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**KINGS RIVER FISHERIES MANAGEMENT PROGRAM  
ANNUAL TECHNICAL REPORT  
2005-2006**



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# EXECUTIVE SUMMARY

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The Kings River Water Association (KRWA), Kings River Conservation District (KRCD), and California Department of Fish and Game (CDFG) have jointly implemented habitat and trout population enhancement projects, and conducted a series of monitoring programs in the lower Kings River and Pine Flat Reservoir. These habitat enhancement projects have been implemented over the past six years in response to the Kings River Fisheries Management Program (FMP) Framework Agreement, which was approved on May 28, 1999. The Framework Agreement includes a number of actions designed to protect and enhance fishery habitat within the lower Kings River and in Pine Flat Reservoir. The Technical Steering Committee (TSC) is responsible for implementing the actions authorized under the agreement and approved by the Executive Policy Committee (ExCom). The scope of activities undertaken as part of the FMP between May 2005 and May 2006 described in this annual technical report includes: a compilation and synthesis of information regarding habitat enhancements, trout population enhancements, and monitoring activities conducted as part of the FMP.

Hydrologic conditions and Pine Flat Reservoir operations and flows within the lower river during 2005-2006 are characterized by high seasonal variability characteristic of the Kings River watershed and water supply operations. Findings and recommendations regarding hydrology and operations include:

- Pine Flat Reservoir operations were successful in maintaining the temperature control pool in the reservoir above the minimum level specified in the Framework Agreement;
- The reservoir releases were characterized by relatively high stream flows during the irrigation season, which were substantially reduced during the non-irrigation season. Average daily stream flows, measured passing over Fresno Weir, were in compliance with the minimum stream flow requirements contained in the Framework Agreement for all 365 days comprising the 2005-2006 program year.
- A real-time telemetry system provided information on flow at Fresno Weir that is available for monitoring and managing conditions within the lower river as part of the fishery program;
- Enhanced Exhibit D flows were provided by KRWA Member Units voluntarily at a rate of 250 cfs (level representing a wet hydrologic year) at Fresno Weir for the first time in the history of the program in the fall and winter of 2005-2006.
- Average daily stream flows, measured at Fresno Weir, were in compliance with the minimum stream flow requirements contained in the Framework Agreement for 361 days comprising the 2005-2006 program year. Of the four days on non-compliance, three were due to operational errors while perfecting the process of maintaining compliant Exhibit D flows, in the first year of Exhibit D operations. The fourth day was due to a flow variance that was approved by the Executive Policy Committee for necessary work to be performed in the river, and for safety purposes of those performing the work. There

were only 5 days in which the target of 250 cfs at Fresno Weir was reached exactly. In every single instance other than these 9 days, the flow requirement at Fresno Weir was exceeded, meaning that the flow was at 251 cfs or more for every other day during the low flow period. In total, the KRWA member units contributed an additional 24,800 acre-feet of water to ensure that Exhibit D flow schedules were met;

- The turbine bypass was utilized during the season for dissolved oxygen management. The turbine bypass provides additional flexibility in managing the cold water pool within Pine Flat Reservoir and the temperature of water released into the lower river to support suitable habitat conditions for trout as part of the FMP; and
- Planning activities were conducted by KRWA during 2005-2006 to establish a framework of agreements necessary to achieve Exhibit D flows by October 2005 (flows were provided). The TSC supports and applauds the activities of the KRWA.

Results of water quality monitoring within Pine Flat Reservoir and the lower Kings River during 2005-2006 have shown:

- Pine Flat Reservoir becomes stratified during late spring, summer, and fall showing a characteristic pattern of warmer water near the surface (epilimnion) and colder water with reduced dissolved oxygen concentrations near the bottom of the reservoir (hypolimnion). The reservoir destratifies in the late-fall and winter due to water temperature becoming uniform throughout the water column;
- The temperature of water released from the reservoir into the lower river can be regulated and managed, to some extent, through selective operation of different outlet works, including the turbine bypass, which initiated operations during 2003. However, the ability to manage water temperatures is limited and constrained by the availability of cold water and release points during various seasonal periods within the reservoir, hydroelectric generation, requirements for irrigation releases, and other factors;
- Aeration and mixing of water released from the reservoir have proven to be effective in maintaining suitable dissolved oxygen concentrations within the lower river during periods when the power plant was in operation. Mean monthly dissolved oxygen concentrations, as measured at the ACOE Bridge, during 2005-2006 exceeded 7.0 mg/L. With the exception of early September through mid November, dissolved oxygen levels measured during 2005-2006 were within the range considered to provide suitable habitat conditions for trout (above 7.0 mg/L), and other fish species and macroinvertebrates inhabiting the lower Kings River. Dissolved oxygen levels measured during the fall period mentioned were within a range considered to be stressful, but not lethal, to trout;
- Water temperatures within the lower river showed a seasonal pattern with the coldest temperatures occurring during the late winter and temperatures generally increasing during the summer and early fall;

- Water temperature showed a characteristic longitudinal gradient downstream of Pine Flat Dam. During summer months the coldest temperatures were located immediately downstream of the dam and temperatures generally increased with distance downstream from the dam. During the fall and winter, when atmospheric temperatures are cool, a reverse temperature gradient was observed with temperatures decreasing as a function of distance downstream from Pine Flat Dam;
- Results of temperature monitoring, and results from the fishery monitoring program, provided no evidence that either dissolved oxygen concentrations or water temperature conditions within the lower river resulted in mortality to trout or other fish species during 2005-2006;
- Results of the 2005-2006 water temperature and dissolved oxygen monitoring are being used by the TSC to refine water quality monitoring as part of the FMP and as a basis for evaluating alternative operational strategies, including operations of the turbine bypass, to address water quality issues affecting habitat conditions for trout in the future; and
- The TSC developed a water quality monitoring program to characterize the chemical and physical parameters at Mill Creek near the confluence with the lower Kings River, and at Fresno Weir. A technical report documenting results of the 2004-2005 water quality monitoring program was completed during the 2005-2006 program year. This report is currently available at the KRCD offices, or on the Fisheries Management Program website, currently hosted by KRCD at <http://www.krcd.org>. Future monitoring efforts will focus on the recommendations of this report.

The FMP continued habitat enhancement efforts on the lower Kings River during 2005-2006 by the following actions:

- Placed approximately 1,800 cubic yards of spawning gravel and approximately 2,500 large (3 to 6 feet in diameter) boulders in the Kings River for habitat improvement. Additional material (boulders and gravel) stockpiling and placement will continue in future years following the Fishery Habitat Master Plan.;
- Secured several dozen logs to existing structures in the Thorburn Spawning Channel to improve overhead cover for trout;
- Repaired a fence between the Pine Flat Recreation Area and private property to the west to protect Juvenile Trout Habitat Structures;
- The first enhanced Exhibit D releases in the history of the program were provided for by KRWA member units in accordance with the levels representing a wet hydrologic year of the Exhibit D flow schedule (250 cfs at Fresno Weir, for water year exceeding 2,100,000 acre feet);



- KRWA's Exhibit D subcommittee continued to meet throughout the year and worked to develop the internal mechanisms to achieve higher fall and winter flows in the lower Kings River for future triggering years; and
- Due to staffing difficulties, and relatively high reservoir levels throughout the year, there was no major fish habitat improvement work completed during the 2005-2006 program year at Pine Flat Reservoir. Work is scheduled to continue for the 2006-2007 program year.

The stocking of trout in State waters is the responsibility of the California Department of Fish and Game. During the 2005-2006 reporting period, the allotted numbers of catchable and sub-catchable size rainbow trout were stocked in the Kings River between Pine Flat Dam and Fresno Weir. In addition, trout eggs were transferred to the lower Kings River for incubation and hatching. Catchable size rainbow trout were also planted in Pine Flat Reservoir and Avocado Lake. A brief summary of 2005-2006 stocking includes:

- Whitlock Vibert Boxes (WVB) were used once during this reporting period to hatch eyed rainbow trout eggs, inside the streamside incubators;
- The upper streamside incubator located downstream of Pine Flat Recreation Area was used during March 2006 when approximately 100,000 eyed Eagle Lake (hatchery strain) rainbow trout eggs were loaded into the tank. The incubator was turned off before all the fry swam out, and pump removed due to an impending flood release. The fry were distributed to the adjacent section of river;
- The lower incubator located in the main Kings River Channel, near the lower end of the Thorburn Spawning and Rearing Channel, was used last during December 2004 and April 2005. The intake was damaged during the 2005 irrigation season, but received the necessary repairs in November 2006;
- On October 19<sup>th</sup> and 21<sup>st</sup>, 2005, 2,500 pounds (25,000 trout) of sub-catchable rainbow trout (4-6 inches in length) were stocked in the lower Kings River as part of the put-and-grow program. Increased minimum flows resulting from Schedule D was going to prevent sampling with electrofishers, so the subcatchables were not marked in 2005. The strain of trout utilized were the offspring of Eagle Lake rainbow trout from Eagle Lake in northern California. Eggs are taken from female Eagle Lake trout as they ascend a tributary creek to spawn. They were fertilized by males also collected during the spawning run, and the eggs held in the hatchery for later distribution. San Joaquin Hatchery personnel stocked the small trout at Winton and Choinumni Parks;
- On October 12<sup>th</sup>, 2005 the San Joaquin Hatchery planted 15,022 Rainbow trout fingerlings (203 pounds) in the lower river. There currently is no annual allotment for RT fingerlings on the Kings River. These fish were in excess of the production needs of the hatchery and the Kings was selected as a suitable destination;

- A total of 29,332 pounds of catchable sized trout (34,078 fish) were stocked in the lower Kings River during this reporting period. This increase (63%) over the proposed allotment was due to the “Trophy Trout” program implemented on the Kings River. Beginning December 2005, large trout were planted in the put-and-take section as well as the catch-and-release section. The trout in the program averaged 4.1 pounds each overall (load averages ranged 3.5 to 5 pounds each trout) during the December through March. The program will continue a minimum of two more years for evaluation;
- No sub-catchable trout were planted in Pine Flat Reservoir during the reporting period;
- Between November 3<sup>rd</sup>, 2005 and March 1<sup>st</sup>, 2006, 22,000 pounds (44,500 trout) of catchable sized rainbow trout, averaging approximately ½ pound each were planted in Pine Flat Reservoir;
- The most recent planting of Chinook salmon fingerling was 5/2/2006, which was 55,000 fingerlings weighing 714 pounds. No Kokanee salmon were stocked in Pine Flat Reservoir during 2005-2006; and
- In 2005-2006 reporting period, the San Joaquin Hatchery planted 6,400 hundred pounds (11,950 trout) of catchable size rainbow trout in Avocado Lake.

As part of the FMP habitat and fishery monitoring was conducted within the lower river and Pine Flat Reservoir. Results of the 2005-2006 monitoring program have shown:

- There were no electrofishing surveys conducted during 2005-2006. However, a very thorough technical document summarizing the results of previous electrofishing studies (1983-2005) on the Kings River was prepared. This paper, titled “Analysis of the Condition of Rainbow Trout Collected from the Kings River Downstream of Pine Flat Dam 1983-2005,” found that based on the results of electrofishing surveys, Rainbow Trout in the Kings River are healthy and in good condition. This paper was published in October of 2005, and was approved by the ExCom for release to the public. The paper is available on the KRCD website at <http://www.krcd.org>;
- In February 2006 KRCD staff collected insect samples from six sites on the lower Kings River. The results of the laboratory analysis were not available for publication in the 2005-2006 Annual Technical Report. An additional round of samples will be collected in November of 2006 from the same locations ;
- Transmitters were implanted and 2 groups of tagged fish were released in the Kings River for study;
- The final draft of the Kings River Fisheries Management Program Water Quality Monitoring Report for the 2004-2005 program year was prepared, presented and approved by the Executive Policy Committee during the 2005-2006 Program Year. This report is available at the KRCD offices, or on the Fisheries Management Program’s website, currently hosted by KRCD at <http://www.krcd.org>;

- The third annual Technical Report was completed in February 2006;
- The excessive fine sediment accumulation at the Frustration Lake site could adversely affect trout reproduction. The percentages of coarse sand, fine sediments and silt will likely increase mortality for developing trout embryos, alevins and swim-up fry. The gravels near Pine Flat Dam are relatively clean. This site has great potential for trout reproduction provided it is wet for the duration of the spawning season; and
- There were 23 permitted bass tournaments at Pine Flat Reservoir. The number of participants was 658 and the average size of bass returned for Weigh-In was 1.71 pounds.

Public education and outreach activities during 2005-2006 included:

- An issue of Kings River Fisheries News newsletter was published and distributed in the early summer of 2006 with the assistance of the Public Advisory Group;
- The FMP constructed a graveled, fishing access vehicle parking area at the Fresno County Green Belt Parkway. A \$7,600 grant was obtained from the Fresno County Recreation and Wildlife Commission that partially funded the project;
- KRWA has developed a real-time telemetry system for monitoring water temperature and streamflow at Fresno Weir. During the summer and fall of 2004 information developed from monitoring being conducted on the lower Kings River was compiled in weekly reports and distributed by KRWA to members of the PAG and other interested parties to provide current information on environmental conditions occurring within the lower river that would affect habitat quality for trout. Weekly reports were distributed electronically to inform managers and other interested parties regarding conditions currently occurring within the lower river. The water temperature and flow monitoring and reporting provided a valuable tool for disseminating real-time information. The TSC has recommended that the real-time monitoring and dissemination of weekly reports, when appropriate, be continued as part of the FMP;
- The PAG developed a web page to inform the public, fishing groups, and government agencies about the FMP. The web page also presents angling opportunities and information related to the Kings River. The web page is available at <http://www.kingsriverfisheries.org>;
- The PAG worked extensively with the 2006 Kings River Day event, to provide valuable historical, operational, scientific and recreational opportunities to hundreds of 6<sup>th</sup> graders. This event was scheduled for May 19, 2006 but was cancelled due to flood releases that submerged the Kelly's Beach location where the event is held. Next year's event is tentatively scheduled for May 18, 2007. This annual event has become an important part of the outreach function of the PAG, and comments from students, teachers, and administrators have been very positive;

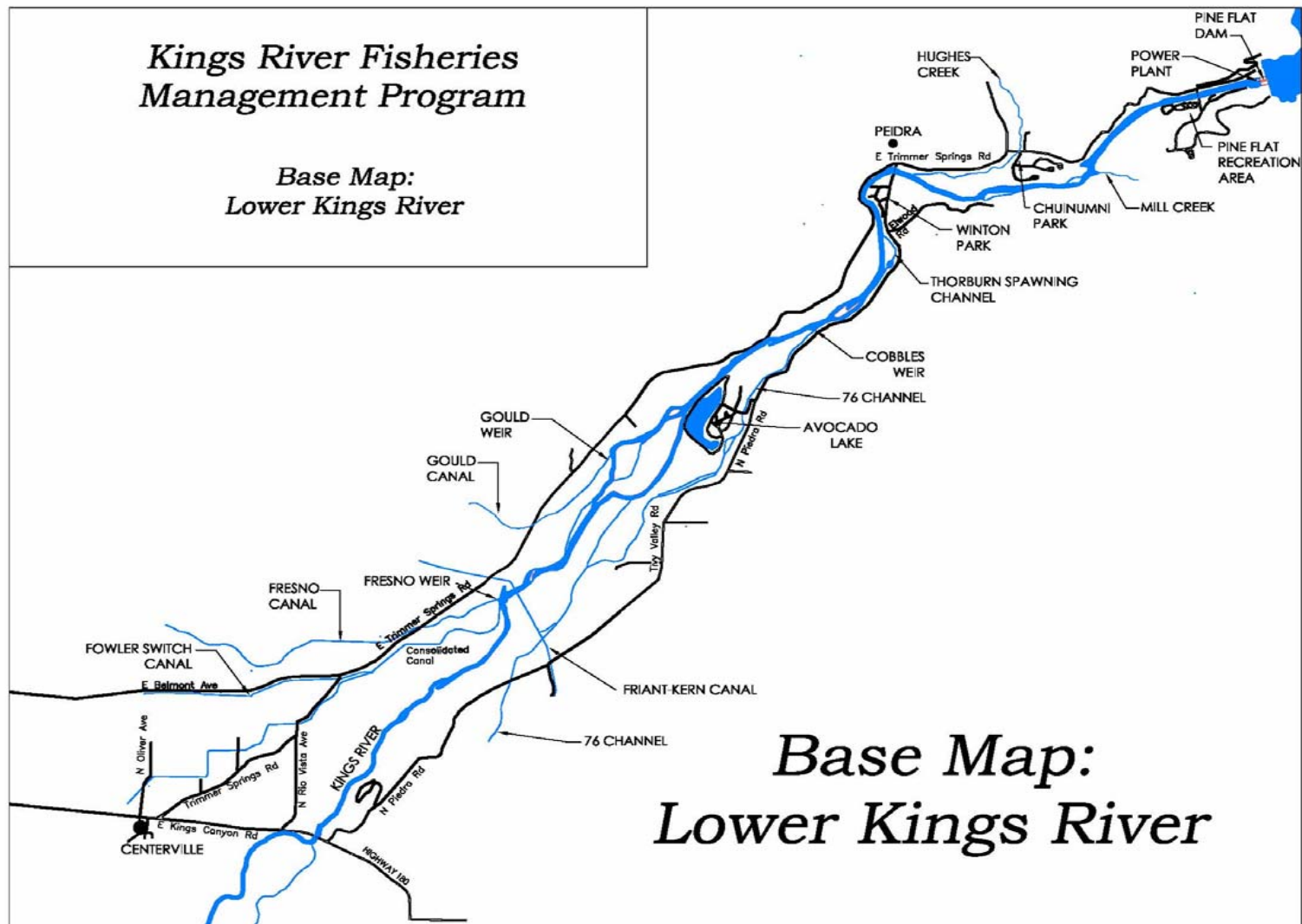
- Several educational tours were conducted at the Thorburn Spawning and Rearing Channel in 2005-2006; and
- The “Guide to Fishing the Lower Kings River.” brochure was completed and approved by the PAG and ExCom, and was published and distributed in spring 2006. A printable version of this document is available on the KRCD website at <http://www.krcd.org>.

# 1.0 INTRODUCTION

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The Kings River Water Association (KRWA), Kings River Conservation District (KRCD), and California Department of Fish and Game (CDFG) have jointly implemented habitat and trout population enhancement projects, and conducted a series of monitoring programs in the lower Kings River (Figure 1-1) and Pine Flat Reservoir. These habitat enhancement projects have been implemented over the past six years in response to the Kings River Fisheries Management Program (FMP) Framework Agreement, which was approved on May 28, 1999. The Framework Agreement includes a number of actions designed to protect and enhance fishery habitat within the lower Kings River and in Pine Flat Reservoir. The Technical Steering Committee (TSC) is responsible for implementing the actions authorized under the agreement and approved by the Executive Policy Committee (ExCom). The scope of activities undertaken as part of the FMP between May 2005 and May 2006 described in this annual technical report includes:

- Monitoring hydrology and operations including inflow to Pine Flat Reservoir, reservoir storage, reservoir releases, operation of remote sensing telemetry systems, turbine bypass operation, and activities to implement enhanced winter flows for fishery habitat as outlined in Exhibits C and D of the Framework Agreement;
- Monitoring water quality including water temperature and dissolved oxygen within Pine Flat Reservoir and the lower Kings River, compliance with dissolved oxygen requirements within the lower river, and planning and monitoring water temperature conditions at the completion of the irrigation season;
- Habitat enhancement projects including boulder acquisition and placement in the river, spawning gravel stockpiling and placement, operation and maintenance of the Thorburn Spawning and Rearing Channel, and riparian habitat protection;
- Fish stocking has occurred as part of the program within the lower river and Pine Flat Reservoir including Whitlock-Vibert box egg incubation, streamside egg incubators, routine stocking of sub-adult and catchable size trout, all done by the CDFG at no cost to the program (except for a small maintenance cost associated with streamside incubators);
- Monitoring activities associated with the FMP included electrofishing surveys within the lower river to develop annual fish population indices, monitoring of fish use within areas associated with habitat enhancement projects such as coves and jetties, monitoring within the Thorburn Spawning and Rearing Channel, water quality monitoring within the lower river, and macroinvertebrate surveys. Monitoring within Pine Flat Reservoir included the compilation of bass tournament records;
- Public education and outreach included summer hydrology and water temperature monitoring reports, internet web page development, news releases, issuance of a news letter on the FMP, and angler access improvements; and



**Figure 1-1.** Map of the lower Kings River and key geographic locations.

- Maintenance activities included watering riparian vegetation planted along the Thorburn Channel, routine maintenance of the channel headgate, and repairs and maintenance of the streamside egg incubators.

The following report presents a compilation and synthesis of information regarding these habitat enhancements, trout population enhancements, and monitoring activities during 2005-2006. Since the Framework Agreement has been in place since 1999, the technical compilation and synthesis report also presents data from earlier projects and monitoring activities as part of the Framework Agreement. This technical report is designed to compile and summarize information available on the implementation and performance of the FMP and to convey information on the FMP to the ExCom, the Public Advisory Committee (PAG) and other interested parties. This annual technical report is intended to accompany the 5-Year Plan to describe and document results of the FMP to date, and to serve as the technical and scientific foundation for the identification of priority actions to be implemented as part of subsequent 5-Year Plans, to identify significant findings that would affect the fishery monitoring within Pine Flat Reservoir and the lower river, or the identification of specific management actions designed to enhance and improve habitat conditions for resident trout and other desirable fish species inhabiting the Kings River system.

One of the principle objectives of the annual report is to provide a project management structure for reviewing and prioritizing existing and proposed habitat enhancement activities, fish stocking, and implementation of other elements contained in the Framework Agreement. Results of the fishery and habitat monitoring program are intended to provide a technical and scientific framework for identifying design criteria and priorities for determining the appropriate scale and location of habitat enhancement projects, linkages among potential projects to maximize biological benefits and reduce cost, identify priorities for habitat enhancement project locations, and identify potential opportunities for expanding enhancement projects through funding augmentation from collaborative grant applications from state, federal, and private funding sources. In addition, one of the key objectives of the annual report is to help ensure coordination and communication among the parties involved in implementing various elements of the Framework Agreement, and to facilitate a process for reviewing and evaluating the performance of management actions in achieving the overall goals of the FMP. The annual report also provides a framework to present monitoring results used by the TSC to evaluate a variety of alternative approaches each year for meeting the goals for the enhancement program, and for evaluating program performance.

## **1.1 ADMINISTRATIVE ACTIVITIES**

The Kings River Fisheries Management Program's fifth 5-Year Implementation Plan (for program year 2005-2006) was presented and approved by the Executive Committee at their meeting of February 10, 2005. This 5-Year Plan provided the basic direction for the Technical Steering Committee and program activities through the year.

The ExCom met three times during the program year, on September 8, 2005, November 28, 2005, and on April 25, 2006, to hear reports from the TSC and the public, and to provide direction to the TSC. The November 28, 2005 meeting of the ExCom was held via teleconference for the express purpose of discussing a necessary flow variance (Appendix H).

The TSC met on an ongoing basis to continue their work on program development and administration. The PAG, with Kevin Wren and then Hank Urbach as Chairmen, met on a monthly basis to discuss and develop issues important to them. Members of the TSC and ExCom routinely attend the PAG meetings to report on their activities and to provide input as requested.

## **1.2 ANNUAL TECHNICAL REPORT**

A number of interested parties and stakeholders, including the ExCom, PAG, resource and water agencies, local angling groups, and others have expressed interest in the information being collected as part of the FMP's monitoring program. Preparation and distribution of an annual technical report has been identified as a useful method of conveying information regarding the program status and monitoring results to interested parties.

Fishery enhancement work under the guidance of the Framework Agreement has occurred on the lower Kings River and Pine Flat Reservoir since the signing of the Framework Agreement on May 28, 1999. The first annual report for the FMP covered the period of May 2002 through May 2003 and was released in September 2004. The second annual technical report covered the period of May 2003 through May 2004 and was released in February 2005. The third annual technical report, which summarizes results of the habitat enhancement activities, trout management, and fishery and habitat monitoring between May 2004 and May 2005, was released in February 2006. This report represents the fourth in the series, and covers the program year between May 2005 and May 2006.

