

2006 Annual Progress Report
of the
Robles Diversion Fish Passage Facility



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1.0 EXECUTIVE SUMMARY

Casitas Municipal Water District (CMWD) is implementing the Robles Fish Passage Facility (Robles Facility) Project described in the Biological Assessment (BA) proposed by Reclamation (USBOR 2003) and analyzed in the Biological Opinion (BO) prepared by National Marine Fisheries Service (NMFS 2003a). This 2006 Annual Progress Report of the Robles Facility, as required by the BO, is the culmination of monitoring and operational data collected from July 1, 2005 to June 30, 2006.

The monitoring and evaluation studies related to the Robles Facility conducted during the 2005-2006 season are included in two main sections of this progress report. The fisheries monitoring section contains: upstream fish migration impediment evaluation, sandbar monitoring at the mouth of the Ventura River, fish attraction evaluation, fish passage monitoring, and water quality sampling. The Robles Facility Operation section contains: information and data on the facility status, flow observations and control, costs associated with operation and monitoring, assessment of the effectiveness to provide fish passage, recommendations of priorities for future activities, and revisions deemed necessary to the operations. Three evaluations were not conducted during 2006. the physical evaluation of the fish passage facility is still in the develop phase and is anticipated to begin in 2007. The fish passage evaluation of migrants moving through the facility was not conducted during 2006 a trap was not operated downstream of the facility. The evaluation of fish migration through the Robles Reach was also not conducted because fish traps were not operated. It is anticipated that both of these biological evaluations will be conducted during 2007.

2.0 INTRODUCTION

NOAA Fisheries listed the southern California steelhead, *Oncorhynchus mykiss*, as endangered in 1997 (NMFS 1997) under the Endangered Species Act (ESA) of 1973. Steelhead were organized into stocks (i.e., groups) of evolutionary significant units (ESU) and represented groupings that were considered to be substantially isolated from other steelhead stocks reproductively and were an important part of the evolutionary legacy of the species. The southern California steelhead ESU included, at the time, steelhead populations from the Santa Maria River in San Luis Obispo County south to Malibu Creek in Los Angeles County. The ESU was later extended to the US/Mexican border in San Diego County in 2002 (NMFS 2003b). In a later delineating approach, NOAA Fisheries recognized the anadromous life history form of *O. mykiss* as a distinct population segment (DPS) under the ESA (NMFS 2005). The DPS policy differs from the ESU by delineating a group of organisms by "marked separation" rather than "substantial reproductive isolation". In the case of *O. mykiss* of the southern California steelhead ESU, this marked separation between the two life history forms was considered valid because of physical, physiological, ecological, and behavioral factors related to its anadromous life history characteristics. Both resident and anadromous *O. mykiss*, where the two forms co-occur and are not reproductively isolated, are still part

of the ESU; however, the anadromous *O. mykiss* (steelhead) are now part of a smaller subset identified as the southern California steelhead DPS.

Rainbow trout can be generally organized into four large groupings (Behnke 1992; Scott and Crossman 1973): 1) coastal rainbow trout that extend from northern Baja California to northern Alaska near the Kuskokwim River and also the Kamchatkan Peninsula of northeastern Asia, 2) redband trout of the inland Columbia and Frazer River basins, 3) redband trout of the central valley of California, and 4) trout of the Gulf of California drainages. The taxonomic group of coastal rainbow trout, *O. m. irideus*, exhibit two life history forms; anadromous and resident. The common name for the anadromous life history form is termed steelhead trout and the resident form is generally termed rainbow trout. Throughout the range of coastal rainbow trout, there is a widespread occurrence of the anadromous life history form (Behnke 1992). There are two general life history patterns exhibited by adult anadromous steelhead when they return from the ocean to spawn in fresh water. The patterns are group by either summer or winter spawning runs. There are many exceptions to this pattern, but this general characterization has been use to group steelhead spawning runs by the season in which the peak of spawning run occurs as they return from the ocean (Busby et al. 1996). Summer steelhead are generally found in river systems that drain from far inland like that of the Columbia Basin. Winter steelhead runs are typically found in the coastal areas where the river system is not as large and overall are the most abundant life history pattern within the species (Busby et al. 1996).

3.0 MONITORING

The monitoring and evaluation studies and activities related to the modifications of the Robles Facility, as outlined in the BO (NMFS 2003a), were intended to achieve three main objectives:

- I. Monitor Fish Passage Facility operations and performance
- II. Determine if the Fish Passage Facility functions and operates in such a fashion that migrating steelhead:
 - a. Successfully navigate into and through the facility, and
 - b. Move through the facility in good physical condition.
- III. Determine if the operations at the Robles Diversion are enhancing the opportunity for:
 - a. Adult steelhead to migrate upstream to the Robles Facility, and
 - b. Smolts and kelts to migrate downstream through the Robles Reach.

3.1 Upstream Fish Migration Impediment Evaluation

Methods

The objective of the impediment evaluation was to assess factors that may impede steelhead's ability to migrate to the fish passage facilities (NMFS 2003a). An initial assessment of potential impediments was completed by Entrix (1999) in the evaluation of natural passage barriers. The Robles reach was surveyed for potential impediments and seven were identified. Of those seven, transects number 4 and 7 were considered to be the most restrictive for upstream passage of adult steelhead. On 20 May 2006, both original Entrix sites were revisited and surveyed to determine cross sectional depths. A tagline was suspended across the wetted channel perpendicular to the flow at each transect site and the total width was measured to nearest foot. Water depth was measured at 2 ft increments across each transect and depth was recorded to nearest 0.01 ft.

Results

Transect 1 (site 4 in Entrix 1999) was located just upstream of the HWY 150 bridge at approximately RM 11.5 and was about 2.5 miles downstream of the Robles Facility. The transect had a total of 28 depths measured across the wetted channel. Of those, only eight had a depth of water to measure, and the remaining were exposed. The depths of water measured ranged from 0.02 ft to 0.47 ft and represented approximately 30% of the measurements. The mean for the measured depths was 0.20 ft. The mean depth for the entire transect that included exposed areas was 0.06 ft. The Discharge of the Ventura River just downstream of the Robles Facility at the time of the survey was measured at 20 cfs and the discharge at the USGS gage near Foster Park was 65 cfs (Appendix 1.1).

Transect 2 (site 7 in Entrix 1999) was located just downstream of the Arroyo Mobile Home Park at approximately RM 7.5 and was about 6.5 miles down stream of the Robles Facility. The transect had a total of 99 depths measured across the wetted channel. Of those, 72 were able to have a depth measured and the remainder were dry. The depths ranged from 0.04 ft to 0.68 ft. The mean depth of the measured depths was 0.27 ft and the mean depth of the entire transect that included the exposed areas was 0.20. Discharge past the Robles Facility at the time of the survey was measured at 20 cfs and the discharge at the USGS gage near Foster Park was 65 cfs (Appendix 1.2).

Discussion

During the initial assessment done by Entrix (1999), a total of seven potential impediments were identified and surveyed. For each impediment, the discharge needed to meet the Thompson (1972) passage criteria was calculated from the measurements and estimates of the slope, velocity, hydraulic radius, substrate size, and relative channel confinement. The Thompson (1972) passage criteria for adult

steelhead at critical riffles is a depth of 0.6 ft for 25% of the total transect width and a continuous portion equal to 10% of the width. The impediments were also evaluated at the criteria of 0.5 ft depth for 25% width and a total of 8 ft width for both depth criteria. The resulting discharge need was estimated to be between 40 and 65 cfs. The Thompson (1972) method also stipulates that the minimum discharge is finally calculated by averaging all transects together; Entrix (1999) did not do this, but was calculated for this report to be approximately 28 cfs. There have been several modifications to the Thompson passage criteria by other researchers; Dettman and Kelly (1986) on the Carmel River used a 0.6 depth over a 5 ft continuous section, on the Santa Ynez River a criteria of 0.6 ft depth over an 8 ft section was used (SYRTAC 1999), and Harrison et al. (2006) used a criteria of 0.6 ft depth over a 10 ft section on the Santa Clara. Thomson's (1972) depth criterion was based on fish body measurements and not on actual observations and it has been observed that salmonids can successfully move through shallower riffles (Mosley 1982). It is anticipate that after more evaluations of the potential impediments in the Ventura River, in conjunction with adult steelhead migration data, a better understanding of the necessary hydraulic requirements for steelhead river passage will be develop.

3.1.1 Sandbar Monitoring

Methods

The primary objective of the sandbar monitoring was to determine if the criteria for initiation of the fish passage augmentation season have been met (NMFS 2003a). From 30 December 2005 to 17 August 2006 the mouth of the Ventura River was inspected 10 times to determine if the sandbar was breached. Seven of the observations were made during the fish passage augmentation season from January 1 to June 30th and three were made outside of the season; one before and two after. During each sandbar inspection, observations and recordings were made for: date, time, status of the sandbar, general location of the mouth, tidal stage, periodic water temperature, dissolved oxygen, turbidity, and discharge at the Robles Facility and Foster Park.

Results

On all 10 inspections, the sandbar was breached and the Ventura River was flowing into the Pacific Ocean (Appendix 2) allowing fish to volitional enter or exit the estuary. After several storms during 2005, the river mouth migrated from the eastside of the estuary to the westside (CMWD 2005). During the 2006 sandbar monitoring period, the mouth remained on the westside of the estuary. During the time of the sandbar inspections, the discharge pass the Robles Facility ranged from 6 cfs to 1,701 cfs and at Foster Park it ranged from 12 to 3,210 cfs.

Discussion

Since the sandbar was already breached before January 1st, 2006, the fish passage augmentation season began on that date and continued through June, 2006 (see section 5.2). The Ventura River, like many other California rivers, typically develops a seasonal sandbar at the mouth during the late spring or summer and is breached by higher river discharge in the late fall and winter. However, during 2005 and 2006 the sandbar did not form during the fish augmentation season. A lagoon that forms after a sandbar develops can provide important rearing habitat for steelhead juveniles, due to the abundant food resources available, and facilitate the physiological and behavioral changes associated with smoltification (Cannata 1998).

3.2 Fish Attraction Evaluation

Methods

The objective of the fish attraction evaluation was to determine if any adult or smolt steelhead were holding in close proximity to the fish ladder entrance during the fish passage augmentation season (NMFS 2003a). The primary area of interest was the reach immediately downstream of the Robles Facility to the low-flow road crossing. Bank and snorkel surveys were completed from mid April to mid July of 2006. The reach immediately downstream of the fish facility was surveyed from the bank 10 times and snorkel surveyed four times. The reach also included the area downstream of the low-flow road crossing within the four interim rock weirs. The distance of this reach was approximately 600 ft. Additional surveys were conducted in the Ventura River mainstem between Robles Facility and Shell Road Bridge. Surveys were also conducted upstream of Robles Facility in Matilija Creek up to Matilija Dam, in North Fork Matilija Creek, and in San Antonio Creek. Bank surveys were conducted by one or two surveyors in an upstream direction while wearing polarized glasses to reduce the water surface refraction. Snorkel surveys were conducted by one or two surveyors in an upstream direction. The type of survey that was conducted was determined on the conditions of the river (e.g., discharge and turbidity). All fish species were identified and enumerated with the greatest amount of certainty that the conditions and fish densities would allow.

Results

A total of 11,180 ft was surveyed from mid April to mid July. Of that, 600 ft was surveyed upstream of Robles Facility, 265 ft in San Antonio Creek and the remainder in the mainstem Ventura River. An estimated 12,204 fish were observed during all surveys (Appendix 3). Most of the fish observed were unidentifiable fry ($n = 6,600$) due to their small size, but were most likely arroyo chub fry, *Gila orcutti*, because of their general high adult abundance within the watershed; identifiable arroyo chub were estimated at 4,638. While arroyo chub were the most abundant species observed during the surveys, three-spine stickleback, *Gasterosteus aculeatus*, were the second

most commonly observed species at 926. *O. mykiss* juveniles were observed in a variety of habitats and the total counted was estimated at 17. The water temperatures where *O. mykiss* were observed ranged from 20.1 to 28.3 °C. The estimated total length of *O. mykiss* observed ranged from 10 cm to 30 cm and the mean length was 18.5 cm. Other fish observed in fewer numbers (< 10 observations) were largemouth bass, *Micropterus salmoides*; fathead minnow, *Pimephales promelas*; carp, *Cyprinus carpio*; and green sunfish, *Lepomis cyanellus*.

Discussion

Previous surveys and studies found fish species throughout the Ventura River similar to the surveys conducted in 2006 (EDAW 1978; Moore 1980; CMWD 1988; and Capelli 1997). The mean size of the *O. mykiss* observed during 2006 was similar to what was estimated by Moore (1980) in the Casitas Springs area for wild *O. mykiss*. Moore estimated the mean fork length of all *O. mykiss* measured at 14.8 cm, which compares to 18.5 cm of the *O. mykiss* observed during 2006. He measured fork length instead of total length, which if taken into account would make the comparison between the two mean lengths even more similar. Moore's method of capturing fish was a backpack electrofisher. During 1988 in the same general area, CMWD electrofished *O. mykiss* and estimated a mean fork length of approximately 23 cm (CMWD 1988). Moore (1980) concluded that differences in growth were related more to the physical conditions of the habitat and water quality. Therefore, any differences among data from previous studies and surveys, is probably more indicative of the changes in habitat and water conditions at the time of the surveys. However, even with this initial assessment, there appears to be similar *O. mykiss* population characteristics. Additional monitoring will be needed before a thorough assessment of the fish assemblage and status can be made.

3.3 Fish Passage Monitoring

Methods

Fish passage monitoring within the Robles Facility was accomplished using a Vaki Riverwatcher (Riverwatcher). The Riverwatcher consists of a scanner with light diodes that send infrared light beams to receivers on the other side. When a fish swims through the infrared beams of light, it breaks the signal and a silhouette is recorded on a computer. Also when a fish swims through the infrared light beams, the scanner triggers an underwater camera to record a short video clip. Only fish swimming upstream can be recorded because the camera is on the upstream side of the scanner. Other data recorded when the scanner is triggered are: date and time, length of the fish (from a length/height ratio), swimming speed (m/sec), and direction of the fish movement (upstream or downstream). The scanner is positioned in the center of an aluminum frame covered with 1/2 inch aluminum bars, spaced apart 2 inches on center, with a resulting 1 1/2 inch spacing between the bars that crowds the fish and directs them to swim through the scanner (Appendix 4). This crowder acts essentially as a bottleneck for the fish to swim through so they can be counted in both an up- and

downstream direction. The Riverwatcher was operated from January 2nd through June 6th when the low flow exit gate was opened, which lowered the water level in the fish bypass below 5.5 ft (30 cfs) so that the Riverwatcher was no longer able to operate. The fish crowder was removed so fish could continue to migrate volitionally, but they could not be counted. All recorded detections were review to determine if and what species of fish each was. For downstream detections, the only method of determination was to review the silhouette. For upstream detections, the video recording was also reviewed determine detection status.

Results

A total of 33 confirmed or probable fish migrated through the Riverwatcher during the fish passage augmentation season of 2006 (Appendix 5.1). Of the 33, 14 were detected moving upstream and 19 moving downstream. None of the downstream migrating fish could be confirmed because there was no video camera downstream of the scanner and the identification of a probable fish was made on the basis of the individual silhouette alone. Of the 14 fish detected moving upstream, a total of six were confirmed to be *O. mykiss*. The total lengths for the six *O. mykiss* ranged from 22 cm to 36 cm with a mean of 29 cm (Appendix 5.2). Of the remaining eight upstream detections, two were confirmed fish, but as they exited the scanner they moved out of the camera field of view too quickly to determine the species. The final six detections were determined to be probable fish based on their silhouettes alone; camera confirmation was not possible because of the aforementioned reason, high turbidity, or poor lighting conditions. For the 19 downstream detections, the lengths ranged from 19 cm to 49 cm and the mean was 28 cm.

The dates of the upstream detections for *O. mykiss* and other probable fish ranged from January 8th to May 5th and the mean date for upstream fish detected at the Riverwatcher was April 4th. The dates of the 19 downstream detections, which were determined to be probable fish, ranged from March 3rd to June 6th the day before the Riverwatcher was removed for the season. The mean date of downstream detections was May 7th. The dates of the upstream migrating fish seem to be primarily associated with the receding limb of the four runoff events in the Ventura River (Appendix 6). The diel migration pattern was different for the two directions. The median time for upstream detections through the Riverwatcher was approximately 1400 h, whereas the downstream median time was approximately 0100 h (Appendix 7).

Discussion

In simple terms, the 2006 fish passage monitoring program demonstrated that the Robles Fish Passage Facility does allow fish to move upstream and downstream and that *O. mykiss* are migrating through this new facility (Appendix 8). The upstream and downstream detections that are thought to be actual fish were moving at times that would be expected for steelhead and rainbow trout populations in a fluvial environment. There were many detections that were the result of debris and water turbulence that had to be filtered out manually before any analysis could occur. The new addition of the

A-frame hoist will allow for more frequent cleaning and assessment of the fish crowder and scanner so that data acquisition and error will improve.

The size of the *O. mykiss* detected migrating upstream seemed to be small in comparison to most other California steelhead populations. However, after taking into account for corrections to the total length that were developed during a pilot calibration test with a dead steelhead provided by Mary Larson of CDFG, it is very possible that four of the 14 fish detected migrating upstream in 2006 were in fact steelhead returning from the ocean to spawn. After adding approximately 8% for underestimation error from the pilot test, four of the upstream fish lengths were similar to 1/1 steelhead that were measured by Shapovalov and Taft (1954). This represents a steelhead that spent one growth year in freshwater and one growth year in the ocean before returning to spawn. The fact that most of the upstream detections occurred on the receding limb after a runoff event may also support the possibility that many of the several of the upstream detections were in fact steelhead, perhaps a total of seven in all. The diel timing of both the upstream and downstream detections were consistent of adult and smolt steelhead migration timing. The upstream detections occurred primarily during the daytime and the pattern was similar to migration timing of other steelhead populations (Bjornn et al. 2003). The downstream detections were distributed in to timing peaks, one in the early morning and the other in late evening. This same pattern has been observed in other populations as well (Giorgi et al. 1986). After further calibration work on the Vaki Riverwatcher, interpretations of the lengths estimated for upstream and downstream migrating fish, timing, and identification should make the Riverwatcher a very useful method to assess and monitor the *O. mykiss* migrating in the Ventura River.

