill releases. These modifications to water operations remain in effect and have avoided further take of *O. mykiss*. Indeed, no further mortality of steelhead has occurred in the five years since these measures were adopted. These refinements to water operations are part of standard operating procedures and are expected to continue as part of implementing operations reflected in the FEIR alternatives. Results of extensive monitoring provide no evidence that current operations and actions to benefit *O. mykiss* are resulting in a threat to the continued existence of *O. mykiss* within the lower Santa Ynez River.

***Issue:*** *Steelhead population status and trends are inconsistent with the FEIR's conclusion that flows implemented under the 2000 BO have resulted in increased abundance of O. mykiss. Review and analysis of data demonstrate that O. mykiss abundance has not increased.*

### **Response**

The available scientific data collected from fishery monitoring within the lower Santa Ynez River basin and shown in Figure 1 demonstrate the increase in *O. mykiss* abundance that has occurred in the lower Santa Ynez River and its tributaries between 1995 and 2011. The increase in *O. mykiss* abundance demonstrated by the results of the fall snorkel surveys, as well as the results of trapping within Hilton and Salsipuedes creeks and the mainstem river, reflects a variety of factors including improvements in access to suitable habitat, improvements in mainstem habitat for *O. mykiss*, successful reproduction, successful migration, and successful growth and survival of *O. mykiss* within the lower river and tributaries.

**While factors outside the control of the Fish Management Plan have a strong effect on the population response (e.g., change in population growth rate and abundance) that impacts the overall performance of the program of fishery management and conservation actions, the program carried out by Reclamation and the Cachuma Member Units in accordance with the 2000 BO Is producing substantial increases in suitable steelhead habitat and a related increase in juvenile steelhead production.**

Habitat and hydrologic conditions and other factors pose significant constraints on the actions that can be taken to improve steelhead abundance and that are sustainable over the long-term. As just one example, instream flow releases that result in a depletion of reservoir storage and water supplies can result in a complete loss of suitable fishery habitat and significant adverse population impacts. Similarly, ocean conditions may have a substantial adverse effect upon the number of returning adults despite a substantial increase in the production of juveniles.

Despite these factors, the available scientific data collected as part of the fishery monitoring in the Santa Ynez River and its tributaries show substantial increases in successful spawning and juvenile steelhead/rainbow trout production; substantial increases in steelhead smolt production; returns of adult anadromous steelhead to natal streams; the expansion of spatial habitat diversity; and, the expansion of access to suitable habitat for spawning and rearing within the mainstem and tributaries of the lower River. NMFS has established an annual average abundance criterion of 4,150 adults for recovery of the southern California steelhead populations (all basins combined). Although the numbers of adult steelhead returning to the Santa Ynez River is substantially less than the desired contribution of the river towards recovery, the trend in increasing abundance since the mid-1990s when the program started is very promising (Figure 1). The NMFS southern California steelhead recovery plan estimates that recovery of the populations may take 80 to 100 years after completion of the recovery actions.

***Issue:*** *Steelhead population status and trends are inconsistent with the FEIR’s conclusion that flows required by the 2000 BO will protect steelhead as a public trust resource and restore steelhead to “good condition”. Review and analysis of data demonstrate that the 2000 BO is not adequate to protect public trust or restore “good condition”.*

#### **Response**

Actions taken to enhance and protect habitat for steelhead and other aquatic resources within the lower Santa Ynez River reflect an interdisciplinary approach to developing and

implementing a fishery management program that is based on consideration of conservation planning principals and site-specific opportunities and constraints. The program is designed to increase the availability and quality of suitable habitat for fish within the mainstem river and tributaries of the lower river. Results of fishery and habitat monitoring demonstrate that successful migration, reproduction, juvenile growth and survival are occurring, and there is an increasing trend in *O. mykiss* abundance. Although it is expected that full restoration of the *O. mykiss* population inhabiting the lower river will take decades to be fully achieved, the trends to date are consistent in demonstrating a positive trajectory of improving good habitat and species conditions.

**The 2000 Biological Opinion issued by NMFS is based directly upon the Santa Ynez Fish Management Plan (FMP) which was developed collaboratively by Santa Ynez River stakeholders including Reclamation, the Cachuma Member Units, NMFS, CDFG, Cal Trout, SWRCB and the United States Fish and Wildlife Service**

The 2000 Biological Opinion issued by the National Marine Fisheries Service is, to a significant degree, based upon the Lower Santa Ynez River Fish Management Plan (FMP), which was developed in furtherance of the SWRCB directive in Water Rights Order 94-5. This relationship is not surprising given that the FMP is a comprehensive program of fishery and habitat restoration actions developed collaboratively with substantial input from NMFS, CDFG, Cal Trout, USFWS, SWRCB, and others. The FMP examined the habitat expansion opportunities, the limiting factors, life history requirements for steelhead and other aquatic species, as well as the Primary Constituent Elements and Viable Salmonid Population principles applicable to steelhead and did so within the site-specific hydrological, access, and habitat constraints of the Santa Ynez River watershed.

