KINGS RIVER FISHERIES MANAGEMENT PROGRAM
ANNUAL TECHNICAL REPORT
2008-2009

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Final Draft
Issued: December 2009

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Note: Photo on the cover of the report is of a fisherman enjoying his day along the Kings River.

EXECUTIVE SUMMARY

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 ten 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 2008 and May 2009 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, including Water Quality Monitoring activities dating back from October of 2006.

Hydrologic conditions and Pine Flat Reservoir operations and flows within the lower river during 2008-2009 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;

- Results of daily flow measurements below Fresno Weir from June 2008 through May 2009 demonstrated **100% compliance** with the instream flow requirements as outlined in the Framework Agreement, with the majority of days greatly exceeding these minimum flow requirements;

- 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;

- Flows measured at Fresno Weir were subject to the levels representing a dry hydrologic year of the Exhibit C flow schedule (95 cfs at Fresno Weir, for a water year less than **2,100,000** acre feet);

- Results of daily flow measurements at Fresno Weir from June 2008 through May 2009 resulted in 10 days in which flows did not reach the 95 cfs target at Fresno Weir as outlined in the Framework Agreement. Of the 10 days, 8 occurred during the flow variances requested for performing fall monitoring work (Electrofishing activities) from November 11-14 and November 22-25, 2008. On January 10-11, 2009, temperatures dropped below the freezing point, and pumpers along the river below Pine Flat Dam

began taking water to protect their crops without notifying the Association of their activities. As such, flows on these days at Fresno Weir were 94 and 93 cfs respectively. Corrective action was taken, and by January 12th, the flow at Fresno Weir was 114 cfs;

- During the late summer and fall of 2008, the Turbine Bypass was utilized heavily for temperature and dissolved oxygen management, by blending releases between the turbine bypass and the low-level sluices from the Pine Flat Dam. 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

- In December of 2006, the KRWA member units signed internal agreements that will govern Exhibit D contributions in the future. Prior to signing these agreements, the KRWA member units provided Exhibit D flows under draft agreements during the 2005-2006 and 2006-2007 water years. The TSC supports and applauds the activities of the KRWA in completing these essential agreements.

Results of water quality monitoring within Pine Flat Reservoir and the lower Kings River during 2008-2009 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 2008-2009 exceeded 7.0 mg/L.

- 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 2008-2009;

- Results of the 2008-2009 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

- Water quality data was collected on June 17, 2008, July 16, 2008, August 14, 2008, February 17, 2009 (storm-water event), and March 26, 2009 for the Ag-Waiver Program. In all cases, sampling showed evidence of good water quality in the Kings River, with all detected constituents within EPA criterion for the protection of freshwater aquatic life. The Technical Steering Committee will continue to review and analyze the data collected by the Ag-Waiver program on an annual basis.

The FMP continued habitat enhancement efforts on the lower Kings River during 2008-2009 by the following actions:

- Applied for Streambed Alteration (1600) Permit and CEQA Permit to complete construction of the Large Woody Debris Pilot Study; and

- Completed Cultural Resources Survey and applied for Letter of Permission as part of the FMP's 404 Permit from USACE.

The stocking of fish in State waters is the responsibility of the California Department of Fish and Game. During the 2008-2009 reporting period, catchable and sub-catchable size rainbow trout were stocked in the Kings River between Pine Flat Dam and Fresno Weir. Due to a lack of availability, no trout eggs were supplied to the program by the CDFG for incubation and hatching in the lower river during the 2008-2009 reporting period. Catchable size rainbow trout were also planted in Pine Flat Reservoir and Avocado Lake. A brief summary of 2008-2009 stocking includes:

- Whitlock Vibert Boxes (WVB) were used during this reporting period to hatch eyed rainbow trout eggs, inside the streamside incubators, using eggs purchased through Troutlodge Inc.;

- These incubators were stocked with 150,000 eyed rainbow trout eggs purchased from Troutlodge Inc. in December of 2008, and again in Feburary of 2009 with 150,000 triploid eggs as part of the Incubator Effectiveness Study during the 2008-2009 program

year. The purchase of rainbow trout eggs will continue through the program in the near future, and will include triploid eggs for the Incubator Effectiveness Study as well;

- During the 2008-2009 program year, a total of 4,055 pounds (27,822 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. These fish were provided by the CDFG at no cost to the FMP;

- On October 22, 2008 the San Joaquin Hatchery planted 14,592 golden trout (GT) fingerlings (114 pounds) in the lower river. There currently is no annual allotment for GT 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 17,200 pounds of catchable sized trout (28,000 fish) were stocked in the lower Kings River during this reporting period;

- The CDFG San Joaquin Hatchery stocked 8,082 pounds (4,883 fish) of super catchable rainbow trout in the lower Kings River. Super catchable trout are defined as trout greater than one pound;

- The trophy trout program continued into the 2008-2009 program year with 1,236 trophy trout (5,546 pounds) planted in addition to the regular catchable allotment. Trophy trout are designated as trout greater than 2.99 pounds each;

- The CDFG San Joaquin Hatchery stocked 31,000 sub-catchable rainbow trout (4,750 pounds) in Pine Flat Reservoir between January 14, 2009 and March 11, 2009;

- Between January 14, 2009 and November 14, 2009, 25,500 pounds (41,400 trout) were planted in Pine Flat Reservoir. The catchable trout averaged around ½ pound each (2 fish/pound) at the time they were stocked in the reservoir;

- The CDFG San Joaquin Hatchery stocked 9,080 pounds (7,567 trout) of super catchables (greater than one pound each) in Pine Flat Reservoir on December 4th and December 24, 2008;

- The CDFG San Joaquin Hatchery stocked 267 trophy trout (999 pounds) of trophy trout (greater than 2.99 pounds each) in Pine Flat Reservoir on January 14, 2009;

- The CDFG San Joaquin Hatchery stocked 42,612 kokanee salmon fingerlings (636 pounds) in Pine flat Reservoir on June 2, 2008;

- Chinook were not stocked in Pine Flat from June 1, 2008 through May 31, 2009. The statewide allotment for Chinook was down 50% and due to water conditions in Pine Flat Reservoir, the decision was made to not stock Chinook in Pine Flat Reservoir. The Chinook were utilized in other area reservoirs with more favorable conditions. Pine Flat Reservoir currently has a Chinook allotment scheduled for 2009-2010; and

- In 2008-2009 reporting period, the San Joaquin Hatchery planted 2,446 pounds (1,891 trout) of super-catchable size rainbow trout (greater than one pound each) and 3,450 pounds (6,975 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 2008-2009 monitoring program have shown:

- Analysis of the benthic macroinvertebrate data collected between November 2007 and February 2008, was completed during the 08-09 Program year. A final report is available in the KRCD library.

- Data collection for the FMP's *Habitat Selection, Behavioral Movement, and Fate of Adult Rainbow Trout within the Kings River Downstream of Pine Flat Dam* study was completed in July of 2008. More than 10 million data points were collected and are currently being analyzed.

- The FMP purchased 150,000 triploid rainbow trout eggs in an effort to study the contribution of streamside incubators to trout abundance in the Kings River below Pine Flat Dam.

- The sixth Annual Technical Report was released in June 2008; and

- There were 40 permitted bass tournaments , with 36 tournaments with complete data sets at Pine Flat Reservoir during the 2008-2009 program year. The number of participants was 994 and the average size of bass returned for Weigh-In was 1.19 pounds.

Public education and outreach activities during 2008-2009 included:

- An issue of Kings River Fisheries News newsletter was published and distributed in the early Fall of 2008 with the assistance of the Public Advisory Group;

- KRWA has developed a real-time telemetry system for monitoring water temperature and streamflow at Fresno Weir. During the summer and fall of 2008 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 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;

- An Ad-Hoc committee as approved by the Ex-Com began meeting in April of 2007 on development of public outreach materials for the Fisheries Management Program. During the 2008-2009 program year, the public outreach material development was concluded, and a speaker's bureau was initiated;

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

- The PAG worked extensively with the 2009 Kings River Day event, to provide valuable historical, operational, scientific and recreational opportunities to hundreds of 6th graders. The event was successfully held on May 15, 2009; and

- Local groups of fisherman worked on establishing a contract with the California Department of Fish and Game's Enforcement branch to commit additional funds for Directed Enforcement Actions targeting the Kings River Fisheries Management Zone during the 2008-2009 program year. Previous actions, such as the one on March 15, 2008, resulted in 26 citations and 20 warnings, along with 178 public contacts by Fish and Game personnel in an effort to curtail illegal fishing activities in the Fisheries Management Zone. It is the hope of the fisherman that future enforcement efforts will yield similar results. These activities were officially outside of the Kings River Fisheries Management Program, but the FMP does thank Fish and Game for the additional efforts.

1.0 INTRODUCTION

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 nine 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 2008 and May 2009 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;

- Water Quality monitoring testing multiple constituents, including pesticides, at Fresno Weir to supplement data available from the Irrigated Lands Program. This sampling protocol included monthly samples taken from October 2006-October 2007 at Fresno Weir as per the suggestions from the 2004-2005 Water Quality Report. The results of this testing, and the results from the Irrigated Lands Program, are included in this annual report;

- 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

- 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.

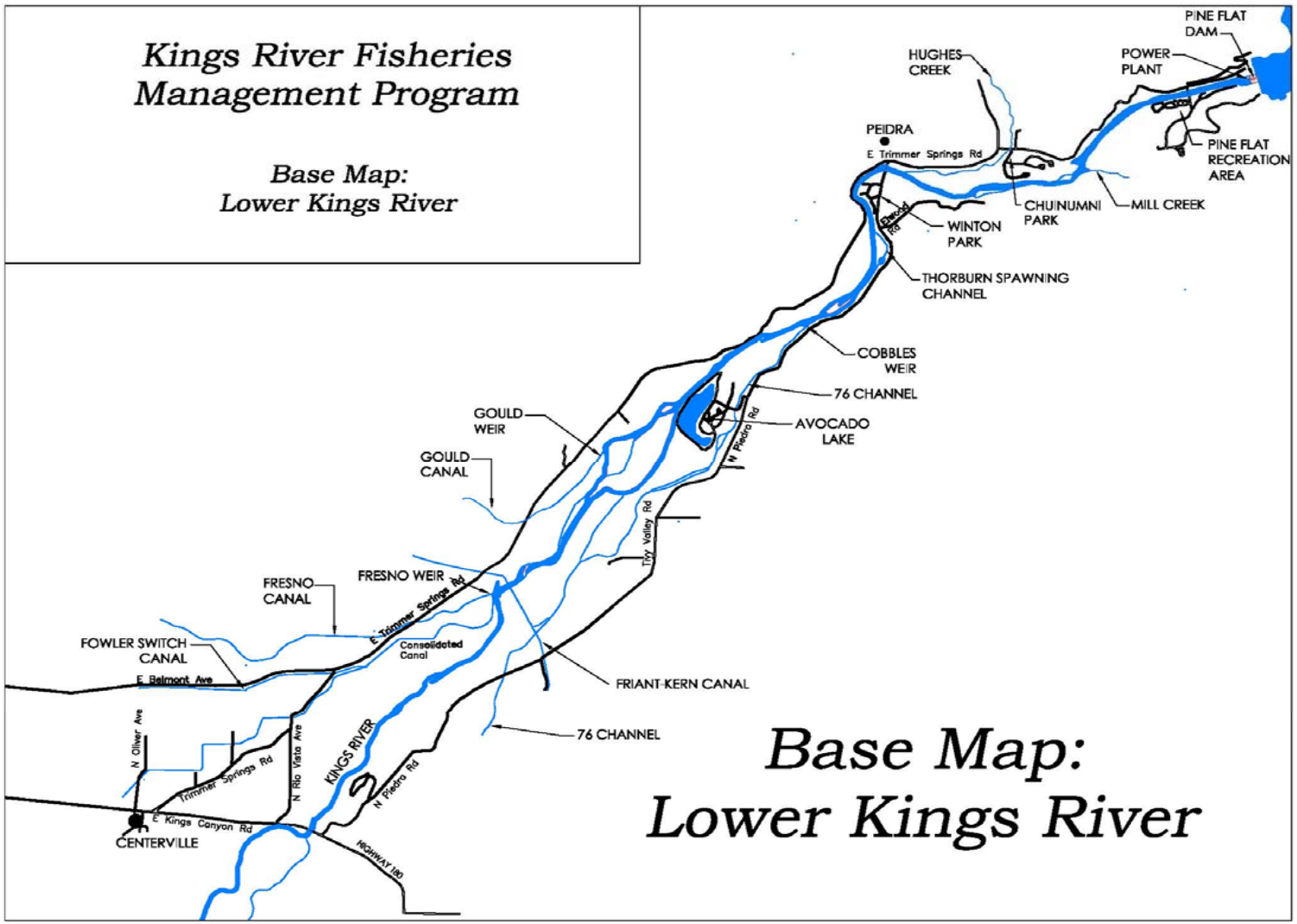

Figure 1-1. Map of the lower Kings River and key geographic locations.

The following report presents a compilation and synthesis of information regarding these habitat enhancements, trout population enhancements, and monitoring activities during 2008-2009. 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 eighth 5-Year Implementation Plan (for program year 2008-2009) was presented and approved by the Executive Committee at their meeting on October 8, 2008. This 5-Year Plan provided the basic direction for the Technical Steering Committee and program activities through the year.

The ExCom met twice during the program year, on October 8, 2008 and April 23, 2009, to hear reports from the TSC and the public, and to provide direction to the TSC. The TSC met on an ongoing basis to continue their work on program development and administration. The PAG, with Hank Urbach as Chairman, 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, the fourth in August 2007, the fifth in February of 2008, and the sixth in April of 2009. This report represents the seventh in the series, and covers the program year between May 2008 and May 2009.

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, 2008 through May 31, 2009 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):

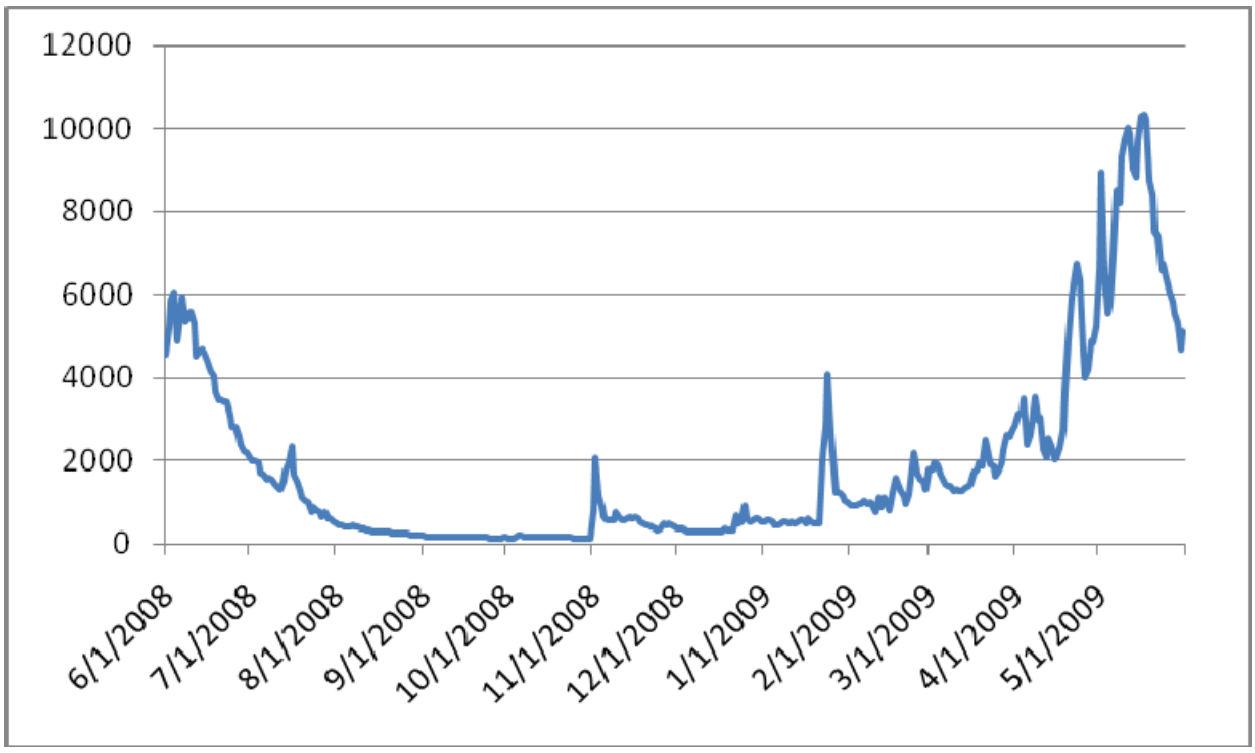

Figure 2-1. Daily inflow into Pine Flat Reservoir in cfs between June 1, 2008 and May 31, 2009.

2.2 RESERVOIR STORAGE

Daily reservoir water storage volume and water surface elevation in Pine Flat Reservoir from June 2008 through May 2009 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 2009.