4.0 WATER QUALITY

Methods

Water temperatures were recorded at nine locations throughout the Ventura River from March into July. The locations ranged from the Ventura River mouth up into the North Fork Matilija Creek and Matilija Creek upstream of Matilija Dam (Appendix 9). The recorders were set to record at 15 min intervals. The recorder at Santa Ana Bridge was lost during the high flows of April.

Results

Mean daily temperatures generally ranged from about 10 °C to 25 °C (Appendix 9). The three sites with the highest temperatures were just below Matilija Dam, Robles Facility, and at Main St. Bridge. These sites had mean daily temperatures at or near 25 °C during the period of monitoring. The daily maximum temperatures followed a similar trend. However, the temperature below Matilija Dam had a generally lower daily variability probable due to the thermal moderating nature of stored water behind the dam.

Discussion

If one was to compare these temperature regimes to guidelines for *O. mykiss* populations in similar environments, half would be considered to not provide acceptable habitat. The guideline used for this comparison was a daily mean $\leq 20^{\circ}\text{C}$ and a daily maximum temperature $\leq 25^{\circ}\text{C}$ (SYRTAC 2000). The higher temperatures that were observed occurred after May. During the fish attraction evaluation surveys, *O. mykiss* were observed at water temperatures up to 28°C (Appendix 3). Even though *O. mykiss* were observed in temperatures not typically expected, they were probably not growing and on the outer edge of their survival envelop (SYRTAC 2000). Grab samples and temperature recorders do not always fully describe the thermal environment. There can be thermal refuge in many locations in a stream that will provide fish with adequate habitat during warmer periods of a day and season (Ebersole et al. 2001).

5.0 ROBLES FACILITY OPERATIONS

5.1 Facility Status

The Robles Fish Passage Facility started the season essentially complete. The only significant item that had yet to be installed and tested was the automated control system. The automated control system was installed and tested during the season and was used during the late March and early April storms. The fish screen cleaning system was able to operate continuously for most of the season. However, the system was unable to keep the screens sufficiently clean to allow the full 500 cfs design flow of water to be diverted during and for several days after a storm peak.

The 2005 Report identified several projects to be completed during the summer and fall. These projects were:

- Installation of interim weirs below the measurement weir.
- Damage restoration of the fish guidance panels after the 2005 storm.
- Installation of additional trash wall height to prevent debris flow into the facility.
- Adjustments and alterations to the brush system.

A brief description of each project and the project's status is listed below:

Construction of the Interim Weirs and Road Crossing Modifications-Four rock and cable weirs were constructed downstream of the measurement weir/low flow (MWLF) crossing to provide interim passage over the MWLF. A vertical face was added to a portion of the downstream face of the MWLF and a shallow trench was cut in the vertex of the MWLF. Work was completed in early September.

Repair of the Fish Guidance Device-The winter storms of 2004-2005 severely damaged the fish guidance device panels. The panels were repaired and bracing was added. The repairs were completed in mid December 2005.

Height Extension of the Timber Trash Wall-The existing timber trash wall was extended vertically about 3 feet. This was done to limit the large debris entering the Robles Facility under high flow events. Funding for this project was provided by the Pacific States Marine Fisheries Commission through the Department of Fish & Game and the work was completed in early October.

Continued Modifications to the Screen Cleaning (Brush) System including replacement of the drive cable, installing a larger drive sheave, installing roller bearing swivels, installing a cable tensioning device, adjusting the counterweight and removing intermediate sheaves-Modifications were made to the screen cleaning system to improve the reliability and effectiveness of the system. This is an ongoing project as Casitas attempts to improve the efficiency of the cleaning system.

Additional projects completed during the summer and fall included:

Sediment Removal from the Robles Forebay (Pond) and diversion channel-The heavy storms of 2004-05 brought large sediment loads (silt, sand, gravels, boulders and organic material) to the Robles Forebay (pond) and the diversion channel. The sediment in the forebay caused the downstream flow to split, sending some of the flow over the cutoff wall and some to the fish passage. The sediment in the diversion channel prevented the screen cleaning brushes from operating and the fish guidance device panels from opening/closing. The sediment was moved downstream of the cutoff wall and to an adjacent storage area. The project was completed in November.

Attempted to repair the trash grate and diffuser panel in the entrance box-The winter storms of 2004-05 damaged one of the vertical grates at the entrance/diffuser box. Casitas staff attempted to close the entrance box gates and pump the box dry to facilitate the removal and repair of the grate. Staff was unable to completely close the gates because of storm sediment in the box and in the entrance pool. Pumps were unable to keep up with the flow into the structure through the partially closed gates. Casitas staff worked for two days trying to close the gates and dry out the facility. Casitas will attempt to make the repairs again this fall.

Removal of *Arundo donax* from the forebay and channel-Casitas contracted with the CCC for *Arundo* and other non-native specie removal from the forebay, spillway and downstream channel area. The removal was completed in early January 2006.

Install a hoist to facilitate the removal and installation of the Vaki Riverwatcher shroud-The shroud requires frequent cleaning under some flow condition. The hoist will allow the shroud to be raised by the fisheries personnel for cleaning, adjustment and maintenance. The hoist was completed in May 2006.

Install Additional Railings at the High Flow Exit and the Diversion Channel-Casitas fabricated and installed additional railings at various locations around the fish passage facility.

5.2 Flow Observations and Control

Flow continued through the Robles Facility area of the Ventura River throughout the summer and fall of 2005. Flow on the river went subsurface about a mile downstream of the Robles Facility. The continuous flows caused several projects to be delayed until the following summer/fall season. Projects not completed include repairs to the eroded spillway concrete and the repairs to the trash grate & diffuser panel in the ladder entrance box.

The District collected flow information and verified flows where and when reasonably safe conditions existed in the Ventura River. Flow and level measurement devices are also located at various locations within the Robles Fish Passage Facility. The primary points of measuring and recording stream flows entering, flowing through and leaving the Robles Fish Passage Facility are:

- Matilija Creek at Matilija Hot Springs – located approximately 2,100 feet downstream of Matilija Dam – good rating for low to moderate flows – operated by Casitas Municipal Water District, formerly a USGS station;
- North Fork Matilija Creek – located approximately 3,000 feet upstream of its confluence with Matilija Creek – good rating for low to moderate flows – operated by the Ventura County Watershed District;
- Robles-Casitas Diversion Canal – located on the diversion canal approximately 1,300 feet downstream of the Robles Diversion Dam – trapezoidal channel with a good rating for flows up to 600 cfs;
- Ventura River near Meiners Oaks (VRNMO) – located approximately 540 feet downstream of the Robles Fish Passage spillway – concrete weir section – good rating to 70 cfs, use of equations above 70 cfs with poor ratings above 1000 cfs (no verifications at higher flows).
- Fish Ladder-A 4 path flow meter by Accusonics located near the Riverwatcher. Provides reasonable flow data in the 15 to 60 cfs range.
- Auxiliary Water Supply-An American Sigma flow meter currently not functioning properly.

All of the instruments can suffer from inaccuracies from time to time. Inaccuracies can be caused by clogging of bubbler lines, electronic creep, debris accumulating on sensors, changes to the measured cross sections and equipment problems. As an example, the auxiliary water supply flow meter would not read above 25 cfs during a test conducted in March. This instrument should read flows up to 120 cfs with the control gates fully opened. For this reason, the data is verified against field measurements and observations. The information gathered from each of these

locations has been reduced to the daily reporting of flows in the form of cubic-feet per second-day (cfsd). The spreadsheets are in Appendix 10, entitled "Ventura River Flow Assessment for the Robles Fish Passage Facility – Winter 2006".

The spreadsheets also provide the data for the elevation of water in the Robles forebay. The forebay elevation is provided as an indicator of the water level driving flows through the fish ladder and the diversion canal. The summations of flow data gathered at each of the primary stream gaging stations provide an assessment of the total flow entering and leaving the Robles reach.

Four rain events provided sufficient runoff for full operation of the Fish Passage Facility during the 2005-06 rainfall season with full operations lasting from a couple of days to several weeks. The first full operation of the season occurred on January 2. With high flows, the fish screens plugged even with the brushes operating. The clogged screens required regular and frequent shutdowns of the facility to clean the screens. Cleaning was accomplished with hand brushes and pressure washing. By the second storm of the season, the brushes were operating continuously but the brushes were still not able to keep up with heavy debris load. Regular shutdowns of the facility for screen cleaning were required for three to four days following a storm peak of more than 1000 cfs, including the late season storms in March and April. The extended timber debris fence worked well in keeping out the larger debris. However, the smaller debris consisting mainly of leaf litter and plant debris continued to clog the screens during heavy flows. The screens remained in place for the entire steelhead migration season.

The automated control system was initiated sporadically in February and used during the March and April storm events. The automatic control system seems to operate as intended. Under high flow conditions, some of the controls are taken out of the automatic position because of the screen clogging issues.

The District implemented the supplemental flow release pattern as specified in the BA/BO. Attached to this report are the supplemental release requirements for each of the storms as used by Casitas for each of the storm events (Appendix 11).

Facility Testing

In early April, Casitas conducted a preliminary test to determine the maximum flows through auxiliary pipeline. At the time of the test, the screens had been manually cleaned and the brushes were functioning. Nearly 500 cfs was being diverted and one spillway gate was open. The fishway was flowing at 50 cfs.

The flow meter for the auxiliary pipeline never read above 25 cfs even though the auxiliary control gate was fully open. The auxiliary pipeline should flow at 100 to 130 cfs with the gate fully open. After checking that the pipe was not clogged and the control gate was fully opened, it was determined that the flow gage was malfunctioning. The flow gage was working the previous year. The transducers for the gage are mounted on a band inside of the pipe. The transducers can become buried in sediment or can be

damaged by debris. The transducers are inaccessible underwater. The transducers will be inspected, cleaned and repaired (if required) once the basin dries out.

Vandalism

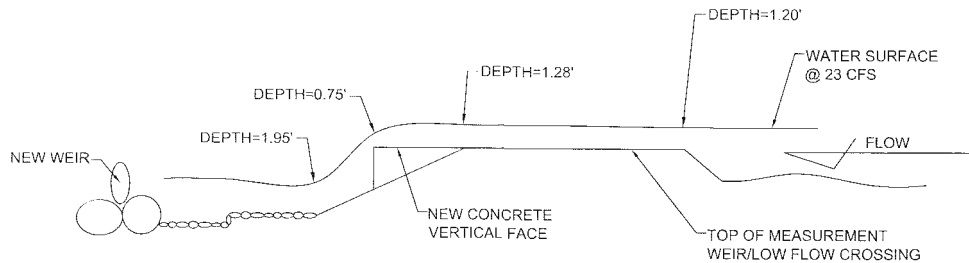
The Robles Facility has experienced some vandalism during the year. Most of the vandalism is minor (such as throwing stop logs in the fish passage) with no consequences. However, during the weekend of March 26, someone entered the facility through the main gate, cutoff power to the overshot gate and manually closed the fish passage gate. These actions cut off the downstream flow, resulting in portions of the stream dewatering. To prevent this from happening again, Casitas has taken the following actions:

- Removed the hand cranks from all of the water control gates.
- Locked all of the water control gates out of the manual mode.
- Changed the locking mechanism on the security gate.
- Alarmed the fish passage so that the on-call person will be notified if flow levels fall below a specified level in the fish passage.

Interim Weir Performance

The January 2, 2006 storm flows caused the top row of rocks on the two upstream weirs to roll forward, reducing their effective height. The reduced height resulted in a jump remaining at the weir at 20 cfs flows. The weir design intended for the downstream pool to be at the edge of the measurement weir/low flow crossing (MWLF) at 20 cfs flows. At 23 cfs flows, the following dimensions were taken using a hand held survey rod:

Depth of downstream pool at the face of the MWLF	1.95 feet
Bottom of downstream pool to water surface on the MLWF	4.56 feet
Depth of water at the downstream edge of the MWLF	0.75 feet
Depth of water in the middle of the MWLF	1.28 feet
Depth of water at the upstream edge of the MWLF	1.20 feet



CROSS SECTION
MEASUREMENT WEIR/LOW FLOW
CROSSING AT 23 CFS

The current jump and pool depth are an improvement over the previous conditions where the vertical jump was 3.8 feet, the horizontal jump was about 8 feet and the pool depth was 0.1-0.3 feet. Provided surface flow stops on the stream at the weirs, repairs will be made to the weirs during the summer/fall of 2006, further reducing the jump required.

5.3 Costs Associated with Operation and Monitoring

The BA/BO specified that the District provide the costs that are associated with the activity. The following is a summary of the direct costs incurred by the District during the 2004-05 and 2005-06 fiscal years:

	<u>FY 2004-05</u>	<u>FY 2005-06</u>
• <u>Fisheries Monitoring:</u>		
Salaries	\$ 19,597	\$ 60,951
Equipment	\$ 4,000	\$ 0
Materials	\$ 0	\$ 86
	<u>\$ 23,597</u>	<u>\$ 61,037</u>
• <u>Facility Operations:</u>		
Salaries	\$ 18,486	\$ 37,766
Materials	\$ 0	\$ 6,122
Equipment	\$ 368	\$ 4,667
	<u>\$ 18,854</u>	<u>\$ 48,430</u>
• <u>Capital Improvements:</u>		
<u>Fish Passage Facility</u>		
Salaries	\$ 79,551	\$ 7,610
Equipment	\$ 1,432	\$ 186

Outside Contracts	<u>\$2,463,407</u>	<u>\$ 43,280</u>
	\$2,544,390	\$ 51,076
Interim Weirs		
Salaries	\$ 0	0
Equipment	\$ 68	0
Outside Contracts	<u>\$ 38,700</u>	<u>\$193,150</u>
	\$ 38,768	\$193,150
Vegetation Mitigation (Arundo)		
Salaries		\$ 960
Equipment		\$ 0
Outside Contract		<u>\$ 30,979</u>
		\$ 31,939
Guidance Device Repair		
Salaries		\$ 1,127
Equipment		\$ 0
Outside Contract		<u>\$ 27,500</u>
		\$ 28,627
Access Platforms		
Labor		\$ 0
Materials		<u>\$ 2,456</u>
		\$ 2,456
Timber Fence Height Addition – funded by the California Department of Fish and Game through the Pacific States Fisheries Commission		
Salaries & Benefits		\$ 6,297
Equipment		\$ 20
Materials		<u>\$ 2,905</u>
		\$ 7,778

5.4 Assessment of the Effectiveness to Provide Fish Passage

The Riverwatcher provided evidence that the Robles Fish Passage Facility is capable of providing fish passage by capturing the images of several *O. mykiss* moving upstream. The fish passage pictures were captured by the Riverwatcher after the interim weirs had suffered the storm damage. Further testing, including the performance testing program, is anticipated to be completed during the next wet season. The revised performance testing program was submitted to National Marine Fisheries Service for review and approval electronically in November of 2005.

5.5 Recommendations Regarding the Prioritization of Future Activities

The District has completed its first season with the fish passage fully operational. Several projects have been identified to improve the functionality and reliability of the system. Other items require repairs. The summer and fall work list is attached Appendix 12. In addition, Casitas has applied for two grants, one to grade the

downstream channel and install 15 weirs and one to add an additional camera and new shroud to the Riverwatcher system. If the grant for the 15 weirs is approved, work would begin in the summer of 2007. Work on the other grant will begin as soon as the grant is approved with the goal to have the modification complete by January 2007.

5.6 Recommendations on any Revisions Deemed Necessary to the Operations

Casitas has no additional recommendations at this time. The recommendations presented in the 2005 report are still valid.

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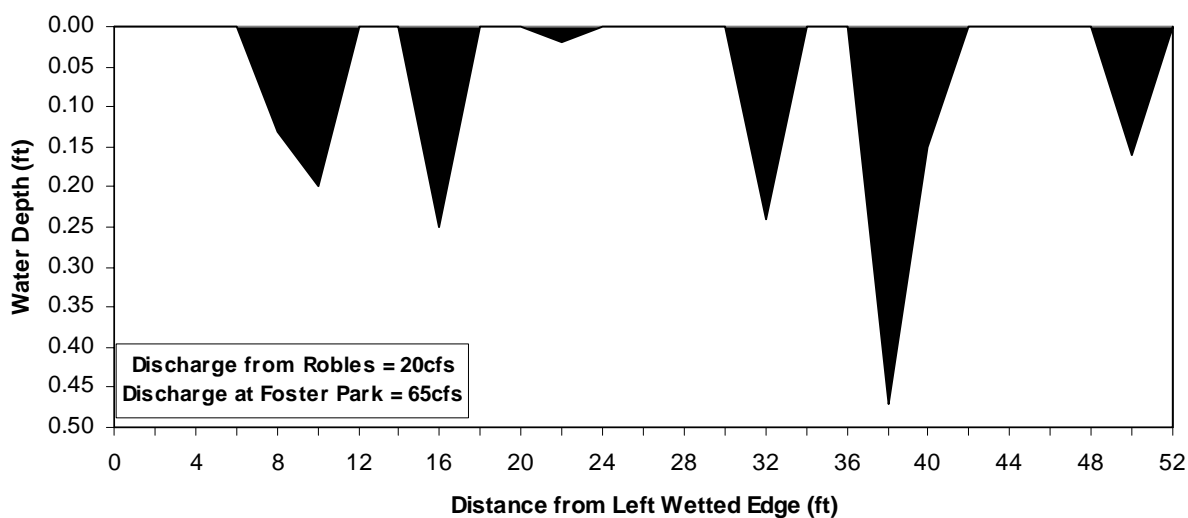
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7.0 APPENDIXES

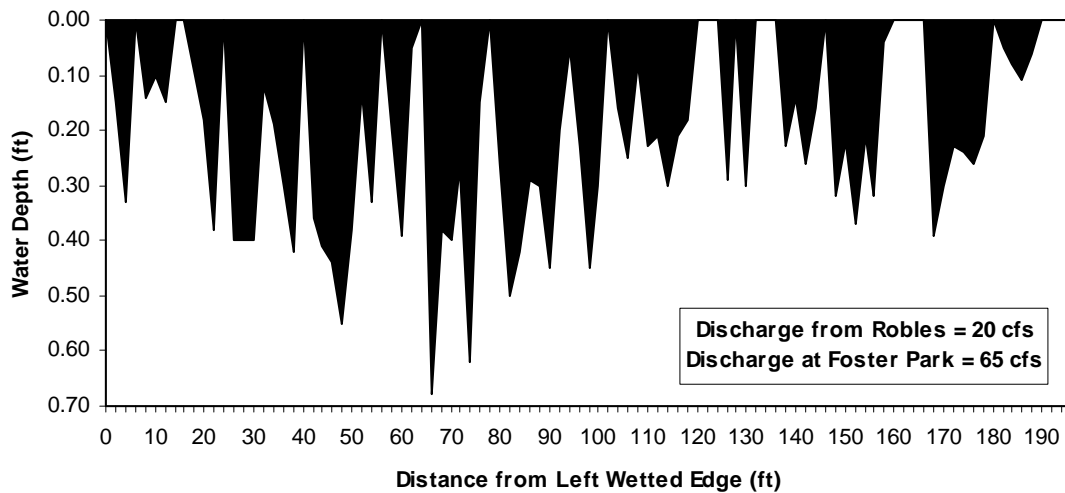
Appendix 1.1. Table, graph, and photo of transect 1.