**The structure and function of the Fish Management Plan and the related conservation actions for steelhead set forth in the 2000 BO and the alternatives evaluated in the FEIR are based upon well recognized concepts of Primary Constituent Elements of steelhead production and abundance and Viable Salmonid Population metrics**

The development and implementation of the Santa Ynez River Fish Management Plan is founded on standard conservation principles for fishery management and species recovery. These include:

**Primary Constituent Elements of steelhead production and abundance (PCEs)**

Freshwater spawning sites (e.g., providing suitable water temperatures and instream flows for successful spawning in the upstream reaches and tributaries)

Freshwater rearing sites (e.g., reducing and avoiding passage barriers and impediments to migration, suitable water quality and instream flows to support physical habitat, connectivity among habitats, and providing suitable food resources for juvenile rearing)

Freshwater migration corridors (e.g., reducing and avoiding passage barriers and impediments to migration, providing suitable water quality and instream flows to support access and connectivity for migration from upstream rearing habitat to coastal marine waters and access to seasonally inundated floodplain habitats)

Estuarine areas (e.g., providing migration and rearing opportunities within lagoon and estuarine habitats)

### **Viable Salmonid Population (VSP) Metrics**

Abundance – number of fish in the population and variance over time (e.g., number of juvenile smolts, number of adult spawners)

Productivity – number of new spawners produced per parent spawner in the previous generation, number of juveniles produced per spawner, stock-recruitment relationships

Spatial structure – number and geographic distribution of population segments within the watershed or distinct population segments among watersheds

Diversity – variation in life history, habitat use, and genetic traits (e.g., genetic variation, relative proportion composed by different life history types, variation in migration timing, use of different habitat types, percentage of adult spawners that are wild)

**The foundation of the Fish Management Plan, the conservation actions of NMFS’s BO, and the alternatives considered by the FEIR are consistent with the general approach and principles of the NMFS southern steelhead recovery plan for habitats downstream of a dam**

The population response to conservation actions (e.g., increased population abundance and resilience) and population growth rates are typically slow when initially rebuilding a stock. There are few, if any, quick fixes and the implementation of enhancement actions requires years to be successful, especially given the natural environmental and biological variability inherent in southern California coastal areas in general, and specifically within the Santa Ynez River watershed. The steelhead enhancement program being carried out pursuant to the FMP and NMFS BO is in the initial phase of population rebuilding. Continued monitoring over a long-term period will be required to evaluate performance and response of the steelhead population. As already noted, the Recovery Plan for Southern California steelhead developed by

NMFS recognizes that as many as 80 to 100 years may be required before the Southern California steelhead population may fully recover.

**The Lower Santa Ynez River Fish Management Plan is yielding substantial benefits to the steelhead and serves as a model for such programs in Southern California**

The Fish Management Plan undertaken by Reclamation and the Cachuma Member Units includes collaborative data collection and monitoring of the habitat conditions and steelhead/rainbow trout. It is a program that started in 1993 and has continued under the terms of the 2000 NMFS biological opinion. The program has improved the understanding of steelhead life history, habitat conditions, restoration and enhancement actions, water operations, and other facets of implementation and evaluation of the performance of fishery management in southern California. The program has also resulted in substantial increases in access to suitable steelhead habitat as well as a significant increase in the spawning and rearing of *O. mykiss*. It serves as a model for development and implementation of conservation actions to benefit steelhead in Southern California.

The fishery management program has been conducted for the past 11 years under the provisions of the 2000 NMFS BO. The program represents a significant local investment of water, staff, and financial resources in fishery habitat protection and enhancement. Water operations have been refined based on the experience gained and the monitoring conducted as part of the program. The current program is consistent with the management alternatives included in the FEIR. The Santa Ynez River steelhead population is in the initial phase of rebuilding and performance of the program will require long-term fishery, flow, water quality, and habitat monitoring. Additional elements of the program are planned for implementation to further benefit steelhead and other aquatic resources. Given its successes to date and its forward looking character, it is reasonable for the FEIR to have developed alternatives based on the continued implementation of the program.

**Issue:** *A Smolt-to-Adult Return curve predicts the chance of adult anadromous O. mykiss return as a function of smolt size. This analytical approach is applied to evaluate the significance of reported trapping, and other fish monitoring data from the lower Santa Ynez River.*

**Response**

Anadromous steelhead experience substantial natural mortality during their residence in coastal marine waters. Steelhead smolts emigrating from the lower Santa Ynez River are susceptible to predation mortality as well as variation in the availability of suitable food resources within the ocean. Based on the relatively high levels of natural mortality between

the smolt and returning adult life stage, the numbers of returning adult steelhead is dependent, in part, on the numbers of juvenile steelhead produced in a watershed and their growth rate and size when entering the ocean. One of the primary objectives of the Santa Ynez River habitat enhancement program is to increase access to suitable spawning and juvenile rearing habitat to increase the production of juveniles. The increasing trend in juvenile *O. mykiss* abundance (Figure 1) is consistent with the objective of increasing the numbers of adult steelhead returning to the river to spawn. Based on the level of juvenile production to date, the numbers of currently returning adult steelhead is expected to be low. As reflected in the NMFS recovery plan, it is expected to take up to 80 to 100 years for steelhead populations to rebuild and recover even after implementation of conservation actions like those that have already been completed on the lower Santa Ynez River. Based on the short time period that the actions have been in place, the influence of factors that are independent of the fishery program, natural variability in hydrologic and ocean conditions, and other factors it is not unexpected that the numbers of adult steelhead that have returned to the river in recent years is low. However, the increasing trend in *O. mykiss* abundance, the returns to date of anadromous adult steelhead, and continued improvements in access and habitat conditions within the lower watershed are all promising and consistent with the findings of the FEIR regarding its analysis of alternatives that reflect the operations and actions included in the Fish Management Plan and 2000 NMFS BO.