Period	Annual Runoff (TAF)	Percent Water Year
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%
October 2006 – September 2007	679	39%
October 2007 – September 2008	1,216	74%
October 2008 - September 2009	1,348	79%

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. Average daily flow in the lower Kings River from June 2008 through May 2009 ranged from 100 to 6,433 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 2008 through May 2009 demonstrated **100% compliance** with the instream flow requirements as outlined in the Framework Agreement, with the majority of days greatly exceeding these minimum flow requirements. These results are shown in Figure 2-4.

Flows measured at Fresno Weir were subject to the levels representing a dry hydrologic year of the Exhibit C flow schedule (95 cfs at Fresno Weir, for a water year less than **2,100,000** acre feet), and the corresponding results are shown in Figure 2-5. Results of daily flow measurements at Fresno Weir from June 2008 through May 2009 resulted in 10 days in which flows did not reach the 95 cfs target at Fresno Weir as outlined in the Framework Agreement. Of the 10 days, 8 occurred during the flow variances requested for performing fall monitoring work (Electrofishing activities) from November 11-14 and November 22-25, 2008. On January 10-11, 2009, temperatures dropped below the freezing point, and pumpers along the river below Pine Flat Dam began taking water to protect their crops without notifying the Association of their activities. As such, flows on these days at Fresno Weir were 94 and 93 cfs respectively.

Corrective action was taken, and by January 12th, the flow at Fresno Weir was 114 cfs. These results are shown in Figure 2-5.

While the 2008-2009 program year did have 10 days of flows that were below the instream flow requirement at Fresno Weir, there were 24 days in which the Exhibit C targets at Fresno Weir were reached exactly. In every single instance other than these 34 days, the flow requirements at Fresno Weir were exceeded, meaning that the flow was at 96 cfs or more for every other day during the low flow period. Information on daily water releases from Pine Flat Reservoir and daily flows at Fresno Weir are summarized in Appendix A.

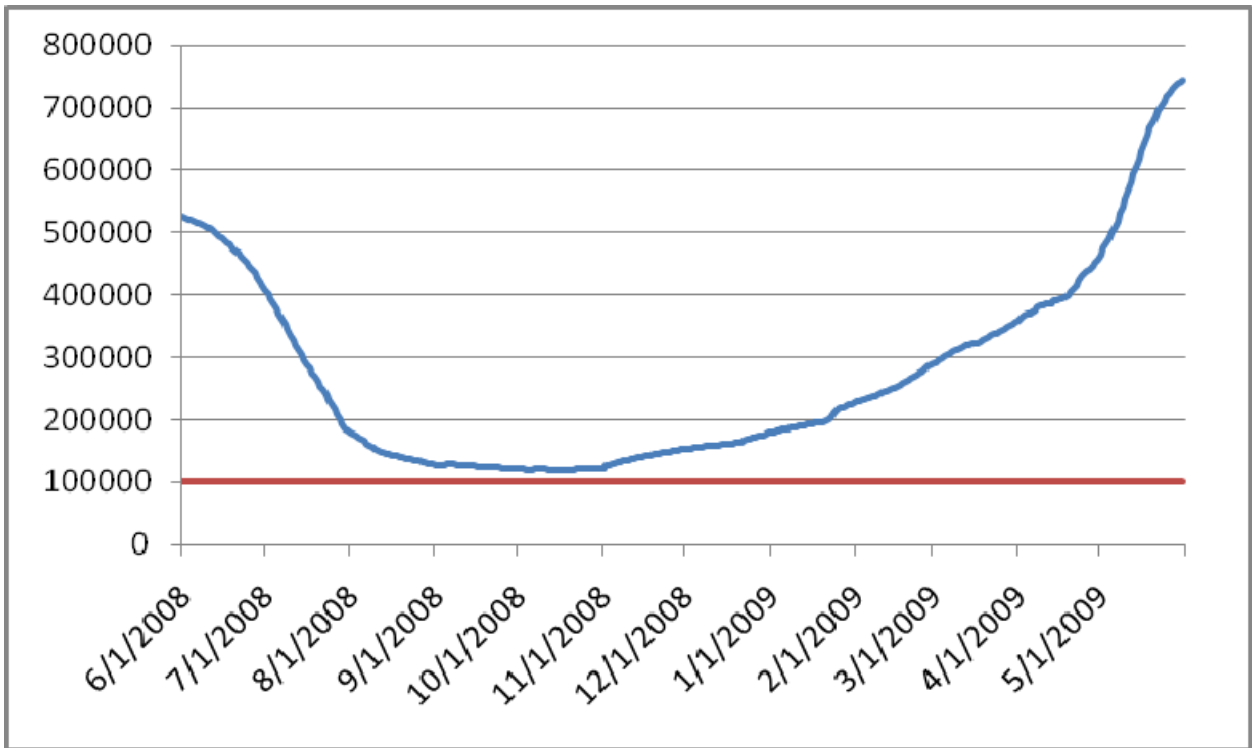

Figure 2-2. Daily storage volume in Pine Flat Reservoir from June 2008 to May 2009.
Note: ----- Storage values in acre-feet volumes. Red Line indicates Temperature Control Pool of 100,000 acre-feet.

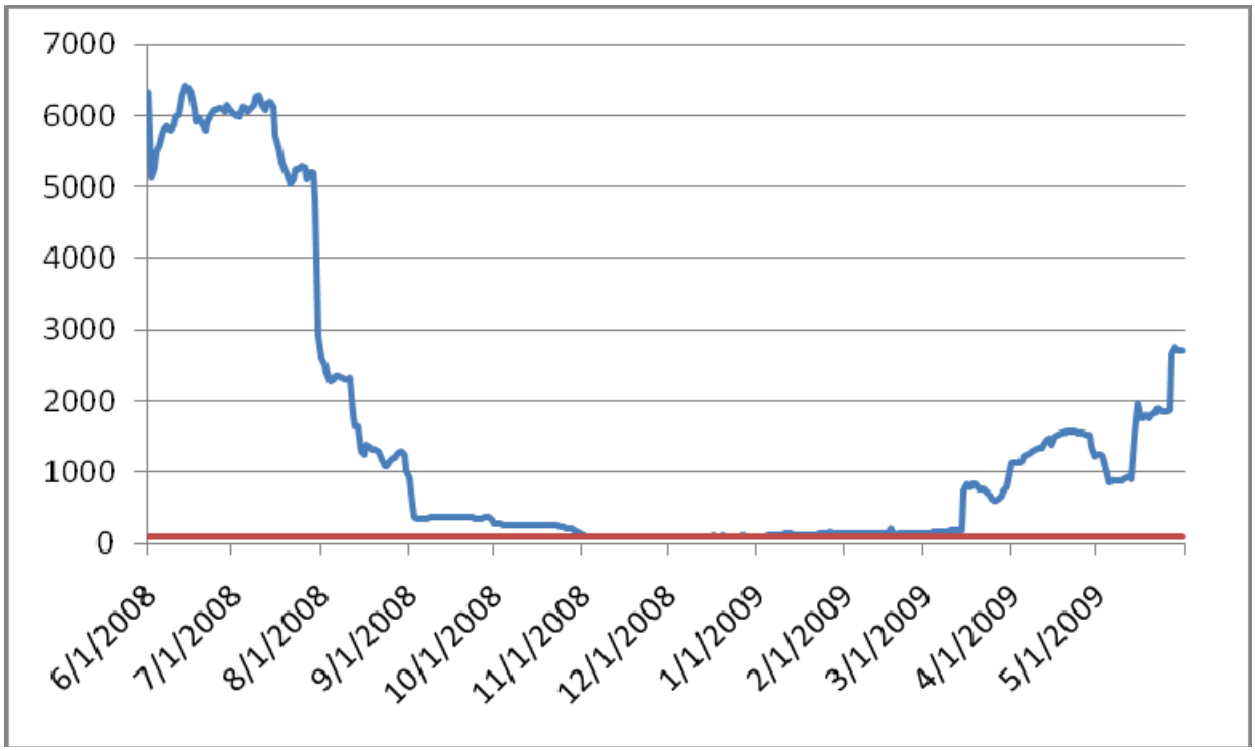

Figure 2-3. Average daily water releases from Pine Flat Reservoir to the lower Kings River between June 2008 and May 2009. Note: ----- Releases represented as flow rate in cfs. Red Line represents minimum flow rate as established by Exhibit C criteria (cfs).

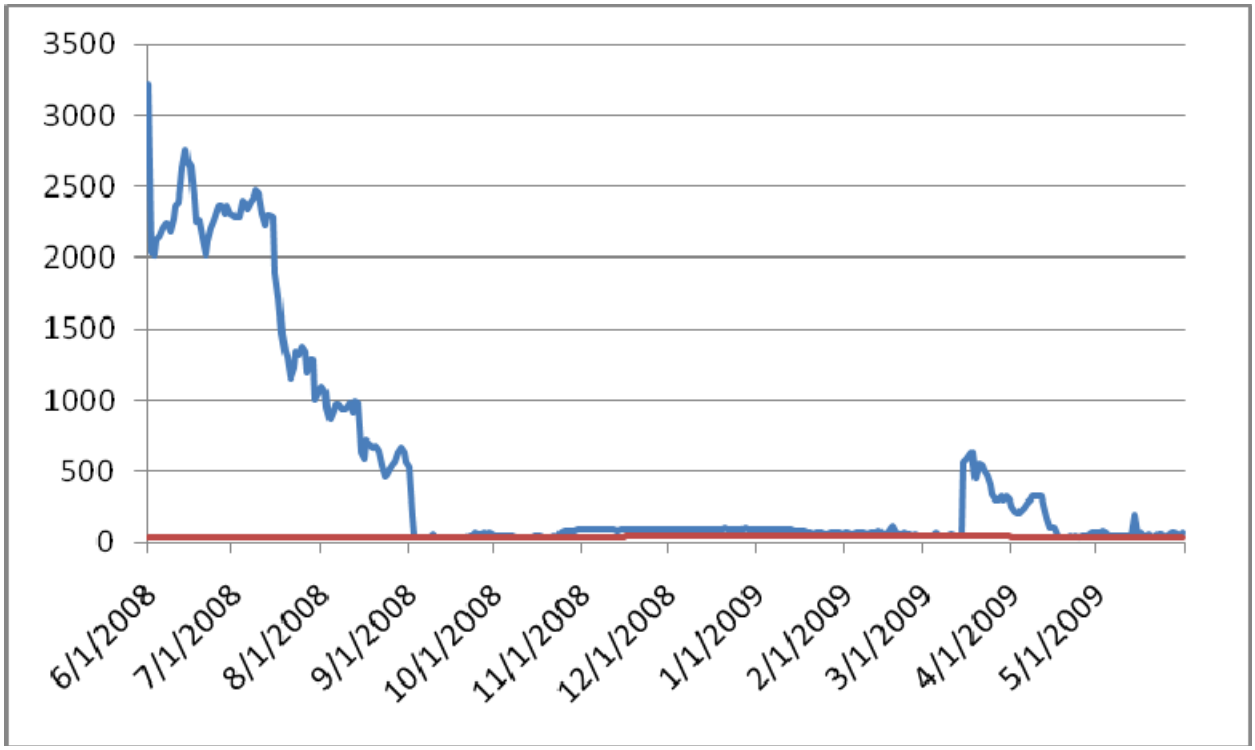

Figure 2-4. Average daily flows in the Kings River below Fresno Weir from June 2008 through May 2009. Note: ----- Flow rate represented in cfs. Red Line represents minimum flow rate as established by Exhibit C criteria (cfs).

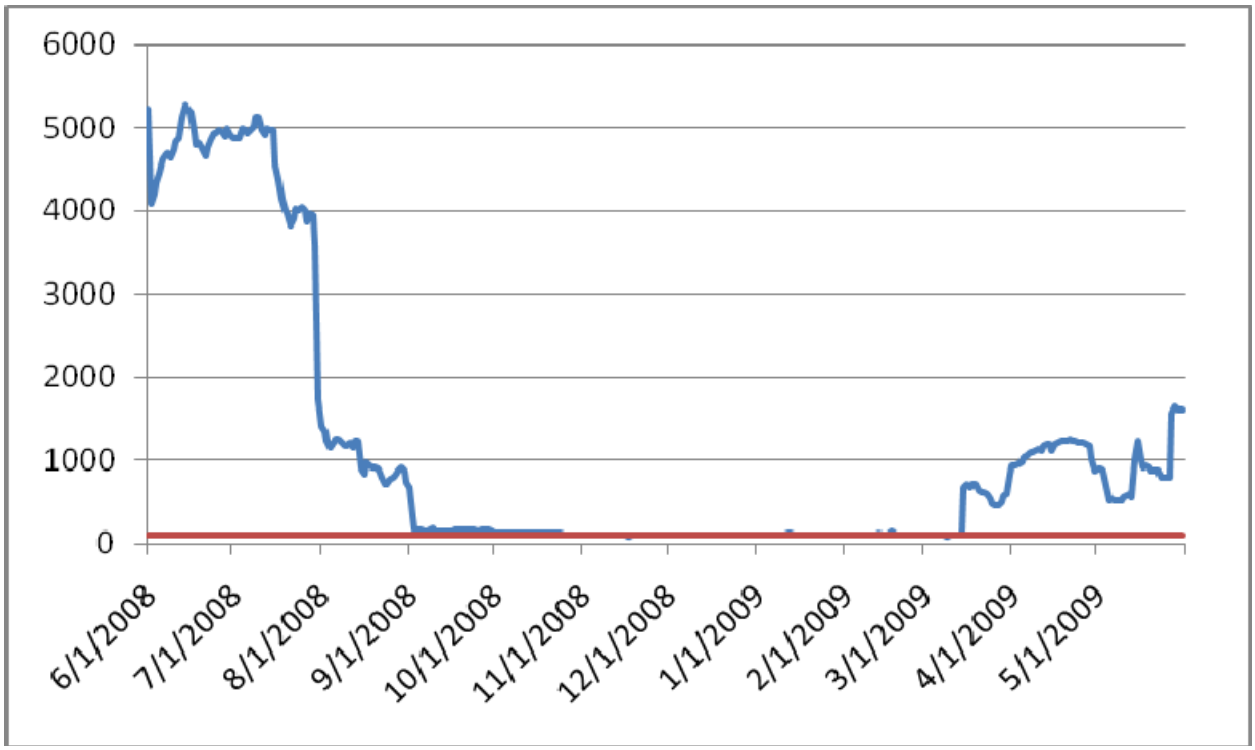

Figure 2-5. Average daily flows in the Kings River at Fresno Weir from June 2008 through May 2009.
Note: ----- Flow rate represented in cfs. Red Line represents minimum flow rate as established by the enhanced Exhibit C criteria (cfs).

2.4 TELEMETRY SYSTEM

During 2008-2009, KRWA continued the use of a real-time (telemetry) flow monitoring stations at Fresno Weir and at Dennis Cut. These systems provide 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 late summer and fall of 2008, the Turbine Bypass was utilized heavily for temperature and dissolved oxygen management, by blending releases between the turbine bypass and the low-level sluices from the Pine Flat Dam. Many thanks are due to the folks at the Army Corps of Engineers and the Kings River Conservation District for operating outside of their established criterion in gate and valve openings for the protection of the Kings River Fishery.

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. Some ideas under discussion in the KRWA Exhibit D committee 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 two consecutive years in the fall and winter of 2005 and 2006. These flows were triggered by the larger than normal water-years in 2004-2005 (149% WY) and 2005-2006 (173% WY), and the KRWA Member Units voluntarily provided the Exhibit D flows in the following water-years (2006-2006 and 2006-2007).

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

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

In December of 2006, the KRWA member units signed internal agreements that will govern Exhibit D contributions in the future. Prior to signing these agreements, the KRWA member units provided Exhibit D flows under draft agreements during the 2005-2006 and 2006-2007

water years. The TSC supports and applauds the activities of the KRWA in completing these essential agreements.

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. These reports were issued during the summer and fall of 2008.

2.8 SUMMARY AND DISCUSSION

Hydrologic conditions and Pine Flat Reservoir operations and flows within the lower river during 2008-2009 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;

- Results of daily flow measurements below Fresno Weir from June 2008 through May 2009 demonstrated **100% compliance** with the instream flow requirements as outlined in the Framework Agreement, with the majority of days greatly exceeding these minimum flow requirements;

- 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;

- Flows measured at Fresno Weir were subject to the levels representing a dry hydrologic year of the Exhibit C flow schedule (95 cfs at Fresno Weir, for a water year less than **2,100,000** acre feet);

- Results of daily flow measurements at Fresno Weir from June 2008 through May 2009 resulted in 10 days in which flows did not reach the 95 cfs target at Fresno Weir as outlined in the Framework Agreement. Of the 10 days, 8 occurred during the flow variances requested for performing fall monitoring work (Electrofishing activities) from November 11-14 and November 22-25, 2008. On January 10-11, 2009, temperatures dropped below the freezing point, and pumpers along the river below Pine Flat Dam began taking water to protect their crops without notifying the Association of their activities. As such, flows on these days at Fresno Weir were 94 and 93 cfs respectively. Corrective action was taken, and by January 12th, the flow at Fresno Weir was 114 cfs;

- During the late summer and fall of 2008, the Turbine Bypass was utilized heavily for temperature and dissolved oxygen management, by blending releases between the turbine bypass and the low-level sluices from the Pine Flat Dam. 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

- In December of 2006, the KRWA member units signed internal agreements that will govern Exhibit D contributions in the future. Prior to signing these agreements, the KRWA member units provided Exhibit D flows under draft agreements during the 2005-2006 and 2006-2007 water years. The TSC supports and applauds the activities of the KRWA in completing these essential agreements.