Distance (ft)	Depth (ft)	Distance (ft)	Depth (ft)	Distance (ft)	Depth (ft)
0	0	18	0	36	0
2	0	20	0	38	0.47
4	0	22	0.02	40	0.15
6	0	24	0	42	0
8	0.13	26	0	44	0
10	0.2	28	0	46	0
12	0	30	0	48	0
14	0	32	0.24	50	0.16
16	0.25	34	0	52	0



Appendix 1.2. Table, graph, and photo of transect 2.

Distance (ft)	Depth (ft)	Distance (ft)	Depth (ft)	Distance (ft)	Depth (ft)	Distance (ft)	Depth (ft)	Distance (ft)	Depth (ft)
0	0	40	0	80	0.26	120	0	160	0
2	0.15	42	0.36	82	0.5	122	0	162	0
4	0.33	44	0.41	84	0.42	124	0	164	0
6	0	46	0.44	86	0.29	126	0.29	166	0
8	0.14	48	0.55	88	0.3	128	0	168	0.39
10	0.1	50	0.38	90	0.45	130	0.3	170	0.3
12	0.15	52	0.13	92	0.2	132	0	172	0.23
14	0	54	0.33	94	0.05	134	0	174	0.24
16	0	56	0	96	0.23	136	0	176	0.26
18	0.09	58	0.2	98	0.45	138	0.23	178	0.21
20	0.18	60	0.39	100	0.3	140	0.14	180	0
22	0.38	62	0.05	102	0	142	0.26	182	0.05
24	0	64	0	104	0.16	144	0.16	184	0.08
26	0.4	66	0.68	106	0.25	146	0	186	0.11
28	0.4	68	0.38	108	0.08	148	0.32	188	0.06
30	0.4	70	0.4	110	0.23	150	0.22	190	0
32	0.12	72	0.27	112	0.21	152	0.37	192	0
34	0.19	74	0.62	114	0.3	154	0.21	194	0
36	0.3	76	0.15	116	0.21	156	0.32	196	0
38	0.42	78	0	118	0.18	158	0.04		



Appendix 2. Ventura River sandbar monitoring data.

Date	Sandbar Breeched (Y/N)	Time (24h)	Tide Height (ft)	Tidal State	High Tide		Low Tide		Temp (°C) ¹	Temp (°C) ²	D/O (mg/L)	Turbidity (NTU)	Discharge at Foster (cfs) ³	Discharge at Robles (cfs)	Notes
					Time (24h)	Height (ft)	Time (24h)	Height (ft)							
12/30/05	Y	10:00	5.36	ebbing	8:00	6.73	15:30	-1.48	-	-	-	-	12	23	river on west bank
02/01/06	Y	15:30	1.00	ebbing	11:00	5.55	17:45	-0.44	-	-	-	-	24	32	river on west bank
02/08/06	Y	16:30	1.13	flooding	20:30	3.53	13:45	-0.56	-	17.0	12.8	1.9	20	28	river on west bank
04/05/06	Y	15:00	1.44	flooding	19:30	3.43	12:00	0.16	14.3	-	-	-	3,210	1,701	river on west bank
05/09/06	Y	14:00	0.99	slack	20:15	5.02	14:00	0.99	19.7	-	-	-	68	35	river on west bank
06/02/06	Y	15:30	3.45	flooding	17:00	3.72	9:30	0.32	23.6	24.9	12.1	2.4	70	33	river on west bank
06/16/06	Y	14:05	3.76	flooding	15:14	4.01	8:17	-0.55	24.2	25.8	13.6	2.7	64	30	river on west bank
06/30/06	Y	13:48	3.68	flooding	14:38	3.79	7:44	0.13	23.9	25.1	13.59	2.8	62	17	river on west bank
07/23/06	Y	17:30	3.98	flooding	20:54	6.32	14:47	2.58	-	-	-	-	-	11	river on west bank
08/17/06	Y	10:40	3.05	slack	7:24	3.26	10:45	3.05	-	21.2	7.06	1.54	-	6	river on west bank

¹Main St. Bridge recording temperature probe.

²Grab sample at mouth.

³USGS gauging station 11118500, downstream of Foster Park.

Appendix 3. Fish Attraction Evaluation and Bank/Snorkel Observations within the Ventura River Basin.

Date	Method	Location	Length (ft)	Temp (°C)	Turbidity (NTU)	Discharge from Robles (cfs)	Species Code ¹	Quantity
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Ventura River upstream of Robles

5/8/2006	Snorkel	Pool at base of Matilija Dam (Matilija)	350	16.8	2.8	35	LMB	7
5/8/2006	Snorkel	Pool at USGS Measurement Weir (Matilija)	90	19.2	1.4	35	NFO	
5/25/2006	Bank	100 ft u/s of S. Matilija Rd. Bridge (NF Matilija)	60	17.7	0.9	35	NFO	
5/25/2006	Bank	0.35 mi u/s of S. Matilija Rd. Bridge (NF Matilija)	20	17.3	1.0	35	NFO	
6/2/2006	Bank	100 ft u/s of S. Matilija Rd. Bridge (NF Matilija)	60	20.1	1.5	33	MYK	8
							ARC	30
6/2/2006	Bank	0.35 mi u/s of S. Matilija Rd. Bridge (NF Matilija)	20	20.1	1.4	33	NFO	

Ventura River downstream of Robles

4/12/2006	Snorkel	0.67 miles d/s of Santa Ana Bridge	100	19.5	1.5	35	STB	8
4/12/2006	Snorkel	Robles entrance pool to d/s most rock weir	600	14	3.2	35	NFO	
4/12/2006	Snorkel	500 ft u/s of HWY 150 Bridge	220	18.7	1.6	35	ARC	15
4/12/2006	Snorkel	0.4 mi d/s of Santa Ana Bridge	150	19.9	1.4	35	ARC	1
4/13/2006	Snorkel	0.4 mi u/s of San Antonio confluence	200		1.9	35	NFO	
4/13/2006	Snorkel	700 ft u/s of San Antonio confluence	175		2.4	35	ARC	450
4/13/2006	Snorkel	Ventura/San Antonio confluence pool	200			35	ARC	11
4/18/2006	Snorkel	Ventura/San Antonio confluence pool	200	14.4	4.8	35	NFO	
4/18/2006	Snorkel	0.36 mi d/s of San Antonio confluence	160	19.4	4.7	35	ARC	450
4/18/2006	Snorkel	0.5 mile u/s of Shell Rd. Bridge (Shell Hole)	320	20.6		35	CRP	7
4/28/2006	Bank	Robles entrance pool to d/s most rock weir	600			35	ARC	120
							STB	5
5/12/2006	Bank	Robles entrance pool to d/s most rock weir	600	20.8	1.7	35	ARC	120
5/19/2006	Bank	Robles entrance pool to d/s most rock weir	600			35	ARC	60
5/19/2006	Bank	1.5 mi d/s of Robles - rip/rap pool	190	21.8	1.1	35	NFO	
5/19/2006	Bank	500 ft u/s of HWY 150 bridge	175	23.9	1.7	35	NFO	
5/24/2006	Snorkel	0.75 mi d/s of Robles - "Big Pool"	175	21.6	1.1	35	ARC	12
							STB	2
5/25/2006	Bank	Robles entrance pool to d/s most rock weir	600	18.7	0.9	35	ARC	90
5/25/2006	Bank	1.5 mi d/s of Robles - rip/rap pool	170	20.3	1.1	35	NFO	
5/25/2006	Bank	500 ft u/s of HWY 150 Bridge	175	21.1	1.8	35	NFO	
5/25/2006	Bank	0.5 mile d/s of Santa Ana Bridge	65	23.4	1.4	35	STB	25
							FRY	250
6/2/2006	Bank	500 ft u/s of HWY 150 Bridge	175	24.3	0.9	33	ARC	9
6/2/2006	Bank	0.5 mi d/s of Santa Ana Bridge	65	26.1	1.0	33	STB	125
							FRY	300
6/2/2006	Bank	Robles entrance pool to d/s most rock weir	600	20.6	0.8	33	FRY	525
							ARC	120
6/2/2006	Bank	1.5 mi d/s of Robles - rip/rap pool	170	22.6	0.8	33	STB	70
							FRY	150
6/9/2006	Bank	Robles entrance pool to d/s most rock weir	600	22.3	0.9	32	FRY	500
							ARC	130
							MYK	2
6/16/2006	Bank	Robles entrance pool to d/s most rock weir	600	22.2	1.0	30	MYK	1
							STB	1
							ARC	100

Cont.							FRY	450
6/23/2006	Bank	Robles entrance pool to d/s most rock weir	600	24.9	1.1	20	MYK	1
							FRY	1000
							ARC	120
							STB	1
6/23/2006	Snorkel	1st weir pool d/s of VRNMO	30			20	MYK	1
							ARC	40
							STB	25
							FHM	1
							FRY	100
6/29/2006	Bank	Robles entrance pool to d/s most rock weir	600	23.1	0.8	16	MYK	2
							ARC	190
							STB	9
							FRY	1300
6/29/2006	Snorkel	Four weirs d/s of VRNMO	200	27.5	1.2	16	MYK	2
							GSF	1
							ARC	300
							STB	100
							FHM	2
							FRY	400
6/29/2006	Snorkel	Robles Entrance pool	100			16	MYK	1
							ARC	50
							STB	30
							FRY	150
7/7/2006	Snorkel	Robles entrance pool to d/s most rock weir	600	24.5	2.7	11	MYK	2
							ARC	850
							STB	300
							FRY	1000
7/14/2006	Snorkel	Four weirs d/s of VRNMO	200	28.3	3.4	8	MYK	3
							ARC	350
							LMB	1
							FHM	4
							STB	150
							FRY	400
7/14/2006	Snorkel	Robles entrance pool	100			8	MYK	2
							ARC	25
							STB	15
							FRY	75

San Antonio Creek

4/18/2006	Snorkel	0.75 mile u/s of Ventura River Confluence	40	21.1	4.0	35	ARC	180
4/18/2006	Snorkel	900 ft d/s of HWY 33 Bridge - trail crossing	50	21.1	4.0	35	ARC	25
						35	STB	10
4/20/2006	Snorkel	San Antonio/Stewart Creek confluence	40	18.7	2.1	35	ARC	400
							STB	
4/20/2006	Snorkel	Fraser St. crossing	35	22	5.0	35	ARC	100
4/20/2006	Snorkel	100 ft u/s of Hwy 33 Bridge	100	22	3.9	35	ARC	290
							STB	50

¹Fish Species Codes

O. mykiss = MYK

3-Spined Stickleback = STB

No Fish Observed = NFO

Fry Unknown Species = FRY

Arroyo Chub = ARC

Carp = CRP

Fathead Minnow = FHM

Largemouth Bass = LMB

Green Sunfish = GSF

Appendix 4. Photo of the fish crowder that directs migrants through the Vaki Riverwatcher scanner. The crowder is out of fish bypass and not operational in photo. Also in photo is the A-frame hoist that was completed in 2006 that will allow for easy removal of the crowder for cleaning and repair.



Appendix 5.1. Summary of Vaki Riverwatcher Fish Counts at Robles Fish Passage Facility.

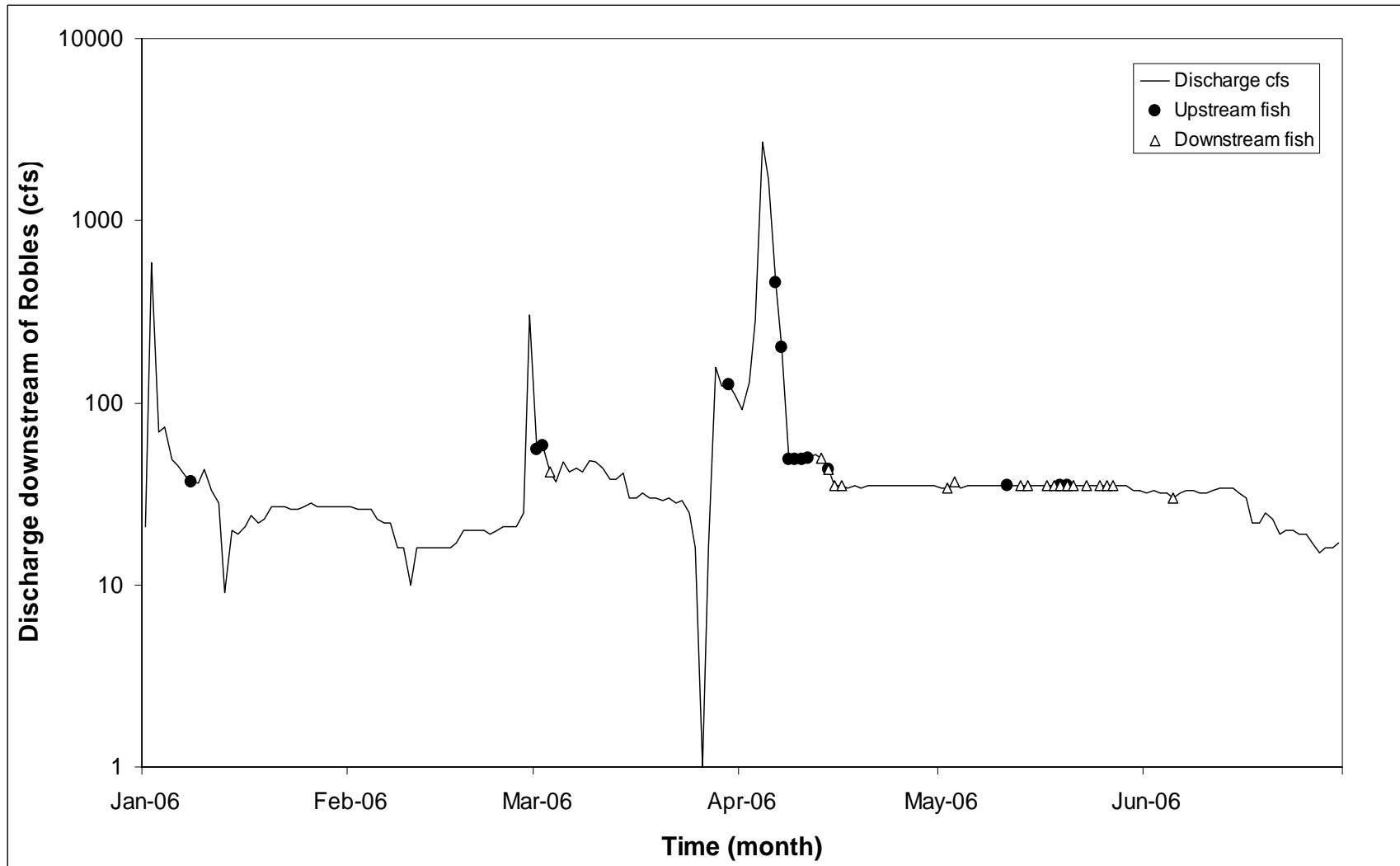
Direction	Upstream	Downstream
<i>O. mykiss</i>	6	0
Fish, Species Unknown	2	0
Fish, Probable	6	19
Not Fish	525	571
Total	539	590
Mean Date, All Fish	4/4/2006	5/7/2006
Mean Time, All Fish (24h)	14:00	01:00
Mean Daily Temperature, All Fish (°C)	13.7	18.1
Mean Length, <i>O. mykiss</i> (cm)	29	N/A
Mean Length, Species Unknown (cm)	31	N/A
Mean Length, Probable (cm)	31	28

Appendix 5.2. Summary of Vaki Riverwatcher Fish Counts at Robles Fish Passage Facility for 2006.