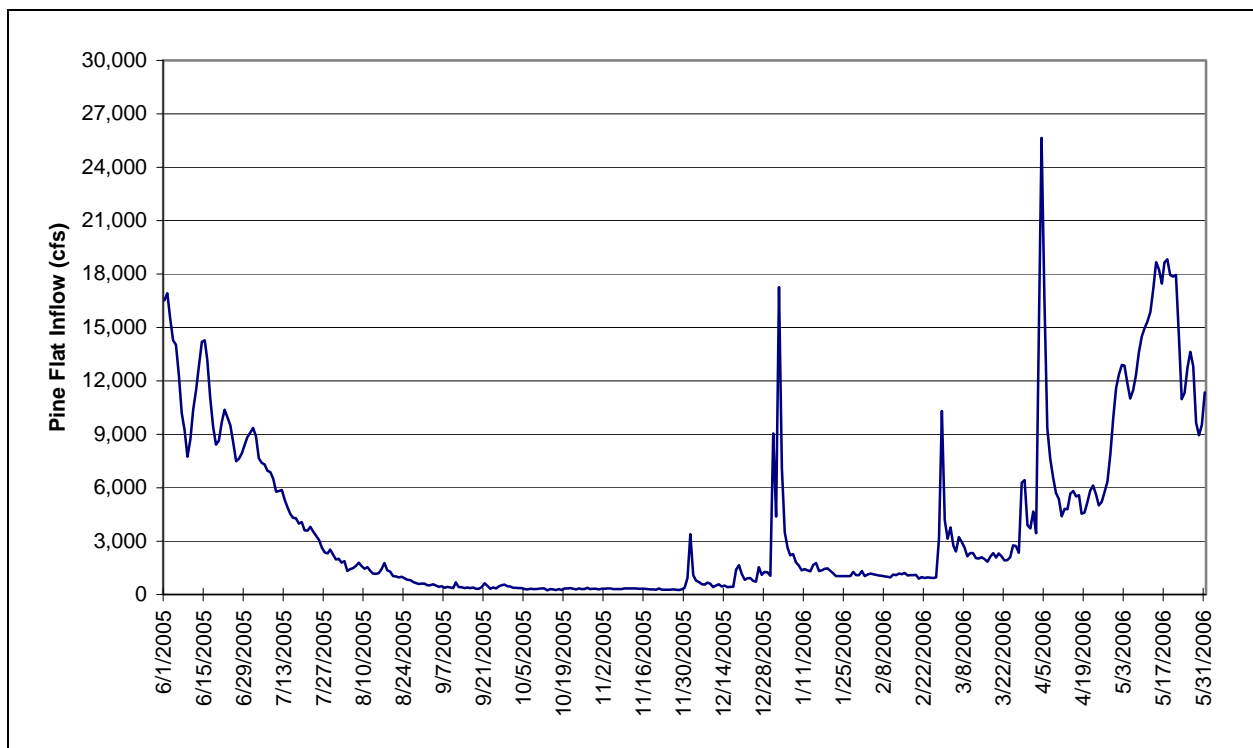
The annual technical report summarizes key accomplishments and performance of the habitat enhancement actions and findings of the monitoring program. Compilation and analyses of available information used to assess performance of the FMP and habitat enhancement program is based upon results of both baseline monitoring within the Kings River and results of project-specific monitoring and performance evaluations. Information from a variety of program elements has been compiled each year representing results of each element of the Kings River monitoring program, as outlined in the 5-Year Plan. The annual technical report includes an executive summary followed by brief descriptions of individual monitoring program elements and results of key findings. The annual technical report summarizes information regarding the status and trends of the physical conditions affecting habitat quality and availability for rainbow trout within the river, and provides guidance and recommendations for future actions and modifications to the program. Documentation of data and other relevant information are included as appendices.



## 2.0 HYDROLOGY AND OPERATIONS

### 2.1 RESERVOIR INFLOW

Daily runoff into Pine Flat Reservoir from June 1, 2005 through May 31, 2006 is shown in Figure 2-1. Inflow into Pine Flat Reservoir is characterized by high seasonal and inter-annual variability reflecting variation in precipitation, snow pack, and runoff within the watershed. The total estimated annual inflow into Pine Flat Reservoir and the corresponding percent water year is summarized below (Table 2-1):



**Figure 2-1. Daily inflow into Pine Flat Reservoir between June 1, 2005 and May 31, 2006.**

### 2.2 RESERVOIR STORAGE

Daily reservoir water storage volume and water surface elevation in Pine Flat Reservoir from June 2005 through May 2006 is shown in Figure 2-2. Reservoir storage reflects the combined effects of reservoir inflow, releases from Pine Flat Reservoir to the lower Kings River, and evaporation. As part of the Framework Agreement, a voluntary 100,000 acre-feet temperature control pool was established. Reservoir operations since implementation of the Framework Agreement have retained the temperature control pool at or above the 100,000 acre-foot pool.

**Table 2-1. Annual runoff in thousands of acre-feet (TAF) and Percent Water Year from October 1999 through September 2006.**

<u>Period</u>	<u>Annual Runoff (TAF)</u>	<u>Percent Water Year</u>
October 1999 -- September 2000	1,534	90%
October 2000 -- September 2001	1,010	59%
October 2001 -- September 2002	1,141	67%
October 2002 -- September 2003	1,426	84%
October 2003 -- September 2004	1,050	62%
October 2004 -- September 2005	2,531	149%
October 2005 -- September 2006	2,952	173%

### **2.3 RESERVOIR RELEASES**

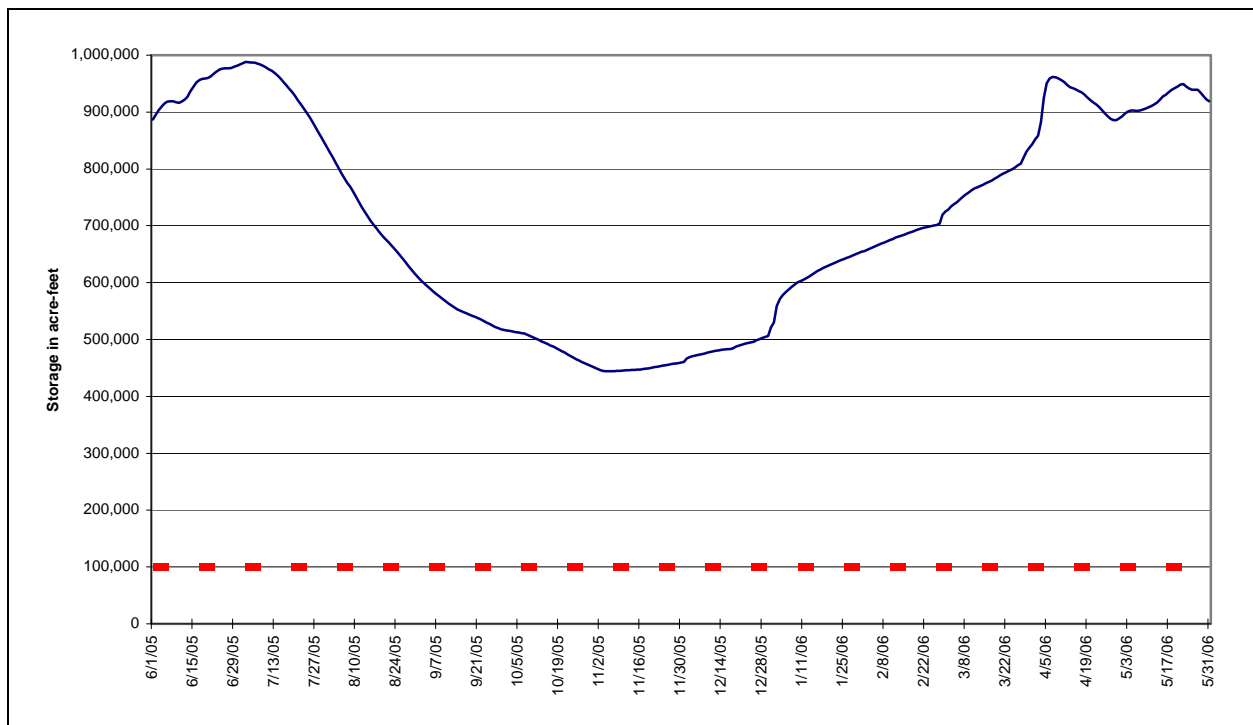
Water releases from Pine Flat Reservoir to the lower Kings River show high variability within the year as shown in Figure 2-3. Releases from Pine Flat Reservoir during the late fall, winter, and spring months have been in accordance with the Exhibit C flow schedule established by the Framework Agreement. In addition to the Exhibit C releases, the 2005-2006 program year represented the first enhanced Exhibit D releases in the history of the program. As per the Framework Agreement, the KRWA member units voluntarily increased the flow schedule in accordance with the levels representing a wet hydrologic year of the Exhibit D flow schedule (250 cfs at Fresno Weir, for water year exceeding 2,100,000 acre feet). Beginning in the early spring, releases from Pine Flat Reservoir increase in response to downstream water demand and irrigation delivery schedules for water from storage. Average daily flow in the lower Kings River from June 2005 through May 2006 ranged from 260 to 13,322 cubic feet per second (cfs) (Figure 2-3).

The Framework Agreement established minimum instream Exhibit C flow releases from Pine Flat Reservoir, flow at Piedra, in Dennis Cut, at Fresno Weir and below Fresno Weir to support resident fish populations in the lower river. Results of daily flow measurements below Fresno Weir from June 2005 through May 2006 have demonstrated 100% compliance with the instream flow requirements as outlined in the Framework Agreement, and these results are shown in Figure 2-4. Flows measured at Fresno Weir were subject to the levels representing a wet hydrologic year of the Exhibit D flow schedule (250 cfs at Fresno Weir, for water year exceeding 2,100,000 acre feet), and the corresponding results are shown in Figure 2-5.

There were four days in the 2005-2006 program year in which instream flow requirements at Fresno Weir were not met. From November 14-16, flows at Fresno Weir were 249 cfs, 247 cfs, and 249 cfs respectively. The error was corrected by an increase in flow ordered on the morning of the 16<sup>th</sup>, thereby increasing the flow to 251 cfs and up from that point on. This event can be attributed to operational errors while perfecting the process of maintaining compliant Exhibit D flows, in the first year of Exhibit D operations. On November 29<sup>th</sup>, flows at Fresno Weir were

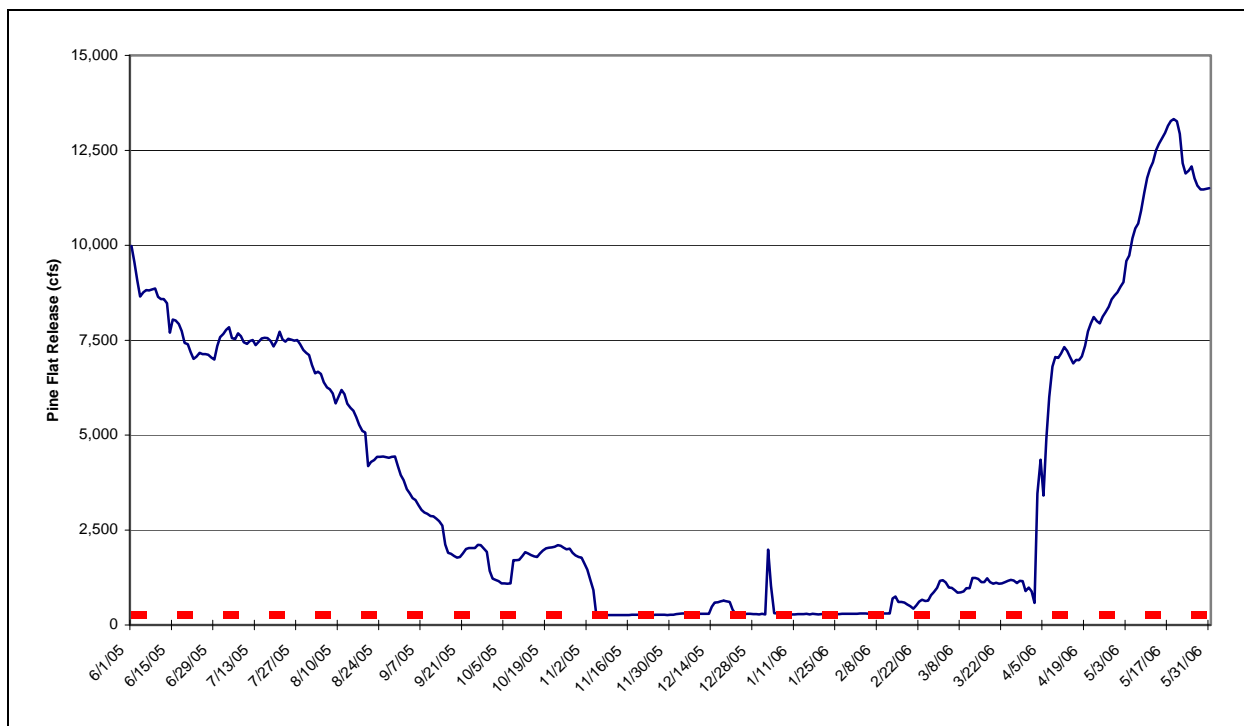
244 cfs, which is also below the compliance level. However, this day was part of a flow variance that was approved by the Executive Policy Committee for necessary work to be performed in the river, and for safety purposes of those performing the work (Appendix H).

While the 2005-2006 program year did have 4 days of flows that were below the instream flow requirement at Fresno Weir, there were only 5 days in which the target of 250 cfs at Fresno Weir was reached exactly. In every single instance other than these 9 days, the flow requirement at Fresno Weir was exceeded, meaning that the flow was at 251 cfs or more for every other day during the low flow period. In total, the KRWA member units contributed an additional 24,800 acre-feet of water to ensure that Exhibit D flow schedules were met. Information on daily water releases from Pine Flat Reservoir and daily flows at Fresno Weir is summarized in Appendix A.

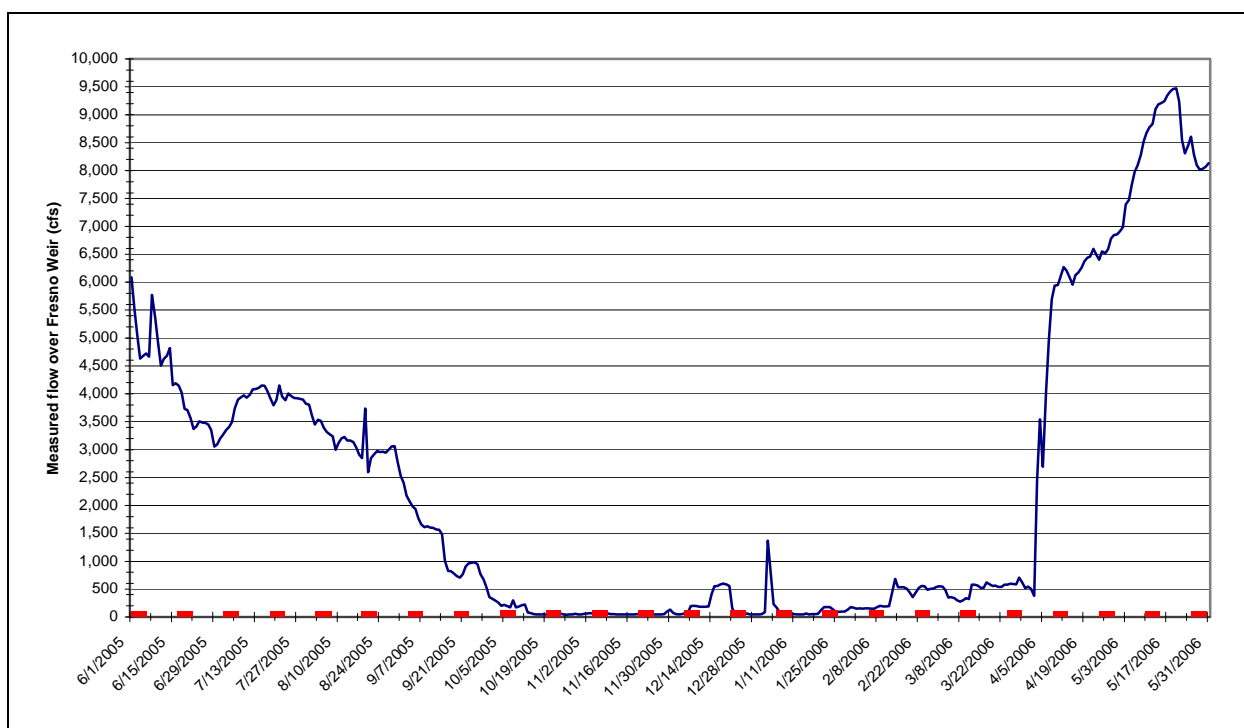


**Figure 2-2. Daily storage volume in Pine Flat Reservoir from June 2005 to May 2005.**

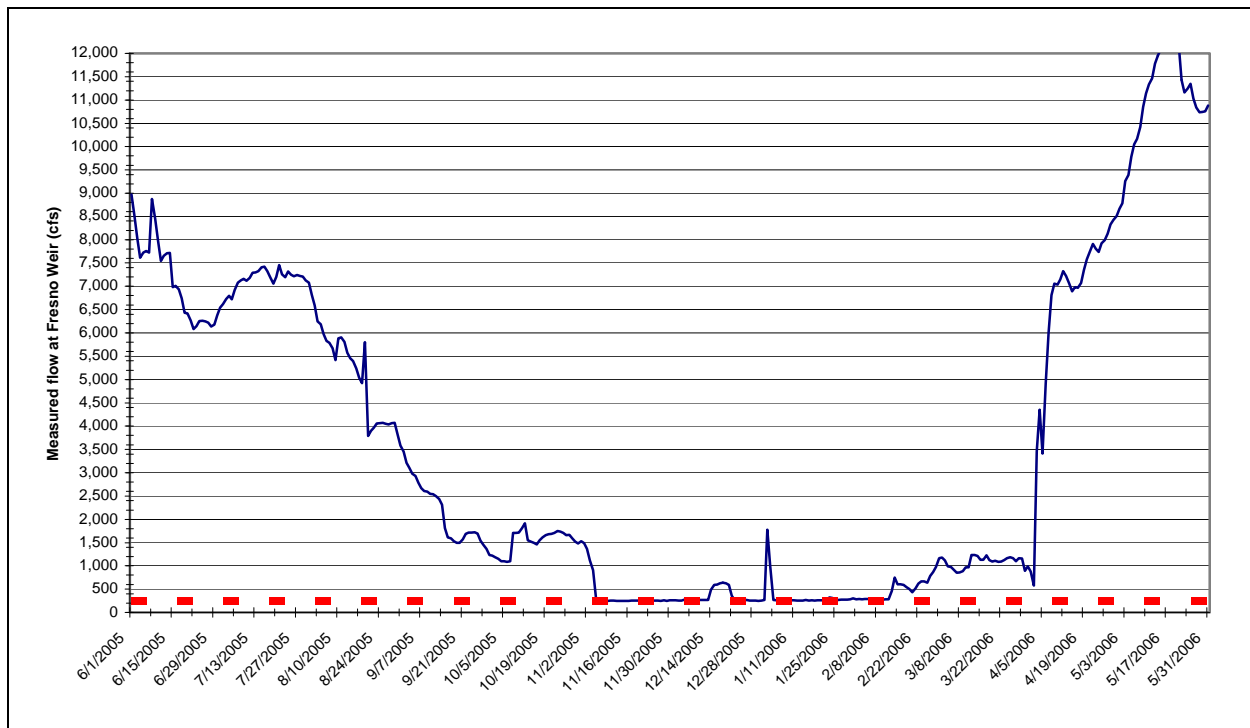
Note: ----- Dashed Line indicates Temperature Control Pool of 100,000 acre-feet.



**Figure 2-3. Average daily water releases from Pine Flat Reservoir to the lower Kings River between June 2005 and May 2006.** Note: -----Dashed Line represents minimum flow rate as established by Exhibit D criteria (cfs).



**Figure 2-4. Average daily flows in the Kings River below Fresno Weir from June 2005 through May 2006.** Note: -----Dashed Line represents minimum flow rate as established by Exhibit C criteria (cfs).



**Figure 2-5. Average daily flows in the Kings River at Fresno Weir from June 2005 through May 2006.**  
 Note: -----Dashed Line represents minimum flow rate as established by the enhanced Exhibit D criteria (cfs).

## 2.4 TELEMETRY SYSTEM

During 2005-2006, KRWA continued the use of a real-time (telemetry) flow monitoring station at Fresno Weir. This system provides data that supports informed decisions on water temperature and flow management after completing the irrigation and delivery season when elevated water temperatures may affect habitat quality for trout within the lower river. The real-time telemetry water temperature monitoring system complements the ongoing temperature monitoring at fixed locations within the river (Section 3.1.2) for use in evaluating factors affecting habitat conditions and the potential health and condition of trout within the river.

## 2.5 TURBINE BYPASS PROJECT

The turbine bypass project was completed in March 2003. The project was developed through the U. S. Army Corps of Engineers (ACOE) Pine Flat Dam Fish and Wildlife Habitat Restoration Investigation that began in 1993. KRCD served as the local sponsor with contributions from the CDFG, KRWA, and California Department of Water Resources (DWR). The turbine bypass provides increased flexibility in operating and managing flows and water temperatures released from Pine Flat Dam. The turbine bypass is operated by KRCD.

The approximately 6-million dollar project involved constructing a conduit system to the existing penstocks to allow for low flows to bypass the power plant turbines. This allows greater flexibility in making releases at various water elevations in Pine Flat Reservoir by allowing releases through the penstocks when flows are less than the 500 to 600 cfs necessary to run the power plant. In this way, there is more flexibility given to the limited releases of colder water

made into the river from the reservoir to benefit the coldwater fishery during low-flow periods of the year. The turbine bypass is also used to increase the dissolved oxygen level in waters released from the power plant.

During the 2005-2006 program year, temperature management was not an issue, with plenty of cold water available throughout the time period. The Turbine Bypass was utilized for the purposes of dissolved oxygen management, by blending releases between the turbine bypass and the mid level gates from the Pine Flat Dam.

## **2.6 EXHIBIT C AND D FLOWS**

Section 1(e) of the Framework Agreement calls for the KRWA to diligently endeavor to increase the minimum water flows in the Kings River downstream of Pine Flat Dam as set forth in Exhibit C to those levels shown in Exhibit D by October 1, 2005. The Exhibit C flow schedule presented in the Framework Agreement is summarized in Table 2-2. Exhibit C flows have been implemented and monitored since 1999.

A KRWA Exhibit D committee was formed and has met regularly to develop programs that will enable the KRWA to reach the Exhibit D flow goals while avoiding or minimizing unacceptable water supply or operational impacts to its member units.

**Table 2-2. Exhibit C flows (cfs) from the Framework Agreement.**

<b>Season</b>	<b>Total Flow at Piedra</b>	<b>Minimum Flow in Dennis Cut</b>	<b>Minimum Flow to Fresno Weir</b>	<b>Water Divertable in China Slough</b>	<b>Required Flow Over Fresno Weir</b>
<b>Oct. 1 – Nov. 15</b>	<b>100</b>	<b>5</b>	<b>95</b>	<b>10</b>	<b>40</b>
<b>Nov. 16 – March 31</b>	<b>100</b>	<b>5</b>	<b>95</b>	<b>5</b>	<b>45</b>
<b>April 1 – Sept. 30</b>	<b>100</b>	<b>5</b>	<b>95</b>	<b>15</b>	<b>35</b>

Some ideas under discussion include rescheduling of irrigation demands and/or the temperature control pool, groundwater recharge and water banking projects, exchange arrangements with the State Water Project (SWP), downstream surface storage projects, and member contribution of entitlement/storage. Exhibit D flows at a rate of 250 cfs (level representing a wet hydrologic year) at Fresno Weir were released for the first time in the history of the program in the fall and winter 2005. These flows were triggered by the larger than normal water-year in 2004-2005 (149% WY), and the KRWA Member Units voluntarily provided the Exhibit D flows in the following water-year (2005-2006).

## **2.7 DISSEMINATION OF TEMPERATURE DATA**

Experience has taught the TSC that sharing water temperature information with our stakeholders during critical or near critical periods that are stressful to trout is important. To this end, KRWA began providing weekly hydrologic and climate reports (Appendix B) to the PAG members and other interested parties several years ago. These one-page reports provide information on flows in the lower river and tributary streams as well as a summary of flow and temperature trends. This has been beneficial to everyone who has an interest in the well being of the trout population

in the lower river and has resulted in much improved communications regarding these possible temperature events.

## **2.8 SUMMARY AND DISCUSSION**

Hydrologic conditions and Pine Flat Reservoir operations and flows within the lower river during 2005-2006 are characterized by high seasonal variability characteristic of the Kings River watershed and water supply operations. Findings and recommendations regarding hydrology and operations include:

- Pine Flat Reservoir operations were successful in maintaining the temperature control pool in the reservoir above the minimum level specified in the Framework Agreement;
- The reservoir releases were characterized by relatively high stream flows during the irrigation season, which were substantially reduced during the non-irrigation season. Average daily stream flows, measured passing over Fresno Weir, were in compliance with the minimum stream flow requirements contained in the Framework Agreement for all 365 days comprising the 2005-2006 program year.
- A real-time telemetry system provided information on flow at Fresno Weir that is available for monitoring and managing conditions within the lower river as part of the fishery program;
- Enhanced Exhibit D flows were provided by KRWA Member Units voluntarily at a rate of 250 cfs (level representing a wet hydrologic year) at Fresno Weir for the first time in the history of the program in the fall and winter of 2005-2006.
- Average daily stream flows, measured at Fresno Weir, were in compliance with the minimum stream flow requirements contained in the Framework Agreement for 361 days comprising the 2005-2006 program year. Of the four days on non-compliance, three were due to operational errors while perfecting the process of maintaining compliant Exhibit D flows, in the first year of Exhibit D operations. One day was due to a flow variance that was approved by the Executive Policy Committee for necessary work to be performed in the river, and for safety purposes of those performing the work. There were only 5 days in which the target of 250 cfs at Fresno Weir was reached exactly. In every single instance other than these 9 days, the flow requirement at Fresno Weir was exceeded, meaning that the flow was at 251 cfs or more for every other day during the low flow period. In total, the KRWA member units contributed an additional 24,800 acre-feet of water to ensure that Exhibit D flow schedules were met;
- The turbine bypass was utilized during the season for dissolved oxygen management. The turbine bypass provides additional flexibility in managing the cold water pool within Pine Flat Reservoir and the temperature of water released into the lower river to support suitable habitat conditions for trout as part of the FMP; and

- Planning activities were conducted by KRWA during 2005-2006 to establish a framework of agreements necessary to achieve Exhibit D flows by October 2005 (flows were provided). The TSC supports and applauds the activities of the KRWA.