3.0 WATER QUALITY

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. 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 mile upstream of the dam using a Hydrolab 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 May 2008 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 2008 through May 2009 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.

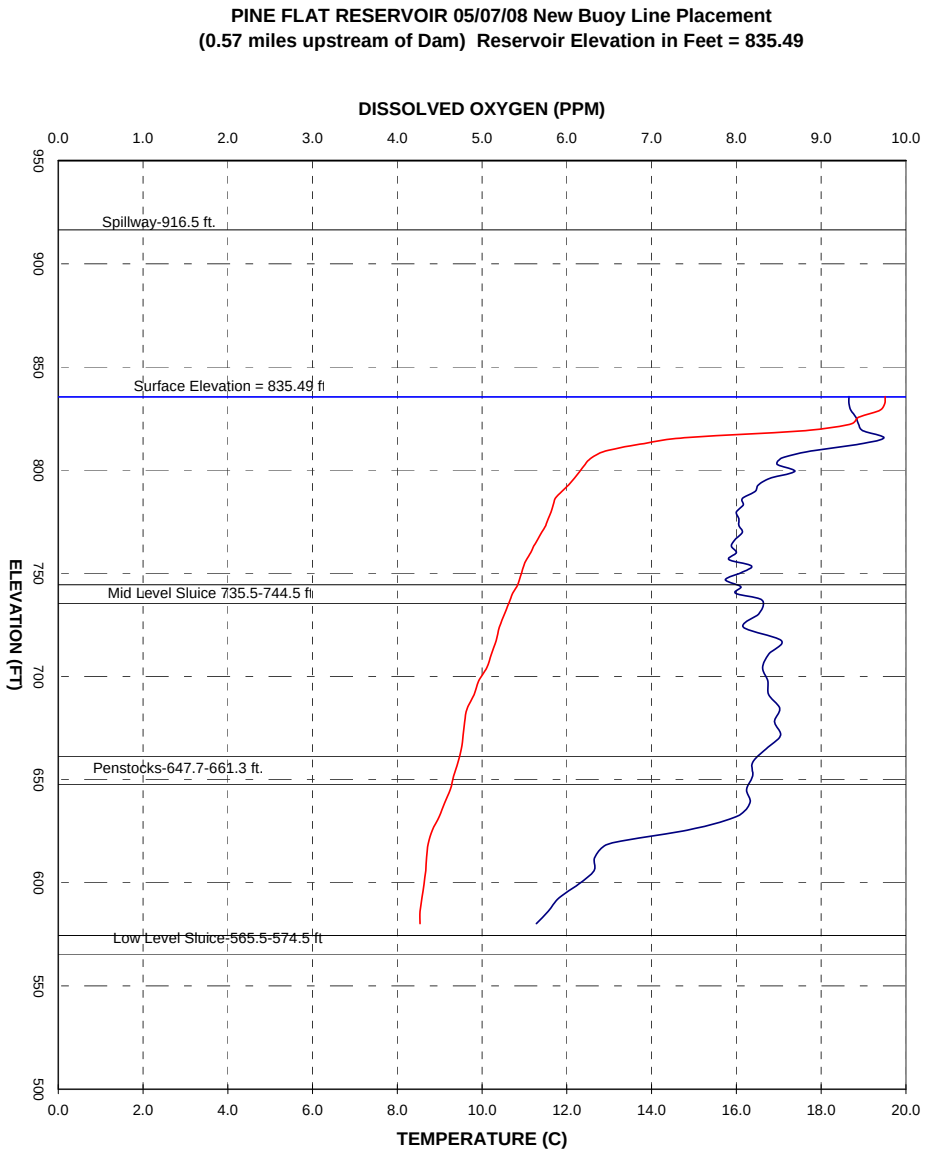

Figure 3-1. May 2008 vertical reservoir temperature and dissolved oxygen profile measurements at Pine Flat Reservoir.

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 ± 0.5˚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 June 2008-May 2009. Results of water temperature monitoring at other locations (Avocado Side and Gould Weir Channel) within the river are included in Appendix D

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 2008-2009 study period. As a general guideline, water temperatures within the range from approximately 15-18˚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˚C or maximum daily temperatures approach or exceed 25˚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

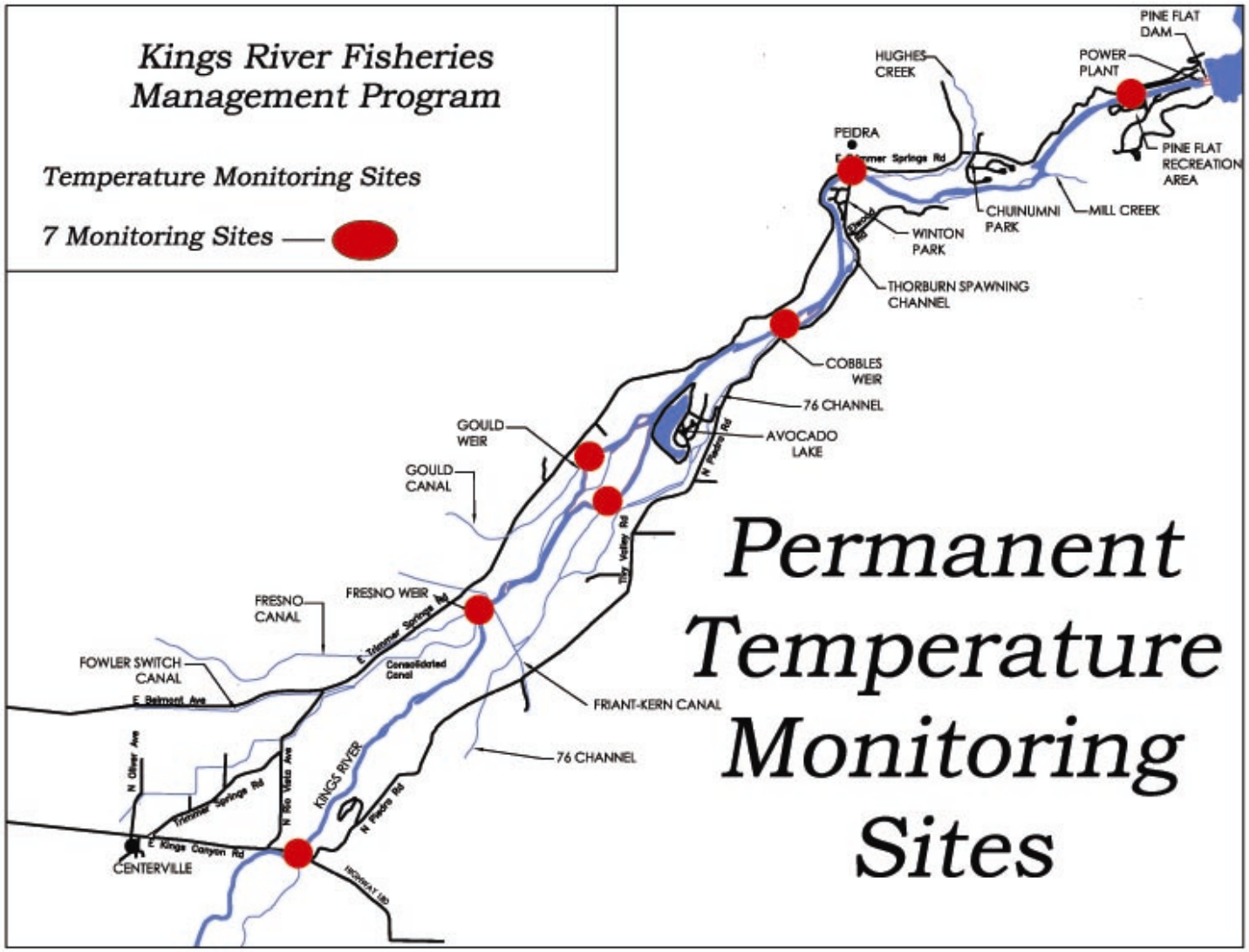

Figure 3-2. Permanent water temperature monitoring locations on the lower Kings River.

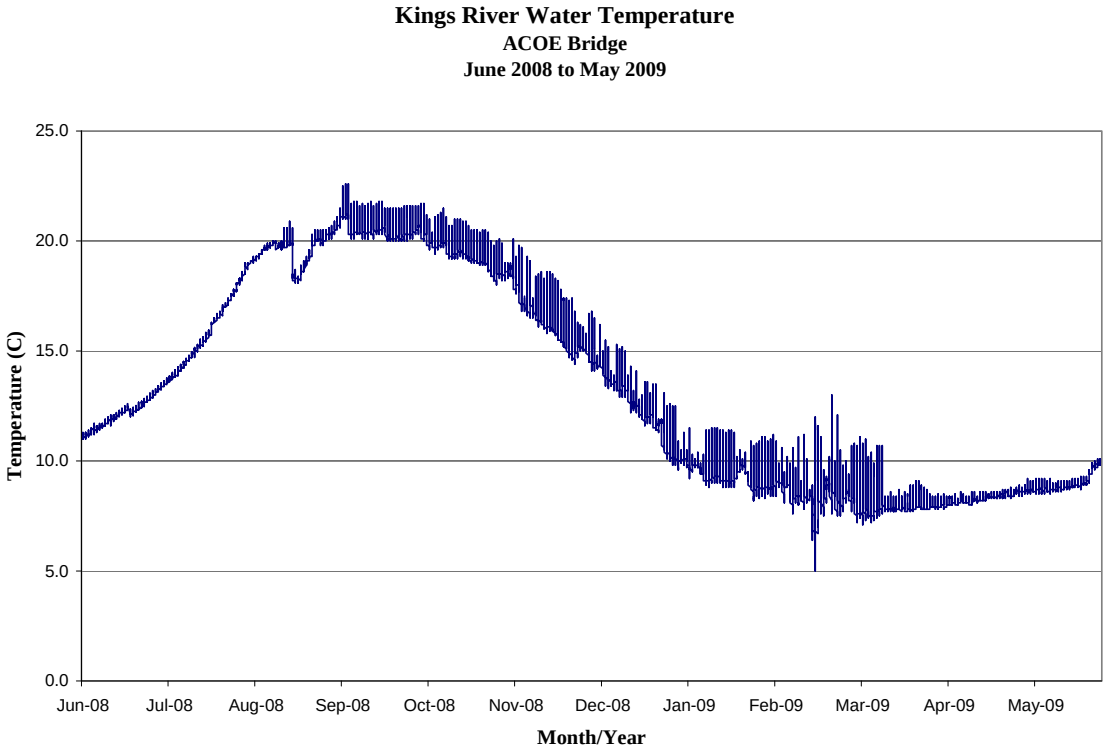

Figure 3-3. Hourly water temperature monitoring results, Army Corps of Engineers Bridge.

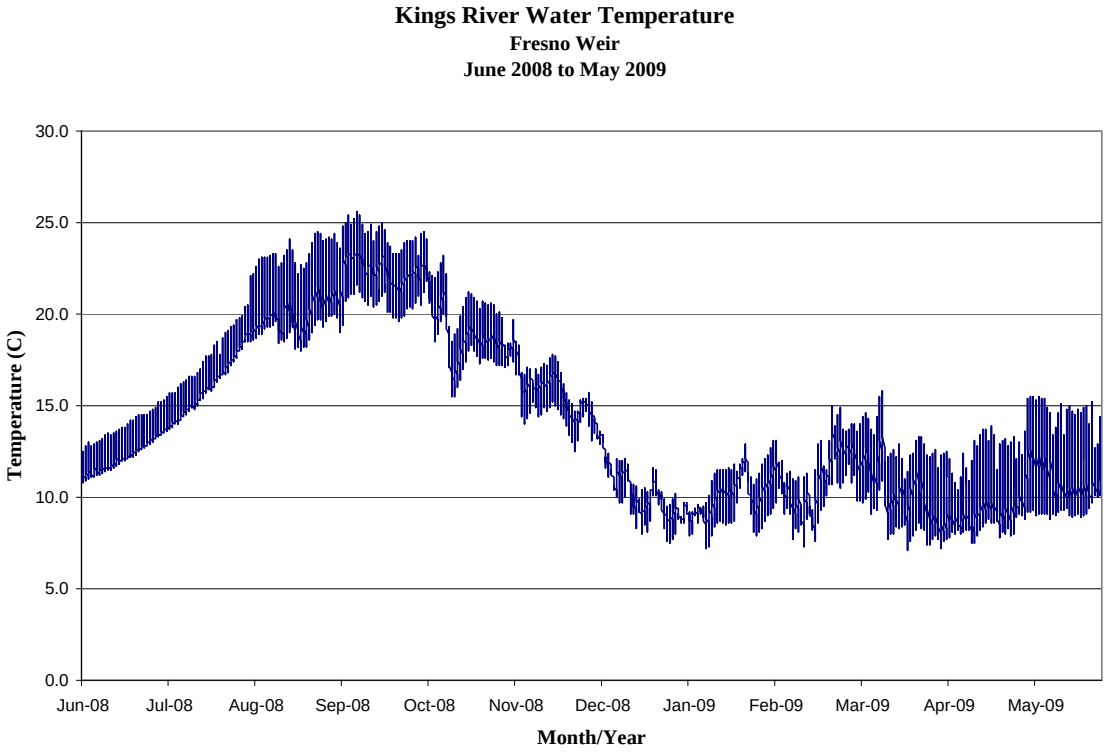

Figure 3-4. Hourly water temperature monitoring results at Fresno Weir.

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 2008 through May 2009 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 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 ± 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. Results of dissolved oxygen measurements at the ACOE Bridge during the period from May 2008 through May 2009 are presented in Figure 3-6. Additional 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 2008-2009, 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 2008" (KRCD 2009) 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 2008. 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.

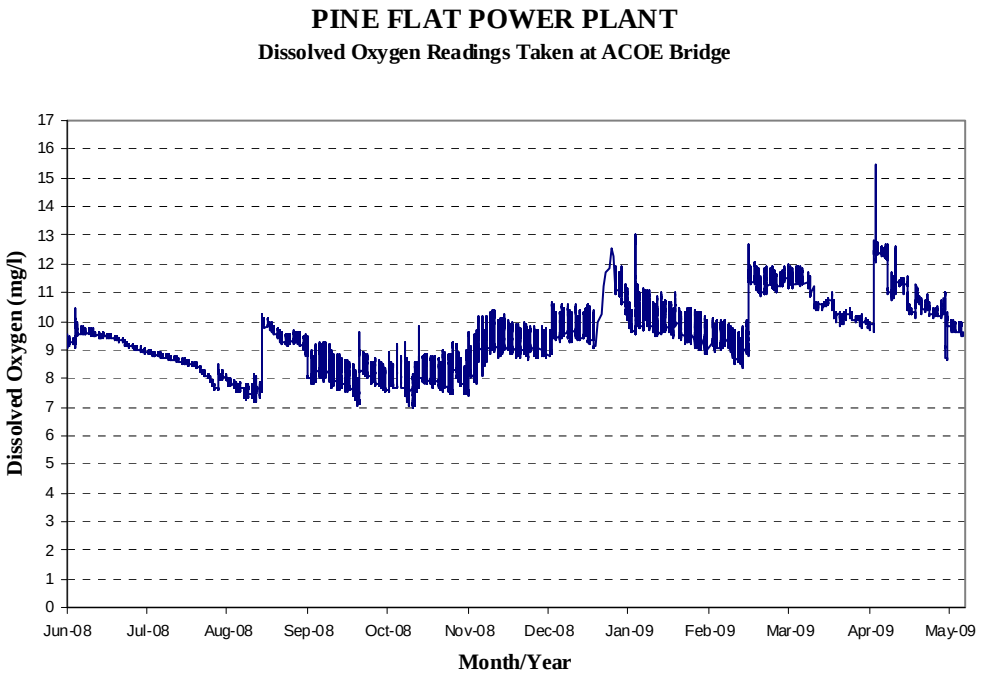

Figure 3-6. Results of dissolved oxygen measurements at the Army Corps Bridge from May 2008 through May 2009.

3.5 CONSTITUENT MONITORING

As per the 2004-2005 and 2006-2007 Water Quality reports, data collected from the Ag-Waiver program on potential water quality constituents are analyzed by the Technical Steering Committee on an annual basis. For this program year, data was collected at the Manning Avenue bridge, and includes data from irrigation season, storm-water events, and non-irrigation season. A duplicate sample was also collected and analyzed for the program. The raw data-set is included in Appendix E.

Water quality data was collected on June 17, 2008, July 16, 2008, August 14, 2008, February 17, 2009 (storm-water event), and March 26, 2009 for the Ag-Waiver Program. In all cases, sampling showed evidence of good water quality in the Kings River, with all detected constituents within EPA criterion for the protection of freshwater aquatic life.