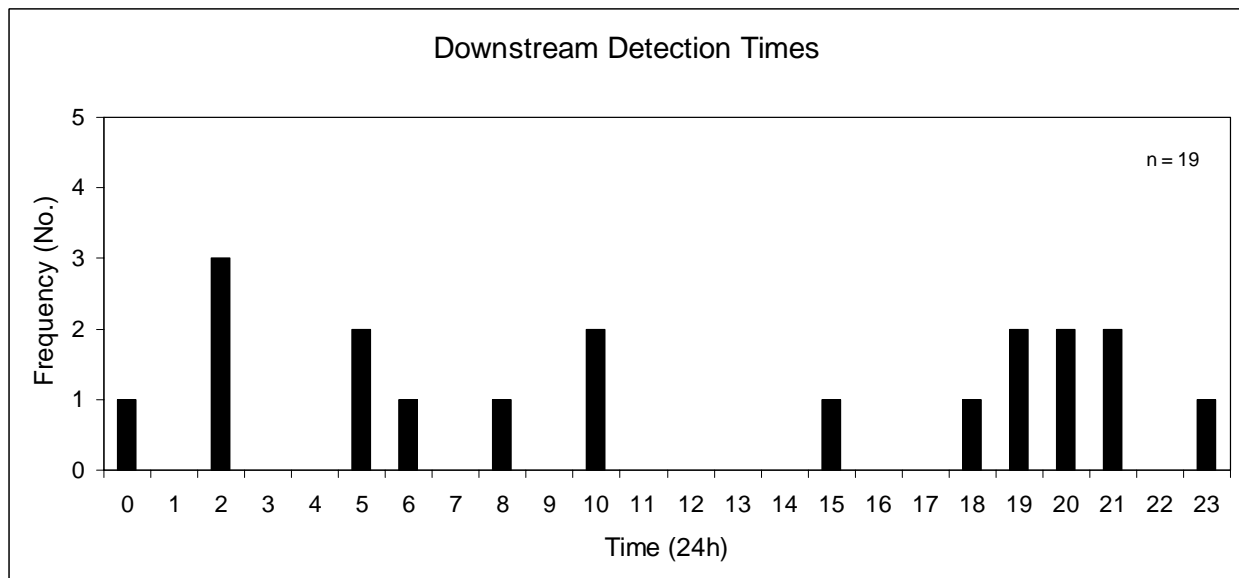
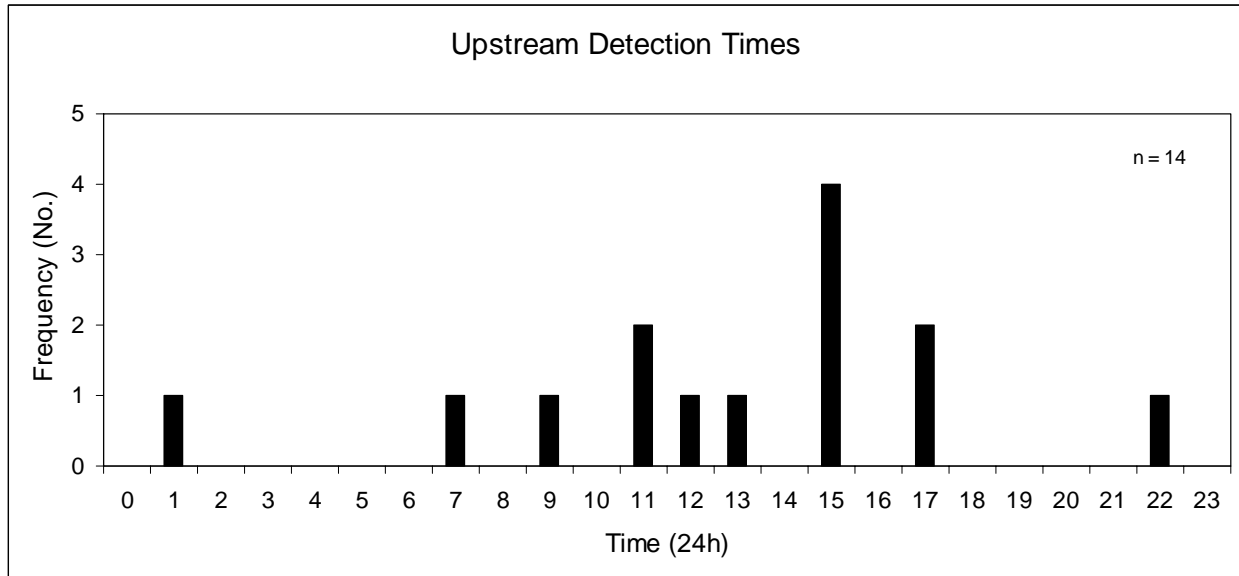
Date	Time (24h)	Mean Daily Temperature (°C) ¹	Direction	Fish Species	Total Length (cm)
1/8/2006	15:59	10.0	upstream	O. mykiss	27
3/1/2006	11:26	8.3	upstream	probable	28
3/2/2006	17:09	10.2	upstream	unknown	34
3/3/2006	10:36	12.8	downstream	probable	28
3/30/2006	9:51	12.0	upstream	O. mykiss	36
4/6/2006	12:26	12.0	upstream	O. mykiss	22
4/8/2006	13:36	13.2	upstream	probable	39
4/8/2006	15:27	13.2	upstream	O. mykiss	25
4/9/2006	15:45	13.4	upstream	probable	28
4/10/2006	7:02	12.7	upstream	O. mykiss	34
4/11/2006	11:14	13.0	upstream	unknown	28
4/13/2006	23:36	14.3	downstream	probable	27
4/14/2006	1:23	14.0	upstream	O. mykiss	31
4/14/2006	19:15	14.0	downstream	probable	44
4/14/2006	20:10	14.0	downstream	probable	49
4/16/2006	8:13	14.1	downstream	probable	21
5/2/2006	21:37	16.7	downstream	probable	39
5/3/2006	21:18	16.3	downstream	probable	19
5/11/2006	15:52	19.3	upstream	probable	27
5/13/2006	0:18	19.0	downstream	probable	35
5/14/2006	5:57	19.6	downstream	probable	21
5/17/2006	20:50	20.6	downstream	probable	22
5/18/2006	5:51	20.8	downstream	probable	24
5/19/2006	21:00	20.3	upstream	probable	33
5/19/2006	2:35	20.3	downstream	probable	21
5/19/2006	6:52	20.3	downstream	probable	24
5/19/2006	10:00	20.3	downstream	probable	28
5/20/2006	17:30	20.3	upstream	probable	31
5/23/2006	19:58	19.2	downstream	probable	24
5/25/2006	18:48	20.2	downstream	probable	27
5/26/2006	2:12	19.8	downstream	probable	25
5/26/2006	15:01	19.8	downstream	probable	24
6/5/2006	2:31	22.4	downstream	probable	31

¹Daily mean of measured values in 4 hr intervals (01/08/06 - 03/03/06) and 15 min intervals (03/30/06 - 06/05/06).

Appendix 6. Discharge downstream of Robles Fish Passage Facility in relation to upstream and downstream migrating fish that passed through the Vaki Riverwatcher during 2006.



Appendix 7. Upstream and downstream frequency distributions of detection times.



Appendix 8. Series and still photos of *O. mykiss* detected moving upstream through the Robles fish ladder.



Series 1. *O. mykiss* recorded on 04-08-06 at 15:27 h and was estimated to be 25 cm.



Series 2. *O. mykiss* detected on 04-10-06 at 07:02 h and was estimated to be 34 cm.

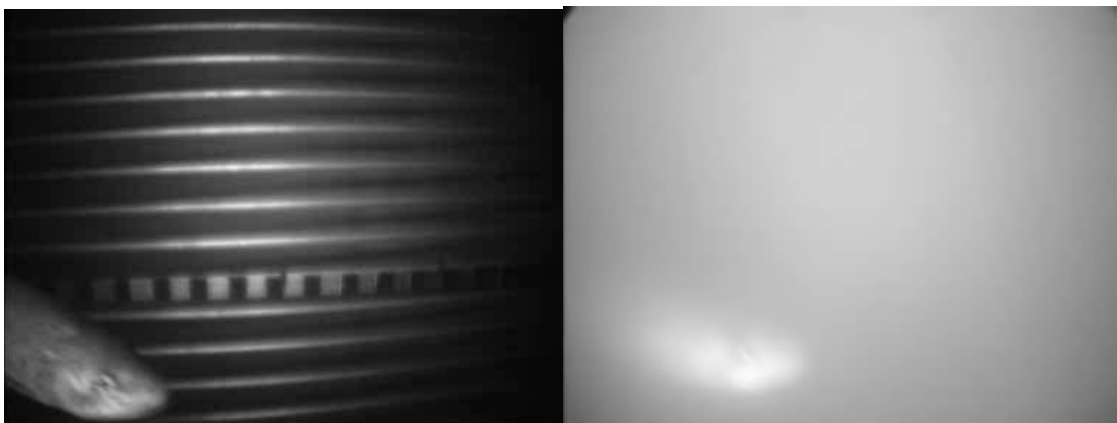


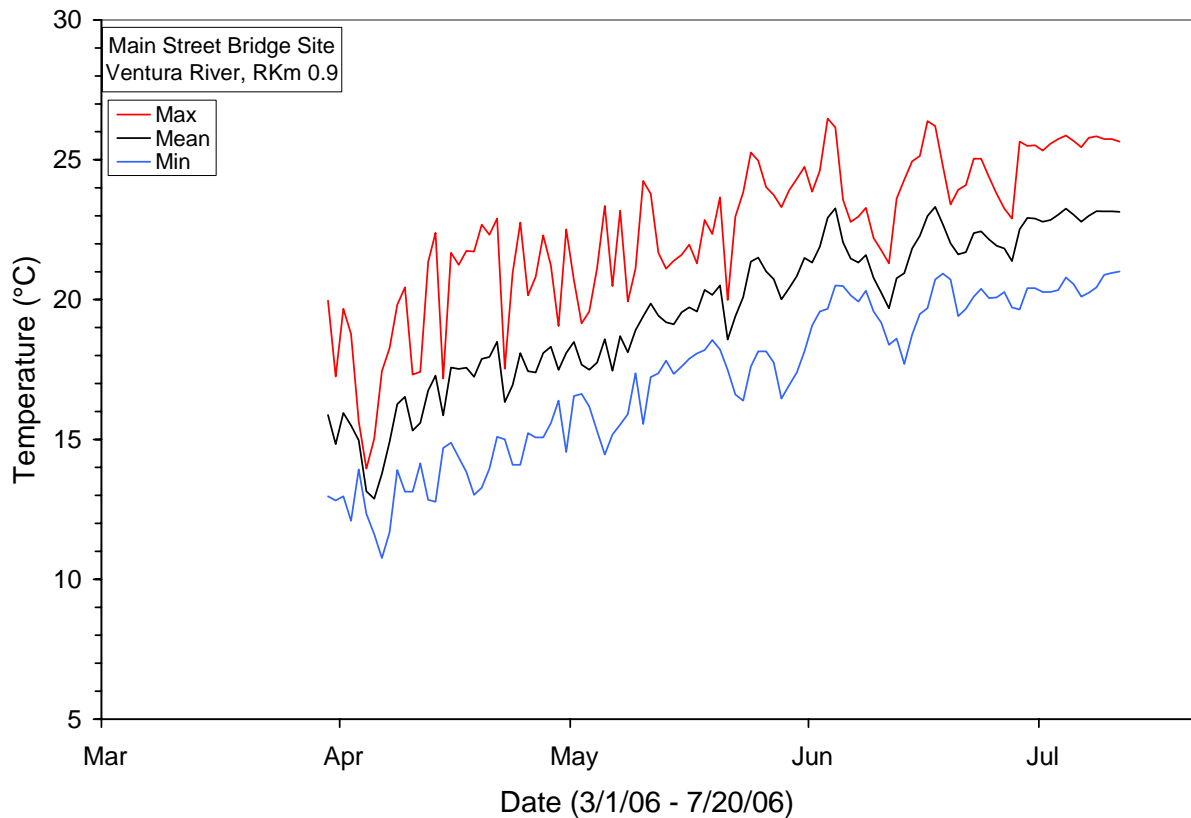
Photo 1. *O. mykiss* detected on 04-14-06 at 01:23 h and was estimated to be 31 cm.

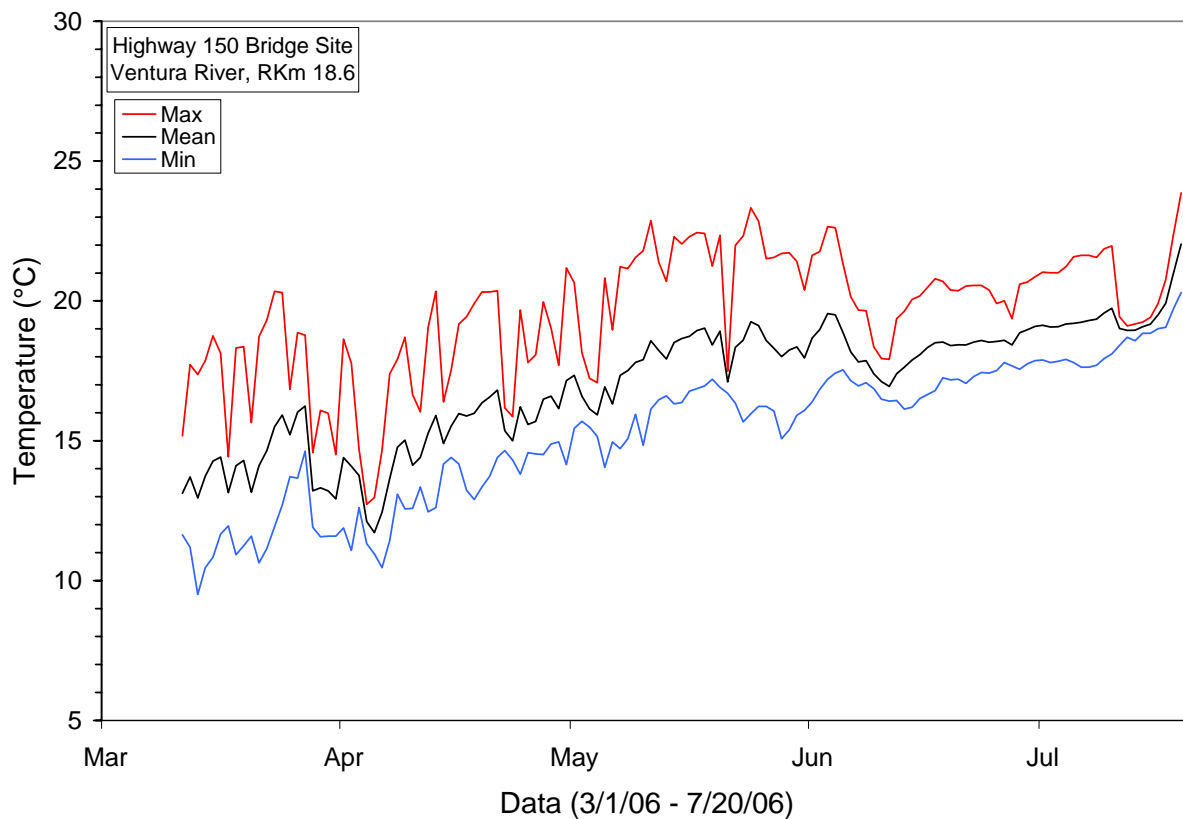
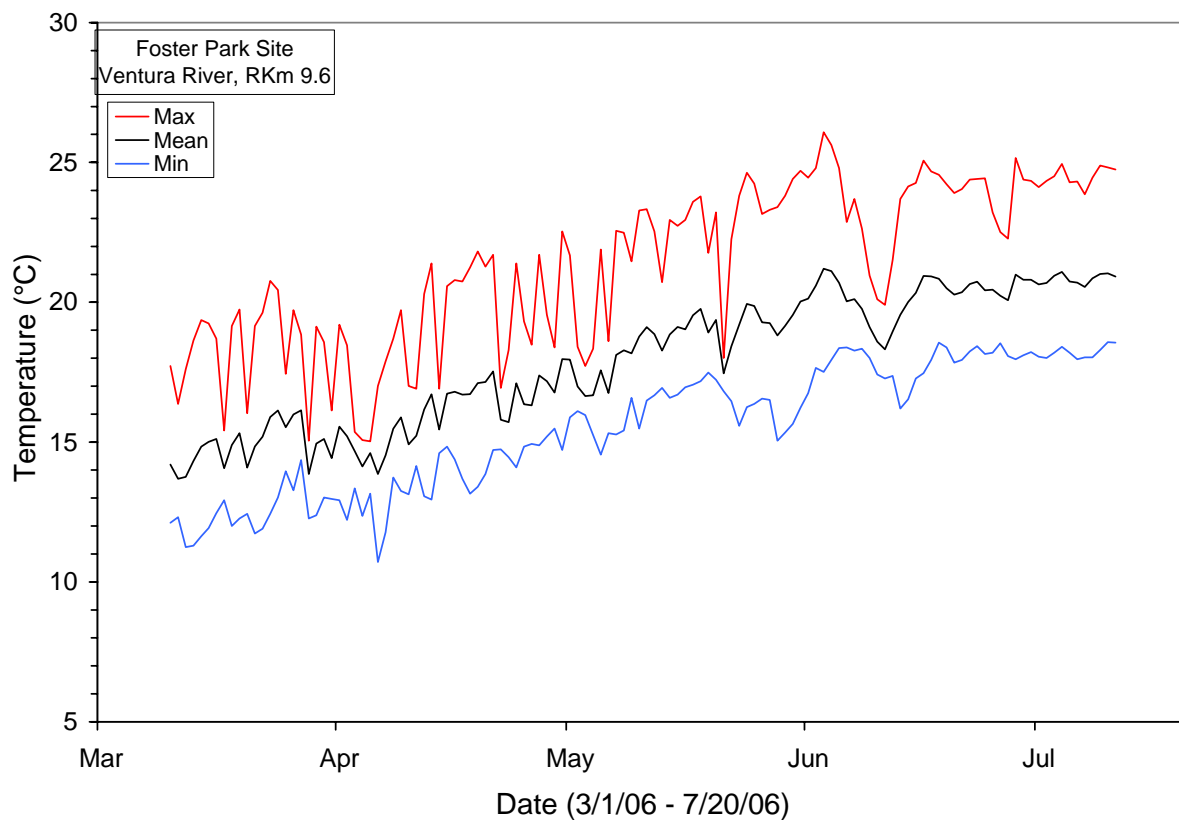
Photo 2. Example of turbidity obscuring the identification of a fish .