## 3.0 WATER QUALITY

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Water quality monitoring as part of the FMP has focused principally on measurements of water temperature and dissolved oxygen concentrations that directly affect habitat quality for fish and macroinvertebrates within Pine Flat Reservoir and the lower Kings River. The TSC developed a water quality monitoring program to characterize the chemical and physical parameters at Mill Creek near the confluence with the lower Kings River, and at Fresno Weir. A technical report documenting results of the 2004-2005 water quality monitoring program was completed during the 2005-2006 program year. This report is currently available at the KRCD offices, or on the Fisheries Management Program website, currently hosted by KRCD at <http://www.krcd.org>. Future monitoring efforts will focus on the recommendations of this report. Results of water temperature and dissolved oxygen monitoring within the reservoir and lower river are presented below.

### 3.1 WATER TEMPERATURE MONITORING

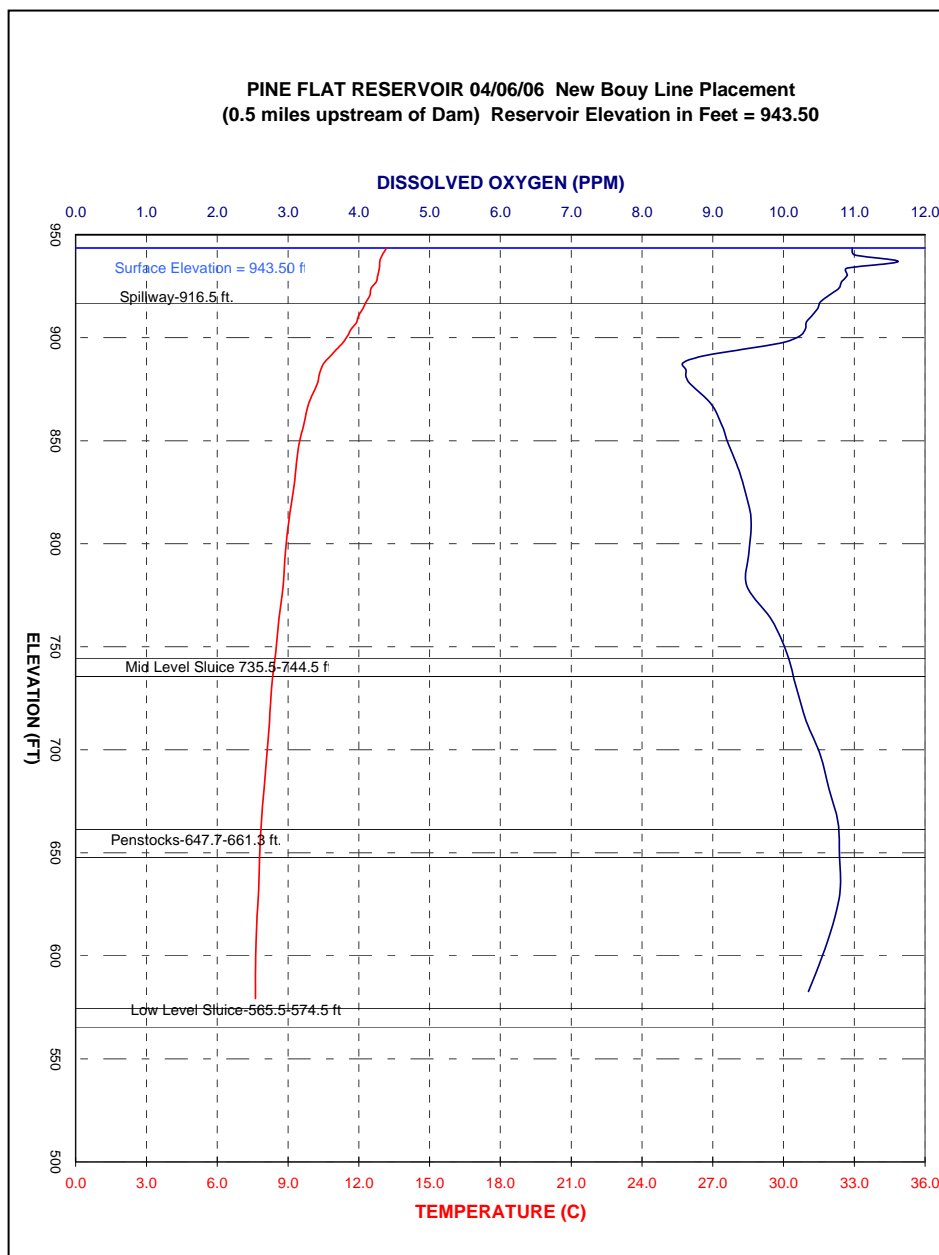
Habitat quality and availability to support resident trout within the lower Kings River is dependent, to a large extent, on the suitability of seasonal water temperatures. Water temperatures within the lower Kings River are affected by a variety of environmental factors including, but not limited to, the temperature of water released from Pine Flat Reservoir, air temperature, stream flow, and the distance downstream from Pine Flat Reservoir. Given the importance of water temperature as a factor affecting habitat conditions for trout within the lower river, the FMP includes an extensive water temperature monitoring component designed to provide information on water temperature within Pine Flat Reservoir and at various locations along the lower river.

#### 3.1.1 Reservoir

Water temperature and dissolved oxygen profile measurements for Pine Flat Reservoir have been collected by KRCD biologists on approximately a monthly basis since 1986. Measurements are taken at a monitoring location approximately 0.5 miles upstream of the dam using a Yellow Springs Instrument portable water quality meter. Vertical profile measurements of both water temperature and dissolved oxygen concentrations are recorded at approximately 3-foot intervals from the surface to the bottom of the water column to characterize the limnological profile within Pine Flat Reservoir in the vicinity of the dam outlet structures.

Results of water quality monitoring have shown a characteristic seasonal pattern of thermal stratification beginning in the spring forming a reservoir hypolimnion (cold water layer near the bottom) and epilimnion (warmer water layer near the surface) increasing through the summer months. Reservoir thermal stratification continues into the fall, at which time atmospheric cooling results in fairly uniform water temperatures throughout the reservoir (reservoir destratification). Later in the fall, cold air temperatures cool the upper layer of water so that the epilimnion is colder than the hypolimnion (reservoir turnover). Results of the April 2006 reservoir profile are presented in Figure 3-1 as an example of monitoring. Results of monthly vertical reservoir temperature and dissolved oxygen profile measurements during the period May 2005 through May 2006 are summarized in Appendix C. Additional vertical profile temperature measurements, collected during previous years, are on file at KRCD.

Results of the reservoir temperature and dissolved oxygen measurements are used as part of the FMP to determine both the dissolved oxygen concentration and temperature of water released from the reservoir into the lower river. The data are also used in temperature control pool management during the fall months after completion of the irrigation season to provide suitable habitat conditions to support trout and other fish species within Pine Flat Reservoir and the lower river. In addition to the vertical temperature profile measurements, water temperature is measured by KRCD at each of the individual outlet ports on Pine Flat Dam. Water temperature at each outlet is available on a real-time basis for use in evaluating water temperature released from the reservoir into the lower Kings River.



**Figure 3-1. April 2006 vertical reservoir temperature and dissolved oxygen profile measurements at Pine Flat Reservoir.**

### 3.1.2 River

Water temperature within the lower Kings River is routinely monitored at a variety of locations from Pine Flat Dam downstream to Highway 180. Permanent monitoring locations within the lower river are shown in Figure 3-2. Water temperature is recorded throughout the year at each location using a computerized temperature sensor and data recording system (Onset temperature recorders), which is routinely calibrated to laboratory standards and is accurate within  $\pm 0.5^{\circ}\text{C}$ .

Results of water temperature monitoring within the lower Kings River are shown, for example, at the Army Corp of Engineers Bridge (ACOE Bridge) (Figure 3-3) and Fresno Weir (Figure 3-4) for May 2005-May 2006. Results of water temperature monitoring at other locations (Avocado Side and Gould Weir Channel) within the river are included in Appendix D. Please note that the Avocado Side Channel is no longer in service, so this annual technical report will be the last showing this graph.

Results of temperature monitoring within the river have shown a general seasonal pattern with lowest temperatures occurring during the winter and early spring, increasing during the spring and summer months, with the greatest increase in seasonal temperatures occurring during the late summer and early fall after completion of the irrigation season. Results of temperature monitoring have also shown a general gradient of temperatures with the coldest temperatures occurring typically near Pine Flat Dam and increasing as a function of distance downstream within the lower river during summer months. In addition, results of temperature monitoring have shown that the diel temperature variation (e.g., difference between the maximum and minimum daily temperature) is typically lowest immediately downstream of Pine Flat Dam with diel temperature variation increasing as a function of distance downstream within the lower river.

A substantial body of information exists on the habitat suitability and response of trout to water temperatures. A variety of factors influence habitat suitability including, but not limited to, the average and daily maximum temperature, the duration of exposure to elevated temperature, diel temperature variation, prey availability, fish condition and stress, availability of microhabitat temperature refugia, and other factors. As a result of these interacting factors specific water temperature criteria have not been identified for use in evaluating habitat conditions but rather, general guidelines have been established to assess habitat conditions within the lower river. Information from the scientific literature was used by the TSC to assess conditions within the river during the 2005-2006 study period. As a general guideline, water temperatures within the range from approximately  $15\text{-}18^{\circ}\text{C}$  have been identified as providing optimal habitat conditions for trout (Moyle 2002). Habitat conditions for trout were identified as stressful as average daily temperatures approach or exceed approximately  $21^{\circ}\text{C}$  or maximum daily temperatures approach or exceed  $25^{\circ}\text{C}$ . As water temperature becomes elevated above the optimal range, quality and availability of habitat within the river to support coldwater species such as rainbow trout may decrease. As part of the FMP, water temperature data collected through the ongoing monitoring program are continuing to be analyzed and evaluated, in addition to the evaluation of alternative management strategies, after completion of the irrigation season, and prior to seasonal declining

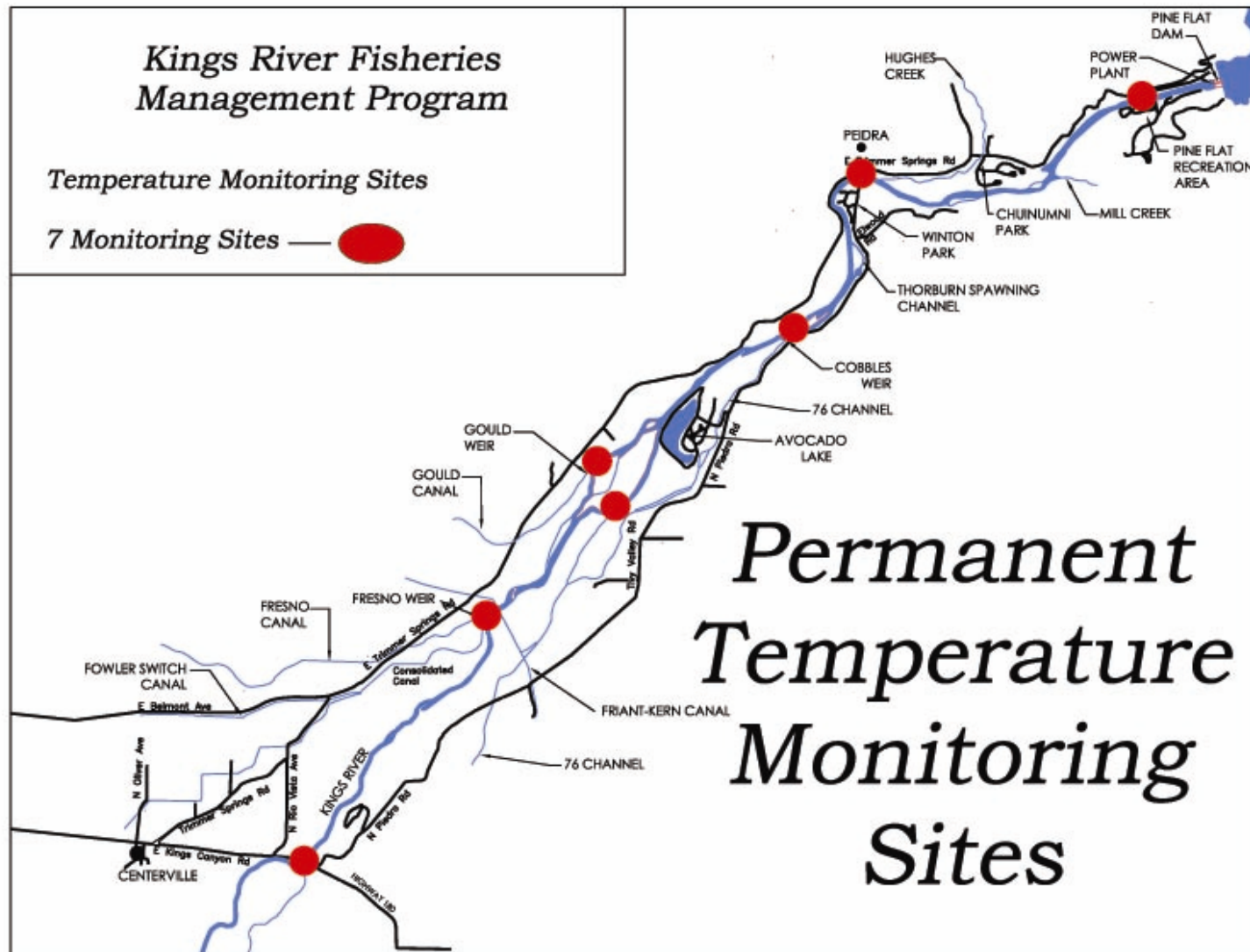
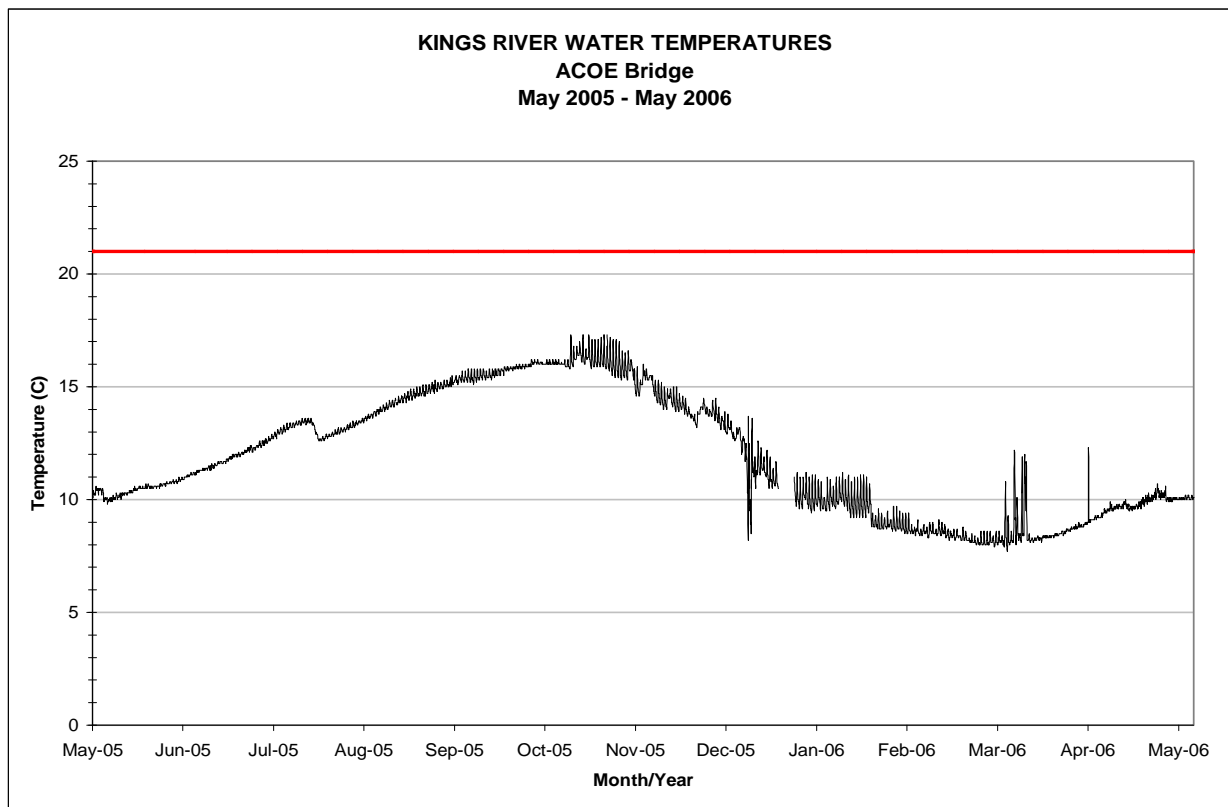
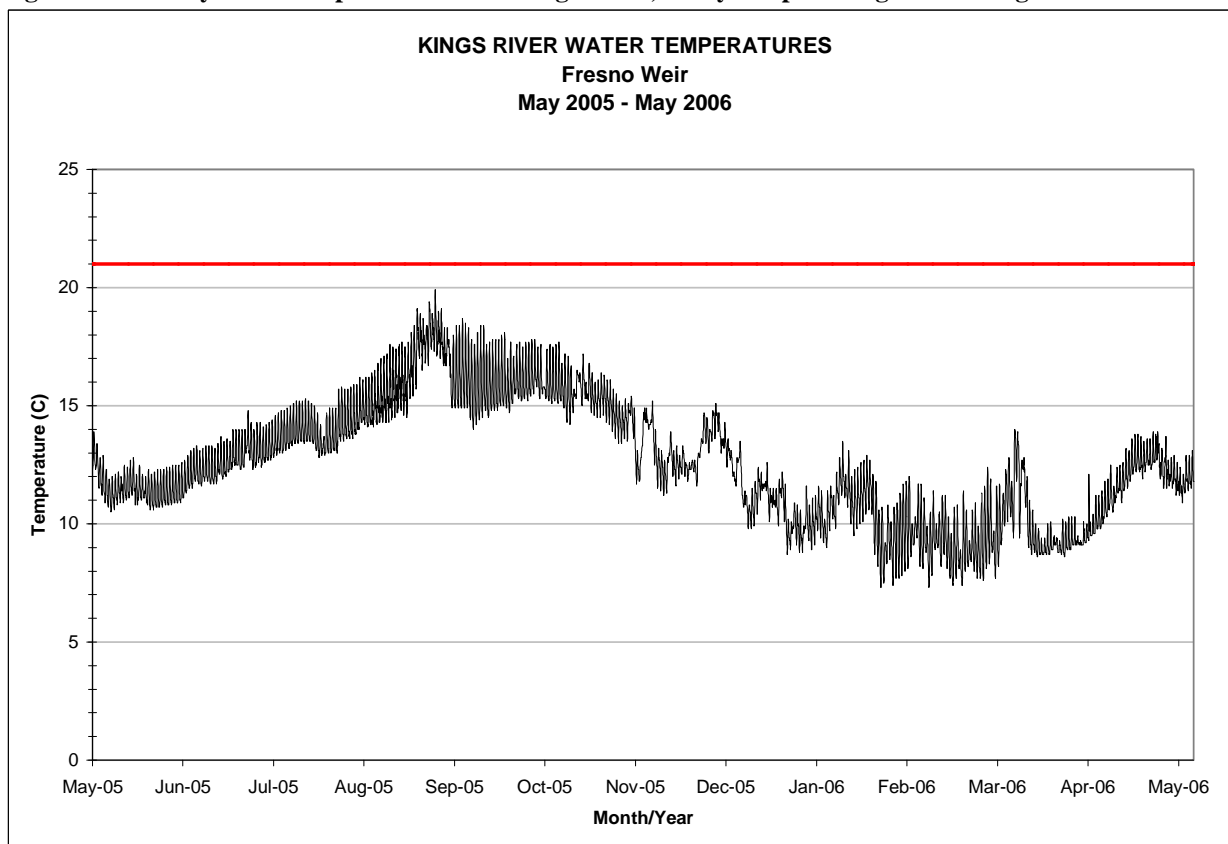


Figure 3-2. Permanent water temperature monitoring locations on the lower Kings River.



**Figure 3-3. Hourly water temperature monitoring results, Army Corps of Engineers Bridge.**



**Figure 3-4. Hourly water temperature monitoring results at Fresno Weir.**

atmospheric temperatures during the fall months (Section 3.4) to help maintain suitable conditions for trout.

Results of water temperature monitoring at the Army Corps of Engineers Bridge (Figure 3-3) showed that seasonal temperatures were generally lower than temperatures observed downstream at Fresno Weir (Figure 3-4). Water temperature throughout the reach was within the range considered to provide suitable habitat conditions for resident trout during the entire year. Water temperatures at other locations within the lower river, were also monitored (Appendix D) as part of the evaluation of habitat conditions. The TSC is continuing to investigate and evaluate water temperature conditions affecting the quality and availability of habitat within the lower river for trout during the late-summer and early-fall and the effectiveness of various management actions, including operation of the turbine bypass (Section 3.4), to provide suitable habitat conditions downstream to Fresno Weir for resident trout throughout the year.

### **3.2 DISSOLVED OXYGEN MONITORING**

Dissolved oxygen concentrations are measured both within Pine Flat Reservoir and within the lower Kings River at the Army Corp of Engineers Bridge. Results of dissolved oxygen monitoring, conducted by KRCD, are briefly summarized below.

#### **3.2.1 Reservoir**

As briefly described above, KRCD conducts monthly monitoring within Pine Flat Reservoir to evaluate vertical profiles in both water temperature and dissolved oxygen concentrations. Results of dissolved oxygen measurements have shown a seasonal pattern, which is strongly associated with reservoir stratification; in which dissolved oxygen concentrations throughout the water column within the reservoir are typically within a suitable range for fish (7 mg/L and above) during the winter and early spring months. As the reservoir becomes thermally stratified during late spring and early summer months, a vertical distribution of dissolved oxygen concentrations becomes apparent with greater dissolved oxygen levels in the upper part of the water column (warmer epilimnion waters) and decreased dissolved oxygen concentrations in the colder waters near the bottom (hypolimnion). The hypolimnion contains very low levels of oxygen. These seasonal patterns in the vertical distribution of dissolved oxygen concentrations within Pine Flat Reservoir are typical of other reservoirs located within the Central Valley, though the actual values may differ significantly. Results of dissolved oxygen monitoring within Pine Flat Reservoir during the period May 2005 through May 2006 are shown monthly in Appendix C in combination with results of vertical water temperature profile measurements. Additional information on results of dissolved oxygen monitoring conducted within Pine Flat Reservoir is on file at KRCD.

In addition to monitoring dissolved oxygen concentrations within the reservoir, KRCD also monitors dissolved oxygen concentrations in the water released from Pine Flat Reservoir into the lower Kings River. Monitoring is conducted at the reservoir outlet elevations to determine both the minimum dissolved oxygen concentrations and potential gas supersaturation resulting from releases through the hydroelectric generator outlet works.

### 3.2.2 River

KRCD routinely monitors dissolved oxygen concentrations within the lower Kings River at the Army Corp of Engineers Bridge, which is located 0.6 miles downstream of Pine Flat Dam. Dissolved oxygen concentrations are measured on a continuous basis using a Hydrolab dissolved oxygen meter routinely (approximately monthly) calibrated to laboratory standards with an accuracy of  $\pm 0.5$  mg/L (Figure 3-5). As a condition of the Federal Energy Regulatory Commission (FERC) license, KRCD is required to maintain a minimum dissolved oxygen concentration at the ACOE Bridge of 7.0 mg/L for the protection of fish and other aquatic organisms inhabiting the lower Kings River when the power plant is operating. Information on dissolved oxygen measurements within the lower Kings River is on file at KRCD. Results of these measurements have shown that dissolved oxygen concentrations within the lower Kings River are within the range considered to be suitable for various fish and macroinvertebrate species that occur in this section of the river.



**Figure 3-5. Dissolved oxygen monitoring station on the ACOE Bridge.**

### 3.3 COMPLIANCE WITH DISSOLVED OXYGEN REQUIREMENTS

Minimum dissolved oxygen concentrations specified by the FERC license are 7.0 mg/L when the power plant is operating. During 2005-2006, KRCD met its operating and monitoring requirements, and conditions were suitable for fish throughout the period when the power plant was in operation. Results of the monitoring are presented in KRCD's report "Dissolved Oxygen Monitoring, Final Report for Calendar Year 2005" (KRCD 2006) which is on file at KRCD.