One minor difference in the results of this testing versus testing performed in 2004-2005 and 2006-2007 was the presence of Diuron, an organophosphate, in the storm-water sample of February 27, 2009. In both the primary and duplicate sample, Diuron was detected at 0.22 ppb and 0.30 ppb respectively. According to the EPA's most recent analysis on Diuron, (July 30, 2003, available at http://www.epa.gov/espp/litstatus/effects/diuron_analysis_final2.pdf) the most sensitive Rainbow Trout species began to show mild effects of toxicity at 16ppm, or roughly 53,000 times the concentration level of what was detected in the samples. Thus, while it would be preferred to see a non-detect under the Diuron column, the levels detected are not alarming.

Overall, evidence of good water quality was evident for all testing periods, and the Technical Steering Committee will continue to review and analyze the data collected by the Ag-Waiver program on an annual basis.

3.6 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 2008-2009 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 2008-2009 exceeded 7.0 mg/L.

- 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 2008-2009;

- Results of the 2008-2009 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

- Water quality data was collected on June 17, 2008, July 16, 2008, August 14, 2008, February 17, 2009 (storm-water event), and March 26, 2009 for the Ag-Waiver Program. In all cases, sampling showed evidence of good water quality in the Kings River, with all detected constituents within EPA criterion for the protection of freshwater aquatic life. The Technical Steering Committee will continue to review and analyze the data collected by the Ag-Waiver program on an annual basis.

4.0 HABITAT ENHANCEMENT

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 2008-2009 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 2008-2009 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 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 river-wide 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. An application for a Letter of Permission (LOP) to complete habitat enhancement work under the FMP's Clean Water Act Section 404 permit was submitted to the U.S. Army Corps of Engineers. Applied Earthworks, Inc. (AEI) was contracted to conduct a Cultural Resources Survey of the proposed materials staging areas along the project area as part of the requirements for the LOP application. The activities were conducted under Element C-2004-10: River-wide Permit for Fish Habitat Projects of the 5-Year Implementation Plan.

4.1.2 Gravel Placement

No activities were conducted under Element C-2007-1: Fishery Habitat Master Plan of the 5-Year Implementation Plan.

4.1.3 Boulder Placement

No activities were conducted under Element C-2007-1: Fishery Habitat Master Plan of the 5-Year Implementation Plan.

4.1.4 Placement of Half Logs in the Thorburn Channel

No habitat work was completed on the Thorburn Channel.

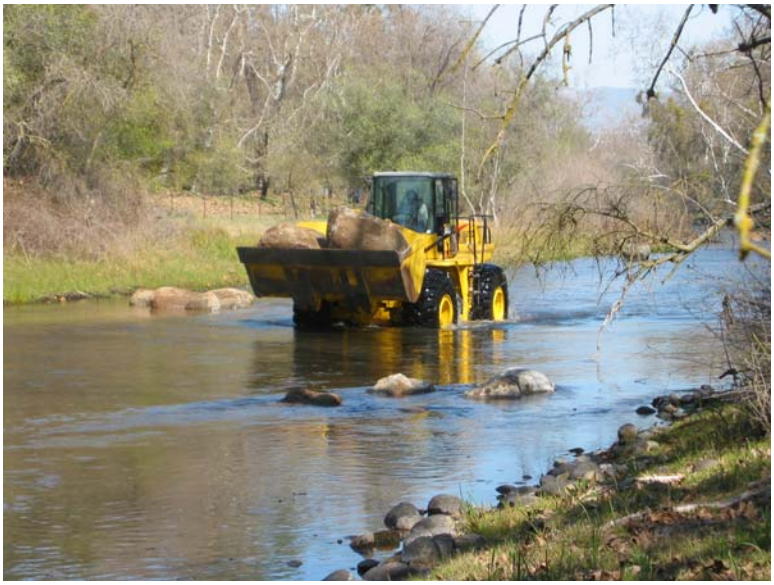

Figure 4-1. Placing boulders near Avocado Lake County Park

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 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-2007-5: Lower Kings River Habitat Conservation Framework of the 5-Year Implementation Plan.

Figure 4-2. Logs providing cover in Thorburn Spawning Channel

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-2007-6: Development of a Fisheries and Habitat Improvement Plan of the 5-Year Implementation Plan.

4.1.8 Development of Exhibit D Flows

Exhibit D flows were not implemented in the fall and winter of 2008. The activities were conducted under Element N-2004-1: Development of Exhibit D Flows of the 5-Year Implementation Plan.

4.1.9 Large Woody Debris Pilot Study

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 is awaiting approval of the Streambed Alteration (1600) and CEQA permits. These activities were conducted under Element C-2007-14: Reconnaissance Investigation of Large Woody Debris (LWD) on the Kings River.

4.2 PINE FLAT RESERVOIR

The major fish habitat improvement work completed during this report period occurred between Deer Creek and Island Park. The improvements consisted of a series of concrete anchors measuring about 2 ft x 6 ft by 2 ft high being placed at strategic locations in the area of the lake bottom. Aviation cable of 3/16-inch stainless steel was strung between the concrete anchors to form a grid for attaching tree and bush cover. The entire area affected by the project was approximately 100 by 400 feet.

Wire gabions filled with Manzanita brush that were prepared last year were moved to a site in Sycamore Cove where they joined approximately 90 other gabions already installed as fish habitat structures.

Planting seed of both winter wheat and barley were conducted at three locations including Deer Creek and Island Park and also Edison Point near Windy gap. The growth of the grasses was very good and much enhanced by the late rains. This should be excellent habitat for warm water species of fishes.

The CDFG biologist previously assigned to this project was redirected to other projects. Personnel from the ACOE took the lead in overseeing that these projects were completed. We support and applaud the efforts of the ACOE. Supplies were purchases using FMP funds.

4.3 SUMMARY AND DISCUSSION

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

- Applied for Streambed Alteration (1600) Permit and CEQA Permit to complete construction of the Large Woody Debris Pilot Study;

- Completed Cultural Resources Survey and applied for Letter of Permission as part of the FMP's 404 Permit from USACE;

5.0 FISH STOCKING

The stocking of fish in State waters is the responsibility of the California Department of Fish and Game. During the 2008-2009 reporting period, catchable and sub-catchable size rainbow trout were stocked in the Kings River between Pine Flat Dam and Fresno Weir. Due to a lack of availability, no trout eggs were supplied to the program by the CDFG for incubation and hatching in the lower river during the 2007-2008 reporting period. 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 during this reporting period to hatch eyed rainbow trout eggs, inside the streamside incubators, using eggs purchased through Troutlodge Inc.

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. The lower incubator is located at the lower end of the Thorburn Spawning and Rearing Channel adjacent to the river. These incubators were stocked with 150,000 eyed rainbow trout eggs purchased from Troutlodge Inc. in December of 2008, and again in Feburary of 2009 with 150,000 triploid eggs as part of the Incubator Effectiveness Study during the 2008-2009 program year. The purchase of rainbow trout eggs will continue through the program in the near future, and will include triploid eggs for the Incubator Effectiveness Study as well.

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

A total of 4,055 pounds (27,822 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. The sub-catchables were stocked on December 18, 2008 and January 5, 2009. 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 October 22, 2008 the San Joaquin Hatchery planted 14,592 golden trout (GT) fingerlings (114 pounds) in the lower river. There currently is no annual allotment for GT 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. A total of 17,200 pounds of catchable sized trout (28,000 fish) were stocked in the lower Kings River during this reporting period. 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.

5.1.3.4 Super Catchable-Sized Rainbow Trout

The CDFG San Joaquin Hatchery stocked 8,082 pounds (4,883 fish) of super catchable rainbow trout in the lower Kings River. Super catchable trout are defined as trout greater than one pound.

5.1.3.5 Trophy Rainbow Trout

Beginning December 2005, CDFG implemented a trophy trout stocking program in the put-and-take section as well as the catch-and-release section. The trophy trout program was implemented 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. Trophy trout are designated as trout greater than 2.99 pounds each. Trophy trout planted in the lower Kings River average approximately 4 pounds (Figure 5-2). The trophy trout program continued into the 2008-2009 program year with 1,236 trophy trout (5,546 pounds) planted in addition to the regular catchable allotment. The full Kings River Planting Records from the San Joaquin Hatchery are available in Appendix E.

Figure 5-2. Trout averaging 4 pounds each were stocked by CDFG from December through March.

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 2008-2009 reporting period.

5.2 RESERVOIR

5.2.1 Kokanee Salmon

The CDFG San Joaquin Hatchery stocked 42,612 kokanee salmon fingerlings (636 pounds) in Pine flat Reservoir on June 2, 2008.

5.2.2 Fingerling Rainbow Trout

The CDFG San Joaquin hatchery personnel stocked 156,825 fingerling rainbow trout (1,230 pounds) in January 15, 2009 in Pine Flat Reservoir.

5.2.3 Sub-Catchable Sized Rainbow Trout

The CDFG San Joaquin Hatchery stocked 31,000 sub-catchable rainbow trout (4,750 pounds) in Pine Flat Reservoir between January 14, 2009 and March 11, 2009.

5.2.4 Catchable-Sized Rainbow Trout

The current annual allotment for Pine Flat Reservoir is 22,000 pounds for the calendar year. Between January 14, 2009 and November 14, 2009, 25,500 pounds (41,400 trout) were planted in Pine Flat Reservoir. The catchable trout averaged around ½ pound each (2 fish/pound) at the time they were stocked in the reservoir.

5.2.4.1 Super Catchable-Sized Rainbow Trout in Pine Flat Reservoir

The CDFG San Joaquin Hatchery stocked 9,080 pounds (7,567 trout) of super catchables (greater than one pound each) in Pine Flat Reservoir on December 4th and December 24, 2008.

5.2.4.2 Trophy Rainbow Trout in Pine Flat Reservoir

The CDFG San Joaquin Hatchery stocked 267 trophy trout (999 pounds) of trophy trout (greater than 2.99 pounds each) in Pine Flat Reservoir on January 14, 2009.

5.2.5 Chinook Salmon

Chinook were not stocked in Pine Flat from June 1, 2008 through May 31, 2009. The statewide allotment for Chinook was down 50% and due to water conditions in Pine Flat Reservoir, the decision was made to not stock Chinook in Pine Flat Reservoir. The Chinook were utilized in other area reservoirs with more favorable conditions. Pine Flat Reservoir currently has a Chinook allotment scheduled for 2009-2010.

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 2008-2009 reporting period, the San Joaquin Hatchery planted 2,446 pounds (1,891 trout) of super-catchable size rainbow trout (greater than one pound each) and 3,450 pounds (6,975 trout) of catchable size rainbow trout in Avocado Lake.

5.3 SUMMARY AND DISCUSSION

- Whitlock Vibert Boxes (WVB) were used during this reporting period to hatch eyed rainbow trout eggs, inside the streamside incubators, using eggs purchased through Troutlodge Inc.;

- These incubators were stocked with 150,000 eyed rainbow trout eggs purchased from Troutlodge Inc. in December of 2008, and again in Feburary of 2009 with 150,000 triploid eggs as part of the Incubator Effectiveness Study during the 2008-2009 program year. The purchase of rainbow trout eggs will continue through the program in the near future, and will include triploid eggs for the Incubator Effectiveness Study as well;

- During the 2008-2009 program year, a total of 4,055 pounds (27,822 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. These fish were provided by the CDFG at no cost to the FMP;

- On October 22, 2008 the San Joaquin Hatchery planted 14,592 golden trout (GT) fingerlings (114 pounds) in the lower river. There currently is no annual allotment for GT 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 17,200 pounds of catchable sized trout (28,000 fish) were stocked in the lower Kings River during this reporting period;

- The CDFG San Joaquin Hatchery stocked 8,082 pounds (4,883 fish) of super catchable rainbow trout in the lower Kings River. Super catchable trout are defined as trout greater than one pound;

- The trophy trout program continued into the 2008-2009 program year with 1,236 trophy trout (5,546 pounds) planted in addition to the regular catchable allotment. Trophy trout are designated as trout greater than 2.99 pounds each;

- The CDFG San Joaquin Hatchery stocked 31,000 sub-catchable rainbow trout (4,750 pounds) in Pine Flat Reservoir between January 14, 2009 and March 11, 2009;

- Between January 14, 2009 and November 14, 2009, 25,500 pounds (41,400 trout) were planted in Pine Flat Reservoir. The catchable trout averaged around ½ pound each (2 fish/pound) at the time they were stocked in the reservoir;

- The CDFG San Joaquin Hatchery stocked 9,080 pounds (7,567 trout) of super catchables (greater than one pound each) in Pine Flat Reservoir on December 4th and December 24, 2008;

- The CDFG San Joaquin Hatchery stocked 267 trophy trout (999 pounds) of trophy trout (greater than 2.99 pounds each) in Pine Flat Reservoir on January 14, 2009;

- The CDFG San Joaquin Hatchery stocked 42,612 kokanee salmon fingerlings (636 pounds) in Pine flat Reservoir on June 2, 2008;

- Chinook were not stocked in Pine Flat from June 1, 2008 through May 31, 2009. The statewide allotment for Chinook was down 50% and due to water conditions in Pine Flat Reservoir, the decision was made to not stock Chinook in Pine Flat Reservoir. The Chinook were utilized in other area reservoirs with more favorable conditions. Pine Flat Reservoir currently has a Chinook allotment scheduled for 2009-2010; and

- In 2008-2009 reporting period, the San Joaquin Hatchery planted 2,446 pounds (1,891 trout) of super-catchable size rainbow trout (greater than one pound each) and 3,450 pounds (6,975 trout) of catchable size rainbow trout in Avocado Lake.

6.0 MONITORING

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.

The 5-Year Plan proposed that electrofishing surveys would be conducted two times per year during (1) spring (prior to initiation of the major irrigation releases) and (2) fall (at the completion of the irrigation season) at two sites in addition to the six sites that are sampled annually. During the 2008-2009 study period, electrofishing surveys were conducted in November, 2008 only. Electrofishing is performed at sampling sites within each of the three management reaches of the lower Kings River (Figure 6-1). Surveys are conducted at the same sampling sites each year for use in establishing an abundance index, and for determining trends in abundance of trout and other fish species.

Sampling is conducted using a block net on the upper end and lower end of the sample reach and backpack electrofishers. Electrofishing surveys have been conducted over a period of 25 years (since 1983) in the Kings River by KRCD and CDFG biologists. The number of sites sampled has been expanded over the years. To the extent possible, sampling methods and the sampling locations utilized in previous surveys by KRCD have been incorporated as part of the electrofishing monitoring program to allow comparison of current results with previous monitoring. In 2007, the FMP began to use a multi-pass depletion technique. This allowed for a more rigorous sampling and provided a more complete assessment of the species composition and abundance found in the sample site. Data collected during the survey include species and number of fish as well as length and weights. This data can then be used to determine trends in the populations and condition of the trout as well as other non-game species. Sampling sites are 300 feet in length and were sampled using backpack electrofishers. A final report is available in the KRCD library.

Crews consisting of 15 to 24 people and five to seven electrofishers were used to conduct the sampling. Few resident rainbow trout (*Onchorhyncus* mykiss) were collected at any of the six sites sampled. As in past years, the most abundant fish were the Sacramento sucker (*Catostomus occidentalis*) and sculpin (*Cottus spp.*).