*Issue: The basis for not prescribing ramping rates at the initiation of water right releases is no longer valid.*

### **Response**

During water right releases from Bradbury Dam, instream flows are typically increased rapidly from a baseflow level to provide efficient movement of the water intended to be recharged downstream. In preparing the Biological Assessment and Biological Opinion the rate of water movement initially during a water right release was characterized as approximately 3 miles per day, assuming that the groundwater and substrate were dry prior to the release. Data developed during one water right release in 2007, after the upper basin groundwater and substrate were saturated as a result of previous instream flow releases made to support steelhead habitat, were observed to move at a rate of approximately 14 miles per day. The biological concern for juvenile steelhead is that an increase in flow (up ramping) may result in water velocities that are high and displace juvenile steelhead downstream into less suitable habitat areas.

Analyses of the data collected during the 2007 water right release (and other water right releases) are summarized in Table 1. Results of these analyses show that during the 2007 water

right release, the rate of downstream movement of the water was 14.8 miles per day which is equivalent to a water velocity of less than 1 ft/sec. Water right releases are typically made during the summer months when juvenile steelhead have a swimming performance that exceeds 1 ft/sec. In fact, velocities of 1 ft/sec are within the range considered to provide suitable habitat for juvenile steelhead and would not be sufficiently high to physically displace steelhead downstream. Based on the estimated water velocities during up-ramping of water right releases shown in Table 1 that are well within the swimming performance capability and suitable habitat conditions for juvenile steelhead, there is no evidence that ramping rates at the initiation of a water right release are displacing steelhead downstream or resulting in significant adverse impacts.

Table 1. **Wetted Front Velocity During Water Rights Releases**

Date & Time WR Release Began <sup>1)</sup>	Flow at Solvang Bridge (cfs)	Date & Time Wetted Front Reached Solvang <sup>2)</sup>	Flow at Solvang Bridge (cfs)	Travel Time <sup>3)</sup> (hours)	Wetted Front Velocity <sup>4)</sup> (mile / day) (feet / sec)		
<i>Pre-fish MOU</i>							
5/26/89 8:00 AM	0.0	6/2/89 9:15 PM	4.5	181.3	1.4	0.08	
9/3/89 8:00 AM	0.0	9/9/89 6:00 AM	5.0	142.0	1.8	0.11	
8/23/90 8:00 AM	0.0	9/1/90 7:30 PM	3.3	227.5	1.1	0.07	
6/6/91 8:00 AM	0.0	6/10/91 2:30 AM	0.7	90.5	2.8	0.17	
9/26/91 8:00 AM	0.0	10/5/91 10:00 PM	1.8	230.0	1.1	0.07	
8/20/92 8:00 AM	0.0	8/23/92 4:15 AM	0.6	68.3	3.7	0.23	
<i>Fish MOU and Interim BO</i>							
7/25/94 8:00 AM	0.0	7/29/94 9:15 PM	0.7	109.2	2.3	0.14	
7/18/96 8:00 AM	0.0	7/21/96 11:00 AM	8.4	75.0	3.4	0.21	
7/11/97 8:00 AM	0.0	7/16/97 6:00 AM	1.9	118.0	2.1	0.13	
6/17/02 8:00 AM	NA	6/24/02 8:30 AM	NA	168.5	1.5	0.09	
8/1/02 8:00 AM	0.0	8/3/02 12:15 AM	0.7	40.2	6.3	0.38	
7/12/04 8:00 AM	0.0	7/17/04 1:15 AM	0.2	113.3	2.2	0.14	
<i>Long-term BO</i>							
7/23/07 8:00 AM	4.5	7/24/07 1:00 AM	15.0	17.0	14.8	0.91	
8/2/10 8:00 AM	0.0	8/3/10 7:30 PM	3.3	35.5	7.1	0.43	
				<i>Average</i>			
				Pre-fish MOU	156.6	2.0	0.12
				Fish MOU and Interim BO	104.0	3.0	0.18
				Long-term BO	26.2	11.0	0.67
				All Releases	115.4	3.7	0.23

Notes

- 1) Date and time water rights release began (all water rights releases assumed to begin at 8 AM).
- 2) Date based on gaged flow observations from the USGS gage at Solvang.
- 3) Time between the beginning of WR release and arrival of wetted front at the Solvang gage.
- 4) Wetted front velocity calculated based on a distance of 10.5 miles (55,440 feet) from Bradbury Dam to the Solvang gage.