### 3.4 PLANNING FOR WARM WATER TEMPERATURE EVENT

One of the fundamental goals and objectives, as outlined in the Framework Agreement, is the maintenance of suitable instream habitat conditions for trout throughout the year downstream to Fresno Weir. Water temperature in the lower Kings River during the early fall, after completion of irrigation demand releases, may become elevated to a level where habitat conditions are stressful and/or unsuitable for trout. Having real-time temperature data available allows for informed decisions by managers to perform operations, as needed, for temperature maintenance of water downstream of Pine Flat Dam in an effort to maintain suitable water temperatures for coldwater species such as rainbow and brown trout. Several management strategies have been identified for addressing temperature maintenance issues including: 1) operation of the turbine bypass to maintain downstream temperatures within an acceptable range; 2) selective releases from the dam's three levels of gates, 3) short-term (pulsed) water releases from Pine Flat Reservoir, and 4) rescheduling of water deliveries to KRWA member units. These alternative operational strategies will continue to be developed by the TSC to maintain suitable water temperature conditions during the late-summer and fall months.

Temperatures at the ACOE Bridge and Fresno Weir were consistently within the range considered to provide suitable habitat for trout (average daily temperatures less than 21°C). Water temperatures within the lower river were maintained within the range considered to be suitable for trout throughout the late-summer and fall of 2005. Temperature management during this period was achieved, in part, by modifying operations of Pine Flat Dam and the turbine bypass to allow release of cold water to the lower river through the low-level sluice gates when needed. Reservoir releases for the FMP during this period were coordinated between KRCD, KRWA and ACOE using results of real-time water temperature monitoring at Fresno Weir and other locations to manage reservoir releases to maintain suitable habitat conditions for trout. Operation of the turbine bypass, which became available for water temperature management in 2003, provided greater flexibility in managing water temperature releases from the dam to maintain suitable fish habitat in the lower river.

### **3.5 SUMMARY AND DISCUSSION**

A great deal of progress has been made with real-time temperature monitoring and the ability to regulate and manage water temperature in the lower river during critical periods. Valuable tools for managing water temperature in the lower river to protect fish habitat include cooperation from the ACOE in allowing the use of the lower sluice gates to release cold water during critical periods, and improved flexibility in managing water temperatures by using the turbine bypass.

Results of water quality monitoring within Pine Flat Reservoir and the lower Kings River during 2005-2006 have shown:

- Pine Flat Reservoir becomes stratified during late spring, summer, and fall showing a characteristic pattern of warmer water near the surface (epilimnion) and colder water with reduced dissolved oxygen concentrations near the bottom of the reservoir (hypolimnion). The reservoir destratifies in the late-fall and winter due to water temperature becoming uniform throughout the water column;
- The temperature of water released from the reservoir into the lower river can be regulated and managed, to some extent, through selective operation of different outlet works, including the turbine bypass, which initiated operations during 2003. However, the ability to manage water temperatures is limited and constrained by the availability of cold water and release points during various seasonal periods within the reservoir, hydroelectric generation, requirements for irrigation releases, and other factors;
- Aeration and mixing of water released from the reservoir have proven to be effective in maintaining suitable dissolved oxygen concentrations within the lower river during periods when the power plant was in operation. Mean monthly dissolved oxygen concentrations, as measured at the ACOE Bridge, during 2005-2006 exceeded 7.0 mg/L. With the exception of early September through mid November, dissolved oxygen levels measured during 2005-2006 were within the range considered to provide suitable habitat conditions for trout, and other fish species and macroinvertebrates inhabiting the lower Kings River. Dissolved oxygen levels measured during the fall period mentioned were within a range considered to be stressful, but not lethal, to trout;



- Water temperatures within the lower river showed a seasonal pattern with the coldest temperatures occurring during the late winter and temperatures generally increasing during the summer and early fall;
- Water temperature showed a characteristic longitudinal gradient downstream of Pine Flat Dam. During summer months the coldest temperatures were located immediately downstream of the dam and temperatures generally increased with distance downstream from the dam. During the fall and winter, when atmospheric temperatures are cool, a reverse temperature gradient was observed with temperatures decreasing as a function of distance downstream from Pine Flat Dam;
- Results of temperature monitoring, and results from the fishery monitoring program, provided no evidence that either dissolved oxygen concentrations or water temperature conditions within the lower river resulted in mortality to trout or other fish species during 2005-2006;
- Results of the 2005-2006 water temperature and dissolved oxygen monitoring are being used by the TSC to refine water quality monitoring as part of the FMP and as a basis for evaluating alternative operational strategies, including operations of the turbine bypass, to address water quality issues affecting habitat conditions for trout in the future;
- The TSC developed a water quality monitoring program to characterize the chemical and physical parameters at Mill Creek near the confluence with the lower Kings River, and at Fresno Weir. A technical report documenting results of the 2004-2005 water quality monitoring program was completed during the 2005-2006 program year. This report is currently available at the KRCD offices, or on the Fisheries Management Program website, currently hosted by KRCD at <http://www.krcd.org>. Future monitoring efforts will focus on the recommendations of this report.

## 4.0 HABITAT ENHANCEMENT

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A fundamental goal and objective of the FMP is to enhance the quality and availability of habitat for a variety of fish and macroinvertebrates within Pine Flat Reservoir and the lower Kings River. As part of the 2005-2006 FMP a variety of habitat enhancement projects were planned and/or implemented to benefit various life stages of trout, other fish species, and macroinvertebrates in the lower Kings River. A brief description of the habitat enhancement projects planned and/or implemented as part of the FMP during 2005-2006 is summarized below.

### 4.1 RIVER

Section 1(f) of the Framework Agreement – Funding / Projects discusses fish habitat improvements to enhance fish and wildlife resources in the lower Kings River. Habitat enhancement projects included the purchase and stockpiling of spawning gravel, the purchase and stockpiling of boulders, and the approval and implementation of a Fishery Habitat Master Plan (June 2004).

#### 4.1.1 Project Permitting

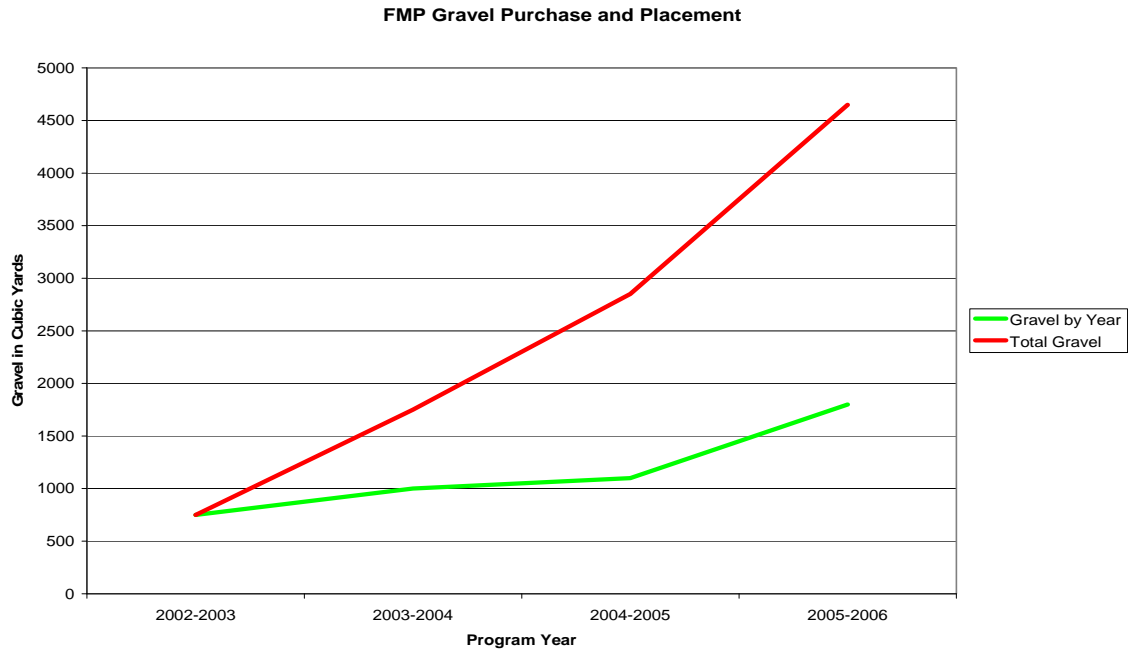
Permits from various state and federal agencies are required to perform work in a stream or river channel. These permits are meant to fully disclose the details of the work, identify any negative environmental impacts that might occur, and identify how these impacts will be avoided or mitigated. The FMP obtained riverwide and multi-year permits for future fish habitat enhancement projects as part of the Fishery Habitat Master Plan. Permits were obtained from the U. S. Army Corps of Engineers, Regional Water Quality Control Board, California Department of Fish and Game, and State Reclamation Board. The activities were conducted under Element C-2004-10: Riverwide Permit for Fish Habitat Projects of the 5-Year Implementation Plan.

#### 4.1.2 Gravel Placement

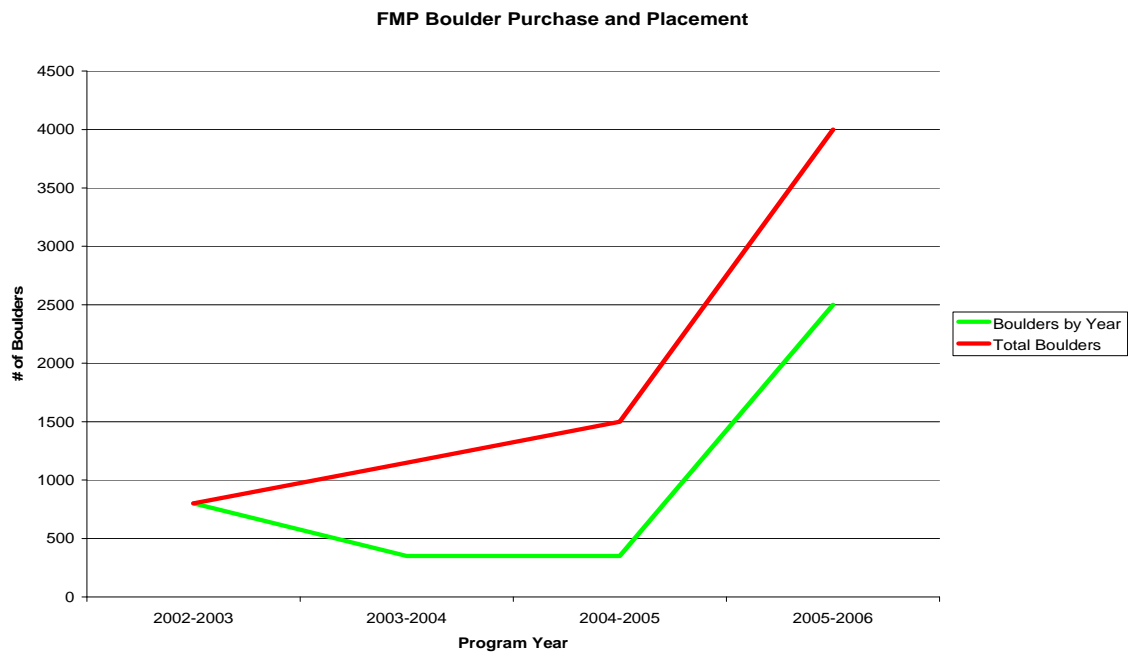
In the fall and winter of 2005-2006, approximately 1,800 cubic yards of gravel was placed in the river at sites near Avocado Lake and near the Pine Flat Recreation Area as part of the Fishery Habitat Master Plan. Additional gravel stockpiling and placement will continue in future years following the Fishery Habitat Master Plan. To date, over 4,500 cubic yards of gravel has been purchased and placed in the river under the FMP (Figure 4-1). The activities were conducted under Element C-2004-1: Fishery Habitat Master Plan of the 5-Year Implementation Plan.

#### 4.1.3 Boulder Acquisition and Stockpiling

In the fall and winter of 2005-2006, approximately 2,500 boulders were purchased and placed in the Kings River at two sites near Avocado Lake County Park, and near the Pine Flat Recreation Area for habitat enhancement as approved in the Fishery Habitat Master Plan (Figure 4-3). Additional boulder stockpiling and placement will continue in future years following the Fishery Habitat Master Plan. To date, over 4,000 boulders have been purchased and placed in the river under the FMP (Figure 4-2). The activities were conducted under Element C-2004-1: Fishery Habitat Master Plan of the 5-Year Implementation Plan.



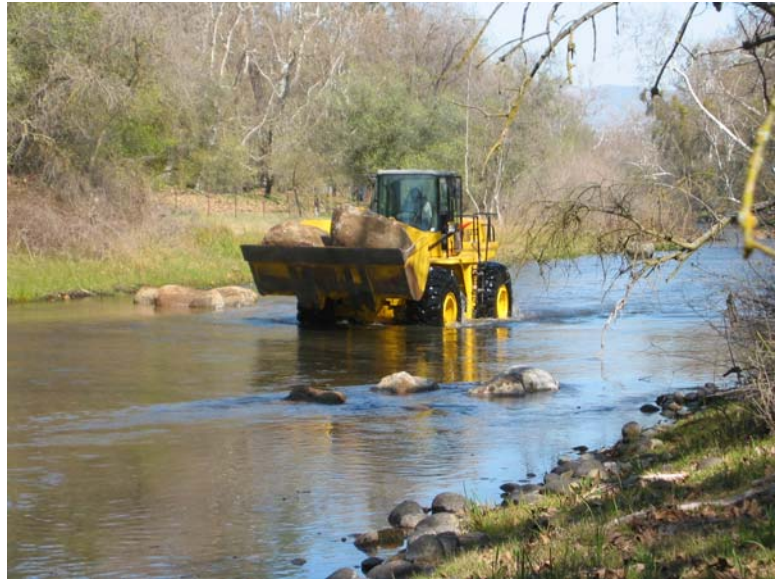
**Figure 4-1. FMP Gravel Purchase and Placement to date.**



**Figure 4-2. FMP Boulder Purchase and Placement to date**

#### **4.1.4 Placement of Half Logs in the Thorburn Channel**

Several dozen small logs were secured with cables to existing habitat piles in the Thorburn Spawning Channel in the Spring of 2006. The logs were strategically secured to provide cover where it was limited in the channel (Figure 4-4). The logs included both Eucalyptus and Cottonwood trees. Staff from all three agencies assisted in a group effort to plan, implement, and supervise the project. The activities were conducted under Element C-2004-11: Placement of Half Logs in the Thorburn Channel of the 5-Year Implementation Plan.



**Figure 4-3. Placing boulders near Avocado Lake County Park**

#### **4.1.5 Lower Kings River Habitat Conservation Framework**

During the program year, little activity occurred on this element. Other groups such as the Kings River Conservancy, Sierra Foothill Conservancy, and Trust for Public Lands are planning



**Figure 4-4. Logs providing cover in Thorburn Spawning Channel**

conservation projects on the Kings River. The FMP and participating agencies are engaged and cooperating with those efforts. The activities were conducted under Element N-2004-5: Lower Kings River Habitat Conservation Framework of the 5-Year Implementation Plan.

#### **4.1.6 Development of a Fisheries and Habitat Improvement Plan**

The TSC has developed a Habitat Enhancement Master Plan as part of the FMP. The Master Plan provides guidance and direction for future habitat enhancement efforts

(e.g., gravel and boulder projects) and serves as the basis for purchasing and stockpiling gravel and boulders to be placed in the river at strategic locations throughout the coming years. The activities were conducted under Element N-2004-6: Development of a Fisheries and Habitat Improvement Plan of the 5-Year Implementation Plan.

#### **4.1.7 Fencing to Protect Juvenile Trout Habitat Structures**

The fence between the Pine Flat Recreation area and the private property to the west was repaired in the spring of 2006. The future fence work will protect a cove and jetty project and a riparian enhancement project. The fence work and riparian project will be implemented as part of the Fishery Habitat Master Plan. The activities were conducted under Element N-2004-7: Fencing to Protect Juvenile Trout Habitat Structures of the 5-Year Implementation Plan.

#### **4.1.8 Development of Exhibit D Flows**

During the 2005-2006 program year, the first enhanced Exhibit D releases in the history of the program were provided for by KRWA member units. These enhanced flows were triggered by a 149% Water Year (approximately 2,531,000 acre feet) in 2004-2005, and were voluntarily provided by the KRWA member units in accordance with the levels representing a wet hydrologic year of the Exhibit D flow schedule (250 cfs at Fresno Weir, for water year exceeding 2,100,000 acre feet) in 2005-2006.

Additionally, KRWA's Exhibit D subcommittee continued to meet throughout the year and worked to develop the internal mechanisms to achieve higher fall and winter flows in the lower Kings River for future triggering years. Tentative internal agreements have been developed to continue to provide enhanced flows in the fall and winter, and another big water year in 2005-2006 (173%, or approximately 2,952,000 acre feet) will likely result in another voluntarily contribution of the KRWA member units in accordance with the levels representing a wet hydrologic year of the Exhibit D flow schedule (250 cfs at Fresno Weir, for water year exceeding 2,100,000 acre feet) during the 2006-2007 program year.

The activities were conducted under Element N-2004-1: Development of Exhibit D Flows of the 5-Year Implementation Plan.

#### **4.2 PINE FLAT RESERVOIR**

Due to staffing difficulties, and relatively high reservoir levels throughout the year, there was no major fish habitat improvement work completed during the 2005-2006 program year at Pine Flat Reservoir. Work is scheduled to continue for the 2006-2007 program year.

### **4.3 SUMMARY AND DISCUSSION**

The FMP continued habitat enhancement efforts on the lower Kings River by the following actions:

- Placed approximately 1,800 cubic yards of spawning gravel and approximately 2,500 large (3 to 6 feet in diameter) boulders in the Kings River for habitat improvement. Additional material (boulders and gravel) stockpiling and placement will continue in future years following the Fishery Habitat Master Plan.;
- Secured several dozen logs to existing structures in the Thorburn Spawning Channel to improve overhead cover for trout;
- Repaired a fence between the Pine Flat Recreation Area and private property to the west to protect Juvenile Trout Habitat Structures;
- The first enhanced Exhibit D releases in the history of the program were provided for by KRWA member units in accordance with the levels representing a wet hydrologic year of the Exhibit D flow schedule (250 cfs at Fresno Weir, for water year exceeding 2,100,000 acre feet);
- KRWA's Exhibit D subcommittee continued to meet throughout the year and worked to develop the internal mechanisms to achieve higher fall and winter flows in the lower Kings River for future triggering years; and
- Due to staffing difficulties, and relatively high reservoir levels throughout the year, there was no major fish habitat improvement work completed during the 2005-2006 program year at Pine Flat Reservoir. Work is scheduled to continue for the 2006-2007 program year.

## 5.0 FISH STOCKING

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The stocking of fish in State waters is the responsibility of the California Department of Fish and Game. During the 2005-2006 reporting period, the allotted numbers of catchable and sub-catchable size rainbow trout were stocked in the Kings River between Pine Flat Dam and Fresno Weir. In addition, trout eggs were supplied to the program by the CDFG for incubation and hatching in the lower river. Catchable size rainbow trout were also planted in Pine Flat Reservoir and Avocado Lake. A brief description of the fish stocking activities is presented below.

### 5.1 RIVER

#### 5.1.1 Whitlock-Vibert Boxes

Section G(1)(j) of the Framework Agreement “Stocking Program” discusses trout stocking in the lower Kings River. Trout egg planting is conducted to increase trout numbers by augmenting the naturally spawned population of rainbow trout. Planting of trout eggs is a fast, efficient, and inexpensive way to increase recruitment of juvenile fish in the river.

Whitlock Vibert Boxes (WVB) were used once during this reporting period to hatch eyed rainbow trout eggs, inside the streamside incubators.

#### 5.1.2 Streamside Incubators

The streamside incubators consisted initially of refrigerators that had been modified to hatch trout eggs. Beginning in 2003, permanent streamside incubators were constructed to replace the refrigerators. The incubators consist of a concrete vault that contains a tank constructed of plywood and fiberglass. A 0.75 horse power pump supplies water from the river that flows through the tank, over the charged WVBs, and back into the river (Figure 5-1).

The upper streamside incubator is located downstream of Pine Flat Recreation Area and was used during March 2006 when approximately 100,000 eyed Eagle Lake (hatchery strain) rainbow trout eggs were loaded into the tank. This strain of fish was artificially selected to spawn approximately two months earlier than the wild run fish. The egg hatching rate seemed lower than in previous attempts. The incubator was turned off before all the fry swam out, and pump removed due to an impending flood release. The fry were distributed to the adjacent section of river.

The lower incubator is located at the lower end of the Thorburn Spawning and Rearing Channel adjacent to the river. This incubator was used last during December 2004 and April 2005. The intake was damaged during the 2005 irrigation season, but received the necessary repairs in November 2006.





**Figure 5-1. Streamside incubator with thousands of rainbow trout fry**

### **5.1.3 Rainbow Trout Stocking**

Trout stocking is the responsibility of the CDFG and occurs at no cost to the FMP.

#### **5.1.3.1 Sub-Catchable Size Rainbow Trout**

On October 19<sup>th</sup> and 21<sup>st</sup>, 2005, 2,500 pounds (25,000 trout) of sub-catchable rainbow trout (4-6 inches in length) were stocked in the lower Kings River as part of the put-and-grow program. In previous years, fish were marked by removing the adipose fin. This allowed the fish to

be distinguished between wild trout (fish hatched in the river) if caught during subsequent sampling. Increased minimum flows resulting from Schedule D was going to prevent sampling with electrofishers, so the subcatchables were not marked in 2005. The strain of trout utilized were the offspring of Eagle Lake rainbow trout from Eagle Lake in northern California. Eggs are taken from female Eagle Lake trout as they ascend a tributary creek to spawn. They were fertilized by males also collected during the spawning run, and the eggs held in the hatchery for later distribution. San Joaquin Hatchery personnel stocked the small trout at Winton and Choinumni Parks. These fish were provided by the CDFG at no cost to the FMP.

#### **5.1.3.2 Fingerling Rainbow Trout**

On 10/12/2005 the San Joaquin Hatchery planted 15,022 Rainbow trout fingerlings (203 pounds) in the lower river. There currently is no annual allotment for RT fingerlings on the Kings River. These fish were in excess of the production needs of the hatchery and the Kings was selected as a suitable destination.

#### **5.1.3.3 Catchable-Sized Rainbow Trout**

The current annual allotment for the Kings River below Pine Flat is 18,000 pounds of catchable trout. However, a total of 29,332 pounds of catchable sized trout (34,078 fish) were stocked in the lower Kings River during this reporting period. This increase (63%) over the proposed allotment was due to the “Trophy Trout” program implemented on the Kings River. Normally, catchable trout (2 fish per pound) are stocked either once or twice per week during the non-irrigation period (roughly October through March) and once each week during the irrigation season when flows are high. Beginning December 2005, large trout were planted in the put-and-take section as well as the catch-and-release section. The trout in the program averaged 4.1 pounds each overall (load averages ranged 3.5 to 5 pounds each trout) during the December



through March (Figure 5-2). During this period, 3,021 trout (12,457 pounds) were planted as part of the program to increase licenses sales and get anglers to return to the Kings River. This created a huge response from anglers, throughout the Valley and State. The program also generated positive press releases and magazine articles as a result. The program will continue a minimum of two more years for evaluation. The full Kings River Planting Records from the San Joaquin Hatchery are available in Appendix E.



**Figure 5-2. Trout averaging 4.1 pounds each were stocked by CDFG from December through March. The program will continue a minimum of two more years for evaluation.**

#### **5.1.4 Trout Relocation to the Lower Kings River**

In 2004-2005, an element to relocate wild rainbow trout from the upper Kings River watershed to the lower Kings River was developed. Some preliminary planning and discussions were conducted for this element. This element may be implemented in the future. The activities were conducted under Element N-2004-8: Trout Relocation to the Lower Kings River of the 5-Year Implementation Plan. However, no work occurred during 2005-2006 reporting period.

## **5.2 RESERVOIR**

### **5.2.1 Kokanee Salmon**

No Kokanee salmon were planted in Pine Flat Reservoir during this reporting period.

### **5.2.2 Fingerling Rainbow Trout**

The CDFG San Joaquin hatchery personnel stocked fingerling rainbow trout twice during the reporting period in Pine Flat Reservoir. The first plant was 234,428 trout weighing a total of 148 pounds and occurred on 6/15/2005. The second fingerling plant was 84,135 trout weighing a total of 355 pounds on 4/5/2006.

### **5.2.3 Sub-Catchable Sized Rainbow Trout**

No sub-catchable trout were planted in Pine Flat Reservoir during the reporting period.

### **5.2.4 Catchable-Sized Rainbow Trout**

The current annual allotment for Pine Flat Reservoir is 22,000 pounds for the calendar year. Between 11/3/2005 and 3/1/2006, 22,000 pounds (44,500 trout) were planted in Pine Flat Reservoir. The 2004-2005 annual report stated 40,050 pounds (68,030 trout) of catchable sized

rainbow trout were planted in Pine Flat Reservoir. It needs to be noted the higher number of trout reported that year was due the difference between reporting periods, and not that DFG has lowered the annual allotment. An early summer plant during 2005 increased the amount reported in the annual report. The catchable trout averaged around ½ pound each (2 fish/pound) at the time they were stocked in the reservoir (load averages ranged 1.5 to 2.2 fish/pound).