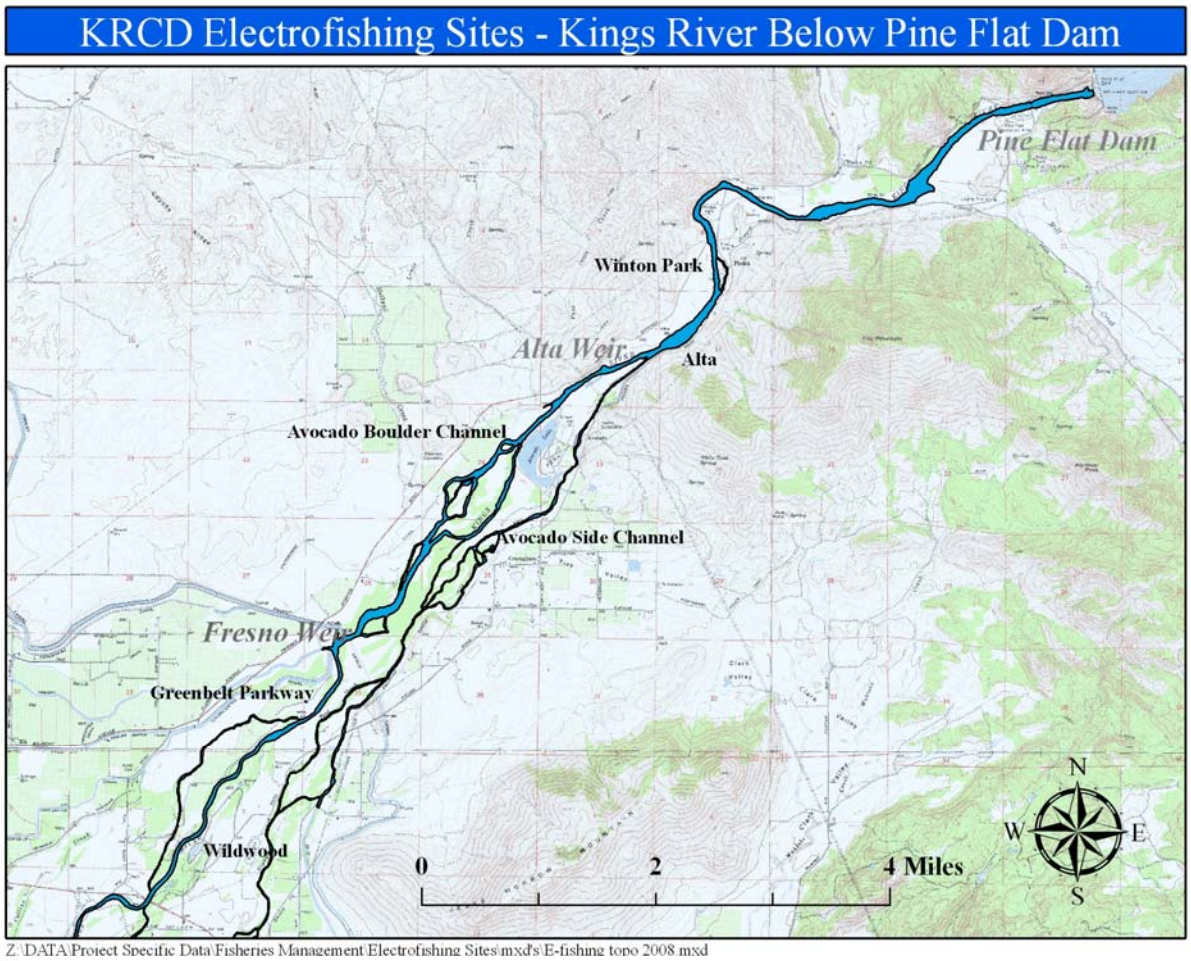

Figure 6-1: Kings River Conservation District annual population monitoring survey sites.

6.1.2 Macroinvertebrates Study

Analysis of the benthic macroinvertebrate data collected between November 2007 and February 2008, was completed during the 08-09 Program year. Results showed that the Kings River supports a diverse assemblage of macroinvertabrates. A final report is available in the KRCD library. These activities were conducted under Element C-2007-5: Monitoring of the 5-Year Implementation Plan.

6.1.3 Fish Tracking Study

Data collection for the FMP's *Habitat Selection, Behavioral Movement, and Fate of Adult Rainbow Trout within the Kings River Downstream of Pine Flat Dam* study was completed in July of 2008. More than 10 million data points were collected and are currently being analyzed. The activities were conducted under Element C-2007-5: Monitoring of the 5-Year Implementation Plan.

6.1.4 Pine Flat Reservoir and Lower Kings River Fish Population Study

While funds were budgeted for this element, no activity occurred and funds will be carried over to the next program year. Funds were budgeted under Element C-2007-5: Monitoring of the 5-Year Implementation Plan.

6.1.5 Bio Mass Estimate

While funds were budgeted for this element, no activity occurred and funds will be carried over to the next program year. Funds were budgeted under Element C-2007-5: 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-2007-5: Monitoring of the 5-Year Implementation Plan.

6.1.7 Incubator Effectiveness Study

The FMP purchased 150,000 triploid rainbow trout eggs from Trout Lodge, Inc. in an effort to study the contribution of streamside incubators to trout abundance in the Kings River below Pine Flat Dam. An estimated 90%-95% hatch rate was observed and the resulting fry were released into the Kings River adjacent to the incubator locations. Funds were budgeted under Element C-2007-5: Monitoring of the 5-Year Implementation Plan.

6.1.8 Dennis Cut Telemetry Installation

A stilling well and telemetry system were installed at the Dennis Cut headworks as part of the monitoring agreed to under the Framework Agreement. The telemetry system installed allows for real-time monitoring and adjustment if flow targets are not being met at this location. These activities were conducted under Element C-2007-5: Monitoring of the 5-Year Implementation Plan.

6.1.9 Water Quality Sampling (River)

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-2007-5: Monitoring of the 5-Year Implementation Plan.

6.1.10 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-2007-5: Monitoring of the 5-Year Implementation Plan.

6.1.11 Fish Tag Purchase

No transmitters were purchased during the program year, though tags purchased in April of 2008 were implanted in rainbow trout and released in June of 2008.

6.1.12 Annual Technical Report

The sixth Annual Technical Report was published and distributed by the FMP in June 2008 The report covered activities for program year 2007-2008 and its 5-Year Implementation Plan. The report was reviewed and approved by the PAG and ExCom. The activities were conducted under Element C-2007-5: 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 is summarized in Table 6-3.

For the 2008-2009 program year, a complete data set is available for 36 of the 40 permitted bass tournaments held at Pine Flat Reservoir. The number of participants was 994 and the average size of bass returned for Weigh-In was 1.19 pounds.

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

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
No. Tournaments	31	16	25	29	33	32	23	32	40	36
No. Anglers	862	367	702	820	890	841	658	1,000	1,413	994
Total Hrs. Fished	7,012	3,454	6,428	7,067	7,807	7,304	5,279	7,940	11,133	8,229
Total No. Bass	1,495	811	1,680	2096	2136	1,634	1,505	2,315	3,091	1,654
Total Weight (lbs.)	1,750	1,245	3,108	3,593.5	3,289.1	2,385	2,570	3,199	4,153	1,971
Hrs fished/angler	8.13	9.41	9.16	8.62	8.77	8.68	8.02	7.93	7.89	8.28
Avg. per bass (lbs)	1.17	1.54	1.85	1.71	1.54	1.46	1.71	1.38	1.34	1.19

In previous Annual Technical Reports, a value for Catch per Hour was given in the table above. This data was erroneously included, as the values representing Catch per Hour misrepresented the true experience of the anglers in these tournaments. In any given tournament, an angler may only report a maximum catch of 5 bass, and in fact the angler is attempting to keep the largest 5 bass possible to win the tournament. Additional bass that may have been caught and subsequently released by anglers are not reported. Therefore, the figures presented in previous Annual Technical Reports were likely to have under-represented the true Catch per Hour value each angler experienced.

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 2008-2009 monitoring program have shown:

- Analysis of the benthic macroinvertebrate data collected between November 2007 and February 2008, was completed during the 08-09 Program year. A final report is available in the KRCD library.

- Data collection for the FMP's *Habitat Selection, Behavioral Movement, and Fate of Adult Rainbow Trout within the Kings River Downstream of Pine Flat Dam* study was completed in July of 2008. More than 10 million data points were collected and are currently being analyzed.

- The FMP purchased 150,000 triploid rainbow trout eggs in an effort to study the contribution of streamside incubators to trout abundance in the Kings River below Pine Flat Dam.

- The sixth Annual Technical Report was released in June 2008; and

- There were 40 permitted bass tournaments, with 36 tournaments with complete data sets at Pine Flat Reservoir during the 2008-2009 program year. The number of participants was 994 and the average size of bass returned for Weigh-In was 1.19 pounds.

7.0 PUBLIC EDUCATION AND OUTREACH

7.1 News Releases and Newsletters

An issue of Kings River Fisheries News newsletter was published and distributed in the early Fall of 2008 with the assistance of the Public Advisory Group. The activities were conducted under Element C-2007-4: 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 2008 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-2007-5: Monitoring of the 5-Year Implementation Plan.

7.3 Web Page Development

The PAG has developed and is operating 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-2007-4: Public Education of the 5-Year Implementation Plan.

7.3.5 Ad-Hoc Group on Public Outreach

An Ad-Hoc committee as approved by the Ex-Com began meeting in April of 2007 on development of public outreach materials for the Fisheries Management Program. During the 2008-2009 program year, the public outreach material development was concluded, and a speaker's bureau was initiated. The activities were conducted under Element C-2007-4: 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 2009

The PAG worked extensively with the 2009 Kings River Day event, to provide valuable historical, operational, scientific and recreational opportunities to hundreds of 6th graders. The event was successfully held on May 15, 2009. 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 Directed Enforcement

Local groups of fisherman worked on establishing a contract with the California Department of Fish and Game's Enforcement branch to commit additional funds for Directed Enforcement Actions targeting the Kings River Fisheries Management Zone during the 2008-2009 program year. Previous actions, such as the one on March 15, 2008, resulted in 26 citations and 20 warnings, along with 178 public contacts by Fish and Game personnel in an effort to curtail illegal fishing activities in the Fisheries Management Zone. It is the hope of the fisherman that future enforcement efforts will yield similar results. These activities were officially outside of the Kings River Fisheries Management Program, but the FMP does thank Fish and Game for the additional efforts.

8.0 OUTSTANDING ELEMENTS

With limited exception, efforts on elements from previous years and the 2008-2009 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.

Study of Pool Habitat and Constructed Deep Water Habitat Pilot Project (C-2008-15). - 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-2008-9). -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

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. The activities were conducted under Element M-2008-1: Thorburn Channel Maintenance of the 5-Year Implementation Plan.

9.2 Streamside Incubator Operation and Maintenance

No activities were conducted under Element M-2008-2: Streamside Incubator Operation and Maintenance of the 5-Year Implementation Plan.

10.0 DEVELOPMENT OF 5-YEAR PLAN

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 2008 to May 2009). This was the eighth 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
6/1/2008	524504	6323	4558	3227
6/2/2008	522339	5143	5185	2030
6/3/2008	521508	5278	5847	2028
6/4/2008	520884	5505	6072	2130
6/5/2008	518272	5600	4882	2150
6/6/2008	515584	5772	5195	2209
6/7/2008	514263	5840	5927	2240
6/8/2008	512203	5842	5365	2248
6/9/2008	510270	5800	5429	2189
6/10/2008	508422	5882	5591	2273
6/11/2008	506293	5976	5331	2375
6/12/2008	502821	6017	4514	2392
6/13/2008	499320	6285	4635	2633
6/14/2008	495387	6433	4697	2758
6/15/2008	491592	6394	4594	2687
6/16/2008	487530	6344	4416	2649
6/17/2008	483805	6096	4151	2412
6/18/2008	480055	5925	4041	2249
6/19/2008	475685	5959	3650	2260
6/20/2008	471140	5879	3462	2133
6/21/2008	466655	5795	3455	2023
6/22/2008	462427	5909	3412	2114
6/23/2008	458064	6015	3392	2204
6/24/2008	452677	6086	3083	2269
6/25/2008	446979	6083	2828	2296
6/26/2008	441165	6113	2798	2364
6/27/2008	435050	6092	2590	2369
6/28/2008	428340	6047	2362	2311
6/29/2008	421423	6142	2239	2373
6/30/2008	414490	6077	2198	2313
7/1/2008	407580	6043	2100	2296
7/2/2008	400477	6002	1985	2283
7/3/2008	393008	5996	1981	2289
7/4/2008	385539	6125	1960	2407
7/5/2008	377688	6098	1709	2382
7/6/2008	369816	6060	1663	2352
7/7/2008	362270	6094	1559	2391
7/8/2008	354092	6155	1571	2428
7/9/2008	345641	6265	1547	2479
7/10/2008	336767	6282	1413	2445

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
7/11/2008	328241	6144	1399	2307
7/12/2008	319669	6089	1321	2231
7/13/2008	311247	6171	1491	2303
7/14/2008	303007	6194	1732	2297
7/15/2008	295469	6121	1959	2292
7/16/2008	289041	5729	2328	1891
7/17/2008	282293	5563	1674	1718
7/18/2008	275392	5337	1494	1472
7/19/2008	268610	5218	1287	1338
7/20/2008	261742	5184	1111	1311
7/21/2008	255083	5042	1036	1161
7/22/2008	248007	5106	985	1226
7/23/2008	240260	5252	773	1347
7/24/2008	232642	5240	865	1324
7/25/2008	224912	5301	809	1373
7/26/2008	217005	5268	738	1338
7/27/2008	209352	5120	635	1190
7/28/2008	201388	5204	762	1283
7/29/2008	193291	5202	585	1284
7/30/2008	185926	4833	590	1011
7/31/2008	182121	2910	520	1053
8/1/2008	179258	2584	471	1099
8/2/2008	176207	2505	449	1061
8/3/2008	173441	2401	427	951
8/4/2008	171069	2299	409	866
8/5/2008	168392	2320	399	926
8/6/2008	165555	2359	418	973
8/7/2008	162675	2362	433	970
8/8/2008	159979	2338	412	936
8/9/2008	156951	2311	386	933
8/10/2008	153779	2311	365	944
8/11/2008	150901	2345	347	987
8/12/2008	149107	1799	327	919
8/13/2008	147516	1644	314	993
8/14/2008	145976	1651	298	980
8/15/2008	145061	1303	287	641
8/16/2008	144043	1247	281	587
8/17/2008	142776	1391	275	722
8/18/2008	141662	1355	270	691
8/19/2008	140510	1318	269	674

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
8/20/2008	139426	1318	266	679
8/21/2008	138449	1291	259	654
8/22/2008	137600	1181	252	547
8/23/2008	136899	1091	247	469
8/24/2008	136014	1092	241	470
8/25/2008	134989	1151	235	520
8/26/2008	134110	1193	227	553
8/27/2008	133134	1210	226	569
8/28/2008	132120	1270	221	632
8/29/2008	130924	1297	215	671
8/30/2008	129724	1243	210	631
8/31/2008	128644	1010	209	564
9/1/2008	127053	932	185	531
9/2/2008	127073	537	183	181
9/3/2008	127728	361	179	46
9/4/2008	128186	354	175	39
9/5/2008	128664	351	173	41
9/6/2008	128923	351	168	40
9/7/2008	128943	359	164	36
9/8/2008	128724	371	162	35
9/9/2008	128285	370	160	64
9/10/2008	127828	370	162	38
9/11/2008	127509	370	163	39
9/12/2008	127172	370	164	39
9/13/2008	126756	370	162	40
9/14/2008	126361	370	157	40
9/15/2008	125985	370	154	39
9/16/2008	125729	376	151	40
9/17/2008	125374	381	151	40
9/18/2008	125020	380	153	41
9/19/2008	124725	380	153	41
9/20/2008	124353	377	152	40
9/21/2008	123942	370	153	41
9/22/2008	123589	362	153	42
9/23/2008	123453	363	150	49
9/24/2008	123277	352	147	68
9/25/2008	122965	350	143	64
9/26/2008	122615	359	141	61
9/27/2008	122265	361	140	65
9/28/2008	121838	361	137	63

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
9/29/2008	121412	364	137	65
9/30/2008	121140	331	147	54
10/1/2008	120967	276	145	47
10/2/2008	120754	274	142	45
10/3/2008	120504	271	138	43
10/4/2008	120349	268	156	44
10/5/2008	120407	268	218	43
10/6/2008	120426	266	195	42
10/7/2008	120581	267	181	43
10/8/2008	120793	260	171	40
10/9/2008	120754	260	165	40
10/10/2008	120639	260	159	40
10/11/2008	120523	260	159	40
10/12/2008	120349	260	159	40
10/13/2008	120215	260	160	41
10/14/2008	120349	260	162	40
10/15/2008	120330	263	159	42
10/16/2008	120215	267	153	42
10/17/2008	120349	261	152	42
10/18/2008	120234	256	148	40
10/19/2008	120041	256	148	41
10/20/2008	120041	256	149	40
10/21/2008	120099	258	149	40
10/22/2008	120465	254	150	43
10/23/2008	121160	250	148	40
10/24/2008	121334	231	145	70
10/25/2008	121315	223	143	86
10/26/2008	121179	221	142	83
10/27/2008	121237	217	142	82
10/28/2008	121353	208	141	80
10/29/2008	121334	194	138	84
10/30/2008	121799	175	138	90
10/31/2008	122401	141	143	95
11/1/2008	123102	110	782	94
11/2/2008	126104	106	2055	93
11/3/2008	128186	101	1149	93
11/4/2008	129664	101	871	93
11/5/2008	130889	100	650	90
11/6/2008	132060	100	560	90
11/7/2008	133195	100	553	91

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
11/8/2008	134009	100	548	90
11/9/2008	135153	100	739	92
11/10/2008	136240	100	640	91
11/11/2008	137250	100	549	90
11/12/2008	138201	100	579	90
11/13/2008	139176	100	608	88
11/14/2008	140259	101	648	89
11/15/2008	141284	105	609	91
11/16/2008	142250	105	619	93
11/17/2008	143240	105	596	92
11/18/2008	144192	105	535	93
11/19/2008	144913	105	471	93
11/20/2008	145785	103	450	92
11/21/2008	146617	100	428	90
11/22/2008	147409	100	414	90
11/23/2008	148138	100	356	90
11/24/2008	148719	100	327	89
11/25/2008	149344	102	365	90
11/26/2008	150078	105	479	97
11/27/2008	150967	105	440	95
11/28/2008	151705	105	472	95
11/29/2008	152337	105	444	95
11/30/2008	152883	105	416	95
12/1/2008	153451	105	369	95
12/2/2008	154130	104	357	95
12/3/2008	154723	100	355	91
12/4/2008	155449	100	313	91
12/5/2008	156023	100	296	91
12/6/2008	156465	100	282	90
12/7/2008	157107	100	284	90
12/8/2008	157617	100	287	90
12/9/2008	158083	100	273	90
12/10/2008	158350	104	267	90
12/11/2008	158684	105	269	92
12/12/2008	159018	102	266	94
12/13/2008	159487	100	270	90
12/14/2008	160135	103	266	91
12/15/2008	160785	103	280	98
12/16/2008	161684	101	294	90
12/17/2008	162044	110	293	90