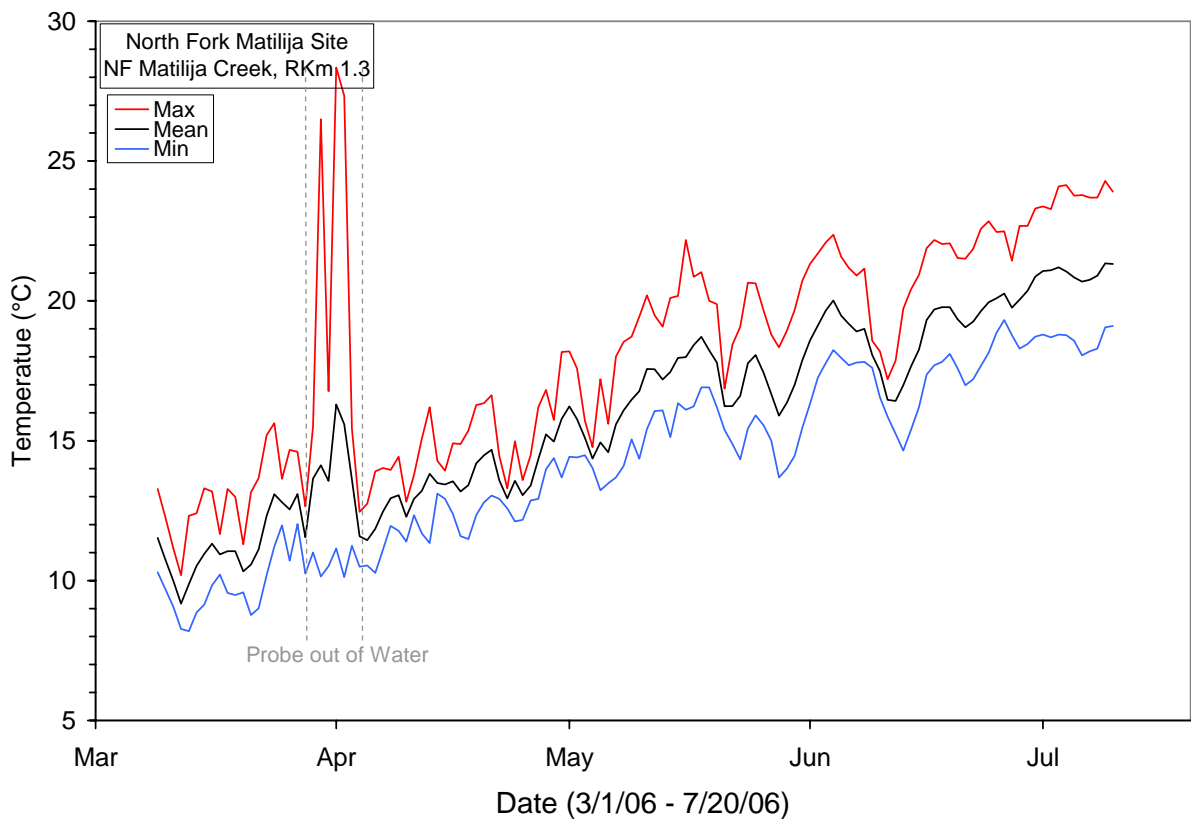
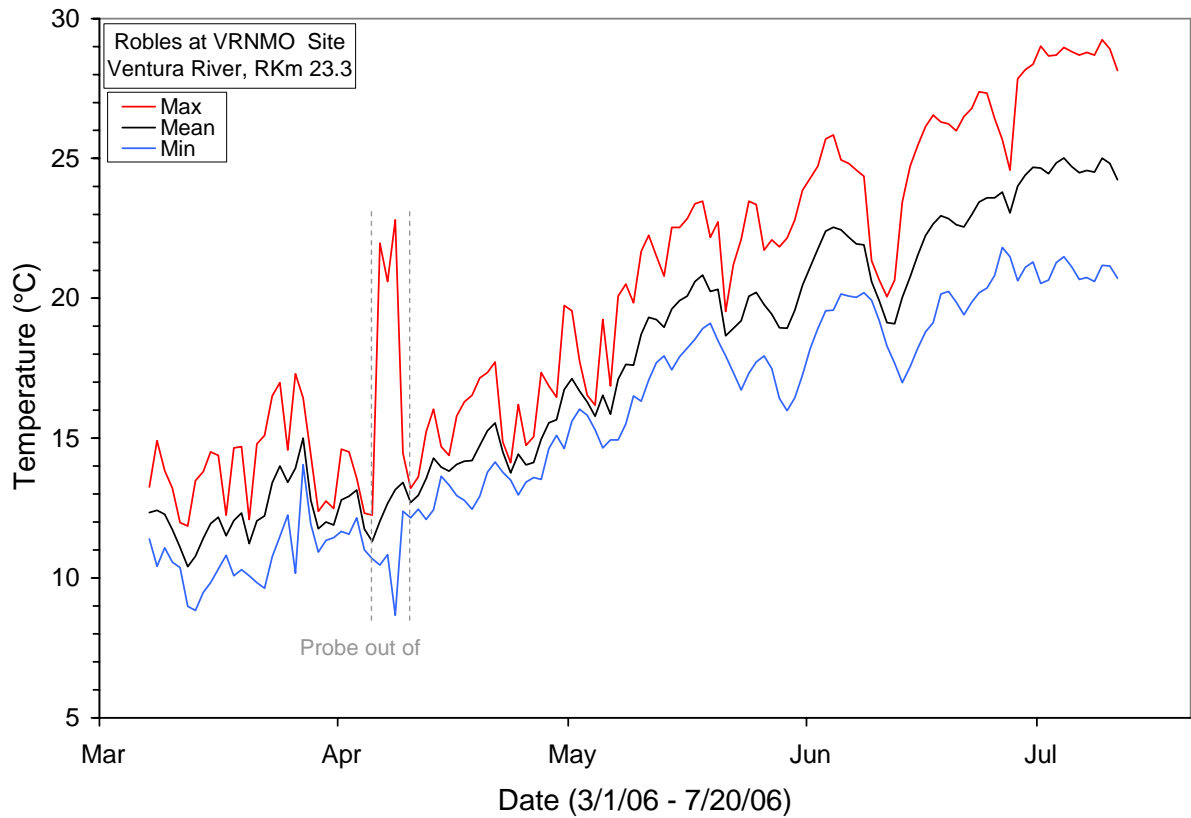
Appendix 9. Water Temperature Data Logger Sites and individual graphs of eight sites.

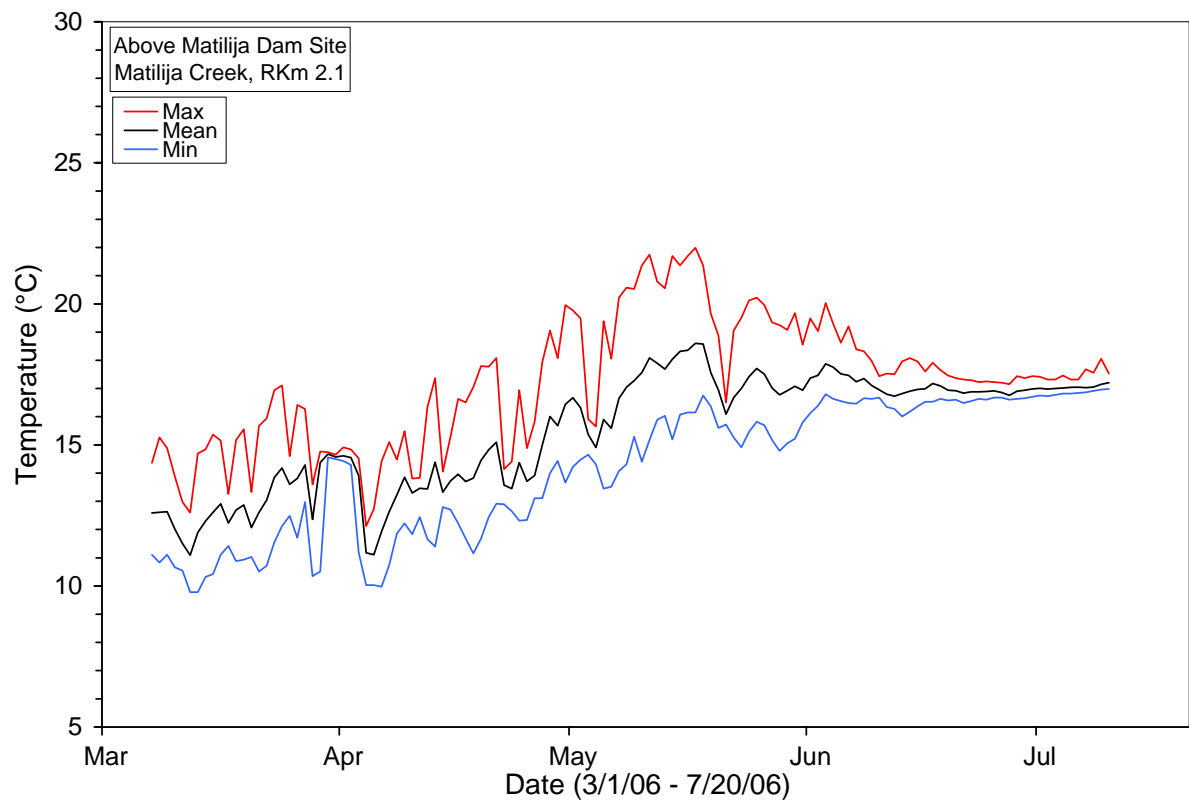
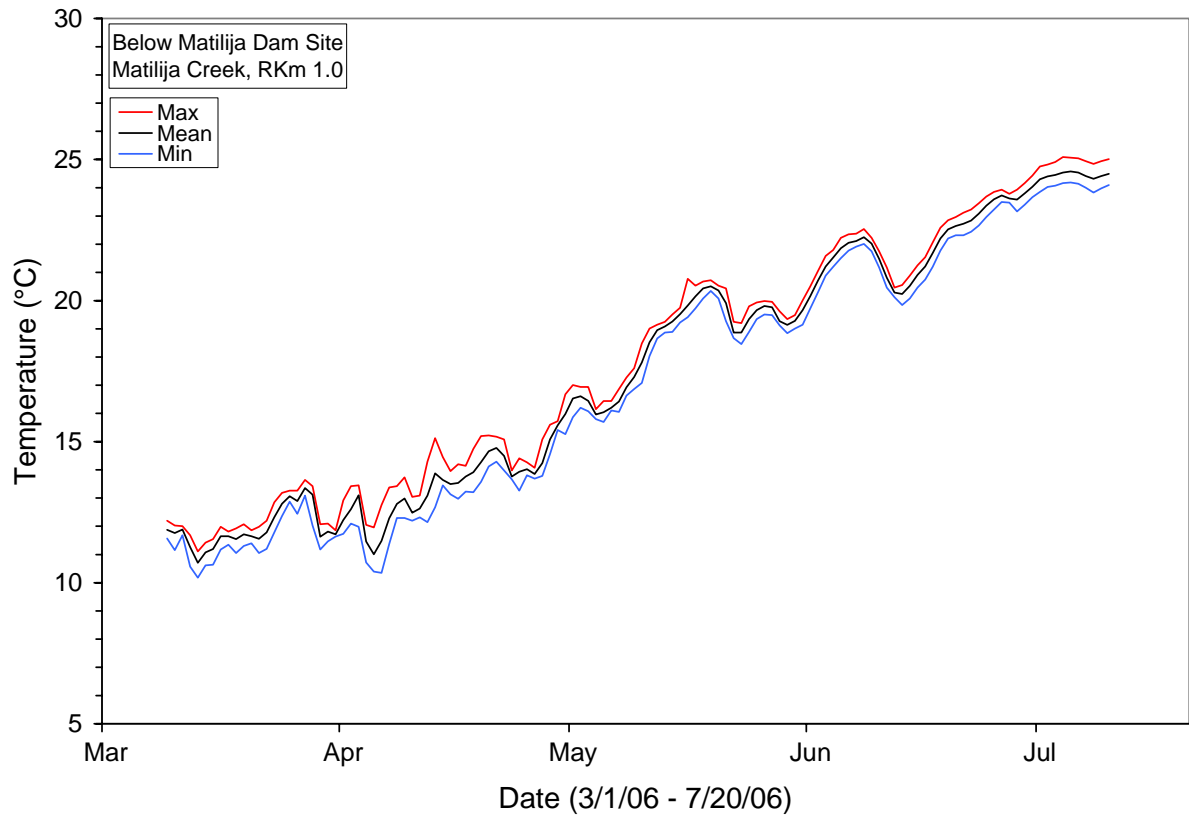
Site Name	Stream	River Kilometer (Mile)
Main St. Bridge	Ventura	0.9 (0.6)
Foster Park	Ventura	9.6 (6.0)
Santa Ana Blvd Bridge ¹	Ventura	15.5 (9.6)
Hwy 150 Bridge	Ventura	18.6 (11.6)
Robles (VRNMO)	Ventura	23.3 (14.5)
NF Matilija	Lower NF Matilija	1.3 (0.8)
Below Matilija Dam	Matilija	1.0 (0.6)
Above Matilija Dam	Matilija	2.1 (1.3)
Upper Matilija	Matilija	8.5 (5.3)

¹No data collected, logger lost









Appendix 10. Annual Flow Summary – Robles Fish Passage Facility – FY 05-06

Source Stream Flows					Robles Facility Flows			
	MATILIJIA CREEK D/S OF DAM (CFSD)	NORTH FORK MATILIJIA CREEK * (CFSD)	SUM OF U/S CREEK FLOWS (CFSD)		FISHWAY LADDER (CFSD)	VRNMO MEAS. WEIR (CFSD)	ROBLES- CASITAS DIVERSION CANAL (CFSD)	TOTAL INFLOW TO ROBLES (CFSD)
July-05	242	165	407		125	453	0	453
Aug-05	138	124	262		178	186	0	186
Sep-05	99	120	219		117	45	0	45
Oct-05	67	111	178		136	102	0	102
Nov-05	62	99	161		137	150	0	150
Dec-05	195	97	292		0	342	0	342
Jan-06	1,477	435	1,912		873	1,527	390	1,917
Feb-06	886	257	1,143		595	837	124	961
Mar-06	2,045	338	2,383		1,061	1,462	647	2,109
Apr-06	9,831	2,222	12,053		1,223	6,476	4,298	10,774
May-06	1,705	344	2,049		1,080	1,080	803	1,883
Jun-06	744	184	928		788	788	0	788
Total	17,491	4,496	21,987		6,313	13,448	6,262	19,710

*Preliminary flow data provided by the Ventura County Watershed Protection District

Ventura River Flow Assessment for the Robles Fish Passage - FY 05-06

	<u>Source Stream Daily Flows</u>			<u>Forebay Avg. Depth (ft)</u>	<u>Robles Facility Daily Flows</u>			<u>Total Inflow (cfsd)</u>
	(1) Matilija Ck D/S Dam (cfsd)	(2) North Fork Matilija Ck. (cfsd)	(1)+(2) Sum of Creek Flows (cfsd)		(3) Fishway Ladder (cfsd)	(4) VRNMO Weir (cfsd)	(5) Diversion Canal (cfsd)	
Jul-05								
1	7	6	13	2.55	15	15	0	15
2	7	6	13	2.97	14	15	0	15
3	6	6	12	3.06	13	13	0	13
4	6	6	12	3.28	13	13	0	13
5	7	6	13	2.56	16	16	0	16
6	9	6	15	0	0	18	0	18
7	9	6	15	0	0	18	0	18
8	9	6	15	0	0	18	0	18
9	9	6	15	0	0	18	0	18
10	9	6	15	0	0	18	0	18
11	9	5	14	0	0	18	0	18
12	9	5	14	0	0	18	0	18
13	9	5	14	0	0	18	0	18
14	9	5	14	0	0	17	0	17
15	7	5	12	0	0	16	0	16
16	6	5	11	0	0	15	0	15
17	6	5	11	0	0	15	0	15
18	6	5	11	0	0	15	0	15
19	7	5	12	0	0	15	0	15
20	8	5	13	0	0	14	0	14
21	8	5	13	0	0	15	0	15
22	8	5	13	0	0	14	0	14
23	8	5	13	0	0	14	0	14
24	8	5	13	0	0	13	0	13
25	8	5	13	0.99	7	9	0	9
26	8	5	13	1.09	8	11	0	11
27	8	5	13	1.09	8	11	0	11
28	8	5	13	1.07	8	11	0	11
29	8	5	13	1.07	8	11	0	11
30	8	5	13	1.06	8	11	0	11
31	8	5	13	1.06	7	10	0	10
Totals	242	165	407		125	453	0	453

	Source Stream Daily Flows			Forebay Avg. Depth (ft)	Robles Facility Daily Flows			Total Inflow (cfsd)
	Matilija Ck D/S Dam (cfsd)	North Fork Matilija Ck. (cfsd)	Sum of Creek Flows (cfsd)		Fishway Ladder (cfsd)	VRNMO Weir (cfsd)	Diversion Canal (cfsd)	
Aug-05								
1	8	4	12	1.06	8	11	0	11
2	6	4	10	1.05	8	11	0	11
3	6	4	10	1.05	8	11	0	11
4	4	4	8	1.01	7	10	0	10
5	5	4	9	0.88	6	6	0	6
6	5	4	9	0.90	6	5	0	5
7	5	4	9	0.86	6	5	0	5
8	5	4	9	0.95	6	7	0	7
9	5	4	9	0.96	7	7	0	7
10	5	4	9	0.96	6	6	0	6
11	4	4	8	0.93	6	6	0	6
12	4	4	8	0.96	6	6	0	6
13	5	4	9	1.03	7	8	0	8
14	2	4	6	1.03	7	8	0	8
15	3	4	7	1.00	7	7	0	7
16	2	4	6	0.97	7	7	0	7
17	2	4	6	0.94	6	6	0	6
18	3	4	7	0.93	6	6	0	6
19	3	4	7	0.98	7	8	0	8
20	3	4	7	0.98	7	6	0	6
21	6	4	10	0.95	7	6	0	6
22	6	4	10	0.94	3	4	0	4
23	5	4	9	1.24	3	4	0	4
24	5	4	9	1.11	5	4	0	4
25	5	4	9	0.88	3	2	0	2
26	5	4	9	0.8	4	3	0	3
27	6	4	10	0.74	5	3	0	3
28	4	4	8	0.9	5	4	0	4
29	4	4	8	1.35	6	6	0	6
30	3	4	7	1.41	3	3	0	3
31	4	4	8	3.03	0	0	0	0
Totals	138	124	262		178	186	0	186

Sep-05	Source Stream Daily Flows			Forebay Avg. Depth (ft)	Robles Facility Daily Flows			Total Inflow (cfsd)
	Matilija Ck D/S Dam (cfsd)	North Fork Matilija Ck. (cfsd)	Sum of Creek Flows (cfsd)		Fishway Ladder (cfsd)	VRNMO Weir (cfsd)	Diversion Canal (cfsd)	
1	4	4	8	3.21	0	0	0	0
2	4	4	8	2.79	0	0	0	0
3	3	4	7	3.59	0	0	0	0
4	7	4	11	4.71	0	0	0	0
5	5	4	9	4.92	0	0	0	0
6	5	4	9	4.13	2	1	0	1
7	5	4	9	1.49	3	2	0	2
8	5	4	9	0.82	4	2	0	2
9	2	4	6	0.71	5	2	0	2
10	2	4	6	0.68	4	1	0	1
11	3	4	7	0.79	5	2	0	2
12	3	4	7	0.75	5	2	0	2
13	3	4	7	0.80	5	2	0	2
14	3	4	7	0.78	5	2	0	2
15	3	4	7	0.80	5	2	0	2
16	3	4	7	0.80	5	2	0	2
17	2	4	6	0.79	5	2	0	2
18	3	4	7	0.79	5	2	0	2
19	2	4	6	0.75	5	2	0	2
20	2	4	6	0.79	5	2	0	2
21	3	4	7	0.68	5	2	0	2
22	3	4	7	0.57	4	1	0	1
23	3	4	7	0.70	4	1	0	1
24	3	4	7	0.71	5	2	0	2
25	3	4	7	0.73	5	2	0	2
26	3	4	7	0.82	6	3	0	3
27	3	4	7	0.8	6	2	0	2
28	2	4	6	0.67	4	2	0	2
29	4	4	8	0.74	5	2	0	2
30	3	4	7	0.73	5	0	0	0
Totals	99	120	219		117	45		45