#### **5.2.5 Chinook Salmon**

The most recent planting of Chinook salmon fingerling was 5/2/2006, which was 55,000 fingerlings weighing 714 pounds. These fish were not included in the last annual technical report.

#### **5.2.6. Avocado Lake**

Avocado Lake is a Fresno County Park located adjacent to the lower Kings River. The lake site served as a source of rock and gravel for the construction of Pine Flat Dam. The lake is a popular recreational site and supports thousands of angler hours each year. The annual allotment delivered during the winter months is 6,000 pounds. In 2005-2006 reporting period, the San Joaquin Hatchery planted 6,400 hundred pounds (11,950 trout) of catchable size rainbow trout in Avocado Lake.

### **5.3 SUMMARY AND DISCUSSION**

- Whitlock Vibert Boxes (WVB) were used once during this reporting period to hatch eyed rainbow trout eggs, inside the streamside incubators;
- The upper streamside incubator located downstream of Pine Flat Recreation Area was used during March 2006 when approximately 100,000 eyed Eagle Lake (hatchery strain) rainbow trout eggs were loaded into the tank. The incubator was turned off before all the fry swam out, and pump removed due to an impending flood release. The fry were distributed to the adjacent section of river;
- The lower incubator located in the main Kings River Channel, near the lower end of the Thorburn Spawning and Rearing Channel, was used last during December 2004 and April 2005. The intake was damaged during the 2005 irrigation season, but received the necessary repairs in November 2006;
- On October 19<sup>th</sup> and 21<sup>st</sup>, 2005, 2,500 pounds (25,000 trout) of sub-catchable rainbow trout (4-6 inches in length) were stocked in the lower Kings River as part of the put-and-grow program. Increased minimum flows resulting from Schedule D was going to prevent sampling with electrofishers, so the subcatchables were not marked in 2005. The strain of trout utilized were the offspring of Eagle Lake rainbow trout from Eagle Lake in northern California. Eggs are taken from female Eagle Lake trout as they ascend a tributary creek to spawn. They were fertilized by males also collected during the spawning run, and the eggs held in the hatchery for later distribution. San Joaquin Hatchery personnel stocked the small trout at Winton and Choinumni Parks;
- On October 12<sup>th</sup>, 2005 the San Joaquin Hatchery planted 15,022 Rainbow trout

fingerlings (203 pounds) in the lower river. There currently is no annual allotment for RT fingerlings on the Kings River. These fish were in excess of the production needs of the hatchery and the Kings was selected as a suitable destination;

- A total of 29,332 pounds of catchable sized trout (34,078 fish) were stocked in the lower Kings River during this reporting period. This increase (63%) over the proposed allotment was due to the “Trophy Trout” program implemented on the Kings River. Beginning December 2005, large trout were planted in the put-and-take section as well as the catch-and-release section. The trout in the program averaged 4.1 pounds each overall (load averages ranged 3.5 to 5 pounds each trout) during the December through March. The program will continue a minimum of two more years for evaluation;
- No sub-catchable trout were planted in Pine Flat Reservoir during the reporting period;
- Between November 3<sup>rd</sup>, 2005 and March 1<sup>st</sup>, 2006, 22,000 pounds (44,500 trout) of catchable sized rainbow trout, averaging approximately ½ pound each were planted in Pine Flat Reservoir;
- The most recent planting of Chinook salmon fingerling was 5/2/2006, which was 55,000 fingerlings weighing 714 pounds. No Kokanee salmon were stocked in Pine Flat Reservoir during 2005-2006; and
- In 2005-2006 reporting period, the San Joaquin Hatchery planted 6,400 hundred pounds (11,950 trout) of catchable size rainbow trout in Avocado Lake.

## 6.0 MONITORING

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Section G (1)(k) of the Framework Agreement “Development of Criteria/Monitoring” calls for the agencies to carry out a monitoring program to determine the effects of various elements of the FMP and the overall status of the fishery. One objective of the FMP is to establish a comprehensive monitoring program that is to provide the agencies and the public with a gauge with which to evaluate the status of the fishery and the relative merits of any particular project.

### 6.1 RIVER

#### 6.1.1 Annual Fish Population Surveys

Long-term annual baseline trout fisheries monitoring within the lower Kings River is being conducted as part of the FMP to determine (1) juvenile trout abundance and distribution; (2) adult trout abundance and distribution; (3) reproductive success, growth, and survival; (4) over-wintering survival, size and age structure of the population; and (5) assess the abundance and condition of the fish community inhabiting the lower Kings River.

During the 2005-2006 program year, electrofishing surveys were not conducted. Electrofishing surveys were scheduled for November 2006. Those results will be made available in the 2006-2007 Annual Technical Report.

While there were no electrofishing surveys conducted during 2005-2006, a very thorough technical document summarizing the results of previous electrofishing studies (1983-2005) on the Kings River. This paper, titled “Analysis of the Condition of Rainbow Trout Collected from the Kings River Downstream of Pine Flat Dam 1983-2005,” found that based on the results of electrofishing surveys, Rainbow Trout in the Kings River are healthy and in good condition. This paper was published in October of 2005, and was approved by the ExCom for release to the public. The paper is available on the KRCD website at <http://www.krcd.org>.

#### 6.1.2 Macroinvertebrates Study

In February 2006 KRCD staff collected insect samples from six sites on the lower Kings River. Samples were collected according to CDFG’s California Stream Bioassessment Procedure modified for low gradient channels. Additional instructions for bifurcated channels and channels immediately below impoundments were followed. The results of the laboratory analysis were not available for publication in the 2005-2006 Annual Technical Report. Additional samples will be collected in November of 2006 from the same locations.

#### 6.1.3 Fish Tracking Study

The fish tracking element of the 2005-2006 5-Year Implementation Plan began in the fall of 2005. 80 radio transmitters were implanted into study fish which were subsequently released into the lower Kings River for study. To date, more than 3 million data points have been collected.

Experimentation with other tracking methods such as aerial tracking and float tracking took place. The California Department of Fish & Game (CDFG) provided a fixed wing aircraft for monitoring a large section of the watershed in a relatively short period of time. CDFG also

supplied 2 inflatable pontoon boats in an effort to cover the entire study area in one day. Float tracking proved to be a highly efficient method of tracking study fish. The activities were conducted under Element C-2004-5: Monitoring of the 5-Year Implementation Plan.

#### **6.1.6 Electroshocking Survey (Raft)**

While funds were budgeted for this element, no activity occurred and funds will be carried over to the next program year. Raft testing and repairs are planned in the future. Funds were budgeted under Element C-2004-5: Monitoring of the 5-Year Implementation Plan.

#### **6.1.7 Water Quality Sampling (River)**

The final draft of the Kings River Fisheries Management Program Water Quality Monitoring Report for the 2004-2005 program year was prepared, presented and approved by the Executive Policy Committee during the 2005-2006 Program Year. The first year of sampling was conducted at five sites along the river. Sampling included monthly measurements for general parameters such as temperature, pH, conductivity, turbidity, alkalinity, and hardness. Laboratory analysis for metals, pesticides, nitrate, and minerals were conducted in July, November, and December of 2004 and January and February of 2005. Results of the sampling show good water quality conditions for trout and other fishes. Water quality monitoring will continue in the future according to the Water Quality Monitoring Report referenced above. This report is available at the KRCD offices, or on the Fisheries Management Program's website, currently hosted by KRCD at <http://www.krcd.org>. The activities were conducted under Element C-2004-5: Monitoring of the 5-Year Implementation Plan.

#### **6.1.8 Real-Time Monitoring**

While funds were budgeted for this element, no activity occurred and funds will be carried over to the next program year. No special monitoring events occurred that required the use of the funds. The funds were budgeted under Element C-2004-5: Monitoring of the 5-Year Implementation Plan.

#### **6.1.9 Algal Monitoring**

While funds were budgeted for this element, no activity occurred and funds will be carried over to the next program year. No observations of dead or dying algae were reported. The funds were budgeted under Element C-2004-5: Monitoring of the 5-Year Implementation Plan.

#### **6.1.10 Fish Tag Purchase**

Two purchases were made during the program year to get the pilot telemetry study off the ground. The initial purchase in the summer of 2005 consisting of 4 radio receivers and peripherals, 40 small transmitters, 40 large transmitters, 20 small dummy tags, and 20 large dummy tags, totaled \$53,648.00. An additional purchase of 50 large transmitters and 50 small transmitters was made in the spring of 2006 totaling \$22,150.00. The total expenditure for telemetry tracking materials was \$75,798.00. The funds were budgeted under Element C-2004-5: Monitoring of the 5-Year Implementation Plan.

#### **6.1.11 Annual Technical Report**

The third Annual Technical Report was published and distributed by the FMP in February 2006. The report covered activities for program year 2004-2005 and its 5-Year Implementation Plan.

The report was reviewed and approved by the PAG and ExCom. The activities were conducted under Element C-2004-5: Monitoring of the 5-Year Implementation Plan.

## 6.2 RESERVOIR

### 6.2.1 Bass Tournament Results

The results of organized angling events are a cost effective means of monitoring the overall condition of the warmwater fishery (see 2002-2003 Annual Technical Report for details and references). The CDFG summarizes results of tournament records on an annual basis. The available information up through December 2006 is summarized in Table 6-3.

For 2006, data is available for 23 permitted bass tournaments with at Pine Flat Reservoir. The number of participants was 658 and the average size of bass returned for Weigh-In was 1.71 pounds. A summary of statistics for Bass Tournament Results is available in Appendix F.

**Table 6-1. Summary of results of organized bass angling tournaments held at Pine Flat Reservoir.**

<b>Year</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>
No. Tournaments	31	16	25	29	33	32	23
No. Anglers	862	367	702	820	890	841	658
Total Hrs. Fished	7,012	3,454	6,428	,7067	7,807	7,304	5,279
Total No. Bass	1,495	811	1,680	2096	2136	1,634	1,505
Total Weight (lbs.)	1,750	1,245	3,108	3,593.5	3,289.1	2,385	2,570
Hrs fished/angler	8.13	9.41	9.16	8.62	8.77	8.68	8.02
Avg. per bass (lbs)	1.17	1.54	1.85	1.71	1.54	1.46	1.71
Catch/Hr.	0.213	0.235	0.261	0.297	0.274	0.224	0.285

### 6.2.2 Pine Flat Reservoir Fish Population

No electrofishing, gill netting, or sub-sampling of bass tournaments occurred during this reporting period.

## 6.3 SUMMARY AND DISCUSSION

As part of the FMP habitat and fishery monitoring has been conducted within the lower river and Pine Flat Reservoir. Results of the 2005-2006 monitoring program have shown:

- There were no electrofishing surveys conducted during 2005-2006. However, a very thorough technical document summarizing the results of previous electrofishing studies (1983-2005) on the Kings River was prepared. This paper, titled “Analysis of the Condition of Rainbow Trout Collected from the Kings River Downstream of Pine Flat Dam 1983-2005,” found that based on the results of electrofishing surveys, Rainbow Trout in the Kings River are healthy and in good condition. This paper was published in

October of 2005, and was approved by the ExCom for release to the public. The paper is available on the KRCD website at <http://www.krcd.org>;

- In February 2006 KRCD staff collected insect samples from six sites on the lower Kings River. The results of the laboratory analysis were not available for publication in the 2005-2006 Annual Technical Report. An additional round of samples will be collected in November of 2006 from the same locations ;
- Transmitters were implanted and 2 groups of tagged fish were released in the Kings River for study;
- The final draft of the Kings River Fisheries Management Program Water Quality Monitoring Report for the 2004-2005 program year was prepared, presented and approved by the Executive Policy Committee during the 2005-2006 Program Year. This report is available at the KRCD offices, or on the Fisheries Management Program's website, currently hosted by KRCD at <http://www.krcd.org>;
- The third annual Technical Report was completed in February 2006;
- The excessive fine sediment accumulation at the Frustration Lake site could adversely affect trout reproduction. The percentages of coarse sand, fine sediments and silt will likely increase mortality for developing trout embryos, alevins and swim-up fry. The gravels near Pine Flat Dam are relatively clean. This site has great potential for trout reproduction provided it is wet for the duration of the spawning season; and
- There were 23 permitted bass tournaments at Pine Flat Reservoir. The number of participants was 658 and the average size of bass returned for Weigh-In was 1.71 pounds.



## **7.0 PUBLIC EDUCATION AND OUTREACH**

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### **7.1 News Releases and Newsletters**

An issue of Kings River Fisheries News newsletter was published and distributed in the early summer of 2006 with the assistance of the Public Advisory Group (Appendix G). The activities were conducted under Element C-2004-4: Public Education of the 5-Year Implementation Plan.

### **7.2 Summer Hydrology and Temperature Report**

KRWA has developed a real-time telemetry system for monitoring water temperature and streamflow at Fresno Weir. During the summer and fall of 2004 information developed from monitoring being conducted on the lower Kings River was compiled in weekly reports and distributed by KRWA to members of the PAG and other interested parties to provide current information on environmental conditions occurring within the lower river that would affect habitat quality for trout. Weekly reports were distributed electronically to inform managers and other interested parties regarding conditions currently occurring within the lower river. The water temperature and flow monitoring and reporting provided a valuable tool for disseminating real-time information. The TSC has recommended that the real-time monitoring and dissemination of weekly reports, when appropriate, be continued as part of the FMP. In addition, the TSC recommends that information on current conditions occurring within the lower Kings River be developed in a format compatible with posting on an Internet based web page that would be accessible to the public. The activities were conducted under Element C-2004-5: Monitoring of the 5-Year Implementation Plan.

### **7.3 Web Page Development**

The PAG has developed and is operation a web page to inform the public, fishing groups, and government agencies about the FMP. The web page also presents angling opportunities and information related to the Kings River. This website is viewable at <http://www.kingsriverfisheries.org>. The activities were conducted under Element C-2004-4: Public Education of the 5-Year Implementation Plan.

### **7.4 Educational Tours & Clean-up: Thorburn Spawning and Rearing Channel**

During the program year, several educational tours were conducted at the Thorburn Spawning and Rearing Channel.

### **7.5 Kings River Day 2006**

This event was scheduled for May 19, 2006 but was cancelled due to flood releases that submerged the Kelly's Beach location where the event is held. Next year's event is tentatively scheduled for May 18, 2007. This annual event has become an important part of the outreach function of the PAG, and comments from students, teachers, and administrators have been very positive.



## **7.6 Public Lands Fishing Access Map**

The “Guide to Fishing the Lower Kings River.” brochure was completed and approved by the PAG and ExCom, and was published and distributed in spring 2006. A printable version of this document is available on the KRCD website at <http://www.krcd.org>. The activities were conducted under Element C-2004-8: Public Lands Fishing Access Map of the 5-Year Implementation Plan.

## 8.0 OUTSTANDING ELEMENTS

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With limited exception, efforts on elements from previous years and the 2005-2006 5-Year Implementation Plan were not conducted during the program year or are ongoing. Some elements may be carried over to the next program year. Below is a brief summary of those elements.

Constructed Deep Water Habitat Pilot Project (C-2005-12). -Implementation of this element did not occur during the program year. Funds will be carried over to the next program year.

Study of Pool Habitat in the Lower Kings River (C-2005-13). -Implementation of this element did not occur during the program year. Funds will be carried over to the next program year.

Phytoplankton and Nutrient Resource Study (N-2005-9). -Little activity occurred for this element during the program year. This is an important element that the TSC plans to research and address in the future.

## **9.0 MAINTENANCE ACTIVITIES**

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### **9.1 Thorburn Channel Maintenance**

Spraying of weeds, brushing, and tree trimming took place along the roadway and nature trail. The headgate was checked every one to two weeks and accumulated debris was removed. The k-rail was checked for beaver dam-building activities and dams were removed. Two areas damaged by the flood releases were repaired. The activities were conducted under Element M-2004-1: Thorburn Channel Maintenance of the 5-Year Implementation Plan.

### **9.2 Streamside Incubator Operation and Maintenance**

The two streamside incubators located near the Thorburn Channel and the Pine Flat Recreation Area were maintained during the year. Plumbing repairs and a new intake screens were installed to improve operation of the water pump. The activities were conducted under Element M-2004-2: Streamside Incubator Operation and Maintenance of the 5-Year Implementation Plan.

## 10.0 DEVELOPMENT OF 5-YEAR PLAN

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Section G(1) of the Framework Agreement includes elements addressing adaptive management (Section 1b); stream temperature monitoring (Section 1d); funding for habitat enhancement projects (Section 1f); enforcement, education, and awareness program (Section 1i); stocking program (Section 1j); development of criteria/monitoring (Section 1k); and access (Section 1p). The 5-Year Plan helps to provide guidance, prioritize activities and the allocation of expenditures, and coordinate among the parties to facilitate efficient implementation of these elements of the Framework Agreement.

A 5-Year Plan was developed during this reporting period (May 2005 to May 2006). This was the fifth annual modification to the 5-Year Plan since the signing of the Framework Agreement on May 28, 1999. Development of the 5-year work plan is based on a consideration of (1) specific requirements identified within the Framework Agreement; (2) results of previous fisheries and water quality monitoring; and (3) prioritization of habitat restoration activities based upon limiting factors analyses. The 5-Year Plans: (1) provide a project management structure for reviewing and prioritizing proposed habitat enhancement activities, fish stocking, and other elements of the Framework Agreement; (2) identify the objectives and methods to be used to assess the overall response of trout and other species for use in evaluating achievement of the Kings River aquatic resource goals as identified in Section 1a of the Framework Agreement; and (3) provide a framework for the experimental design and evaluation of specific enhancement activities (e.g., enhancement projects funded under the Framework Agreement, fish stocking and supplementation, pulse flows for temperature management, etc.) within the context of the overall goals and activities being implemented through the Framework Agreement. Results of monitoring and evaluation activities serve, in part, as the basis for the adaptive management element of the Framework Agreement (Section 1b) and for identifying changes in program priorities, or the allocation of resources from one program element to another. The 5-Year Plan is a “living plan” that is reviewed by the TSC, PAG and ExCom on an annual basis throughout the 10-year period of the agreement and revised as projects and elements of the program are implemented and as new scientific information becomes available.

## 11.0 REFERENCES

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# **APPENDIX A**

Summary of Daily Hydrologic Data for Pine Flat and the Kings River  
(on following pages)

Provisional data, storage in acre-feet, other data in cubic feet per second.

Date	Pine Flat Storage Acre-feet	Flow at Piedra cfs	Pre Project Piedra cfs	Measured Flows Below Fresno Weir cfs
6/1/2005	887,082	9,984	16,518	6,084
6/2/2005	895,529	9,563	16,924	5,538
6/3/2005	903,127	9,079	15,507	5,054
6/4/2005	909,358	8,653	14,279	4,628
6/5/2005	915,048	8,762	14,026	4,682
6/6/2005	918,495	8,815	12,348	4,720
6/7/2005	918,948	8,807	10,211	4,667
6/8/2005	919,174	8,834	9,240	5,768
6/9/2005	917,081	8,860	7,737	5,370
6/10/2005	916,347	8,638	8,710	4,918
6/11/2005	918,213	8,584	10,400	4,505
6/12/2005	921,609	8,581	11,493	4,622
6/13/2005	927,061	8,476	12,885	4,683
6/14/2005	936,361	7,700	14,191	4,817
6/15/2005	944,911	8,044	14,287	4,157
6/16/2005	952,061	8,021	13,163	4,187
6/17/2005	956,170	7,924	11,074	4,141
6/18/2005	958,200	7,736	9,447	4,017
6/19/2005	959,186	7,429	8,418	3,728
6/20/2005	960,115	7,398	8,633	3,708
6/21/2005	962,906	7,185	9,658	3,560
6/22/2005	967,450	7,009	10,387	3,370
6/23/2005	971,365	7,064	9,944	3,416
6/24/2005	974,644	7,164	9,504	3,508
6/25/2005	976,520	7,136	8,530	3,485
6/26/2005	976,696	7,136	7,485	3,476
6/27/2005	976,990	7,119	7,631	3,447
6/28/2005	977,635	7,037	7,940	3,353
6/29/2005	979,633	6,994	8,429	3,054
6/30/2005	981,516	7,347	8,830	3,092
7/1/2005	983,518	7,578	9,083	3,196
7/2/2005	986,113	7,668	9,367	3,264
7/3/2005	988,003	7,775	8,901	3,354
7/4/2005	987,589	7,842	7,652	3,402
7/5/2005	987,294	7,554	7,399	3,497
7/6/2005	986,821	7,532	7,303	3,744
7/7/2005	985,228	7,683	6,959	3,897
7/8/2005	983,459	7,603	6,874	3,939
7/9/2005	981,575	7,446	6,507	3,972
7/10/2005	978,635	7,405	5,780	3,931
7/11/2005	975,406	7,475	5,826	3,980
7/12/2005	972,184	7,507	5,872	4,078

Provisional data, storage in acre-feet, other data in cubic feet per second.

Date	Pine Flat Storage Acre-feet	Flow at Piedra cfs	Pre Project Piedra cfs	Measured Flows Below Fresno Weir cfs
7/13/2005	968,443	7,366	5,314	4,085
7/14/2005	964,012	7,462	4,895	4,103
7/15/2005	958,721	7,546	4,536	4,151
7/16/2005	952,928	7,562	4,305	4,144
7/17/2005	947,098	7,558	4,294	4,047
7/18/2005	940,946	7,480	3,989	3,921
7/19/2005	935,332	7,339	4,078	3,792
7/20/2005	928,598	7,471	3,616	3,893
7/21/2005	920,703	7,725	3,584	4,147
7/22/2005	913,807	7,524	3,816	3,946
7/23/2005	906,829	7,464	3,545	3,886
7/24/2005	899,268	7,536	3,308	4,008
7/25/2005	891,133	7,516	3,063	3,961
7/26/2005	882,488	7,484	2,645	3,925
7/27/2005	873,400	7,506	2,378	3,920
7/28/2005	864,201	7,393	2,310	3,910
7/29/2005	855,875	7,240	2,528	3,896
7/30/2005	847,000	7,164	2,245	3,821
7/31/2005	837,805	7,111	1,985	3,807
8/1/2005	829,199	6,850	2,013	3,613
8/2/2005	820,434	6,629	1,799	3,450
8/3/2005	811,195	6,672	1,886	3,537
8/4/2005	801,911	6,609	1,321	3,514
8/5/2005	793,052	6,395	1,446	3,390
8/6/2005	784,507	6,254	1,497	3,319
8/7/2005	776,321	6,209	1,618	3,274
8/8/2005	768,643	6,095	1,798	3,235
8/9/2005	760,398	5,840	1,594	2,995
8/10/2005	751,246	6,028	1,462	3,118
8/11/2005	741,753	6,190	1,548	3,205
8/12/2005	733,073	6,077	1,324	3,225
8/13/2005	724,796	5,827	1,194	3,161
8/14/2005	716,864	5,715	1,172	3,161
8/15/2005	709,078	5,644	1,206	3,133
8/16/2005	702,357	5,472	1,445	3,040
8/17/2005	696,010	5,275	1,783	2,912
8/18/2005	689,598	5,115	1,373	2,851
8/19/2005	683,073	5,068	1,294	3,735
8/20/2005	677,964	4,189	1,033	2,597
8/21/2005	672,306	4,299	1,023	2,848
8/22/2005	666,720	4,343	972	2,912
8/23/2005	660,924	4,428	1,002	2,975



Provisional data, storage in acre-feet, other data in cubic feet per second.

Date	Pine Flat Storage Acre-feet	Flow at Piedra cfs	Pre Project Piedra cfs	Measured Flows Below Fresno Weir cfs
8/24/2005	655,062	4,432	914	2,957
8/25/2005	649,040	4,440	828	2,965
8/26/2005	642,863	4,418	811	2,948
8/27/2005	636,534	4,407	699	3,002
8/28/2005	630,191	4,429	642	3,060
8/29/2005	623,608	4,436	585	3,058
8/30/2005	617,560	4,187	605	2,784
8/31/2005	611,949	3,949	603	2,528
9/1/2005	606,456	3,815	529	2,405
9/2/2005	601,391	3,578	512	2,175
9/3/2005	596,614	3,471	568	2,083
9/4/2005	591,946	3,346	510	1,982
9/5/2005	587,078	3,297	423	1,936
9/6/2005	582,800	3,154	461	1,772
9/7/2005	578,628	3,035	381	1,662
9/8/2005	574,690	2,964	426	1,613
9/9/2005	570,722	2,928	401	1,629
9/10/2005	566,854	2,876	368	1,603
9/11/2005	563,001	2,866	675	1,596
9/12/2005	559,419	2,804	412	1,571
9/13/2005	555,978	2,738	420	1,564
9/14/2005	552,720	2,619	356	1,483
9/15/2005	550,453	2,124	398	1,010
9/16/2005	548,191	1,904	351	828
9/17/2005	546,104	1,875	401	822
9/18/2005	543,937	1,817	316	781
9/19/2005	541,690	1,779	332	734
9/20/2005	539,657	1,798	412	705
9/21/2005	537,504	1,888	634	768
9/22/2005	535,227	2,007	485	904
9/23/2005	532,577	2,031	331	963
9/24/2005	529,977	2,027	390	974
9/25/2005	527,341	2,030	346	985
9/26/2005	524,670	2,112	441	948
9/27/2005	522,172	2,103	514	766
9/28/2005	520,137	2,018	561	672
9/29/2005	518,106	1,932	472	529
9/30/2005	516,906	1,420	446	357
10/1/2005	515,914	1,225	369	326
10/2/2005	514,964	1,189	380	292
10/3/2005	513,974	1,153	364	256
10/4/2005	513,109	1,098	368	201

Provisional data, storage in acre-feet, other data in cubic feet per second.