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
12/18/2008	162562	105	374	94
12/19/2008	163647	103	321	90
12/20/2008	164554	111	308	96
12/21/2008	165281	105	319	100
12/22/2008	166718	101	665	94
12/23/2008	168254	100	490	92
12/24/2008	169359	100	521	91
12/25/2008	170907	100	933	96
12/26/2008	172230	100	592	91
12/27/2008	173325	107	527	93
12/28/2008	174447	106	552	100
12/29/2008	175902	100	614	92
12/30/2008	177387	100	595	92
12/31/2008	178688	100	536	92
1/1/2009	179852	100	532	92
1/2/2009	181116	100	568	94
1/3/2009	182408	100	564	93
1/4/2009	183321	105	539	93
1/5/2009	184090	117	450	97
1/6/2009	184910	123	430	97
1/7/2009	185733	121	489	92
1/8/2009	186678	121	506	92
1/9/2009	187796	125	539	93
1/10/2009	188698	125	463	90
1/11/2009	189404	131	536	90
1/12/2009	190239	137	499	94
1/13/2009	191049	132	526	96
1/14/2009	191934	125	549	79
1/15/2009	192723	125	557	80
1/16/2009	193662	125	474	80
1/17/2009	194529	126	609	78
1/18/2009	195398	126	503	77
1/19/2009	196120	126	473	75
1/20/2009	196818	126	482	71
1/21/2009	197743	126	490	64
1/22/2009	200354	128	2081	67
1/23/2009	204483	140	2862	67
1/24/2009	211472	143	4067	68
1/25/2009	216165	143	2651	64
1/26/2009	218770	146	1674	62

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
1/27/2009	220701	154	1247	68
1/28/2009	222748	153	1233	73
1/29/2009	224404	145	1141	69
1/30/2009	225931	143	1043	66
1/31/2009	227437	141	1004	64
2/1/2009	228760	141	908	65
2/2/2009	230140	144	903	67
2/3/2009	231498	147	927	64
2/4/2009	232805	146	953	64
2/5/2009	234308	146	965	65
2/6/2009	235788	141	1030	71
2/7/2009	237136	137	968	71
2/8/2009	238709	138	980	71
2/9/2009	240843	138	928	55
2/10/2009	242846	135	774	65
2/11/2009	244775	150	1118	71
2/12/2009	246768	145	874	66
2/13/2009	248826	145	1127	82
2/14/2009	250383	137	904	62
2/15/2009	252087	136	807	62
2/16/2009	254140	139	1237	68
2/17/2009	257207	205	1579	100
2/18/2009	259860	168	1484	115
2/19/2009	261975	128	1275	69
2/20/2009	264070	135	1135	63
2/21/2009	266175	137	956	63
2/22/2009	268462	142	1175	69
2/23/2009	272063	145	1853	58
2/24/2009	275690	142	2176	54
2/25/2009	278771	130	1710	45
2/26/2009	281901	138	1564	55
2/27/2009	284654	143	1503	50
2/28/2009	286995	153	1308	49
3/1/2009	289469	153	1788	50
3/2/2009	291923	151	1787	49
3/3/2009	295099	148	1942	47
3/4/2009	298416	155	1899	50
3/5/2009	301254	158	1660	72
3/6/2009	304011	157	1588	53
3/7/2009	306339	158	1447	50

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
3/8/2009	308646	157	1403	49
3/9/2009	310834	165	1378	48
3/10/2009	312839	188	1267	59
3/11/2009	314692	184	1314	56
3/12/2009	316806	178	1290	52
3/13/2009	318702	177	1285	51
3/14/2009	320508	178	1357	52
3/15/2009	321445	751	1376	570
3/16/2009	322221	832	1444	590
3/17/2009	323648	798	1692	620
3/18/2009	325175	834	1769	638
3/19/2009	327228	842	1964	450
3/20/2009	329157	771	1847	555
3/21/2009	332209	755	2491	550
3/22/2009	334946	755	2307	515
3/23/2009	337064	728	1922	470
3/24/2009	339489	674	1862	410
3/25/2009	341489	618	1647	340
3/26/2009	343628	601	1764	305
3/27/2009	346078	624	1944	305
3/28/2009	348671	676	2264	325
3/29/2009	351817	751	2619	305
3/30/2009	355045	778	2563	322
3/31/2009	357810	1029	2693	300
4/1/2009	360551	1132	2858	250
4/2/2009	363684	1131	3144	217
4/3/2009	367037	1139	3135	210
4/4/2009	369155	1165	3473	230
4/5/2009	370999	1236	2388	240
4/6/2009	373269	1255	2627	282
4/7/2009	375861	1281	2898	305
4/8/2009	379378	1298	3547	329
4/9/2009	381956	1319	2966	326
4/10/2009	384047	1347	3071	321
4/11/2009	385290	1334	2243	325
4/12/2009	386179	1386	2049	267
4/13/2009	387105	1464	2525	180
4/14/2009	389818	1471	2339	100
4/15/2009	391500	1390	2021	100
4/16/2009	393043	1516	2049	100

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
4/17/2009	394589	1532	2303	42
4/18/2009	396138	1561	2737	39
4/19/2009	398992	1562	3645	39
4/20/2009	403456	1564	4924	39
4/21/2009	409486	1575	5952	42
4/22/2009	416153	1579	6482	38
4/23/2009	423249	1577	6743	42
4/24/2009	430295	1559	6324	38
4/25/2009	434936	1552	4580	42
4/26/2009	438729	1551	4019	42
4/27/2009	442271	1535	4218	42
4/28/2009	446940	1519	4891	58
4/29/2009	451983	1358	4834	65
4/30/2009	457675	1231	5234	70
5/1/2009	465766	1241	6665	70
5/2/2009	476319	1244	8942	70
5/3/2009	484364	1218	6501	80
5/4/2009	491269	1038	5550	65
5/5/2009	498630	850	5760	49
5/6/2009	507480	874	6919	45
5/7/2009	518521	873	8532	45
5/8/2009	529893	872	8212	42
5/9/2009	542622	878	9329	42
5/10/2009	555593	904	9756	45
5/11/2009	568634	917	10028	42
5/12/2009	582405	948	9871	45
5/13/2009	595011	909	9043	49
5/14/2009	605872	1532	8847	200
5/15/2009	617514	1966	9726	45
5/16/2009	630328	1769	10295	65
5/17/2009	643652	1752	10348	49
5/18/2009	656840	1815	10241	42
5/19/2009	667428	1764	8738	55
5/20/2009	677440	1801	8412	42
5/21/2009	686763	1830	7543	38
5/22/2009	695575	1897	7405	61
5/23/2009	702698	1856	6593	55
5/24/2009	710984	1841	6754	39
5/25/2009	717846	1840	6377	45
5/26/2009	725093	1882	6082	55

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
5/27/2009	730441	2650	5809	70
5/28/2009	735163	2749	5557	73
5/29/2009	739903	2706	5319	63
5/30/2009	742404	2708	4662	50
5/31/2009	746064	2707	5097	66

APPENDIX B

Hydrologic and Climate Summary Reports for 2008-2009 Program Year
(on following pages)

Kings River Fisheries Management Program
Hydrologic and Climatic Summary Report

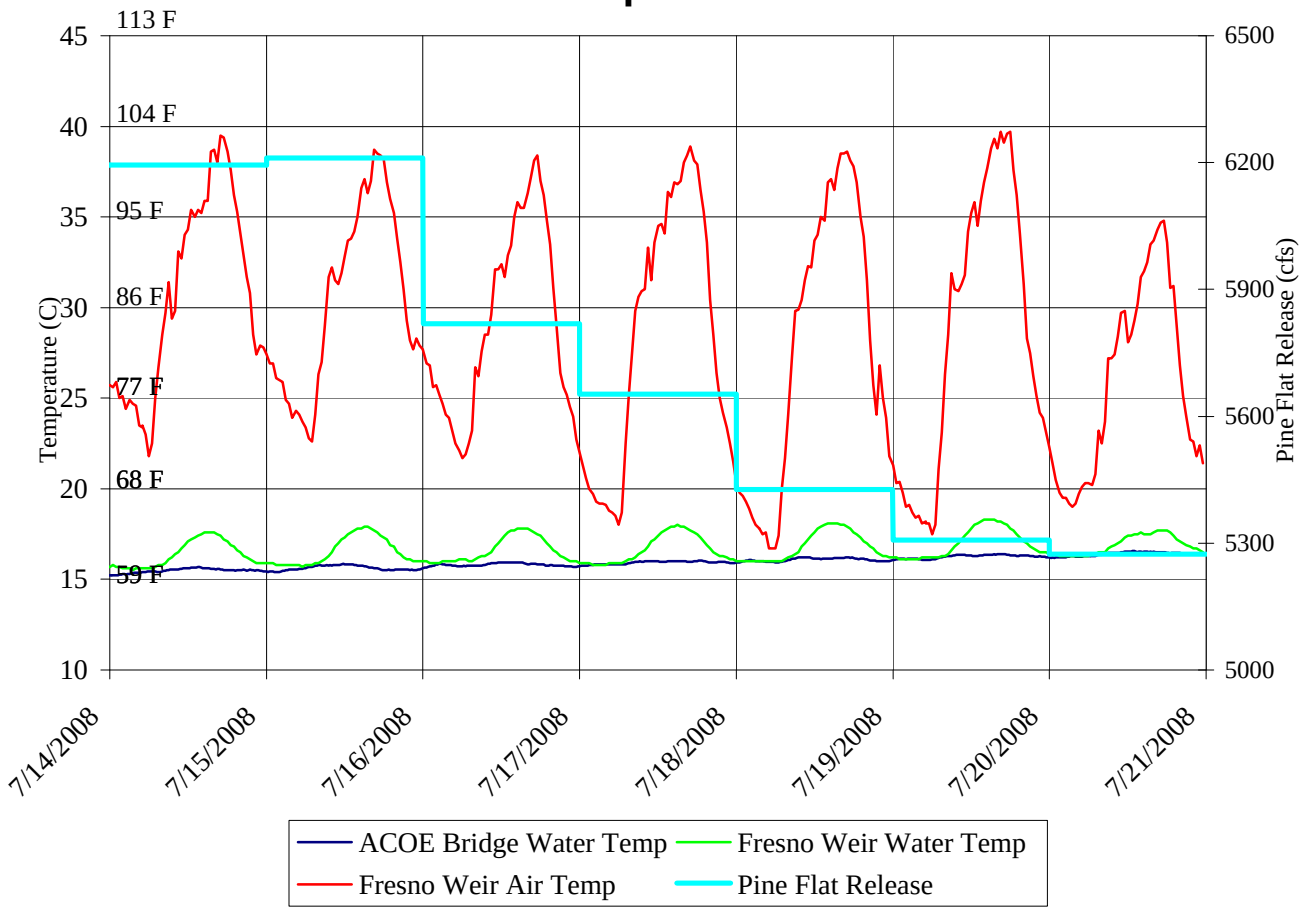
Provisional Data - Subject to Revision

7/21/2008

Flow Rates	Actual	Exhibit "C" Criteria	Date		
Kings River Below North Fork	926 cfs	NA cfs	7/21/2008		ACOE
Mill & Hughes Creeks	0 cfs	NA cfs	7/21/2008		KRWA
Piedra	5,274 cfs	100 cfs	7/21/2008		KRWA
Dennis Cut	250 cfs	5 cfs	7/21/2008		KRWA
At Fresno Weir	3,924 cfs	95 cfs	7/21/2008		KRWA
Over Fresno Weir	1,679 cfs	35 cfs	7/21/2008	.	KRWA

Pine Flat			Date		
Storage	259,570 af		7/21/2008	0700	ACOE
Elevation	781.57 ft		7/21/2008	0700	ACOE
Release	5,191 cfs		7/21/2008	0700	KRCD
Release Temperature	61.9 F	16.6 C	7/21/2008	0700	KRCD
Avg. Fresno Weir Water Temp	62.4 F	16.9 C	7/21/2008		

Flow and Temperature Trends



Kings River Fisheries Management Program
Hydrologic and Climatic Summary Report

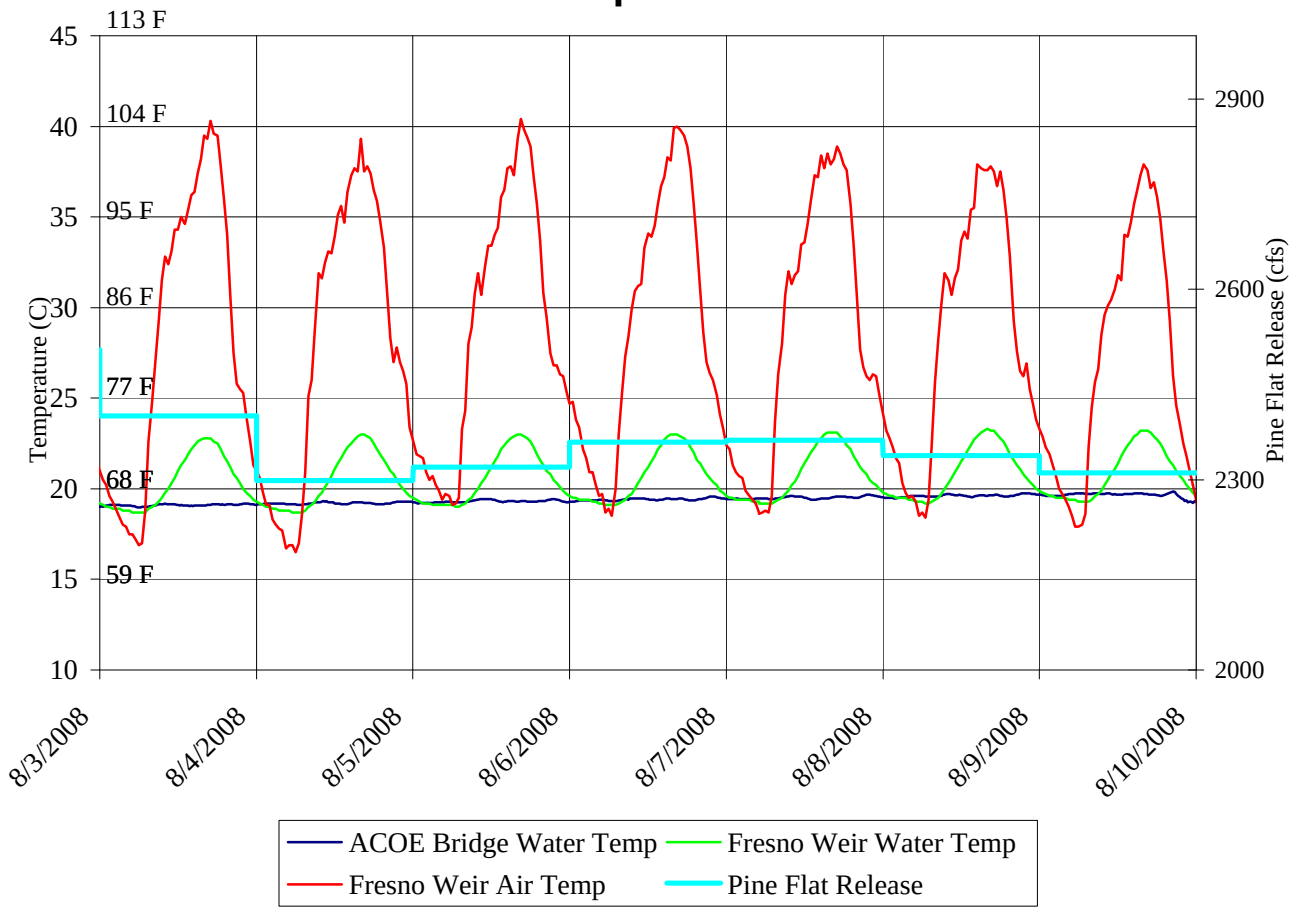
Provisional Data - Subject to Revision

8/11/2008

Flow Rates	Actual	Exhibit "C" Criteria	Date		
Kings River Below North Fork	380 cfs	NA cfs	8/11/2008		ACOE
Mill & Hughes Creeks	0 cfs	NA cfs	8/11/2008		KRWA
Piedra	2,345 cfs	100 cfs	8/11/2008		KRWA
Dennis Cut	150 cfs	5 cfs	8/11/2008		KRWA
At Fresno Weir	1,455 cfs	95 cfs	8/11/2008		KRWA
Over Fresno Weir	960 cfs	35 cfs	8/11/2008	.	KRWA

Pine Flat			Date		
Storage	150,901 af		8/11/2008	0700	ACOE
Elevation	738.57 ft		8/11/2008	0700	ACOE
Release	2,345 cfs		8/11/2008	0700	KRCD
Release Temperature	67.3 F	19.6 C	8/11/2008	0700	KRCD
Avg. Fresno Weir Water Temp	68.0 F	20.0 C	8/11/2008		