Oct-05	<u>Source Stream Daily Flows</u>			Forebay Avg. Depth (ft)	<u>Robles Facility Daily Flows</u>			Total Inflow (cfsd)
	Matilija Ck D/S Dam (cfsd)	North Fork Matilija Ck. (cfsd)	Sum of Creek Flows (cfsd)		Fishway Ladder (cfsd)	VRNMO Weir (cfsd)	Diversion Canal (cfsd)	
1	2	4	6	0.72	5	3	0	3
2	2	4	6	0.68	5	3	0	3
3	2	4	6	0.62	4	3	0	3
4	2	4	6	0.63	4	3	0	3
5	3	4	7	0.66	4	3	0	3
6	3	4	7	0.66	4	3	0	3
7	3	4	7	0.71	5	3	0	3
8	3	4	7	0.70	5	3	0	3
9	3	4	7	0.63	4	3	0	3
10	3	4	7	0.73	5	3	0	3
11	3	4	7	0.73	5	3	0	3
12	2	4	6	0.72	5	3	0	3
13	1	3	4	0.35	2	1	0	1
14	1	3	4	0.27	1	1	0	1
15	2	3	5	0.47	1	1	0	1
16	2	4	6	0.45	1	1	0	1
17	2	5	7	0.65	4	3	0	3
18	2	4	6	0.80	5	3	0	3
19	2	4	6	0.73	5	4	0	4
20	2	4	6	0.85	5	3	0	3
21	2	3	5	0.79	5	3	0	3
22	2	3	5	0.72	5	3	0	3
23	2	3	5	0.72	5	3	0	3
24	2	3	5	0.73	5	5	0	5
25	2	3	5	0.77	5	5	0	5
26	2	3	5	0.78	5	5	0	5
27	2	3	5	0.82	6	5	0	5
28	2	3	5	0.80	6	5	0	5
29	2	3	5	0.76	5	5	0	5
30	2	3	5	0.77	5	5	0	5
31	2	3	5	0.75	5	5	0	5
Totals	67	111	178		136	102	0	102

Nov-05	Source Stream Daily Flows			Forebay Avg. Depth (ft)	Robles Facility Daily Flows			Total Inflow (cfsd)
	Matilija Ck D/S Dam (cfsd)	North Fork Matilija Ck. (cfsd)	Sum of Creek Flows (cfsd)		Fishway Ladder (cfsd)	VRNMO Weir (cfsd)	Diversion Canal (cfsd)	
1	2	3	5	0.70	5	5	0	5
2	2	3	5	0.83	6	5	0	5
3	2	3	5	0.87	6	5	0	5
4	2	3	5	1.20	5	5	0	5
5	2	3	5	1.40	5	5	0	5
6	3	3	6	1.42	5	5	0	5
7	3	2	5	1.49	5	5	0	5
8	2	3	5	1.42	5	5	0	5
9	2	6	8	1.70	5	5	0	5
10	2	6	8	1.64	5	5	0	5
11	2	4	6	1.31	5	5	0	5
12	2	4	6	1.23	5	5	0	5
13	2	4	6	1.21	5	5	0	5
14	2	4	6	1.19	5	5	0	5
15	2	3	5	1.17	5	5	0	5
16	2	3	5	1.13	5	5	0	5
17	2	3	5	1.08	5	5	0	5
18	2	3	5	1.03	5	5	0	5
19	2	3	5	1.08	5	5	0	5
20	2	3	5	1.14	5	5	0	5
21	2	3	5	1.11	5	5	0	5
22	2	3	5	1.14	5	5	0	5
23	2	3	5	1.30	5	5	0	5
24	2	3	5	1.24	5	5	0	5
25	2	3	5	1.23	5	5	0	5
26	2	3	5	1.26	5	5	0	5
27	2	3	5	1.17	5	5	0	5
28	2	3	5	0.00	0	5	0	5
29	2	3	5	0.00	0	5	0	5
30	2	3	5	0.00	0	5	0	5
Totals	62	99	161		137	150	0	150

Dec-05	Source Stream Daily Flows			Forebay Avg. Depth (ft)	Robles Facility Daily Flows			Total Inflow (cfsd)
	Matilija Ck D/S Dam (cfsd)	North Fork Matilija Ck. (cfsd)	Sum of Creek Flows (cfsd)		Fishway Ladder (cfsd)	VRNMO Weir (cfsd)	Diversion Canal (cfsd)	
1	3	3	6	0	0	7	0	7
2	3	4	7	0	0	7	0	7
3	3	4	7	0	0	7	0	7
4	4	3	7	0	0	8	0	8
5	4	3	7	0	0	8	0	8
6	4	3	7	0	0	8	0	8
7	5	3	8	0	0	9	0	9
8	6	3	9	0	0	10	0	10
9	6	3	9	0	0	10	0	10
10	6	3	9	0	0	10	0	10
11	6	3	9	0	0	10	0	10
12	6	3	9	0	0	10	0	10
13	7	3	10	0	0	11	0	11
14	6	3	9	0	0	11	0	11
15	6	3	9	0	0	12	0	12
16	4	3	7	0	0	10	0	10
17	7	3	10	0	0	12	0	12
18	7	3	10	0	0	13	0	13
19	7	3	10	0	0	13	0	13
20	8	3	11	0	0	12	0	12
21	7	3	10	0	0	12	0	12
22	8	3	11	0	0	13	0	13
23	8	3	11	0	0	13	0	13
24	7	3	10	0	0	12	0	12
25	8	3	11	0	0	12	0	12
26	8	3	11	0	0	13	0	13
27	8	3	11	0	0	17	0	17
28	8	3	11	0	0	13	0	13
29	8	3	11	0	0	13	0	13
30	8	3	11	0	0	13	0	13
31	9	5	14	0	0	13	0	13
Totals	195	97	292		0	342	0	342

Jan-06	Source Stream Daily Flows			Forebay Avg. Depth (ft)	Robles Facility Daily Flows			Total Inflow (cfsd)
	Matilija Ck D/S Dam (cfsd)	North Fork Matilija Ck. (cfsd)	Sum of Creek Flows (cfsd)		Fishway Ladder (cfsd)	VRNMO Weir (cfsd)	Diversion Canal (cfsd)	
1	9	7	16	0	0	21	0	21
2	418	260	678	3.40	23	592	96	688
3	162	41	203	7.66	48	69	164	233
4	101	11	112	7.52	48	73	35	108
5	59	8	67	7.73	49	49	7	56
6	49	6	55	7.60	46	45	0	45
7	39	5	44	6.65	40	40	0	40
8	33	5	38	5.85	33	37	0	37
9	31	5	36	5.75	33	36	0	36
10	84	4	88	6.51	36	43	43	86
11	71	4	75	5.21	28	33	39	72
12	22	4	26	4.23	28	28	6	34
13	6	4	10	2.10	9	9	0	9
14	11	4	15	2.91	20	20	0	20
15	10	4	14	2.84	19	19	0	19
16	14	4	18	3.03	21	21	0	21
17	16	4	20	3.24	24	24	0	24
18	16	4	20	3.57	22	22	0	22
19	19	4	23	3.31	23	23	0	23
20	21	4	25	3.52	27	27	0	27
21	21	4	25	3.53	27	27	0	27
22	22	4	26	3.50	27	27	0	27
23	23	4	27	3.43	26	26	0	26
24	25	4	29	3.38	26	26	0	26
25	25	4	29	3.39	27	27	0	27
26	25	4	29	3.39	28	28	0	28
27	27	4	31	3.40	27	27	0	27
28	29	4	33	3.44	27	27	0	27
29	29	4	33	3.45	27	27	0	27
30	30	4	34	3.44	27	27	0	27
31	30	3	33	3.42	27	27	0	27
Totals	1477	435	1912		873	1527	390	1917

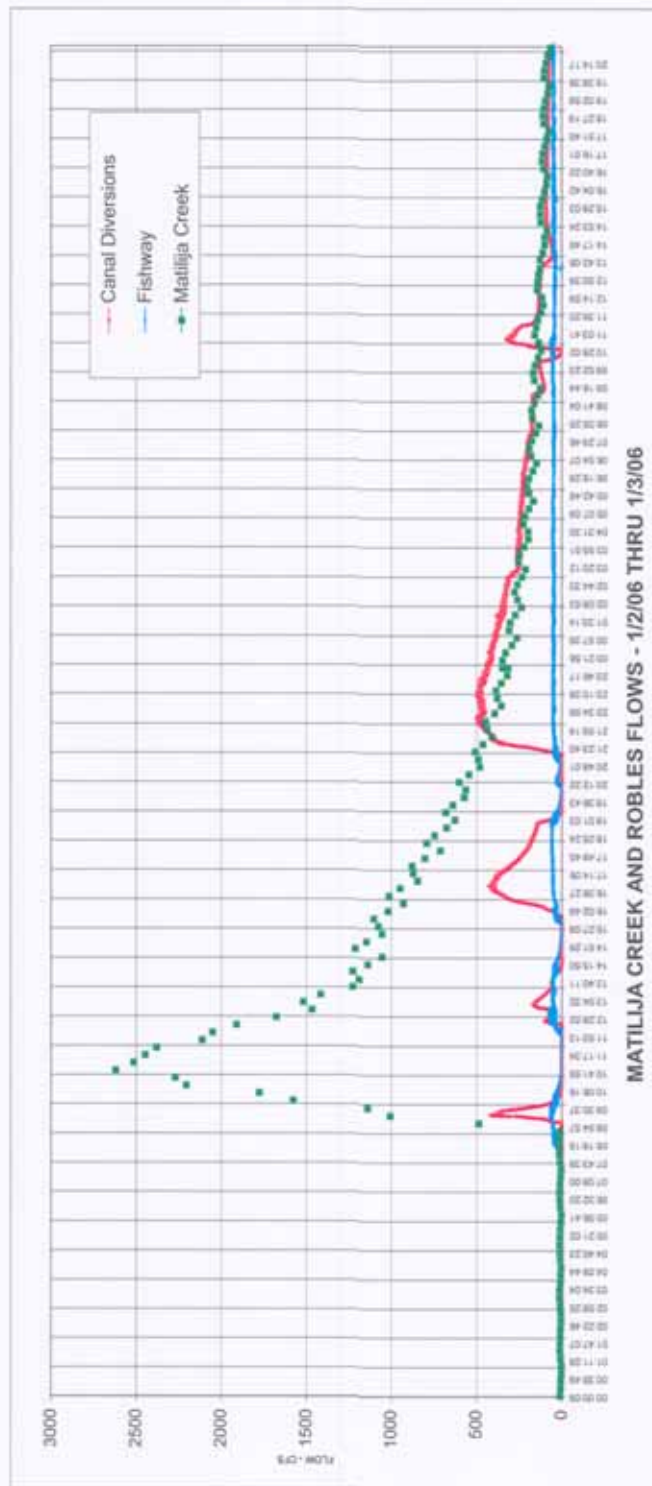
Feb-06	Source Stream Daily Flows			Forebay Avg. Depth (ft)	Robles Facility Daily Flows			Total Inflow (cfsd)
	Matilija Ck D/S Dam (cfsd)	North Fork Matilija Ck. (cfsd)	Sum of Creek Flows (cfsd)		Fishway Ladder (cfsd)	VRNMO Weir (cfsd)	Diversion Canal (cfsd)	
1	32	3	35	3.41	27	27	0	27
2	34	3	37	3.40	26	26	0	26
3	22	3	25	3.33	26	26	0	26
4	24	3	27	3.32	26	26	0	26
5	25	3	28	3.29	23	23	0	23
6	25	3	28	3.19	22	22	0	22
7	21	3	24	3.19	22	22	0	22
8	15	3	18	2.37	16	16	0	16
9	15	3	18	2.29	16	16	0	16
10	15	3	18	2.25	10	10	0	10
11	15	3	18	2.25	16	16	0	16
12	15	3	18	2.20	16	16	0	16
13	15	3	18	2.21	16	16	0	16
14	15	3	18	2.20	16	16	0	16
15	15	3	18	2.24	16	16	0	16
16	15	3	18	2.24	16	16	0	16
17	16	3	19	2.39	17	17	0	17
18	20	3	23	2.83	20	20	0	20
19	20	3	23	2.84	20	20	0	20
20	20	3	23	2.83	20	20	0	20
21	20	3	23	2.80	20	20	0	20
22	21	3	24	2.80	19	19	0	19
23	21	3	24	2.80	20	20	0	20
24	21	3	24	2.95	21	21	0	21
25	22	3	25	2.96	21	21	0	21
26	22	3	25	2.95	21	21	0	21
27	25	38	63	3.52	43	25	8	33
28	340	141	481	6.73	43	303	116	419
Totals	886	257	1143		595	837	124	961

	Source Stream Daily Flows			Forebay Avg. Depth (ft)	Robles Facility Daily Flows			Total Inflow (cfsd)
	Matilija Ck D/S Dam (cfsd)	North Fork Matilija Ck. (cfsd)	Sum of Creek Flows (cfsd)		Fishway Ladder (cfsd)	VRNMO Weir (cfsd)	Diversion Canal (cfsd)	
Mar-06								
1	126	17	143	6.69	37	55	71	126
2	88	14	102	6.83	43	58	29	87
3	84	14	98	6.57	41	42	63	105
4	37	13	50	4.93	40	37	4	41
5	66	11	77	6.51	39	47	11	58
6	78	14	92	6.64	41	42	20	62
7	92	11	103	7.05	43	44	69	113
8	38	8	46	5.06	41	42	0	42
9	50	7	57	8.12	48	48	0	48
10	63	6	69	7.69	47	47	0	47
11	16	6	22	4.36	44	44	0	44
12	27	6	33	4.99	38	38	0	38
13	42	5	47	6.28	38	38	5	43
14	41	5	46	5.48	41	41	7	48
15	39	5	44	5.47	30	30	5	35
16	37	5	42	5.48	30	30	3	33
17	37	5	42	5.48	32	32	4	36
18	37	5	42	5.45	30	30	3	33
19	35	4	39	5.45	30	30	0	30
20	37	5	42	5.40	29	29	1	30
21	38	5	43	5.40	30	30	3	33
22	35	4	39	5.17	28	28	0	28
23	35	4	39	4.91	29	29	0	29
24	37	4	41	4.62	25	25	0	25
25	38	4	42	5.53	16	16	2	18
26	41	4	45	8.31	0	0	22	22
27	43	4	47	7.36	20	16	12	28
28	159	70	229	5.73	33	156	70	226
29	256	40	296	7.63	36	123	172	295
30	153	19	172	8.03	36	125	44	169
31	140	14	154	8.05	46	110	27	137
Totals	2045	338	2383		1061	1462	647	2109

Apr-06	Source Stream Daily Flows			Forebay Avg. Depth (ft)	Robles Facility Daily Flows			Total Inflow (cfsd)
	Matilija Ck D/S Dam (cfsd)	North Fork Matilija Ck. (cfsd)	Sum of Creek Flows (cfsd)		Fishway Ladder (cfsd)	VRNMO Weir (cfsd)	Diversion Canal (cfsd)	
1	153	20	173	8.14	47	91	48	139
2	162	15	177	8.05	47	129	48	177
3	199	96	295	7.73	47	284	11	295
4	2796	618	3414	5.67	37	2,709	141	2850
5	1768	356	2124	7.59	46	1,701	326	2027
6	827	151	978	8.67	51	459	372	831
7	520	86	606	7.96	48	203	383	586
8	387	68	455	7.90	49	49	329	378
9	320	59	379	8.00	49	49	270	319
10	287	55	342	7.98	49	49	277	326
11	271	53	324	7.89	50	50	197	247
12	247	51	298	7.92	52	52	174	226
13	238	50	288	7.93	50	50	143	193
14	132	48	180	7.03	43	43	159	202
15	124	46	170	6.00	35	35	149	184
16	126	44	170	6.07	35	35	134	169
17	122	42	164	6.09	34	34	123	157
18	111	41	152	6.05	35	35	112	147
19	108	39	147	6.05	34	34	104	138
20	98	35	133	6.03	35	35	94	129
21	94	32	126	6.04	35	35	90	125
22	92	31	123	6.04	35	35	86	121
23	89	29	118	6.04	35	35	83	118
24	88	27	115	6.04	35	35	75	110
25	85	26	111	6.04	35	35	72	107
26	83	23	106	6.03	35	35	69	104
27	80	22	102	6.02	35	35	65	100
28	78	21	99	6.00	35	35	58	93
29	74	20	94	6.00	35	35	55	90
30	72	18	90	5.96	35	35	51	86
Totals	9831	2222	12053		1223	6476	4298	10774