Date	Pine Flat Storage Acre-feet	Flow at Piedra cfs	Pre Project Piedra cfs	Measured Flows Below Fresno Weir cfs
10/5/2005	512,244	1,099	304	219
10/6/2005	511,339	1,086	279	197
10/7/2005	510,435	1,095	317	171
10/8/2005	508,300	1,712	314	297
10/9/2005	506,293	1,706	312	173
10/10/2005	504,168	1,718	315	189
10/11/2005	501,761	1,815	336	211
10/12/2005	499,320	1,918	337	221
10/13/2005	496,724	1,886	230	78
10/14/2005	494,295	1,847	301	67
10/15/2005	491,955	1,809	290	54
10/16/2005	489,538	1,790	244	44
10/17/2005	487,610	1,884	305	44
10/18/2005	484,845	1,964	250	43
10/19/2005	482,048	2,021	338	44
10/20/2005	479,338	2,040	339	46
10/21/2005	476,677	2,048	361	47
10/22/2005	473,785	2,064	330	55
10/23/2005	470,785	2,103	296	73
10/24/2005	468,069	2,085	339	62
10/25/2005	465,322	2,042	303	45
10/26/2005	462,622	1,999	310	42
10/27/2005	459,931	2,009	373	43
10/28/2005	457,558	1,904	301	47
10/29/2005	455,386	1,832	332	55
10/30/2005	453,103	1,798	321	48
10/31/2005	451,134	1,773	294	43
11/1/2005	448,861	1,614	331	56
11/2/2005	446,557	1,457	328	62
11/3/2005	444,948	1,171	337	70
11/4/2005	444,182	917	336	64
11/5/2005	444,258	271	312	81
11/6/2005	444,297	263	305	80
11/7/2005	444,450	261	298	67
11/8/2005	444,756	261	302	63
11/9/2005	445,139	261	350	61
11/10/2005	445,484	261	340	53
11/11/2005	445,906	261	347	50
11/12/2005	446,135	261	347	46
11/13/2005	446,289	263	335	45
11/14/2005	446,480	264	328	44
11/15/2005	446,902	263	325	43

Provisional data, storage in acre-feet, other data in cubic feet per second.

Date	Pine Flat Storage Acre-feet	Flow at Piedra cfs	Pre Project Piedra cfs	Measured Flows Below Fresno Weir cfs
11/16/2005	447,286	264	317	45
11/17/2005	447,977	266	309	47
11/18/2005	448,823	267	296	47
11/19/2005	449,439	267	284	50
11/20/2005	450,517	266	275	49
11/21/2005	451,443	266	333	47
11/22/2005	452,253	265	268	47
11/23/2005	453,219	263	266	45
11/24/2005	454,186	265	263	46
11/25/2005	454,921	266	261	48
11/26/2005	455,929	266	286	46
11/27/2005	456,976	268	269	45
11/28/2005	457,830	272	243	52
11/29/2005	458,569	260	293	97
11/30/2005	459,541	268	378	132
12/1/2005	460,905	269	938	75
12/2/2005	466,851	285	3,404	54
12/3/2005	469,170	294	1,099	47
12/4/2005	470,627	301	773	49
12/5/2005	472,047	299	695	66
12/6/2005	473,192	288	568	68
12/7/2005	474,259	289	552	195
12/8/2005	475,487	293	668	202
12/9/2005	476,756	294	609	195
12/10/2005	477,788	294	416	185
12/11/2005	478,981	294	508	185
12/12/2005	480,134	294	578	185
12/13/2005	481,091	294	446	190
12/14/2005	481,848	484	502	400
12/15/2005	482,327	592	406	552
12/16/2005	482,966	598	426	558
12/17/2005	483,205	622	427	582
12/18/2005	485,005	637	1,407	597
12/19/2005	487,690	624	1,656	584
12/20/2005	489,216	610	1,147	556
12/21/2005	490,947	402	835	153
12/22/2005	492,802	297	914	65
12/23/2005	494,054	296	930	60
12/24/2005	495,185	291	768	55
12/25/2005	496,237	289	721	48
12/26/2005	498,752	294	1,550	61
12/27/2005	500,744	291	1,113	46

Provisional data, storage in acre-feet, other data in cubic feet per second.

Date	Pine Flat Storage Acre-feet	Flow at Piedra cfs	Pre Project Piedra cfs	Measured Flows Below Fresno Weir cfs
12/28/2005	502,576	288	1,280	46
12/29/2005	504,657	283	1,250	48
12/30/2005	506,456	274	1,063	45
12/31/2005	521,383	293	9,060	53
1/1/2006	529,851	276	4,380	84
1/2/2006	558,902	1,987	17,264	1,372
1/3/2006	571,418	1,029	7,107	795
1/4/2006	578,015	314	3,510	231
1/5/2006	583,197	302	2,628	166
1/6/2006	587,784	278	2,207	84
1/7/2006	592,435	274	2,285	66
1/8/2006	596,391	274	1,806	58
1/9/2006	599,870	277	1,634	55
1/10/2006	602,151	276	1,373	53
1/11/2006	604,526	278	1,446	51
1/12/2006	607,444	290	1,373	47
1/13/2006	610,416	288	1,306	47
1/14/2006	613,440	286	1,664	48
1/15/2006	617,107	292	1,776	63
1/16/2006	620,103	279	1,324	46
1/17/2006	623,334	294	1,374	53
1/18/2006	625,798	288	1,447	52
1/19/2006	628,038	281	1,474	55
1/20/2006	630,604	285	1,330	118
1/21/2006	632,899	291	1,203	180
1/22/2006	635,060	288	1,044	180
1/23/2006	637,133	285	1,044	180
1/24/2006	639,348	284	1,044	135
1/25/2006	641,336	284	1,044	90
1/26/2006	643,373	287	1,044	94
1/27/2006	645,368	291	1,044	98
1/28/2006	647,458	292	1,278	98
1/29/2006	649,553	292	1,092	129
1/30/2006	651,651	291	1,101	180
1/31/2006	653,893	295	1,323	166
2/1/2006	655,343	294	1,044	148
2/2/2006	657,544	299	1,135	154
2/3/2006	659,797	300	1,184	148
2/4/2006	662,006	299	1,158	154
2/5/2006	664,219	298	1,107	154
2/6/2006	666,389	297	1,084	148
2/7/2006	668,516	297	1,054	148

Provisional data, storage in acre-feet, other data in cubic feet per second.

Date	Pine Flat Storage Acre-feet	Flow at Piedra cfs	Pre Project Piedra cfs	Measured Flows Below Fresno Weir cfs
2/8/2006	670,647	298	1,023	180
2/9/2006	672,733	298	1,009	203
2/10/2006	674,775	303	970	188
2/11/2006	676,868	304	1,127	188
2/12/2006	679,251	304	1,093	196
2/13/2006	681,066	700	1,183	424
2/14/2006	682,642	751	1,150	680
2/15/2006	684,702	606	1,219	535
2/16/2006	686,523	603	1,073	532
2/17/2006	688,444	588	1,097	532
2/18/2006	690,175	541	1,101	505
2/19/2006	692,101	501	1,109	435
2/20/2006	693,982	430	892	355
2/21/2006	695,479	516	994	434
2/22/2006	696,784	617	943	524
2/23/2006	697,994	663	969	558
2/24/2006	699,253	635	951	552
2/25/2006	700,416	638	935	486
2/26/2006	701,387	782	970	504
2/27/2006	703,621	865	3,159	510
2/28/2006	719,371	973	10,316	538
3/1/2006	724,796	1,165	4,187	551
3/2/2006	728,408	1,180	3,138	544
3/3/2006	734,068	1,119	3,778	483
3/4/2006	737,855	988	2,751	352
3/5/2006	741,253	977	2,430	356
3/6/2006	746,214	916	3,236	336
3/7/2006	750,942	853	2,963	297
3/8/2006	754,929	860	2,650	277
3/9/2006	758,420	885	2,159	298
3/10/2006	762,022	965	2,327	336
3/11/2006	765,379	970	2,327	320
3/12/2006	767,826	1,237	2,043	579
3/13/2006	770,021	1,237	2,021	577
3/14/2006	772,425	1,214	2,103	560
3/15/2006	774,935	1,131	1,995	524
3/16/2006	777,193	1,131	1,851	523
3/17/2006	779,764	1,229	2,144	621
3/18/2006	783,010	1,126	2,336	587
3/19/2006	785,798	1,089	2,080	556
3/20/2006	788,902	1,115	2,314	564
3/21/2006	791,858	1,085	2,159	537

Provisional data, storage in acre-feet, other data in cubic feet per second.

Date	Pine Flat Storage Acre-feet	Flow at Piedra cfs	Pre Project Piedra cfs	Measured Flows Below Fresno Weir cfs
3/22/2006	794,351	1,091	1,930	540
3/23/2006	796,745	1,125	1,939	577
3/24/2006	799,300	1,166	2,102	578
3/25/2006	802,747	1,185	2,771	597
3/26/2006	806,362	1,167	2,736	592
3/27/2006	809,459	1,101	2,360	586
3/28/2006	820,063	1,165	6,281	706
3/29/2006	830,639	1,157	6,425	624
3/30/2006	837,215	890	3,893	516
3/31/2006	843,391	987	3,720	546
4/1/2006	851,971	881	4,675	507
4/2/2006	858,482	577	3,441	381
4/3/2006	882,101	3,458	15,373	2,445
4/4/2006	924,390	4,355	25,656	3,542
4/5/2006	950,328	3,414	16,543	2,696
4/6/2006	958,837	4,912	9,341	4,030
4/7/2006	961,975	6,009	7,655	4,981
4/8/2006	961,278	6,808	6,596	5,695
4/9/2006	958,663	7,060	5,712	5,935
4/10/2006	956,112	7,035	5,373	5,946
4/11/2006	952,524	7,147	4,394	6,110
4/12/2006	947,963	7,323	4,822	6,272
4/13/2006	943,991	7,220	4,798	6,209
4/14/2006	941,864	7,058	5,681	6,078
4/15/2006	939,627	6,891	5,819	5,954
4/16/2006	936,990	6,985	5,511	6,128
4/17/2006	934,931	6,970	5,580	6,170
4/18/2006	930,764	7,073	4,541	6,257
4/19/2006	925,981	7,351	4,590	6,370
4/20/2006	921,100	7,730	5,172	6,433
4/21/2006	916,968	7,938	5,836	6,457
4/22/2006	913,130	8,110	6,117	6,598
4/23/2006	908,795	8,003	5,638	6,491
4/24/2006	903,464	7,938	5,011	6,403
4/25/2006	897,816	8,120	5,214	6,550
4/26/2006	892,745	8,239	5,765	6,518
4/27/2006	888,357	8,376	6,353	6,590
4/28/2006	885,808	8,574	7,884	6,779
4/29/2006	886,085	8,676	9,921	6,843
4/30/2006	888,966	8,758	11,596	6,852
5/1/2006	892,857	8,914	12,372	6,910
5/2/2006	897,592	9,028	12,897	6,980

Provisional data, storage in acre-feet, other data in cubic feet per second.

Date	Pine Flat Storage Acre-feet	Flow at Piedra cfs	Pre Project Piedra cfs	Measured Flows Below Fresno Weir cfs
5/3/2006	900,889	9,582	12,860	7,390
5/4/2006	902,903	9,729	11,892	7,473
5/5/2006	902,568	10,179	11,010	7,749
5/6/2006	902,064	10,447	11,455	7,977
5/7/2006	902,568	10,570	12,315	8,093
5/8/2006	904,249	10,904	13,577	8,274
5/9/2006	906,267	11,384	14,472	8,524
5/10/2006	908,177	11,777	14,956	8,676
5/11/2006	910,539	12,018	15,341	8,773
5/12/2006	913,130	12,190	15,860	8,838
5/13/2006	916,630	12,504	17,144	9,098
5/14/2006	922,007	12,674	18,663	9,188
5/15/2006	927,516	12,814	18,259	9,209
5/16/2006	930,421	12,964	17,469	9,242
5/17/2006	934,817	13,144	18,650	9,348
5/18/2006	939,110	13,271	18,819	9,415
5/19/2006	942,037	13,322	17,944	9,463
5/20/2006	944,969	13,264	17,853	9,474
5/21/2006	948,252	12,934	17,942	9,235
5/22/2006	949,232	12,164	14,586	8,544
5/23/2006	945,084	11,893	10,975	8,309
5/24/2006	941,347	11,965	11,328	8,446
5/25/2006	939,225	12,077	12,736	8,610
5/26/2006	939,397	11,764	13,639	8,294
5/27/2006	939,283	11,572	12,828	8,100
5/28/2006	934,302	11,472	9,647	8,010
5/29/2006	928,257	11,474	8,943	8,037
5/30/2006	922,574	11,491	9,542	8,069
5/31/2006	919,004	11,505	11,350	8,132

# **APPENDIX B**

Example of Hydrologic and Climate Summary Report  
(on following page)



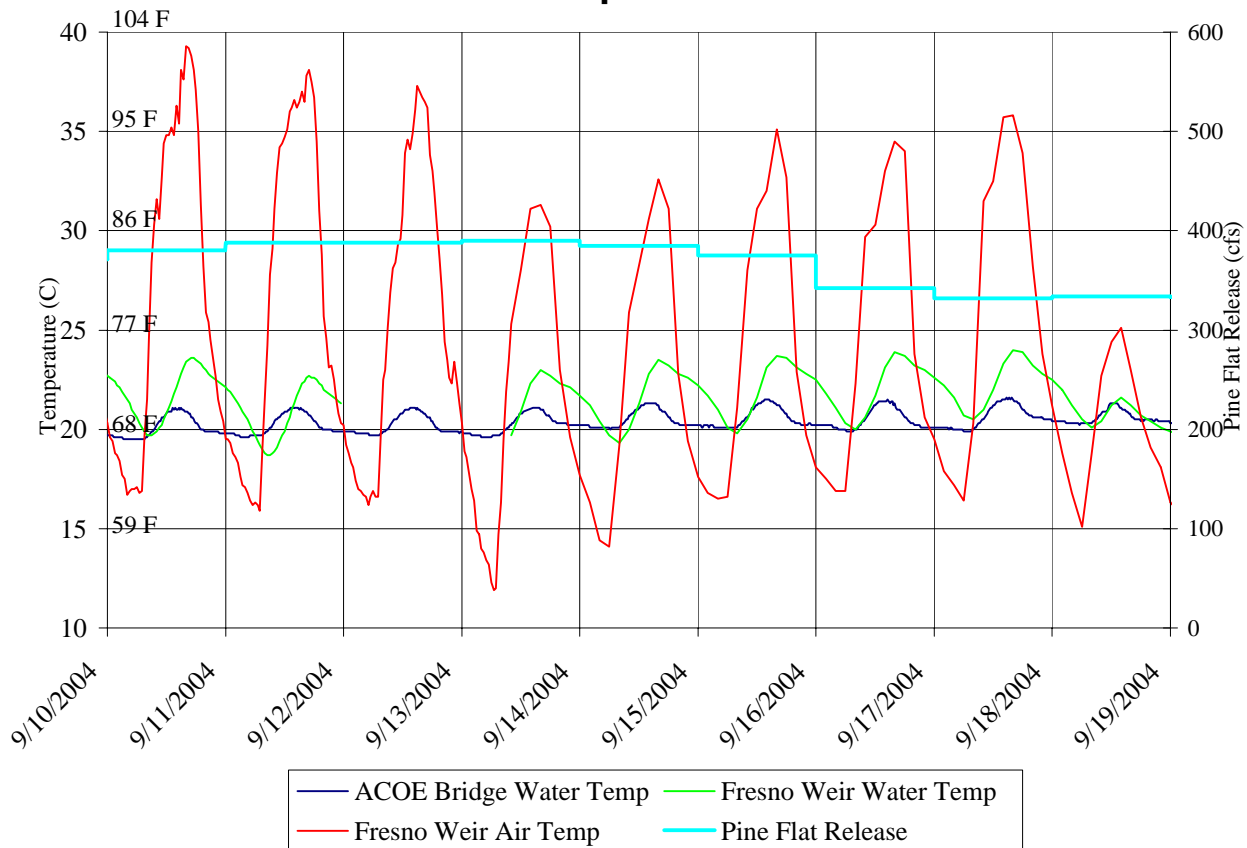
# Kings River Fisheries Management Program Hydrologic and Climatic Summary Report

Provisional Data - Subject to Revision  
9/21/2004

Flow Rates	Actual	Exhibit "C" Criteria	Date	
Mill & Hughes Creeks	0	NA	9/19/2004	KRWA
Piedra	333 cfs	100 cfs	9/19/2004	KRWA
Dennis Cut	55 cfs	5 cfs	9/19/2004	KRWA
At Fresno Weir	203 cfs	95 cfs	9/19/2004	KRWA
Over Fresno Weir	48 cfs	35 cfs	9/19/2004	KRWA

Pine Flat	Date				
Storage	115,300 af		9/19/2004	0700	ACOE
Elevation	721 ft		9/19/2004	0700	ACOE
Release	333 cfs		9/19/2004	0700	KRCD
Release Temperature	69 F	20.3 C	9/19/2004	0700	KRCD
Avg. Fresno Weir Water Temp	67 F	19.6 C	9/19/2004		

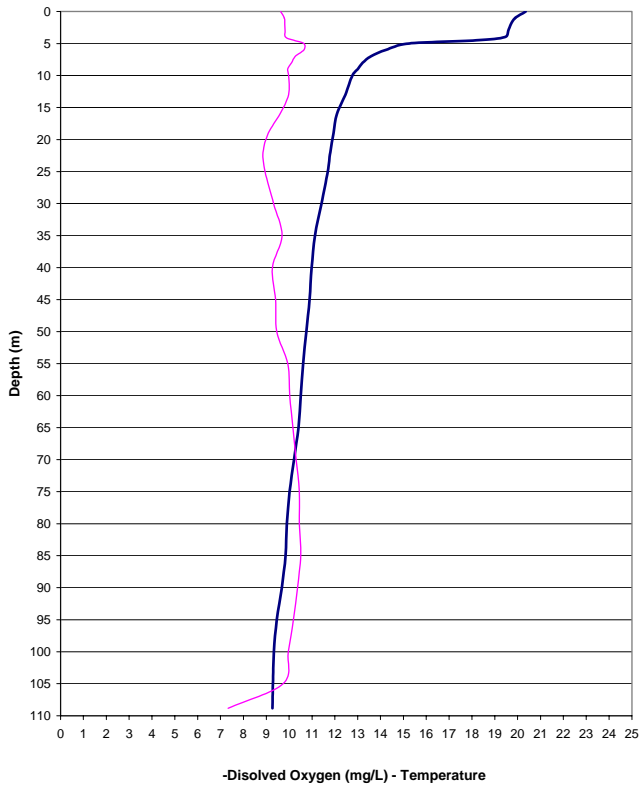
## Flow and Temperature Trends



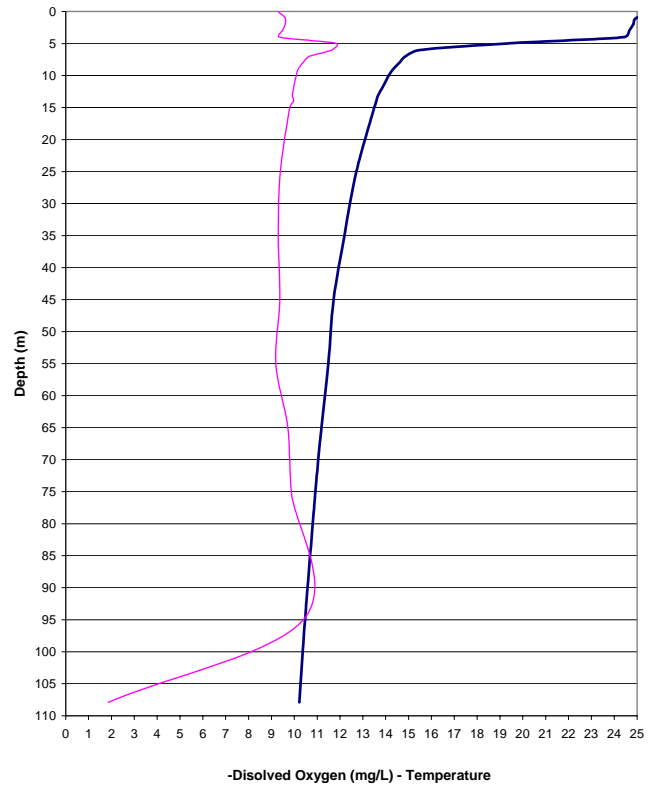
# **APPENDIX C**

Pine Flat Reservoir Temperature and Dissolved Oxygen Profiles from May 2005 through  
May 2006 (on following pages)

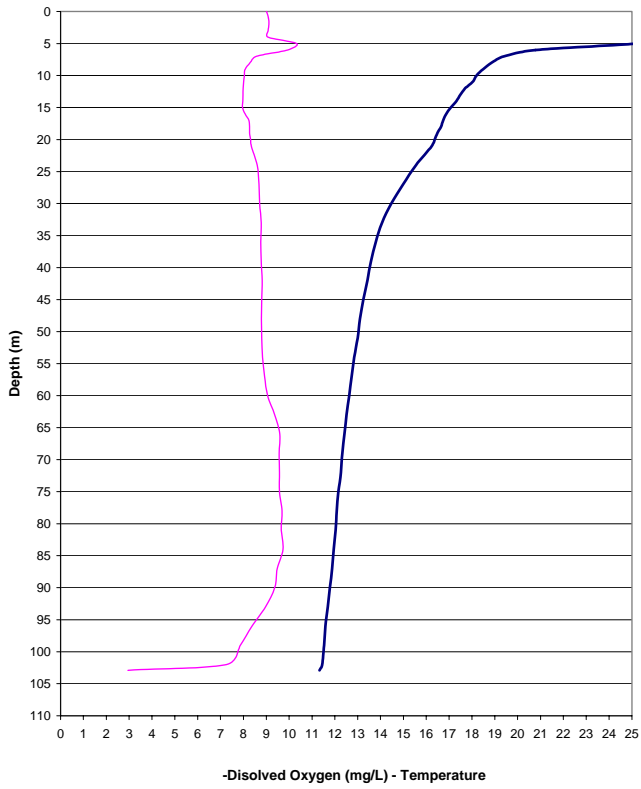
**Temperature and Dissolved Oxygen Profile**  
Pine Flat Reservoir 6/10/05



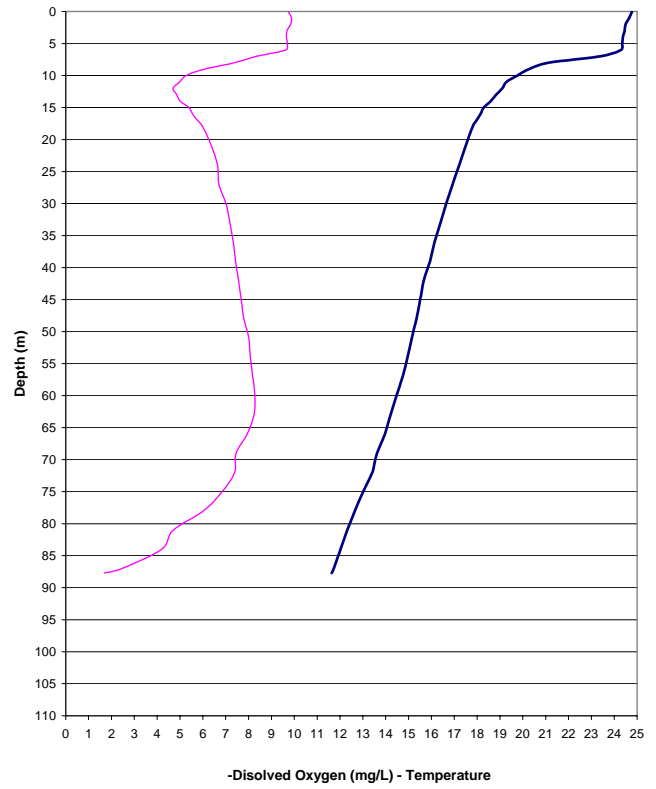
**Temperature and Dissolved Oxygen Profile**  
Pine Flat Reservoir 07/01/05