Flow and Temperature Trends



Kings River Fisheries Management Program
Hydrologic and Climatic Summary Report

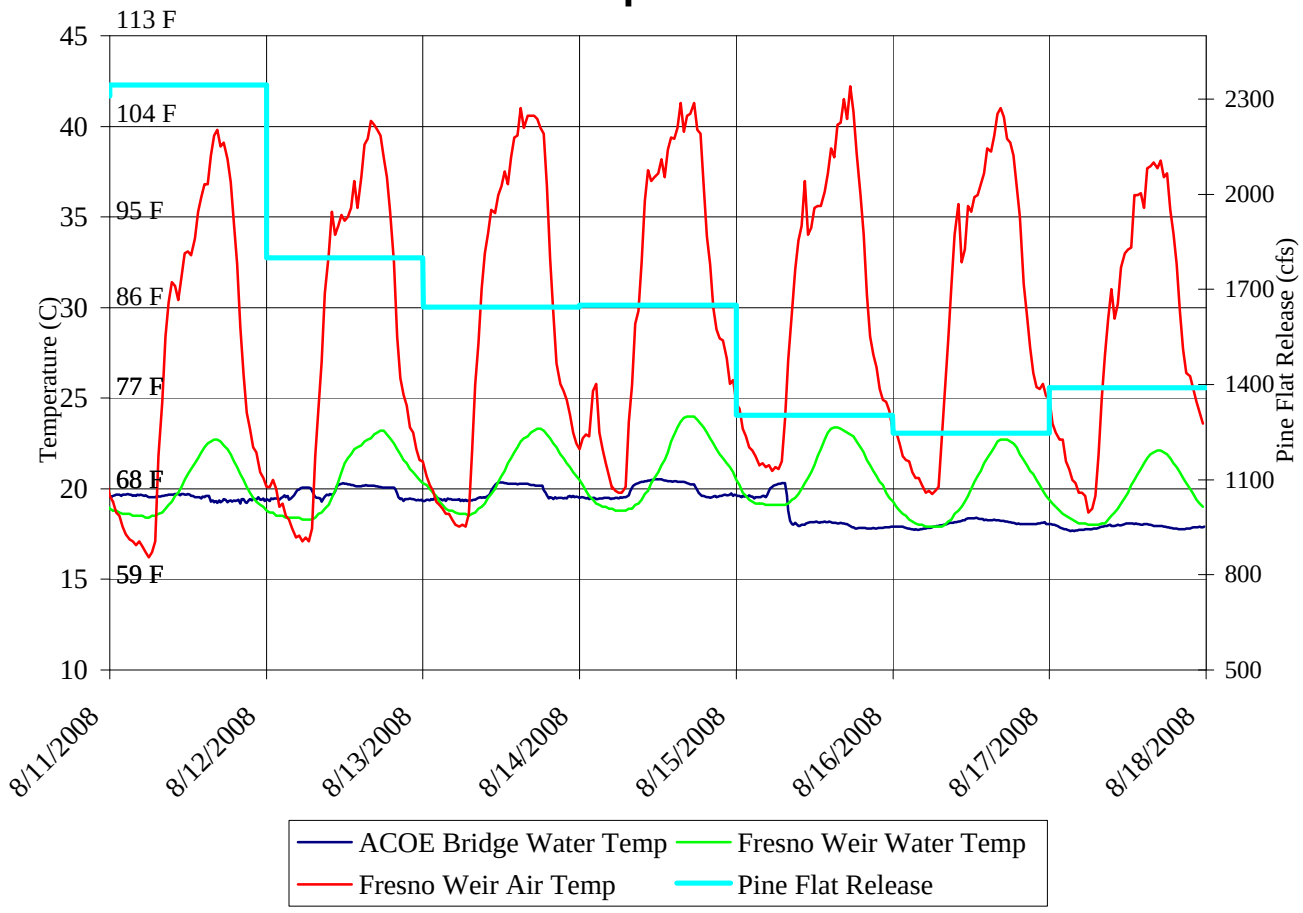
Provisional Data - Subject to Revision

8/18/2008

Flow Rates	Actual	Exhibit "C" Criteria	Date		
Kings River Below North Fork	290 cfs	NA cfs	8/18/2008		ACOE
Mill & Hughes Creeks	0 cfs	NA cfs	8/18/2008		KRWA
Piedra	1,355 cfs	100 cfs	8/18/2008		KRWA
Dennis Cut	100 cfs	5 cfs	8/18/2008		KRWA
At Fresno Weir	955 cfs	95 cfs	8/18/2008		KRWA
Over Fresno Weir	740 cfs	35 cfs	8/18/2008	.	KRWA

Pine Flat			Date		
Storage	141,662 af		8/18/2008	0700	ACOE
Elevation	734.24 ft		8/18/2008	0700	ACOE
Release	1,355 cfs		8/18/2008	0700	KRCD
Release Temperature	64.4 F	18.0 C	8/18/2008	0700	KRCD
Avg. Fresno Weir Water Temp	67.5 F	19.7 C	8/18/2008		

Flow and Temperature Trends



Kings River Fisheries Management Program
Hydrologic and Climatic Summary Report

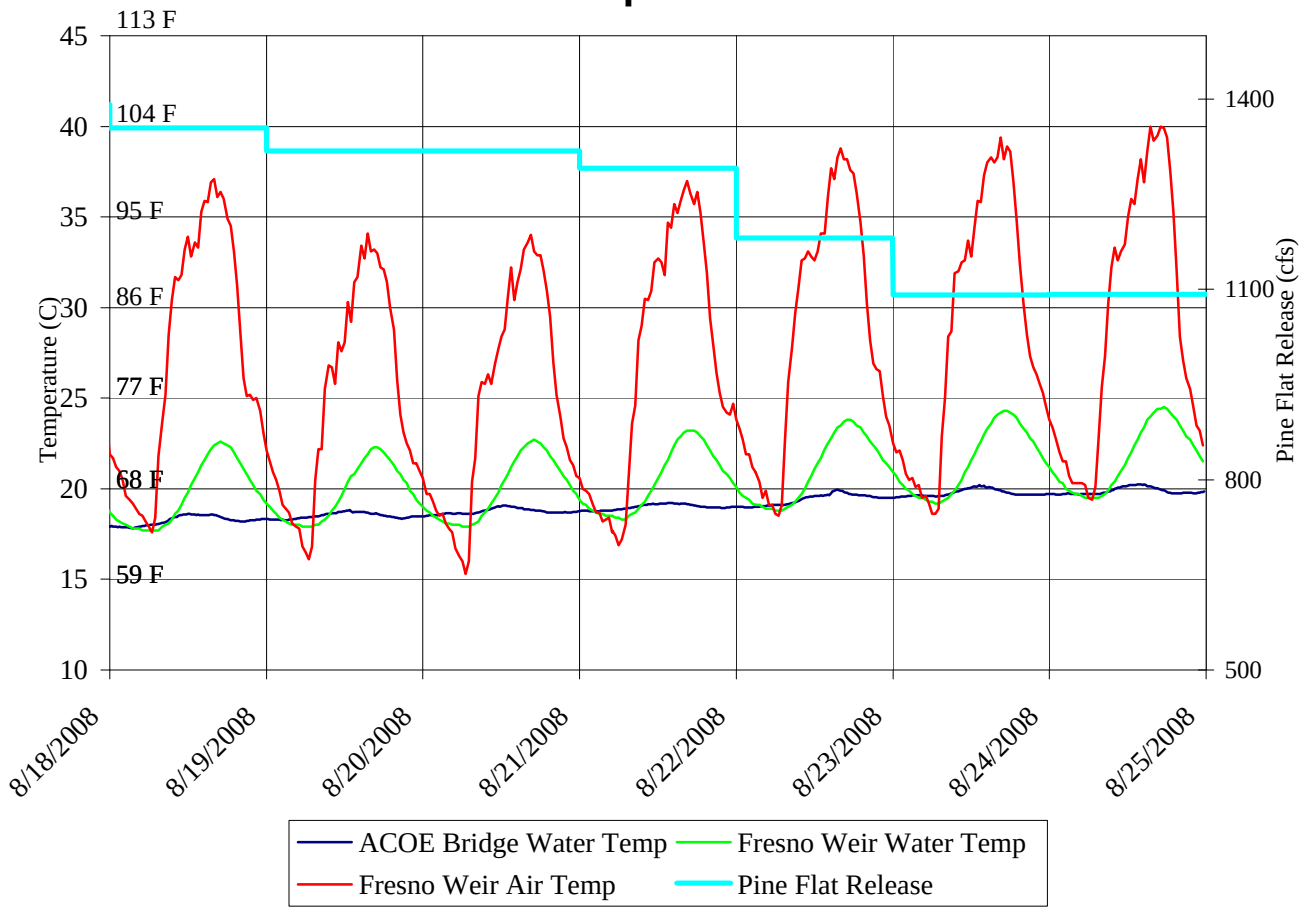
Provisional Data - Subject to Revision

8/25/2008

Flow Rates	Actual	Exhibit "C" Criteria	Date		
Kings River Below North Fork	259 cfs	NA cfs	8/25/2008		ACOE
Mill & Hughes Creeks	0 cfs	NA cfs	8/25/2008		KRWA
Piedra	1,090 cfs	100 cfs	8/25/2008		KRWA
Dennis Cut	100 cfs	5 cfs	8/25/2008		KRWA
At Fresno Weir	700 cfs	95 cfs	8/25/2008		KRWA
Over Fresno Weir	480 cfs	35 cfs	8/25/2008	.	KRWA

Pine Flat			Date		
Storage	136,014 af		8/25/2008	0700	ACOE
Elevation	731.52 ft		8/25/2008	0700	ACOE
Release	1,090 cfs		8/25/2008	0700	KRCD
Release Temperature	67.6 F	19.8 C	8/25/2008	0700	KRCD
Avg. Fresno Weir Water Temp	70.9 F	21.6 C	8/25/2008		

Flow and Temperature Trends



Kings River Fisheries Management Program
Hydrologic and Climatic Summary Report

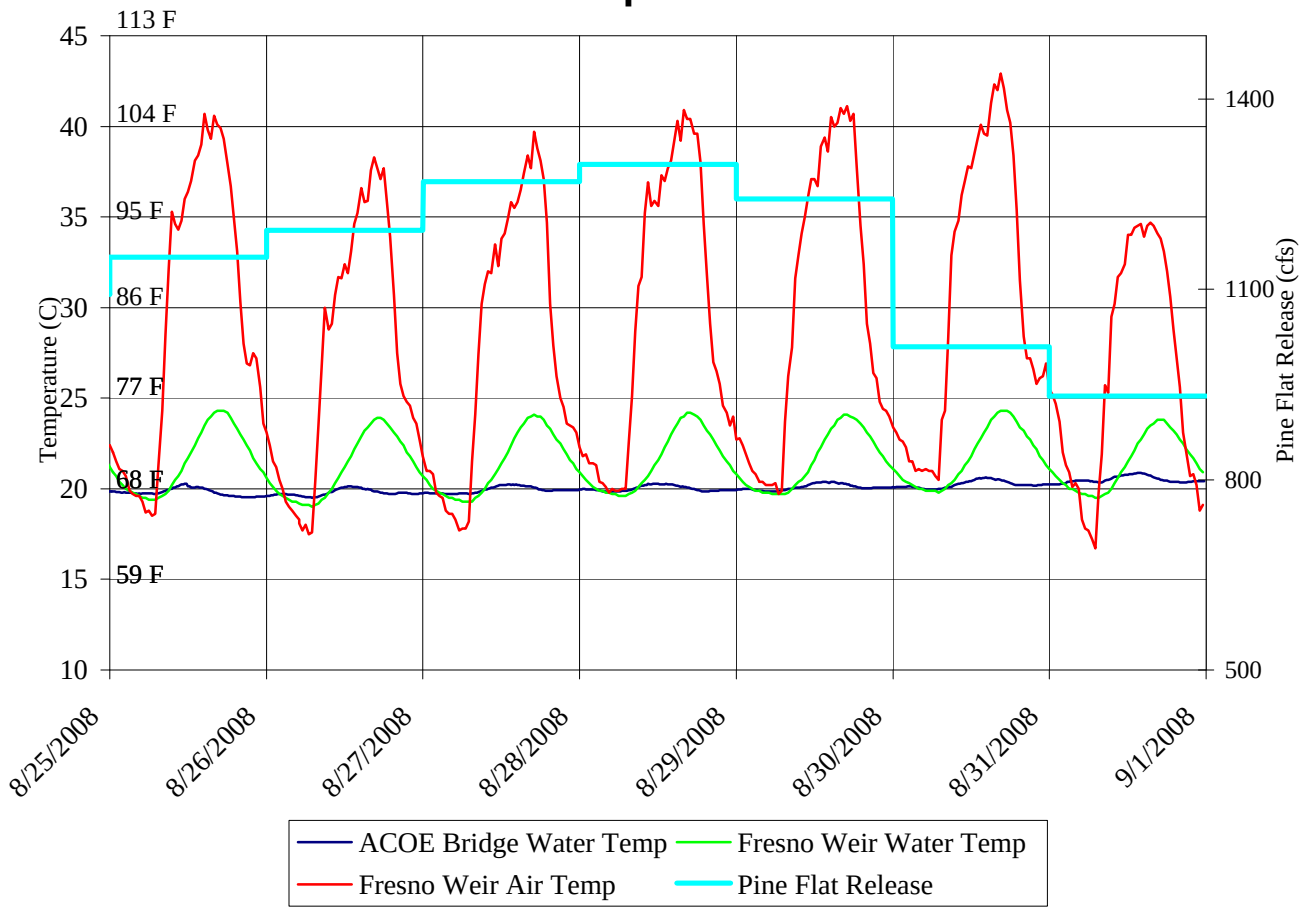
Provisional Data - Subject to Revision

9/1/2008

Flow Rates	Actual	Exhibit "C" Criteria	Date		
Kings River Below North Fork	222 cfs	NA cfs	9/1/2008		ACOE
Mill & Hughes Creeks	0 cfs	NA cfs	9/1/2008		KRWA
Piedra	932 cfs	100 cfs	9/1/2008		KRWA
Dennis Cut	100 cfs	5 cfs	9/1/2008		KRWA
At Fresno Weir	702 cfs	95 cfs	9/1/2008		KRWA
Over Fresno Weir	547 cfs	35 cfs	9/1/2008	.	KRWA

Pine Flat			Date		
Storage	127,053 af		9/1/2008	0700	ACOE
Elevation	727.08 ft		9/1/2008	0700	ACOE
Release	932 cfs		9/1/2008	0700	KRCD
Release Temperature	68.7 F	20.4 C	9/1/2008	0700	KRCD
Avg. Fresno Weir Water Temp	70.5 F	21.4 C	9/1/2008		

Flow and Temperature Trends



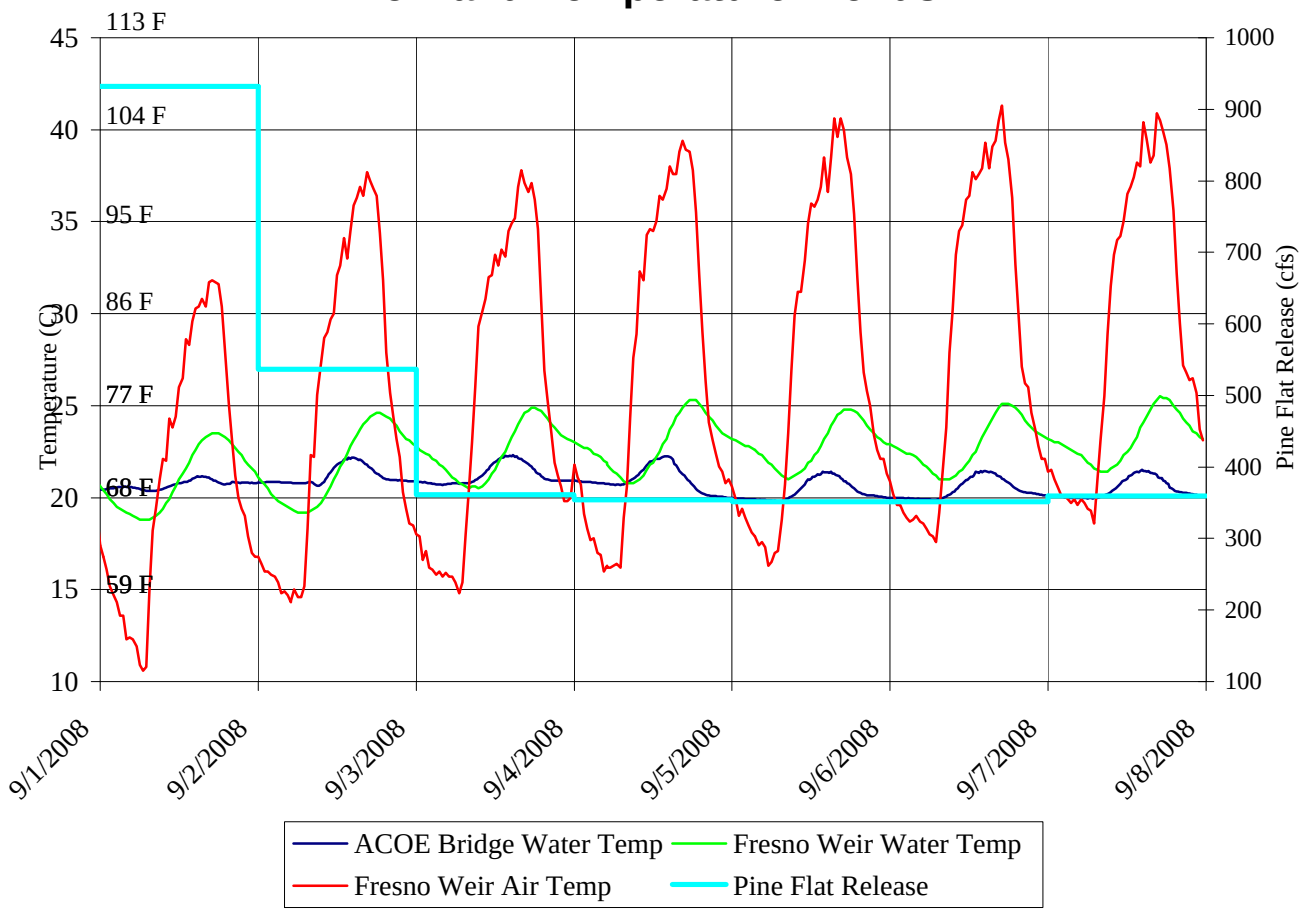
Kings River Fisheries Management Program
Hydrologic and Climatic Summary Report