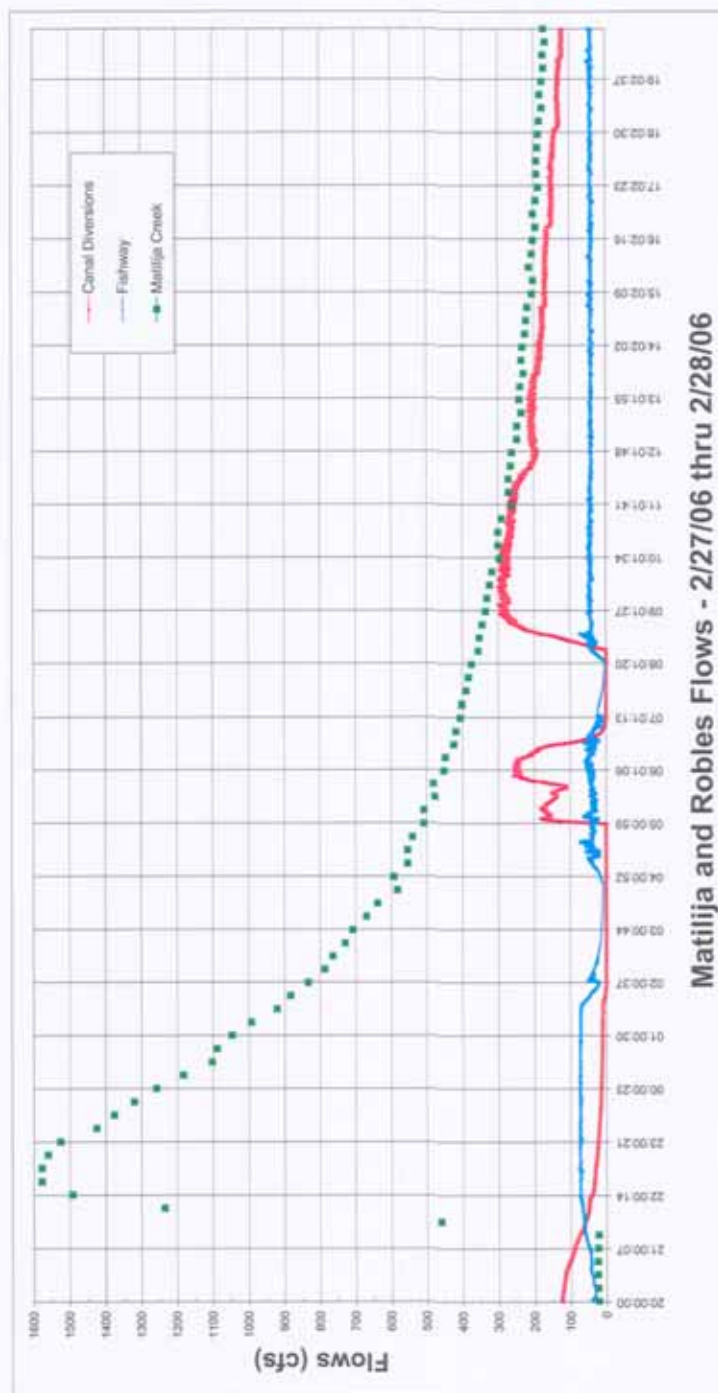
	<u>Source Stream Daily Flows</u>			Forebay Avg. Depth (ft)	<u>Robles Facility Daily Flows</u>			Total Inflow (cfsd)
	Matilija Ck D/S Dam (cfsd)	North Fork Matilija Ck. (cfsd)	Sum of Creek Flows (cfsd)		Fishway Ladder (cfsd)	VRNMO Weir (cfsd)	Diversion Canal (cfsd)	
May-06								
1	70	17	87	5.91	34	34	48	82
2	69	15	84	5.88	34	34	46	80
3	132	15	147	6.31	37	37	106	143
4	112	14	126	6.10	34	34	84	118
5	50	14	64	6.02	35	35	23	58
6	48	13	61	6.02	35	35	23	58
7	47	13	60	6.02	35	35	23	58
8	48	12	60	6.03	35	35	22	57
9	95	12	107	6.12	35	35	64	99
10	90	12	102	6.18	35	35	63	98
11	49	11	60	6.13	35	35	21	56
12	49	11	60	6.05	35	35	20	55
13	49	11	60	6.05	35	35	19	54
14	49	11	60	6.03	35	35	19	54
15	51	10	61	6.04	35	35	19	54
16	50	10	60	6.06	35	35	18	53
17	50	10	60	6.07	35	35	18	53
18	51	10	61	6.07	35	35	18	53
19	49	10	59	5.97	35	35	15	50
20	47	9	56	5.90	35	35	12	47
21	47	10	57	5.92	35	35	14	49
22	46	13	59	5.92	35	35	18	53
23	46	10	56	5.90	35	35	13	48
24	43	10	53	5.89	35	35	13	48
25	39	9	48	5.87	35	35	11	46
26	38	9	47	5.87	35	35	11	46
27	38	9	47	5.86	35	35	11	46
28	39	9	48	5.82	35	35	9	44
29	38	9	47	5.84	35	35	10	45
30	38	8	46	5.53	33	33	6	39
31	38	8	46	4.78	33	33	6	39
Totals	1705	344	2049		1080	1080	803	1883

Jun-06	Source Stream Daily Flows			Forebay Avg. Depth (ft)	Robles Facility Daily Flows			Total Inflow (cfsd)
	Matilija Ck D/S Dam (cfsd)	North Fork Matilija Ck. (cfsd)	Sum of Creek Flows (cfsd)		Fishway Ladder (cfsd)	VRNMO Weir (cfsd)	Diversion Canal (cfsd)	
1	37	8	45	5.54	32	32	0	32
2	37	7	44	5.56	33	33	0	33
3	36	7	43	5.56	32	32	0	32
4	32	7	39	5.50	32	32	0	32
5	28	7	35	5.20	30	30	0	30
6	25	7	32	4.31	32	32	0	32
7	24	7	31	4.12	33	33	0	33
8	24	7	31	4.00	33	33	0	33
9	25	7	32	3.85	32	32	0	32
10	25	7	32	4.00	32	32	0	32
11	18	7	25	4.07	33	33	0	33
12	25	6	31	4.09	34	34	0	34
13	25	6	31	4.06	34	34	0	34
14	25	6	31	3.88	34	34	0	34
15	26	6	32	3.62	32	32	0	32
16	29	6	35	3.65	30	30	0	30
17	22	6	28	3.59	22	22	0	22
18	22	6	28	3.75	22	22	0	22
19	22	6	28	3.66	25	25	0	25
20	23	6	29	3.66	23	23	0	23
21	20	6	26	3.33	19	19	0	19
22	20	6	26	3.28	20	20	0	20
23	24	5	29	3.08	20	20	0	20
24	24	5	29	3.05	19	19	0	19
25	24	5	29	3.05	19	19	0	19
26	24	5	29	3.21	17	17	0	17
27	24	5	29	3.25	15	15	0	15
28	16	5	21	3.25	16	16	0	16
29	16	5	21	3.16	16	16	0	16
30	22	5	27	3.20	17	17	0	17
Totals	744	184	928		788	788	0	788



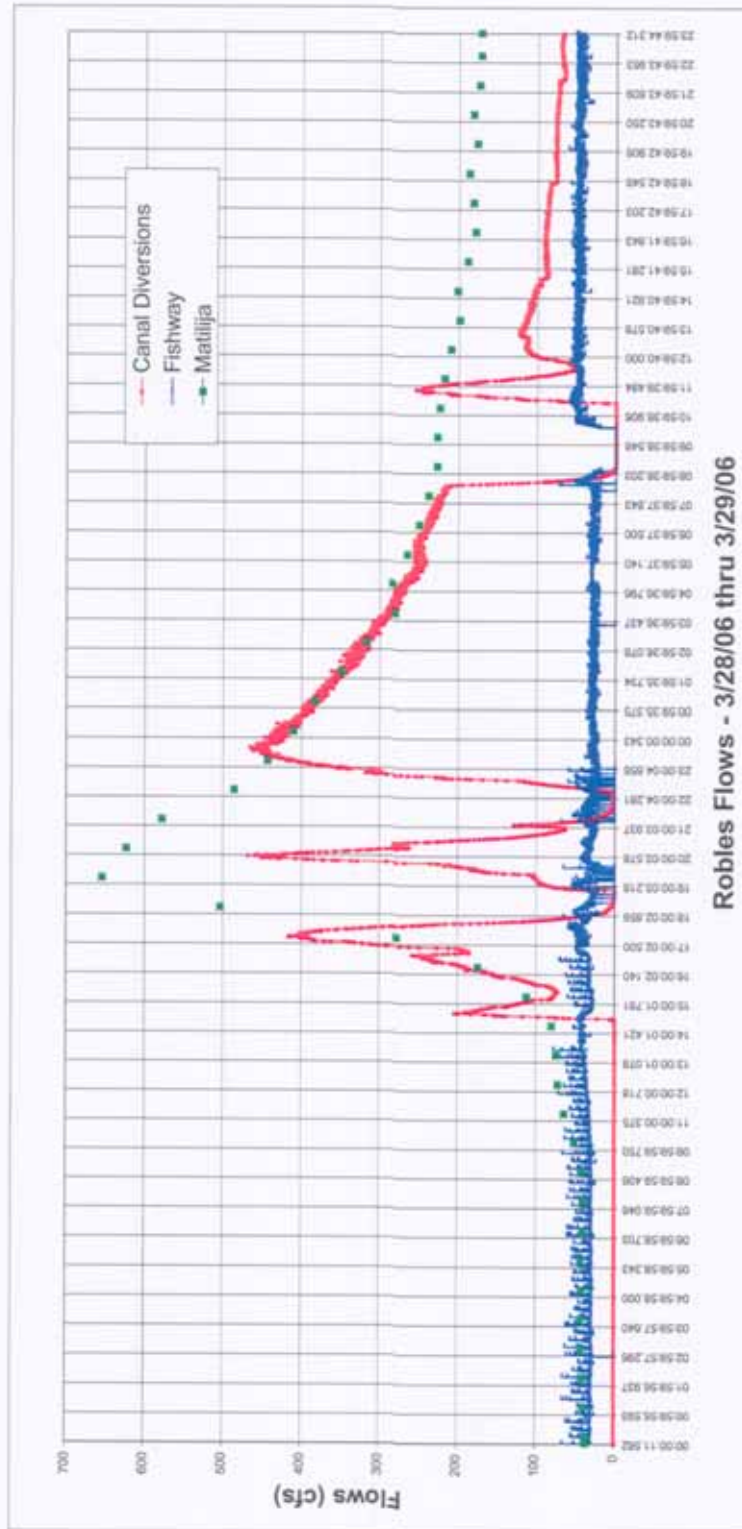
(Note that North Fork flow conditions are not included for total inflow into Robles)

Figure 1 - Storm Event of January 2 thru 3, 2006



(Note that North Fork flow conditions are not included for total inflow into Robles.)

Figure 2 - Storm Event of February 27 thru 28, 2006



(Note that North Fork flow conditions are not included for total inflow into Robles.)

Figure 3 - Storm Event of March 28 thru 29, 2006

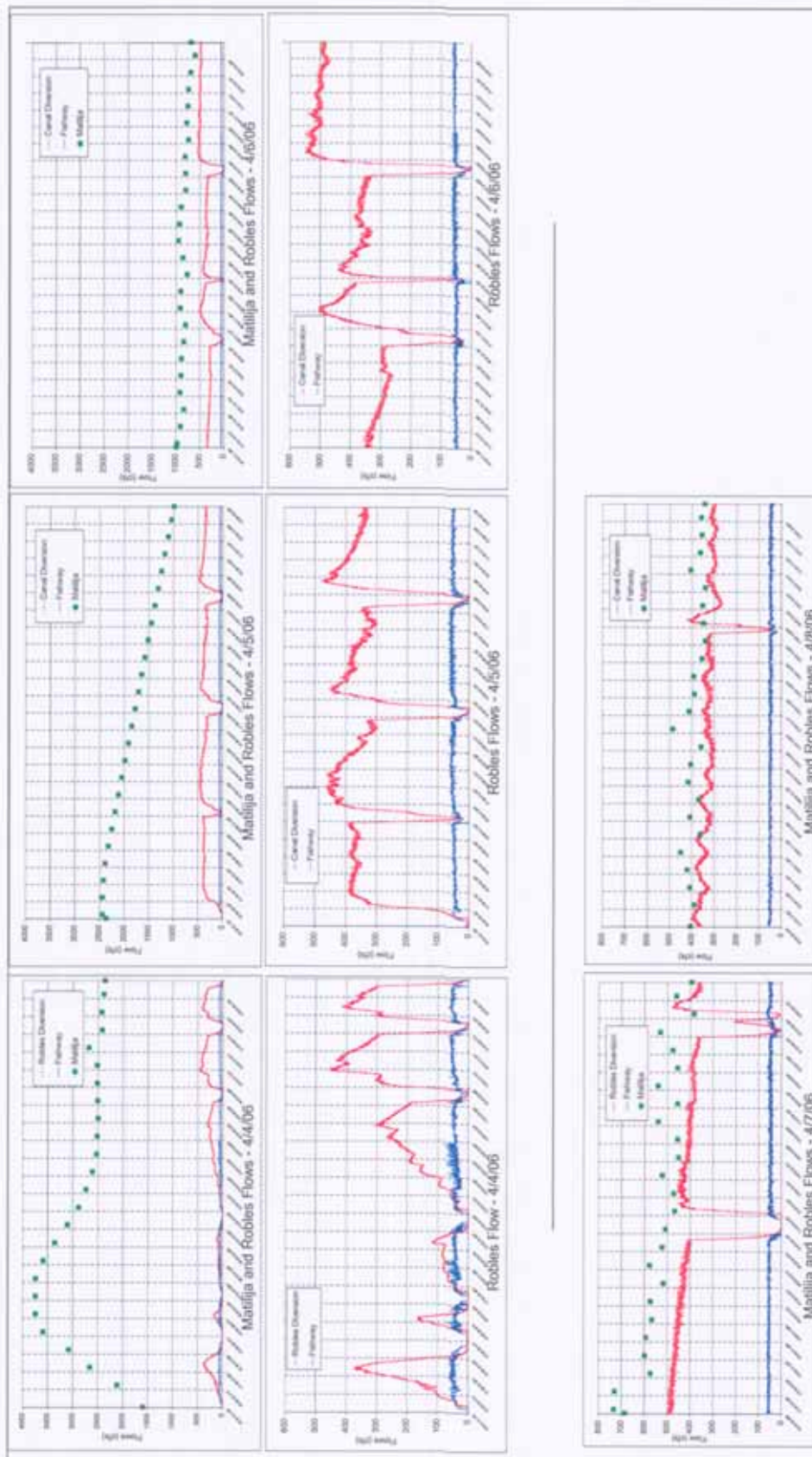


Figure 4 - Storm Event of April 4 through April 8, 2006

Appendix 11. Supplemental release requirements and related documents.

Flow Assessment at Robles Diversion and Fish Passage Facility

Date: 1/2/05 Time: 0930 Prepared by: S. Wickstrom

INITIAL STORM EVENTS

Current Flow Conditions

Fish Ladder (cfs) 50-52
 Auxiliary Pipeline (cfs) 0
 Measurement Weir (cfs) 50
 Robles Canal (cfs) 113
 Spillway Gates (Open/Closed) 1 C | 2 C | 3 C | 4 C
 Cutoff Wall (Overflow - Yes/No) No

Estimated Inflow to Robles (cfs)

163

Initial Storm Peak

Date 1/2/06
 Time ~ 0900
 Mailija Dam Peak
 Flow (cfs) ~ 3500 cfs

Matilija W.S. Elevation 1096.02
 Matilija Creek @ Matilija Hot Spgs
 North Fork Matilija Creek (cfs)
 Lake Casitas W.S Elevation 558.98

Current day is 1 days after Peak.

Robles Release Requirements

					Release Schedule
Day	DATE	Robles Inflow	Table 2-3 Initial Rel.	Table 2-4 Selection	Table 2-4 Rel. (cfs)
1	<u>1/2/06</u>	<u>163</u>	<u>50</u>		<u>50</u>
2					<u>50</u>
3					<u>50</u>
4					<u>50</u>
5					<u>50</u>
6					<u>50</u>
7					<u>50</u>
8					<u>50</u>
9					<u>50</u>
10					<u>50</u>
11					<u>40</u>
12					<u>30</u>

OVERLAPPING EVENTS

Overlapping (OL) Storm Peak

Date _____
 Time _____
 OL Peak Flow (cfs) _____
 Days since initial Peak _____

Days since OL Peak to < 600 cfs _____
 Table 2-6 Initial Release (cfs) _____
 Table 2-7 Initial Release (cfs) _____

OPERATOR INSTRUCTIONS


Fish Ladder Flow set at _____ cfs
 Auxiliary Flow set at _____ cfs.
 Diversion Setpoints:
 Maximum _____
 Minimum _____

Other Instructions: URNMO WEIR INST. REGISTERING 1.49'
AT 50 cfs, SHOULD BE 1.34' cfs. Adjustments
TO INSTRUMENT NEEDED - SHIFT.

POSTED: 1/3/08

BY: S. Wickstrom

INTEROFFICE MEMORANDUM

TO: BRIAN TAYLOR, ANDY BENITEZ
FROM: STEVE WICKSTRUM 
SUBJECT: DIVERSIONS FROM MATILIJA DAM
DATE: 1/09/06
CC: JOHN J. JOHNSON

By the suggestion of John Johnson, staff should perform a diversion of water from Matilija Dam to Lake Casitas on Tuesday, January 10, 2006. The following parameters exist as of this morning:

- Matilija Dam W.S – 1095.72 – approximately 25 cfs spill and 8 cfs release from the 8” valve.
- Low WS elevation in last 35 days – 12/30/05 ~ 1091.74.
- Water storage in Matilija Reservoir that is available for Casitas’ diversions is approximately 421 AF.
- No storms approaching the coastal area in the 10-day forecast.
- Flow at Ventura River near Meiners Oaks measurement weir is 35 cfs, after last week’s storm and natural recession.

The following settings shall be made to divert waters from Matilija Dam to Lake Casitas:

- **Monday, 1/9/06**
 - Increase releases from Matilija Dam at 1300 hours
 - Release approximately 50 to 100 cfs
 - Leave overshot gate at current setting, run screen brushes as available.
- **Tuesday, 1/10/06**
 - Check Matilija Dam water surface elevation at 0700 hours
 - if > 1093.00, increase releases to 200 cfs
 - if < 1093.00, continue same release until minimum elevation is reached.
 - Maintain original release (34 cfs) through fishway, divert all other inflow.
 - Minimum water surface elevation at Matilija Dam is 1090.00.
- **Shutdown Parameters**
 - **Shutdown shall occur when Matilija Dam reaches elevation 1090.00.**
 - Upon termination of the diversion from Matilija Dam, reduce releases to match initial spill condition (25 cfs) by setting valves appropriately.
 - Andy Benitez will make daily checks and adjustments of system to keep Matilija Reservoir elevation constant until next storm event.

If you have any questions – please ask.

CE/JENGR WKS/Pub: Passage/WX: 2006-1-9-06 Diversion from Matilija Dam

Steve Wickstrum

From: John Johnson
Sent: Thursday, January 12, 2006 10:15 AM
To: Steve Wickstrum
Subject: FW: Vaki in Robles Fish Passage

Steve, for the fisheries report this year. Thanks,

John J. Johnson
General Manager
Casitas Municipal Water District
(805) 649-2251 ext. 112
jjohnson@casitaswater.com <<mailto:jjohnson@casitaswater.com>>

-----Original Message-----

From: Mike Gibson
Sent: Tuesday, January 10, 2006 3:52 PM
To: Stan Glowacki (E-mail); Mary Larson (E-mail)
Cc: John Johnson
Subject: Vaki in Robles Fish Passage

Hello,

With flows dropping in the Ventura River, the Vaki will need to be removed soon. Because the Vaki is centered in the shroud at 5ft, the Vaki is only operable when levels in the fish passage are above 5ft, when levels drop below 5ft the Vaki becomes a barrier and blocks migration. The level in the fish passage is currently at about 5.7ft, approximately 30 - 35 cfs through the fish passage. At this level the top of the Vaki is just at the surface of the water. The level of the fish passage will continue to be monitored over the next few days. I'm predicting the Vaki will be removed sometime on Friday 13th.