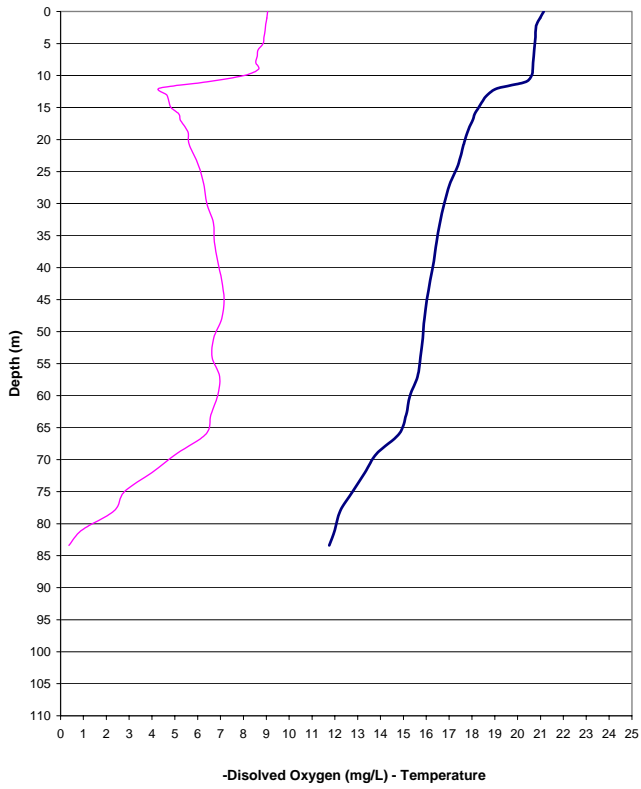
**Temperature and Dissolved Oxygen Profile**  
Pine Flat Reservoir 08/03/05



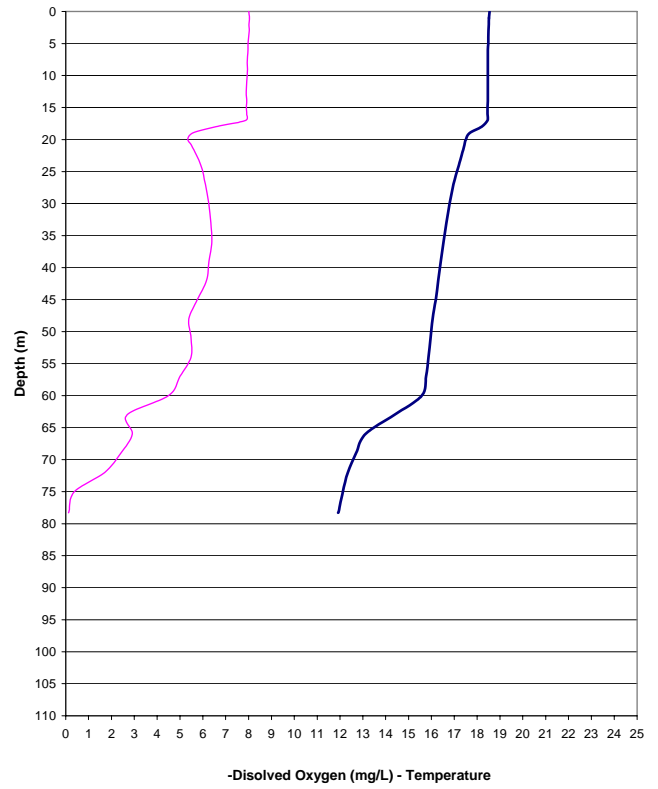
**Temperature and Dissolved Oxygen Profile**  
Pine Flat Reservoir 09/07/05



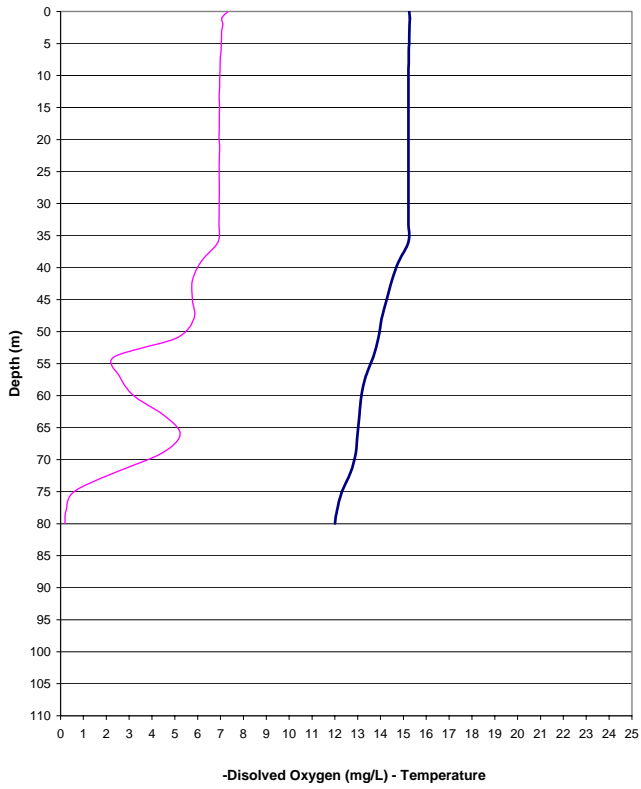
Temperature and Dissolved Oxygen Profile  
Pine Flat Reservoir 10/04/05



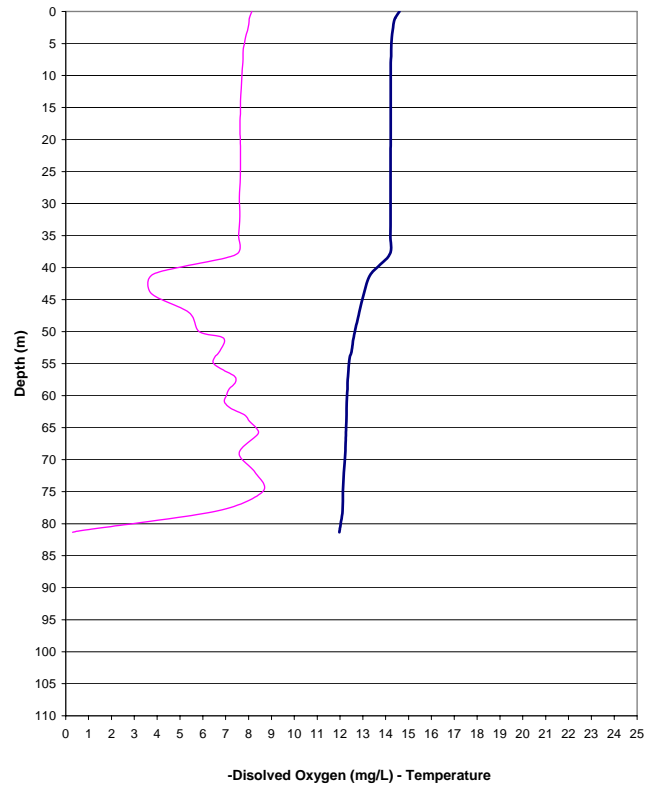
Temperature and Dissolved Oxygen Profile  
Pine Flat Reservoir 11/02/05



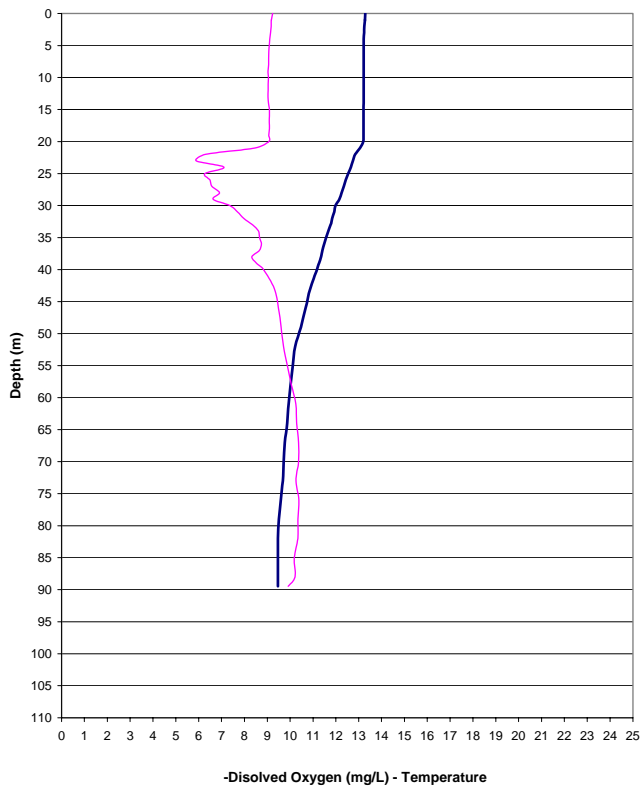
**Temperature and Dissolved Oxygen Profile**  
Pine Flat Reservoir 12/07/05



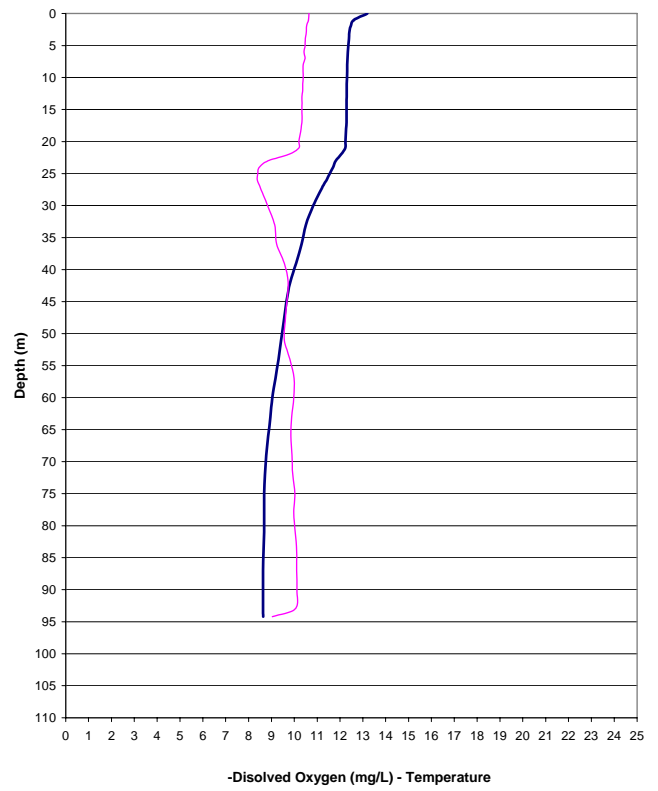
**Temperature and Dissolved Oxygen Profile**  
Pine Flat Reservoir 12/19/05



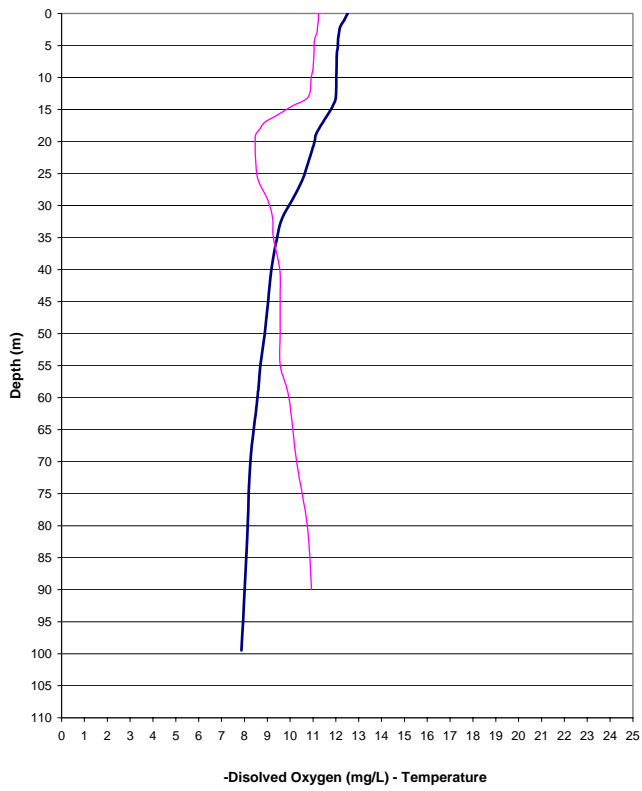
**Temperature and Dissolved Oxygen Profile**  
Pine Flat Reservoir 01/11/06



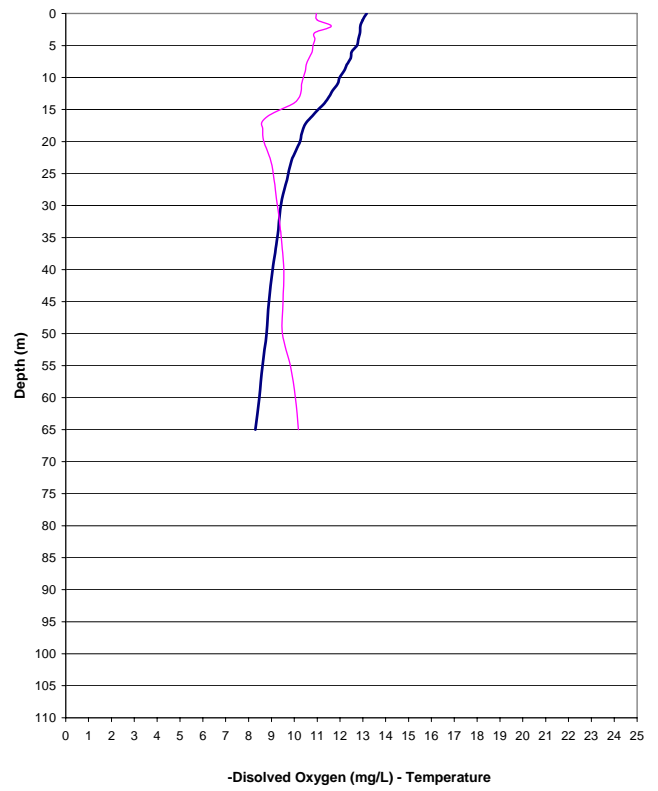
**Temperature and Dissolved Oxygen Profile**  
Pine Flat Reservoir 02/08/06



**Temperature and Dissolved Oxygen Profile**  
Pine Flat Reservoir 03/09/06



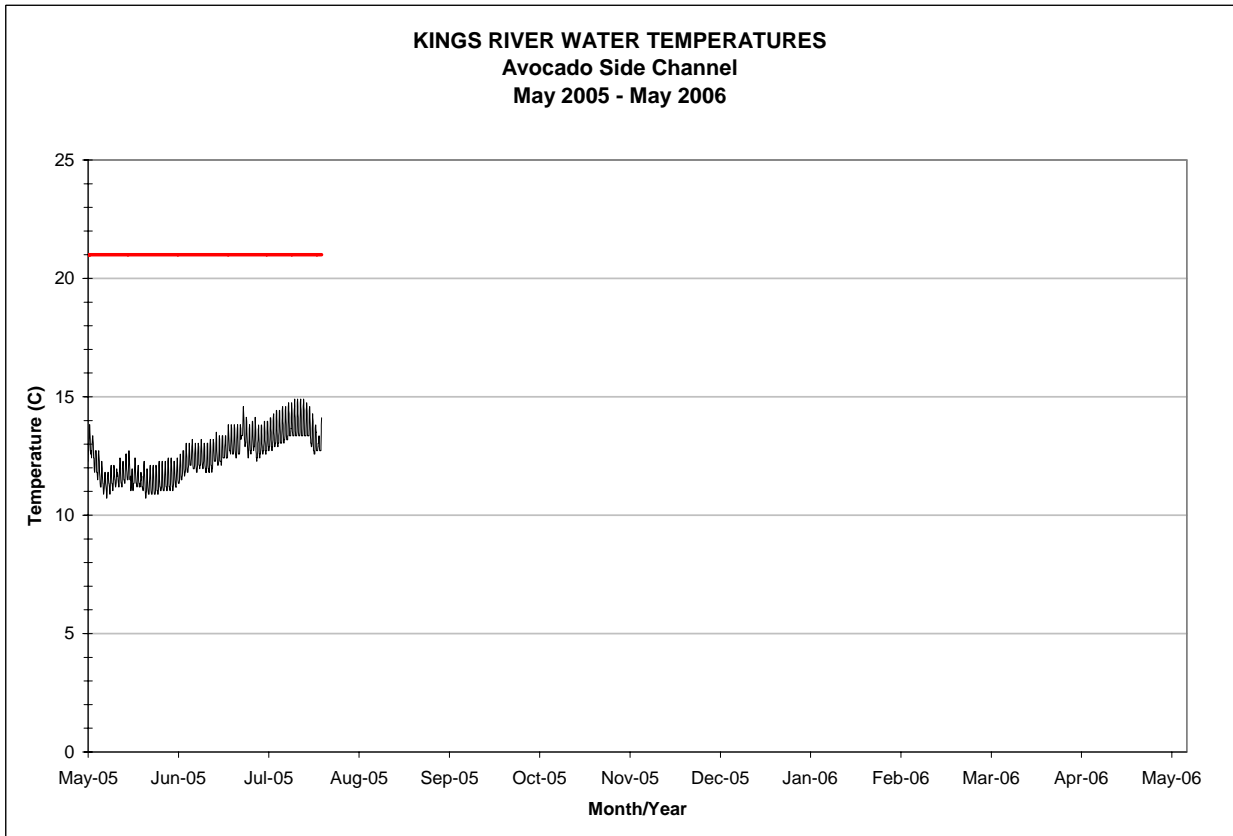
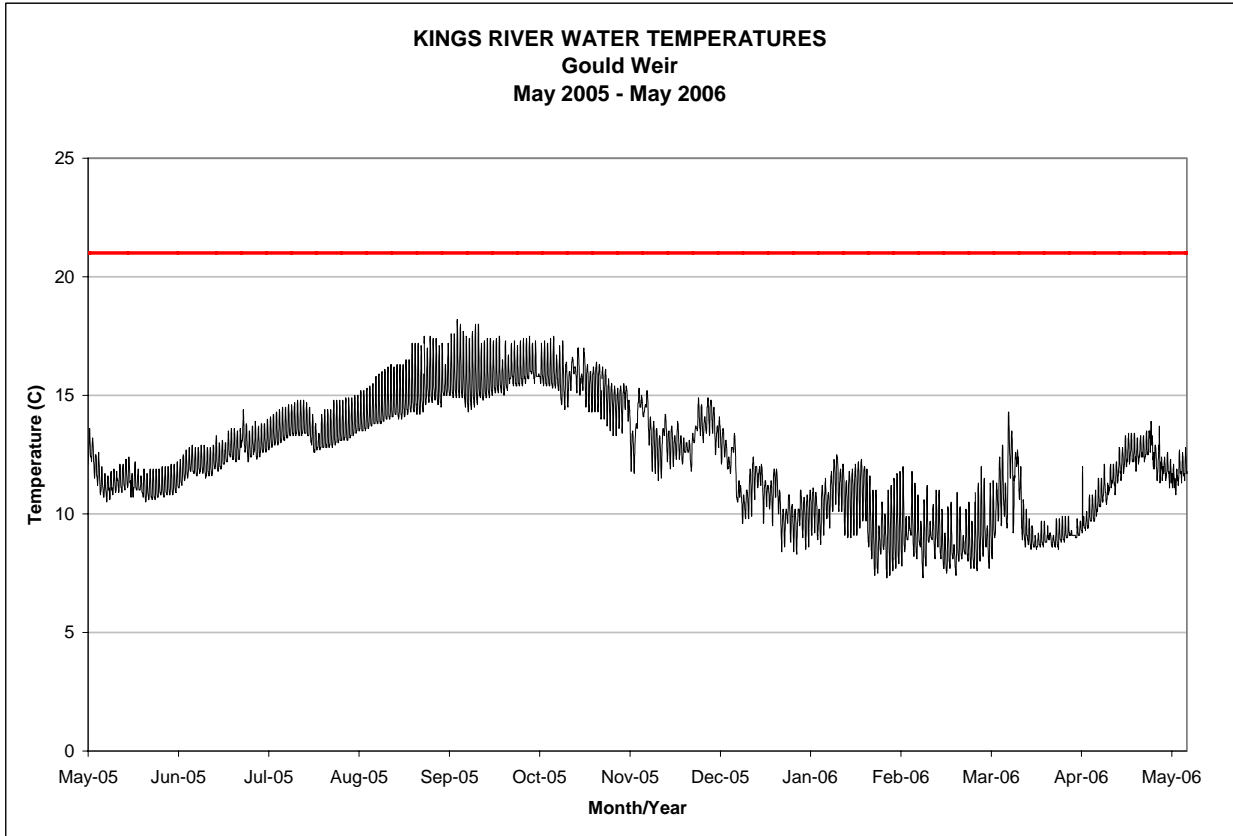
**Temperature and Dissolved Oxygen Profile**  
Pine Flat Reservoir 04/06/06





# **APPENDIX D**

Results of Water Temperature Monitoring on the Lower Kings River  
(on following page)



# **APPENDIX E**

CDFG Kings River Planting Records – San Joaquin Hatchery  
(on following pages)

**California Department of Fish and Game**  
**Daily Fish Planted**  
**StateWide Data - San Joaquin Hatchery**

Data filtered to display records for: Report=Fish Planted; Fac = SJH; Date Range: 6/1/2005 to 5/31/2006 ; Water = Kings River, Below Pine Flat Dam

A	Fac	Date	A/I	Spec	Var	Ru	YC	Lot	ID	BF	Tg	Water	County	R	Sz	Fish/Lb.	Lbs.	Pounds	Number	Method
	SJH	6/2/2005	I	RT	S	-	04	1				Kings River, Below Pine Flat Dam	Fresno	4	C	1.9		300	570	Direct
	SJH	6/10/2005	I	ELT	H	-	04	1				Kings River, Below Pine Flat Dam	Fresno	4	C	1.8		300	540	Direct
	SJH	6/16/2005	I	ELT	H	-	04	1				Kings River, Below Pine Flat Dam	Fresno	4	C	1.7		300	510	Direct
	SJH	6/24/2005	I	ELT	H	-	04	1				Kings River, Below Pine Flat Dam	Fresno	4	C	2.0		300	600	Direct
	SJH	6/30/2005	I	RT	W	-	04	1				Kings River, Below Pine Flat Dam	Fresno	4	C	1.9		300	570	Direct
	SJH	7/8/2005	I	RT	W	-	04	1				Kings River, Below Pine Flat Dam	Fresno	4	C	1.9		300	570	Direct
	SJH	7/14/2005	I	RT	W	-	04	1				Kings River, Below Pine Flat Dam	Fresno	4	C	2.5		300	750	Direct
	SJH	7/22/2005	I	RT	W	-	04	1				Kings River, Below Pine Flat Dam	Fresno	4	C	2.0		300	600	Direct
	SJH	7/28/2005	I	RT	W	-	04	1				Kings River, Below Pine Flat Dam	Fresno	4	C	1.8		300	540	Direct
	SJH	8/5/2005	I	RT	W	-	04	1				Kings River, Below Pine Flat Dam	Fresno	4	C	1.9		300	570	Direct
	SJH	8/11/2005	I	RT	W	-	04	1				Kings River, Below Pine Flat Dam	Fresno	4	C	2.0		300	600	Direct
	SJH	8/19/2005	I	RT	W	-	04	1				Kings River, Below Pine Flat Dam	Fresno	4	C	2.1		300	630	Direct
	SJH	8/23/2005	I	RT	W	-	04	1				Kings River, Below Pine Flat Dam	Fresno	4	C	2.1		300	630	Direct
	SJH	9/2/2005	I	RT	W	-	04					Kings River, Below Pine Flat Dam	Fresno	4	C	2.0		500	1,000	Direct
	SJH	9/8/2005	I	RT	W	-	04	1				Kings River, Below Pine Flat Dam	Fresno	4	C	1.9		300	570	Direct
	SJH	9/16/2005	I	RT	W	-	04	1				Kings River, Below Pine Flat Dam	Fresno	4	C	1.9		300	570	Direct
	SJH	9/22/2005	I	RT	W	-	04	1				Kings River, Below Pine Flat Dam	Fresno	4	C	2.0		300	600	Direct
	SJH	9/30/2005	I	RT	W	-	04					Kings River, Below Pine Flat Dam	Fresno	4	C	1.7		300	510	Direct
	SJH	10/6/2005	I	RT	W	-	04					Kings River, Below Pine Flat Dam	Fresno	4	C	2.1		300	630	Direct
	SJH	10/7/2005	I	RT	W	-	04					Kings River, Below Pine Flat Dam	Fresno	4	C	2.0		20	40	Direct
	SJH	10/7/2005	I	RT	C	-	03	2				Kings River, Below Pine Flat Dam	Fresno	4	C		2.5	100	40	Direct
	SJH	10/12/2005	I	RT	KJ	-	05					Kings River, Below Pine Flat Dam	Fresno	4	F	74.0		203	15,022	Direct
	SJH	10/14/2005	I	RT	W	-	04					Kings River, Below Pine Flat Dam	Fresno	4	C	2.1		300	630	Direct
	SJH	10/19/2005	I	ELT	H	-	05					Kings River, Below Pine Flat Dam	Fresno	4	SC	10.0		500	5,000	Truck
	SJH	10/19/2005	I	ELT	H	-	05					Kings River, Below Pine Flat Dam	Fresno	4	SC	10.0		500	5,000	Truck
	SJH	10/20/2005	I	RT	W	-	04					Kings River, Below Pine Flat Dam	Fresno	4	C	1.9		300	570	Truck
	SJH	10/21/2005	I	ELT	H	-	05					Kings River, Below Pine Flat Dam	Fresno	4	SC	10.0		1,000	10,000	Truck
	SJH	10/21/2005	I	ELT	H	-	05					Kings River, Below Pine Flat Dam	Fresno	4	SC	10.0		500	5,000	Truck
	SJH	10/28/2005	I	RT	W	-	04					Kings River, Below Pine Flat Dam	Fresno	4	C	2.0		300	600	Direct
	SJH	11/4/2005	I	RT	W	-	04					Kings River, Below Pine Flat Dam	Fresno	4	C	1.8		300	540	Direct

Friday, November 17, 2006

Daily Fish Planted ( Rev: 03/20/2005)

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**Preliminary - Subject to Change**

A	Fac	Date	A/I	Spec	Var	Ru	YC	Lot	ID	BF Tg Water	County	R	Sz	Fish/Lb.	Lbs.	Pounds	Number	Method
	SJH	11/10/2005	I	RT	W	-	04			Kings River, Below Pine Flat Dam	Fresno	4	C	1.9		300	570	Direct
	SJH	11/18/2005	I	RT	W	-	04			Kings River, Below Pine Flat Dam	Fresno	4	C	1.8		300	540	Direct
	SJH	11/22/2005	I	RT	W	-	04	1		Kings River, Below Pine Flat Dam	Fresno	4	C	2.0		425	850	Direct
	SJH	11/22/2005	I	RT	W	-	04			Kings River, Below Pine Flat Dam	Fresno	4	C	1.6		75	120	Direct
	SJH	12/2/2005	I	RT	W	-	04	1		Kings River, Below Pine Flat Dam	Fresno	4	C	1.8		300	540	Direct
	SJH	12/8/2005	I	RT	W	-	04	1		Kings River, Below Pine Flat Dam	Fresno	4	C	1.8		300	540	Direct
	SJH	12/14/2005	I	RT	C	-	03	2		Kings River, Below Pine Flat Dam	Fresno	4	C		3.7	1,000	270	Direct
	SJH	12/14/2005	I	RT	W	-	04	1		Kings River, Below Pine Flat Dam	Fresno	4	C	1.9		300	570	Direct
	SJH	12/16/2005	I	RT	C	-	03	2		Kings River, Below Pine Flat Dam	Fresno	4	C		3.5	800	229	Direct
	SJH	12/21/2005	I	RT	C	-	03	2		Kings River, Below Pine Flat Dam	Fresno	4	C		3.8	750	200	Direct
	SJH	12/22/2005	I	RT	H	-	04	1		Kings River, Below Pine Flat Dam	Fresno	4	C	1.8		500	900	Direct
	SJH	12/28/2005	I	RT	H	-	04	1		Kings River, Below Pine Flat Dam	Fresno	4	C	2.0		400	800	Direct
	SJH	12/30/2005	I	RT	C	-	03	2		Kings River, Below Pine Flat Dam	Fresno	4	C		3.8	750	200	Direct
	SJH	1/5/2006	I	RT	H	-	04	1		Kings River, Below Pine Flat Dam	Fresno	4	C	2.0		500	1,000	Truck
	SJH	1/11/2006	I	RT	C	-	03	2		Kings River, Below Pine Flat Dam	Fresno	4	C		4.0	800	200	Truck
	SJH	1/11/2006	I	RT	H	-	04			Kings River, Below Pine Flat Dam	Fresno	4	C	2.1		300	630	Truck
	SJH	1/13/2006	I	RT	C	-	03	2		Kings River, Below Pine Flat Dam	Fresno	4	C		3.8	750	200	Truck
	SJH	1/19/2006	I	RT	H	-	04			Kings River, Below Pine Flat Dam	Fresno	4	C	2.0		300	600	Truck
	SJH	1/25/2006	I	RT	C	-	03	2		Kings River, Below Pine Flat Dam	Fresno	4	C		4.3	860	200	Truck
	SJH	1/25/2006	I	RT	H	-	04			Kings River, Below Pine Flat Dam	Fresno	4	C	2.1		300	630	Truck
	SJH	1/27/2006	I	RT	C	-	03	2		Kings River, Below Pine Flat Dam	Fresno	4	C		4.2	975	232	Truck
	SJH	1/27/2006	I	RT	H	-	04			Kings River, Below Pine Flat Dam	Fresno	4	C	2.2		15	33	Truck
	SJH	2/2/2006	I	RT	H	-	04			Kings River, Below Pine Flat Dam	Fresno	4	C	2.0		300	600	Truck
	SJH	2/8/2006	I	RT	C	-	03	2		Kings River, Below Pine Flat Dam	Fresno	4	C		4.6	920	200	Truck
	SJH	2/8/2006	I	RT	H	-	04			Kings River, Below Pine Flat Dam	Fresno	4	C	1.7		320	544	Truck
	SJH	2/10/2006	I	RT	C	-	03	2		Kings River, Below Pine Flat Dam	Fresno	4	C		5.0	1,000	200	Truck
	SJH	2/16/2006	I	RT	C	-	04	1		Kings River, Below Pine Flat Dam	Fresno	4	C	1.6		300	480	Truck
	SJH	2/22/2006	I	RT	C	-	04	1		Kings River, Below Pine Flat Dam	Fresno	4	C	1.3		300	390	Truck
	SJH	2/22/2006	I	RT	C	-	03	2		Kings River, Below Pine Flat Dam	Fresno	4	C		4.3	850	200	Truck
	SJH	2/24/2006	I	RT	C	-	03	2		Kings River, Below Pine Flat Dam	Fresno	4	C		4.5	900	200	Truck
	SJH	3/2/2006	I	RT	C	-	04			Kings River, Below Pine Flat Dam	Fresno	4	C	1.8		300	540	Truck
	SJH	3/7/2006	I	RT	C	-	03	2		Kings River, Below Pine Flat Dam	Fresno	4	C		4.8	950	200	Truck
	SJH	3/7/2006	I	RT	C	-	04			Kings River, Below Pine Flat Dam	Fresno	4	C	1.7		300	510	Truck
	SJH	3/10/2006	I	RT	C	-	03	2		Kings River, Below Pine Flat Dam	Fresno	4	C		4.0	800	200	Truck
	SJH	3/16/2006	I	RT	C	-	04			Kings River, Below Pine Flat Dam	Fresno	4	C	1.9		300	570	Truck
	SJH	3/22/2006	I	RT	C	-	03	2		Kings River, Below Pine Flat Dam	Fresno	4	C		4.0	200	50	Truck
	SJH	3/24/2006	I	RT	C	-	04	1		Kings River, Below Pine Flat Dam	Fresno	4	C	1.9		300	570	Truck
	SJH	3/30/2006	I	RT	C	-	04	1		Kings River, Below Pine Flat Dam	Fresno	4	C	1.8		400	720	Truck

Friday, November 17, 2006

Daily Fish Planted ( Rev: 03/20/2005)

Page 2 of 3

**Preliminary - Subject to Change**

A	Fac	Date	A/I	Spec	Var	Ru	YC	Lot	ID	BF Tg Water	County	R	Sz	Fish/Lb.	Lbs.	Pounds	Number	Method
	SJH	4/27/2006	I	RT	C	-	04			Kings River, Below Pine Flat Dam	Fresno	4	C	1.4		500	700	Truck
	SJH	5/5/2006	I	RT	C	-	04	1		Kings River, Below Pine Flat Dam	Fresno	4	C	1.5		520	780	Truck
	SJH	5/5/2006	I	ELT	H	-	04	1		Kings River, Below Pine Flat Dam	Fresno	4	C		3.8	152	40	Truck
	SJH	5/11/2006	I	RT	C	-	04	1		Kings River, Below Pine Flat Dam	Fresno	4	C	1.6		500	800	Truck
	SJH	5/19/2006	I	RT	C	-	04	1		Kings River, Below Pine Flat Dam	Fresno	4	C	1.5		500	750	Truck
	SJH	5/25/2006	I	RT	S	-	05			Kings River, Below Pine Flat Dam	Fresno	4	C	1.6		500	800	Truck

**Report Totals:**      **32,035**      **74,100**

# **APPENDIX F**

CDFG Bass Tournament Statistics Summary  
(on following page)

# Tournament Statistics for Pine Flat

## 2003

Number of Entrants	820	Catch Per Hr	0.29661076912
Number of Hours	262	Weight Per Fish	1.71445992366
TotalHrs	7,067	Fish Per Angler	8.61768292683
Number of Fish	2,096		
Total Weight	3,593.51		

## 2004

Number of Entrants	890	Catch Per Hr	0.27360937650
Number of Hours	298	Weight Per Fish	1.53984082397
TotalHrs	7,807	Fish Per Angler	8.77162921348
Number of Fish	2,136		
Total Weight	3,289.10		

## 2005

Number of Entrants	841	Catch Per Hr	0.22372834942
Number of Hours	291	Weight Per Fish	1.45973867809
TotalHrs	7,304	Fish Per Angler	8.68430439952
Number of Fish	1,634		
Total Weight	2,385.21		

## 2006

Number of Entrants	658	Catch Per Hr	0.28509187346
Number of Hours	193	Weight Per Fish	1.70775016611
TotalHrs	5,279	Fish Per Angler	8.02279635258
Number of Fish	1,505		
Total Weight	2,570.16		

This statistics are excluding contest reports with number of teams instead of number of entrants and tournaments with missing information.

Monday, December 18, 2006

Page 1 of 1



# **APPENDIX G**

Fishery News Newsletter (Summer 2006)  
(on following pages)



# Kings River Fisheries News

Joining together to improve the Kings River fisheries.

Summer 2006

## Fish Go 'On Air' To Aid In Tracking Studies

Along the Kings River below Pine Flat Dam these days, the top-rated radio stations are being operated by fish.

A pilot project that began last year employing radio telemetry has provided a wealth of information to researchers and managers within the Kings River Fisheries Management Program related to trout.

"From a data gathering point of view, what we've seen thus far has been very valuable in that it has helped to dispell misconceptions about fish placed in the river," said Clifton Lollar, Kings River Water Association Resource Analyst and a member of the program's Technical Steering Committee.



KRCD's Geneva Ornelas uses monitoring equipment on a daily basis to track fish behavior and movement for the study.

Many people felt trout would typically be swept downstream or into canals. "We've found the fish are holding quite well in the river," he said.

Making that determination possible are state-of-the-art radio transmitters that have been surgically implanted into several dozen trout in two separate phases and releases (in October and February). A third release is scheduled to take place in June after this spring's high water conditions abate. The releases were

planned to track fish in a typical variety of flow regimes.

The trout equipped with transmitters are released into the river where they are tracked on a regular basis by Kings River Conservation District environmental staff members using monitoring equipment.

Tracy Purpuro, A KRCD biologist, said five different frequencies are utilized and each fish has its own identification code.

Tracking and monitoring can take place in any type of water flow conditions. Anglers catching tagged fish are rewarded for returning the radio devices. Some transmitters have been found along the river minus fish and a few have been lost.

Purpuro said no major patterns of movement have been detected and, under high flow conditions, the fish have tended to move toward the river edges. "They are finding places to hide," he said.

There has been one air reconnaissance survey. Additionally, two

*continued on page 4*


## Trophy Trout Prove Popular With Anglers

A trophy trout planting program has proven to be extremely popular with Kings River anglers.

The trophy trout planting program, which concluded in March, was started in December by the California Department of Fish and Game.

With the possibility of catching planted trout weighing up to nine pounds, anglers responded in much greater than typical numbers by fishing the river downstream from Pine Flat Dam.

The larger fish were planted in various areas, with some going into the Kings below Cobbles Weir, within the river's catch-and-release zone.

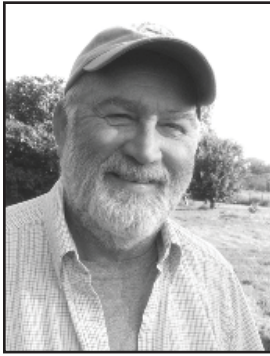
Anglers say the enthusiasm over the trophy trout has expanded interest in the river's entire fishery. 



KRCD biologist Jeff Halstead with one of the trophy trout planted in the Kings River. At left is Dale Mitchell of the California Department of Fish and Game.

# Viewing The Kings' Fishery Habitat Progress

*Public Advisory Committee's New Leader Has Been On Hand All The Way*



*Hank Urbach - Chairman of the Kings River Fisheries Management Program Public Advisory Group.*

Hank Urbach, who is now chairing the Kings River Fisheries Management Program's Public Advisory Group, looks back at more than two decades and is generally pleased with what he sees in terms of the river's fishery enhancement progress.

"Some of us are reasonably happy with the way things have developed," says Urbach, a Centerville area resident who is retired as a computer expert.

"We think there is an opportunity to turn things around in the river fishery."

(Please see "Anglers Corner," Page 3.)

Urbach wasn't always so optimistic. "I was on the original Lower Kings River Committee in the 1980's that filed a public trust complaint on the Kings River," he says. "We were pretty upset with what had happened to the fishery."

It was a tremendously contentious time, he recalls. There was little or no trust between the anglers and the river's primary oversight agencies—the Kings River Water Association, Kings River Conservation District and California Department of Fish and Game.

The public trust complaint, filed in 1991 with the State Water Resources Control Board, was the anglers' choice of strategies (rather than a lawsuit, such as the environmental litigation that has dominated San Joaquin River interests since 1988).

"Out of that came the Framework Agreement," he says. "We could have been like the guys on the San Joaquin and we would have taken 25 years to get one boulder in the river."

That agreement established the Kings River Fisheries

Management Program in 1999 in a partnership between the KRWA, KRCd and California Department of Fish and Game, with cooperation from Pacific Gas and Electric Company and, ultimately, the anglers themselves.

Cooperation, consensus and program implementation are at the heart of the Fisheries Management Program. The 28 KRWA member agencies voluntarily provided 12 percent of their storage rights to establish the program's 100,000 acre-foot temperature control pool along with providing increased minimum releases. In the program's first 10 years, the partnering agencies will have contributed \$2 million for habitat work.


"We recognized the reality that we were not going to get an imposed agreement," Urbach said. "It would have to be voluntary. That was a new concept at the time."

Although some anglers wanted a Public Advisory Group to have a major and direct role in managing the fisheries program, Urbach said he was among those who "took the approach, 'Let's see what happens.' We've been in it ever since."

Urbach, a Minnesota native who has lived in Fresno County since 1979, has been a regular at Public Advisory Committee meetings, first under the chairmanship of Mickey Powell of Visalia and more recently under the leadership of Kevin Wren of Fresno.

He sees the Kings River Fisheries Management Program as "an example of how cooperation can work." He also appreciates the amount of studies, data collection, program design and habitat improvement construction that the Fisheries Management Program has been able to achieve on a modest spending plan.

"I think if we did it in the typical way, we'd be looking at millions and millions of dollars," Urbach said.

Instead, he said, the three partnering agencies have been generous with their personnel resources and the environmental and engineering staffs of KRCd have been particularly well positioned to lend credible professional expertise to the Fisheries Management Program. 

## Big Water Year Sets Stage For Increased Minimum Flows

For a second straight year, natural Kings River runoff is going to be high enough to trigger the potential for higher minimum releases through the period when there is no irrigation demand.


When the Fisheries Management Program was adopted in 1999, KRWA members voluntarily doubled minimum releases from 50 c.f.s. to what is now the typical minimum release of 100 c.f.s. at times when there are no irrigation demands.

In addition to this voluntary increase in minimum flow, the Fisheries Management Program Framework Agreement established a non-binding objective for Kings River Water Association member units to provide minimum releases scaled up to 250 cubic feet per second when higher runoff year provides additional water supplies.

Last fall and winter represented the first time since the Kings River Fisheries Management Program was established in 1999 that supply

conditions had been great enough for the increased minimum releases to take place.

Anglers—and particularly fly fishermen—were pleased with the higher minimum flows.

KRWA member units internally used a one-time, non-precedent-setting arrangement to provide the higher releases last year and are attempting to frame such a procedure for use this fall. 

# Objectives For The Fishery

Hank Urbach, *Kings River Fisheries Management Program Public Advisory Group Chairman*

Nearly 25 years after concern among anglers began mounting over fishery conditions below Pine Flat Dam, anglers and agencies that have collaborated on constructively solving problems are beginning to see results.

We are now seven years into the first decade of the Kings River Fisheries Management Program. A tremendous amount of knowledge has been gained. Many habitat improvements are being made. The program's three partnering agencies—the Kings River Water Association, Kings River Conservation District and California Department of Fish and Game—have invested hundreds of thousands of dollars and significant staff and consultant time into planning and projects to benefit the fishery.

Most of all, there has been a great deal of hard work and willingness to understand other points of view, leading to cooperation, consensus and accomplishment of some of the initial goals of the program.


As the new chairman of the program's Public Advisory Group, I have three primary goals to pursue this year. I will encourage the Fisheries Management Program to:

- Continue implementing its habitat master plan, which has already resulted in significant improvements in and along the river and, to some extent, Pine Flat Reservoir.
- Continue gathering data and studying the river and its ecosystem, including all the new water quality criteria and permanent use of the novel telemetry that is making it possible to accurately monitor fish movements in the river.
- Improve public outreach to develop a wider base of public involvement in order to build greater understanding of the Fisheries Management Program, appreciation of program needs, respect for fishing regulations and interest in fishing itself.

This last point is of great importance because a key to the program's future success will be building public support for continuation of funding, particularly at the state level through the Department of Fish and Game. An important responsibility of the Public Advisory Group is to help build a coalition that will go to Sacramento to lobby for continued funding, and highlighting the economic and recre-

ational values of a high quality fishery in the lower Kings River.

In the longer term, I'd like to see us work toward extending improved minimum flows—those that occur when there is no irrigation demand—downstream from Fresno Weir. That part of the river fishery is or could be the most productive but it simply doesn't get the flows it needs. I see conjunctive uses of water as a creative way to get more flows into that reach. To accomplish this would really be no different than the sorts of discussions and technical effort that established the program in 1999 through its Framework Agreement and related agreements. We've asked the Technical Steering Committee to take a look at the river below Fresno Weir, particularly where it has stretches of slow moving water to see if more riffles, that are so important to bug production, can be created. It's an engineering problem.

And, as we've seen since all of this began, engineering and policy problems pop up all the time. Working together, we can continue the progress we have made toward the goal of restoring the Kings River to the "Blue Ribbon" fishery for which it was once famous. 

## Fisheries Management Program Puts Its Fishery Habitat Master Plan To Work

A great deal of effort during the Kings River Fisheries Management Program's first seven years was directed toward gathering data and understanding the river's habitat and its needs but this past fall and winter that knowledge was translated into action.

Funding totaling \$400,000 from the program's three partnering agencies—the Kings River Conservation District, Kings River Water Association and California Department of Fish and Game—permitted large numbers of boulders to

*continued on page 4*



*Boulders placed in the river improve habitat by providing shelter from flows for fish.*



# Fish Go 'On Air' To Aid In Tracking Studies, *continued*



CDF&G Warden-Pilot Gary Schales (left) and KRCD's Louie Long get ready for takeoff on a fish reconnaissance flight May 10.

fish were found downstream from Highway 180 and another transmitter, although not found, was triangulated to be somewhere in a field along Mill Creek, leading to speculation it might have been caught by a terrestrial predator.

There are also continuous monitoring telemetry stations located along the river to track upstream and downstream movements.

Lollar said some fish had been found to make movements both ways through a diversion structure in the river, Cobbles Weir, in which the Alta Irrigation District left a bay open to aid fish movement.

The program's objectives include determining:

- Performance and applicability of alternative telemetry methods (e.g., radio and ultrasonic tagging, stationary and mobile monitoring, etc.) within the river and select a preferred method for use in the pilot study.
- Residence time of wild and hatchery produced adult trout after release into the river over a range of seasonal flow conditions.

- Geographic distribution of adult trout within the river.

- Whether other aspects of the fishery monitoring program should be modified to more effectively sample and monitor trout abundance using other fishery sampling techniques.

- Habitat selection preferences within the river including the use of gravel and boulder habitat enhancement projects.

- Movement of adult trout within the river system in response to variation in stream flows.

- Potential for existing weirs to act as barriers or impediments to adult trout migration.

- Mortality or loss of adult trout from the river.

"The study is providing data on a level we have never seen before," Lollar said. 🐟

## Fisheries Management Program, *continued*

be installed for fish shelter from high, swift flows as well as with layers of gravel for trout spawning in parts of the river below Pine Flat Dam.

Heavy equipment was also used to rip cobblestone-laden bottoms in seven reaches of river in order to improve aquatic habitat.

The work, carried out by contractors and KRCD's flood operation and maintenance staff, was all contemplated in the program's Fishery Habitat Master Plan.

Work began November 12 and continued until high water conditions from winter storm events made further construction impossible until next fall.

Since 1999, the Kings River Fisheries Management Program has included pledges from KRCD and KRWA to provide a total of \$100,000 annually for program use. The CDFG pledged to seek a like amount in state funds, which it has done. 🐟



An adult rainbow trout with an implanted transmitter is planted as part of the Fisheries Management Program's Telemetry Study.

### Kings River Fisheries News

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# **APPENDIX H**

Flow Variance Schedule of Flows as Presented at November 28, 2005 meeting of the  
Executive Policy Committee  
(on following pages)

Assumptions

- 1) 4 hour lag transit time from Pine Flat to Cobbles.
- 2) 4 hour drain down of pool behind Cobbles.
- 3) Attempt to meet mean daily 250 cfs release from Pine Flat.

	Time	Desired Flow @ Cobbles Weir cfs	76 Channel Diversion cfs	Pine Flat Release cfs	Mean Daily Pine Flat Release sfd	Mean Daily Pine Flat Release Required sfd
	2400			265		
Day -1	100			265	265	260
	200			265		
	300			265		
	400			265		
	500			265		
	600			265		
	700			265		
	800			265		
	900			265		
	1000			265		
	1100			265		
	1200			265		
	1300			265		
	1400			265		
	1500			265		
	1600			265		
	1700			265		
	1800			265		
	1900			265		
	2000			265		
	2100			265		
	2200			265		
	2300			265		
	2400			265		
Day 1 Training Tuesday Nov. 29	100			230	270	269
	200			195		
	300			195		
	400			195		
	500			195		
	600	0		185		
	700	0	0	185		
	800	0	0	185		
	900	0	0	185		
	1000	185	0	185		
	1100	185	75	185		
	1200	185	75	185		
	1300	185	75	260		
	1400	185	0	360		
	1500	185	0	400		
	1600			400		
	1700			400		
	1800			400		
	1900			400		
	2000			400		
	2100			400		
	2200			290		
	2300			250		
	2400			215		

Assumptions

- 1) 4 hour lag transit time from Pine Flat to Cobbles.
- 2) 4 hour drain down of pool behind Cobbles.
- 3) Attempt to meet mean daily 250 cfs release from Pine Flat.

	Time	Desired Flow @ Cobbles Weir cfs	76 Channel Diversion cfs	Pine Flat Release cfs	Mean Daily Pine Flat Release sfd	Mean Daily Pine Flat Release Required sfd
Day 2 Board Removal Wen. Nov. 30	100			185	282	282
	200			185		
	300			185		
	400			185		
	500			185		
	600	185		185		
	700	185	0	185		
	800	185	75	185		
	900	185	75	185		
	1000	185	75	185		
	1100	185	75	185		
	1200	185	75	185		
	1300	185	75	185		
	1400	185	75	260		
	1500	0	0	410		
	1600	0		410		
	1700			410		
	1800			410		
	1900			410		
	2000			410		
	2100			410		
	2200			410		
	2300			410		
	2400			410		
Day 3 Thursday 1-Dec	100			300	263	260
	200			265		
	300			265		
	400			265		
	500			265		
	600			265		
	700			265		
	800			260		
	900			260		
	1000			260		
	1100			260		
	1200			260		
	1300			260		
	1400			260		
	1500			260		
	1600			260		
	1700			260		
	1800			260		
	1900			260		
	2000			260		
	2100			260		
	2200			260		
	2300			260		
	2400			260		



KINGS RIVER WATER ASSOCIATION  
PINE FLAT DAM RELEASE SCHEDULE  
Nov. 28 to Dec. 1, 2005

<u>Date</u>	<u>Time</u>	<u>From</u>	<u>To</u>	<u>Change</u>
Nov. 28, 2005	2400	265	230	-35
Nov. 29, 2005	0100	230	195	-35
Nov. 29, 2005	0700	195	185	-10
Nov. 29, 2005	1200	185	260	+75
Nov. 29, 2005	1300	260	360	+100
Nov. 29, 2005	1400	360	400	+40
Nov. 29, 2005	2100	400	290	-110
Nov. 29, 2005	2200	290	250	-40
Nov. 29, 2005	2300	250	215	-35
Nov. 29, 2005	2400	215	185	-30
Nov. 30, 2005	1300	185	260	+75
Nov. 30, 2005	1400	260	410	+150
Nov. 30, 2005	2400	410	300	-110
Dec. 1, 2005	0100	300	265	-35