---Mike

Michael W. Gibson
Fisheries Biologist
Casitas Municipal Water District
1055 Ventura Ave, Oak View, CA 93022
PH: 805-649-2251 x116
CL: 805-797-1961
FX: 805-649-3001

INTEROFFICE MEMORANDUM

TO: JOHN JOHNSON, GENERAL MANAGER
FROM: STEVE WICKSTRUM
SUBJECT: STORM EVENT – DIVERSION STATUS
DATE: 2/28/06
CC:

This memorandum is to document the status of the diversions at 1100 hours on this date, after the significant storm event of the last twenty-four hours.

As of approximately 0300 hours on 2/28/06, flow conditions peaked in the upper Matilija Creek and North Fork Matilija Creek. Matilija Dam began to spill at this point in time and crested at approximately two feet over spill. The facilities at Robles Diversion Dam were set to allow a 50 cfs flow thru the fish ladder and divert all other excess up to 500 cfs down the canal. The flows entering the Robles basin did exceed 550 cfs (an initial estimate of >2000 cfs) and overtopped the cutoff wall. Diversions were reduced greatly during this time due to the leaf litter gathering on the face of the screens. The facility was dewatered between 0630 to 0930 hours to remove leaf litter.

At 0700 hours, approximately 814 cfs was being released downstream through the spillway gates. Diversions restarted and the Vaki meter reinstalled at 0930 hours. An approximately flow of 200 cfs was diverted to Lake Casitas. Diversions once again ceased at 1030 hours due to the collection of leaf litter – 10 feet of head developed with only 200 cfs moving through the screens and into the canal (note that at ten feet of head the full 500 cfs should be achieved through the screens). Staff will clean the screens again and restart the system. The flows contained a moderately high turbidity in the water (light brown) with fine suspended plant material. All water was then passed down stream through the spillway gates while staff cleaned the screens by hand.

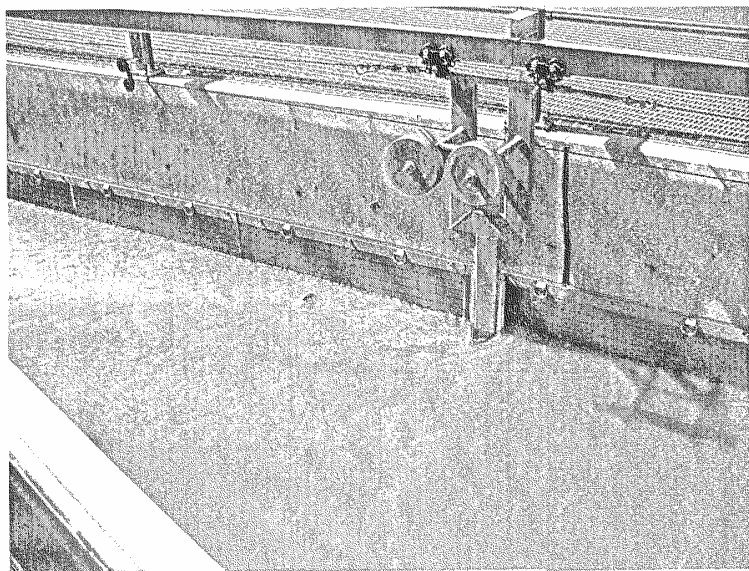
The screen brushes are operational, although it appears that they are ineffective. There are several issues regarding the ability to pass 500 cfs through the screens that should be considered. First is the width of the gap, which is my understanding that the gap in the screens were sized for protection of frye. Second is the fact that this is a very flashy system, and when it flashes there is a high level of turbidity and fine plant material suspended homogenously throughout the water column. Third, it is noticed that with the screen bars at a vertical alignment, and the brushes moving across the screens in a horizontal motion, the brushes do not effectively remove debris from the screen. And fourth, as the debris collects on the screen as fast as it is removed, often sweeping directly around the brush in an eddy current and impinging on the screen.

During today's event, the District lost approximately seven hours of opportunity to divert 500 cfs. This lost opportunity is a loss of roughly 74 acre-feet of water during that period that would

have been otherwise been diverted in pre-ladder conditions. The reason is singly due to the plugging of the screens and the down time to drain the facility and clean the screens by hand.

Operation instructions at this time is to keep the facility operational, diversions and fish passage. It is likely that we will continue to experience the leaf litter fouling of the screens for the rest of the day. Flows are receding rapidly, which may improve the water quality. Per BA/BO, the operational charts will be applied the day after the peak of the storm – which will be tomorrow, 3/1/06. Flow settings will be determined and applied at that time.

If you have any questions, please see me.



COLUMBIA RIVER Fish Passage Facility, August 2006. (Source: Oregon Department of Fish and Wildlife)

Flow Assessment at Robles Diversion and Fish Passage Facility

Date: 3/1/06 Time: 0900 Prepared by: S. Wickstrom

INITIAL STORM EVENTS

Current Flow Conditions

Fish Ladder (cfs)	<u>49.7</u>
Auxiliary Pipeline (cfs)	<u>0</u>
Measurement Weir (cfs)	<u>49.7</u>
Robles Canal (cfs)	<u>83</u>
Spillway Gates (Open/Closed)	1 <u>OL</u> 2 <u>OL</u> 3 <u>OL</u> 4 <u>OL</u>
Cutoff Wall (Overflow - Yes/No)	<u>No</u>

Estimated Inflow to Robles (cfs)

133

Matilija W.S. Elevation	<u>1096.94</u>
Matilija Creek @ Matilija Hot Spgs	
North Fork Matilija Creek (cfs)	
Lake Casitas W.S. Elevation	

Initial Storm Peak

Date 2/28/06
 Time 0330
 Matilija Dam Peak 1097.20
 Flow (cfs) 307.0

Current day is 1 days after Peak.

*BASED ON SPILL CHART
 EVENT DID RESULT IN FLOW OVER
 CUTOFF WALL - SCREENS PLUGGED*

Robles Release Requirements

					Release Schedule
Day	DATE	Robles Inflow	Table 2-3 Initial Rel.	Table 2-4 Selection	Table 2-4 Rel. (cfs)
1	<u>3/1/06</u>	<u>133</u>	<u>50</u>	<u>2-4x-50</u>	<u>50</u>
2	<u>3/2/06</u>				<u>50</u>
3	<u>3/3/06</u>				<u>50</u>
4	<u>4</u>				<u>50</u>
5	<u>5</u>				<u>50</u>
6	<u>6</u>				<u>50</u>
7	<u>7</u>				<u>50</u>
8	<u>8</u>				<u>50</u>
9	<u>9</u>				<u>50</u>
10	<u>10</u>				<u>50</u>
11	<u>11</u>				<u>40</u>
12	<u>3/12/06</u>				<u>30</u>

*Flow ADJUSTMENTS TO
 BE MADE @ 10:00AM
 EACH DAY - SW*

OVERLAPPING EVENTS

Overlapping (OL) Storm Peak

Date _____
 Time _____
 OL Peak Flow (cfs) _____
 Days since initial Peak _____

Days since OL Peak to < 600 cfs _____
 Table 2-6 Initial Release (cfs) _____
 Table 2-7 Initial Release (cfs) _____

OPERATOR INSTRUCTIONS

Fish Ladder Flow set at _____ cfs
Auxiliary Flow set at _____ cfs.
Diversion Setpoints:
Maximum _____
Minimum _____

Other Instructions: _____

POSTED: 3/1/06

BY: S. Wickstrom

Flow Assessment at Robles Diversion and Fish Passage Facility

Date: 3/29/06 Time: 0830 Prepared by: S. WICKSTROM

INITIAL STORM EVENTS

Current Flow Conditions

Fish Ladder (cfs) 31.5
 Auxiliary Pipeline (cfs) 0
 Measurement Weir (cfs) 31.5
 Robles Canal (cfs) 215
 Spillway Gates (Open/Closed) 1 c 2 c 3 c 4 c
 Cutoff Wall (Overflow - Yes/No) NO

Estimated Inflow to Robles (cfs)

Matilija W.S. Elevation 1095.96
 Matilija Creek @ Matilija Hot Spgs 242.5
 North Fork Matilija Creek (cfs) 242.5
 Lake Casitas W.S Elevation 1096.32

Initial Storm Peak

Date 3/28/06
 Time 1742
 Matilija Dam Peak 1096.32
 Flow (cfs) 1447 cfs AT WEIR, NO DIVERSION DUE TO SCREEN PLUG

Current day is 1 days after Peak.

Robles Release Requirements

					Release Schedule
Day	DATE	Robles Inflow	Table 2-3 Initial Rel.	Table 2-4 Selection	Table 2-4 Rel. (cfs)
1	3/29	242	82	2-4a	82-74
2	3/30				68
3	3/31				62
4	4/1				56
5	4/2				56
6	4/3				50
7	4/4				50
8	4/5				50
9	4/6				50
10	4/7				50
11	4/8				40
12	4/9				30

OVERLAPPING EVENTS

Overlapping (OL) Storm Peak

Date _____ Days since OL Peak to < 600 cfs _____
 Time _____ Table 2-6 Initial Release (cfs) _____
 OL Peak Flow (cfs) _____ Table 2-7 Initial Release (cfs) _____
 Days since initial Peak _____

OPERATOR INSTRUCTIONS

Fish Ladder Flow set at 50 cfs
 Auxiliary Flow set at 24 cfs.
 Diversion Setpoints:
 Maximum 500
 Minimum 0

Other Instructions: _____

POSTED: _____

BY: _____

CASITAS MUNICIPAL WATER DISTRICT
INTEROFFICE MEMORANDUM

TO: JOHN JOHNSON, GENERAL MANAGER
FROM: NEIL COLE, CIVIL ENGINEER
SUBJECT: REQUEST FROM PRESIDENT KAISER TO PULL SCREENS AT THE ROBLES FISH PASSAGE
DATE: APRIL 5, 2006

President of the Board Kaiser has made a request to pull the fish screens at Robles fish passage. The letter written to NOAA Fisheries states that the screens can be pulled if the agencies agree that steelhead are unlikely to be present in the river.

Staff contacted Stan Glowacki with NOAA Fisheries and Mary Larson with the Department of Fish & Game. Stan's response was that if a screen needed to be pulled for a brief period of time to be cleaned and immediately put back in place, this was acceptable provided only one screen was removed at a time. Removing a screen and leaving it out was not acceptable. Mary did not think it was a good idea to pull the screens at this time.

At the present time, we are diverting approximately 480 cfs with the screens requiring a shutdown cleaning approximately every 8 hours. We do not recommend pulling the screens at this time.

Flow Assessment at Robles Diversion and Fish Passage Facility

Date: 4/7/06 Time: 11:30 Prepared by: Nora Cole

INITIAL STORM EVENTS

Current Flow Conditions

Fish Ladder (cfs) 50 cfs
 Auxiliary Pipeline (cfs) closed
 Measurement Weir (cfs) 72 1.49'
 Robles Canal (cfs) 434
 Spillway Gates (Open/Closed) 1 A 2 C 3 C 4 C
 Cutoff Wall (Overflow - Yes/No) NO

Estimated Inflow to Robles (cfs)

485/506

Initial Storm Peak

Date _____
 Time _____
 Matilija Dam Peak _____
 Flow (cfs) _____

Matilija W.S. Elevation _____
 Matilija Creek @ Matilija Hot Spgs _____
 North Fork Matilija Creek (cfs) _____
 Lake Casitas W.S Elevation _____

Current day is _____ days after Peak.

Robles Release Requirements

					Release Schedule
Day	DATE	Robles Inflow	Table 2-3 Initial Rel.	Table 2-4 Selection	Table 2-4 Rel. (cfs)
1					
2					
3	<u>4/7/06</u>	<u>485</u>	<u>100 cfs</u>		
4	<u>4/8/06</u>		<u>74 cfs</u>		
5	<u>4-9-06</u>		<u>71</u>		
6	<u>4-10-06</u>		<u>52</u>		
7	<u>4-11-06</u>		<u>50</u>		
8			<u>50</u>		
9			<u>40</u>		
10			<u>30</u>		
11			<u>30</u>		
12			<u>30</u>		

OVERLAPPING EVENTS

Overlapping (OL) Storm Peak

Date 4/4/06
 Time 0400
 OL Peak Flow (cfs) 5227
 Days since initial Peak 7 peak to peak

Days since OL Peak to < 600 cfs 3
 Table 2-6 Initial Release (cfs) _____
 Table 2-7 Initial Release (cfs) 7-76 100 cfs column

OPERATOR INSTRUCTIONS

Fish Ladder Flow set at _____ cfs
 Auxiliary Flow set at _____ cfs.
 Diversion Setpoints:
 Maximum _____
 Minimum _____

Other Instructions: _____

POSTED: _____

BY: [Signature]

Robles Diversion and Fish Passage Facility

Operation Instructions for

Wednesday, May 3, 2006
0830 hours

Conditions:

Lake Casitas – 566.25 feet – 0.75 feet from spill
Matilija Reservoir – 1095.72 – slight spill
- all water in reservoir has been held in excess of 35 days

Instructions:

- 1) Beginning on the morning of Wednesday, May 3, 2006, release water from Matilija Dam thru the 30" valve at 75-80% open.
- 2) Divert water at Robles Diversion Dam, less 30 cfs released thru the fish ladder. Limit the ladder release to 30 cfs.
- 3) Continue to release and divert until any one of the following occur:
 - a. Lake Casitas reaches elevation 567.00, do not spill;
 - b. Matilija Reservoir reaches elevation 1090.00
 - c. Thursday at 3:00 PM.
- 4) Upon any one of the three conditions occurring, close the 30" valve at Matilija Dam, allow Robles system to operate in automatic during the recession of flow. If Lake Casitas reaches spill, completely raise the overshot gate.

ROBLES - 0910 HRS - 5/3/06
DIVERSIONS: 46 cfs
Fishway: 33 cfs
RIVER WEIR: 45 cfs

5/4/06 - 1530 HRS - 30" VALVE CLOSED
By ANDY BENITEZ, 12" VALVE FULL OPEN.
ROBLES SYSTEM ON AUTOMATIC.
5/5/06 - 0900 HRS
Fishway ~~33~~ - 36 cfs
DIVERSION - 25 cfs
MATILAJA RES - 1091.46
CASITAS EL - 566.36

Robles Diversion and Fish Passage Facility

Operation Instructions for

Tuesday, May 9, 2006

0830 hours

Conditions:

Lake Casitas – 566.39 feet – 0.75 feet from spill

Matilija Reservoir – 1093.71 – no spill

**- all water in reservoir below elevation
1090.70 has been held in excess of 35
days, estimated at approximately 300 AF.
The 12-inch valve is in the full open
position.**

Instructions:

- 1) Beginning on the morning of Tuesday, May 9, 2006,
release water from Matilija Dam thru the 30" valve at 50%
open.**
- 2) Divert water at Robles Diversion Dam, less 30 cfs
released thru the fish ladder. Limit the ladder release to
30 cfs.**
- 3) Continue to release and divert until any one of the
following occur:
 - a. Lake Casitas reaches elevation 567.00, do not spill;**
 - b. Matilija Reservoir reaches elevation 1090.00**
 - c. Thursday at 3:00 PM.****
- 4) Upon any one of the three conditions occurring, close the
30" valve at Matilija Dam, allow Robles system to operate in
automatic during the recession of flow. If Lake Casitas reaches
spill, completely raise the overshot gate. Leave the 12" valve at
Matilija Dam in full open position, Andy Benitez will made
adjustments of the 12" valve as needed to balance Matilija
Reservoir elevation.**

Stopped ORONES - Matilija El - 1089.86

APPENDIX 12
ROBLES FISH PASSAGE
WORK LIST FOR THE SUMMER/FALL OF 2006

<u>TASK</u>	<u>STATUS</u>	<u>WORK DONE BY</u>
<u>Annual Tasks</u>		
Inspect all of the Facilities	Pending	Everyone
Inspect the canal and the drainages	Pending	P & Maint
Lubricate all gates	Pending	M & E
Check all gate gear boxes	Pending	M & E
Test limit switches	Pending	M & E
Calibrate level sensors including canal terminus	Pending	M & E
Maintain standby generator	Pending	contractor & Eng
Back up PLC data and programs	Pending	M & E & Dirk
Clean and adjust fish screens	Pending	P
Function test (Around the third week in September)	Pending	Everyone
Conduct safety inspection & training (1 st week in October)	Pending	P
Clean transducers	Pending	M & E
<u>One time (hopefully) Items</u>		
Add concrete to the spillway apron	Pending	contractor & Eng
Fill in scour hole at the diffuser (entrance) box w/rock	Pending	contractor & Eng
Fix the weirs	RFP out	contractor & Eng
Arundo/non native plant removal	Pending	Eng & CCC
Repair trash grate in the entrance box	Pending	P
Install raw water pump for screen cleaning	Pending	P
Inspect and repair auxiliary pipeline flowmeter	Pending	M & E & Eng
Determine cause of fishway flow meter errors at lower flows	Pending	M & E
Eliminate or reduce error caused by the VFD on the other instrumentation	Pending	M & E
Inspect the diffusers behind the fish screens	Pending	P
Install safety signs at the fish screen brushes	Pending	P
Install internet connection to Chlorination station-wifi to control building	Pending	?
Repair the gate at Rice Road	Pending	P

Repair the fence	Pending	P
Add a gate to the top of the spillway	Pending	P
Install rungs and ladder in the diversion control channel (both sides of the fish guidance device?)	Pending	P
Bridge Crane for Fish Screens and Facilities	Pending	Eng & P
Vaki shroud repairs	Pending	P
Overshot gate seals	Pending	Eng & P
Staff gage at the bridge	Pending	P
Clean out entrance pool	Pending	Eng
Investigate & repair canal road gate	Pending	Eng
<u>Brush System Tests & Improvements</u>		
Stiffen the brushes by adding stiff sides or replace w/ stiffer bristles	<u>Brushes are ordered</u>	Eng & P
Replace a brush with a squeegee or scraper blade	<u>Scraper is ordered</u>	Eng & P
Add air system per Yakima Screen Shop suggestion	<u>Pending</u>	?
Adjust openings in the diffuser panels	<u>Pending</u>	?
Replace diffuser panels with larger opening panels	<u>Pending</u>	?
Add cable tensioner to west side brush system	<u>In process</u>	P
Add bigger sheave to west side brush drive	<u>Pending</u>	P
Remove intermediate tensioners on the west side	<u>In process</u>	P

P – Pipeline Crew

Maint – Maintenance Crew

M & E – Mechanical & Electrical Section

Eng – Engineering

? – Decision on whether to proceed is waiting further information or investigation.