Provisional Data - Subject to Revision
9/8/2008

Flow Rates	Actual	Exhibit "C" Criteria	Date		
Kings River Below North Fork	194 cfs	NA cfs	9/8/2008		ACOE
Mill & Hughes Creeks	0 cfs	NA cfs	9/8/2008		KRWA
Piedra	370 cfs	100 cfs	9/8/2008		KRWA
Dennis Cut	65 cfs	5 cfs	9/8/2008		KRWA
At Fresno Weir	155 cfs	95 cfs	9/8/2008		KRWA
Over Fresno Weir	40 cfs	35 cfs	9/8/2008	.	KRWA

Pine Flat			Date		
Storage	128,943 af		9/8/2008	0700	ACOE
Elevation	728.03 ft		9/8/2008	0700	ACOE
Release	370 cfs		9/8/2008	0700	KRCD
Release Temperature	68.9 F	20.5 C	9/8/2008	0700	KRCD
Avg. Fresno Weir Water Temp	73.8 F	23.2 C	9/8/2008		

Flow and Temperature Trends



Kings River Fisheries Management Program
Hydrologic and Climatic Summary Report

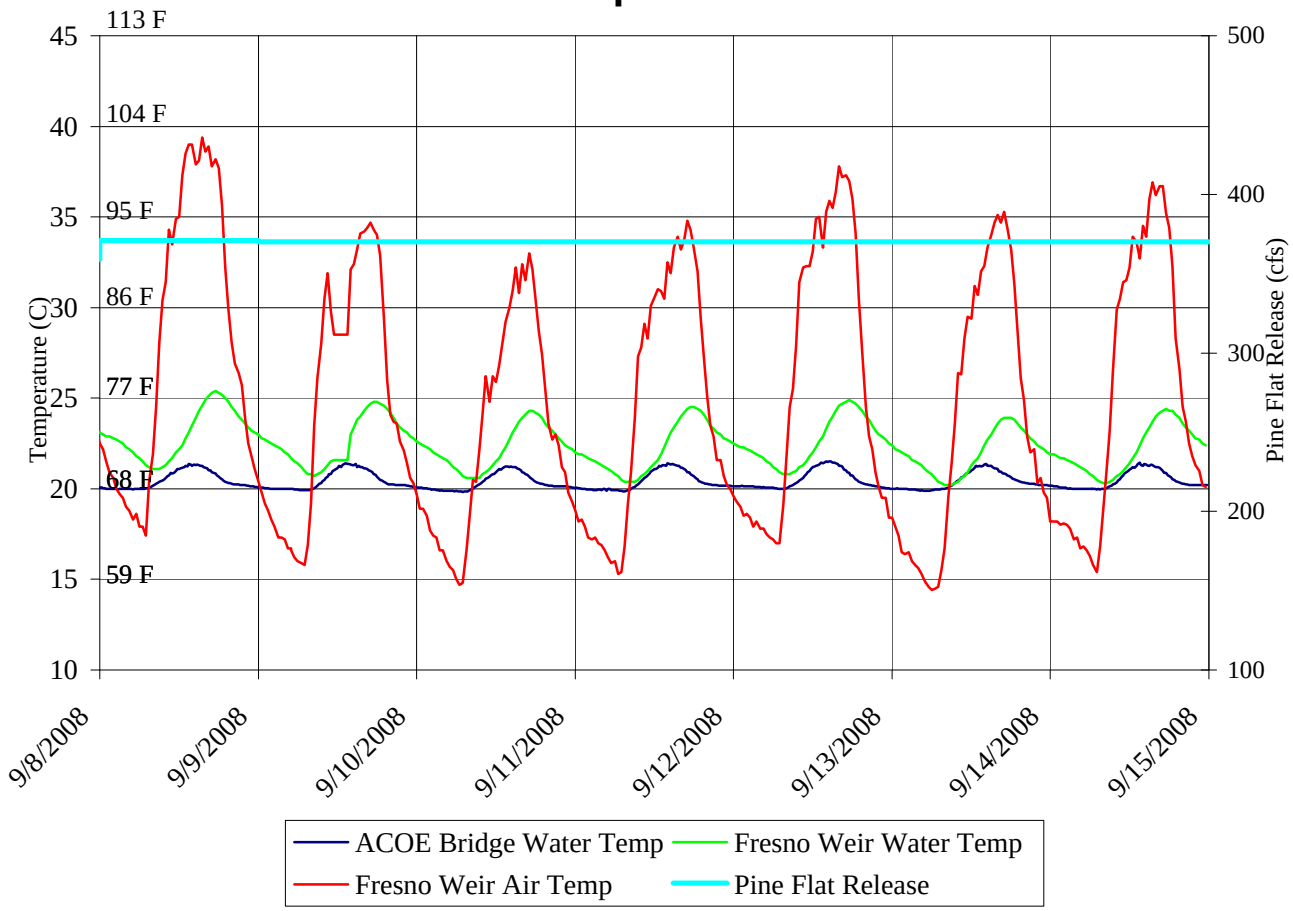
Provisional Data - Subject to Revision

9/15/2008

Flow Rates	Actual	Exhibit "C" Criteria	Date	
Kings River Below North Fork	185 cfs	NA cfs	9/15/2008	ACOE
Mill & Hughes Creeks	0 cfs	NA cfs	9/15/2008	KRWA
Piedra	370 cfs	100 cfs	9/15/2008	KRWA
Dennis Cut	65 cfs	5 cfs	9/15/2008	KRWA
At Fresno Weir	140 cfs	95 cfs	9/15/2008	KRWA
Over Fresno Weir	35 cfs	35 cfs	9/15/2008 .	KRWA

Pine Flat			Date		
Storage	126,361 af		9/15/2008	0700	ACOE
Elevation	726.73 ft		9/15/2008	0700	ACOE
Release	370 cfs		9/15/2008	0700	KRCD
Release Temperature	67.8 F	19.9 C	9/15/2008	0700	KRCD
Avg. Fresno Weir Water Temp	71.8 F	22.1 C	9/15/2008		

Flow and Temperature Trends



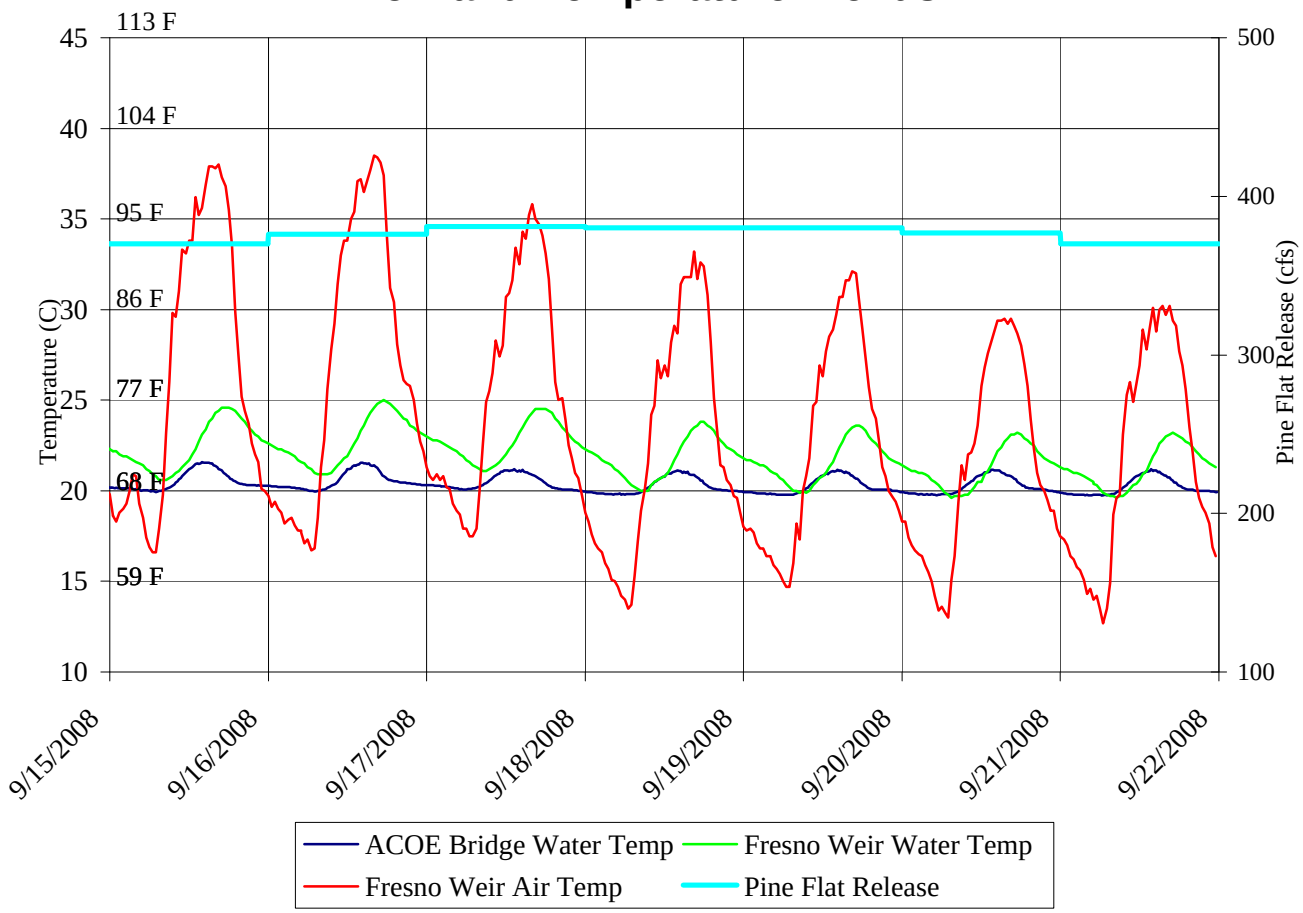
Kings River Fisheries Management Program
Hydrologic and Climatic Summary Report

Provisional Data - Subject to Revision
9/22/2008

Flow Rates	Actual	Exhibit "C" Criteria	Date		
Kings River Below North Fork	182 cfs	NA cfs	9/22/2008		ACOE
Mill & Hughes Creeks	0 cfs	NA cfs	9/22/2008		KRWA
Piedra	355 cfs	100 cfs	9/22/2008		KRWA
Dennis Cut	50 cfs	5 cfs	9/22/2008		KRWA
At Fresno Weir	155 cfs	95 cfs	9/22/2008		KRWA
Over Fresno Weir	35 cfs	35 cfs	9/22/2008	.	KRWA

Pine Flat			Date		
Storage	123,942 af		9/22/2008	0700	ACOE
Elevation	725.50 ft		9/22/2008	0700	ACOE
Release	370 cfs		9/22/2008	0700	KRCD
Release Temperature	67.6 F	19.8 C	9/22/2008	0700	KRCD
Avg. Fresno Weir Water Temp	70.2 F	21.2 C	9/22/2008		

Flow and Temperature Trends



Kings River Fisheries Management Program
Hydrologic and Climatic Summary Report

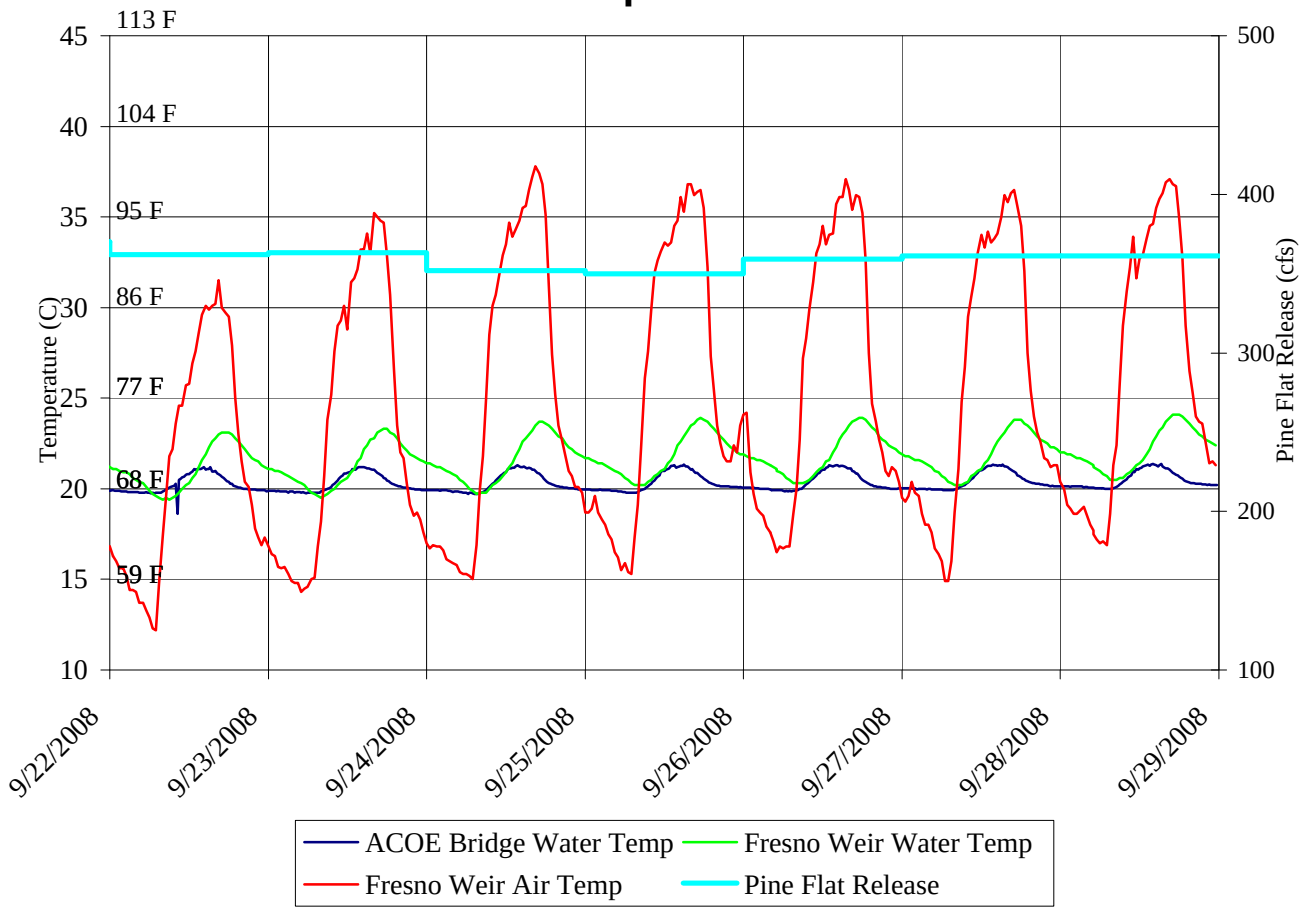
Provisional Data - Subject to Revision

9/29/2008

Flow Rates	Actual	Exhibit "C" Criteria	Date		
Kings River Below North Fork	160 cfs	NA cfs	9/29/2008		ACOE
Mill & Hughes Creeks	0 cfs	NA cfs	9/29/2008		KRWA
Piedra	361 cfs	100 cfs	9/29/2008		KRWA
Dennis Cut	50 cfs	5 cfs	9/29/2008		KRWA
At Fresno Weir	156 cfs	95 cfs	9/29/2008		KRWA
Over Fresno Weir	36 cfs	35 cfs	9/29/2008	.	KRWA

Pine Flat			Date		
Storage	121,838 af		9/29/2008	0700	ACOE
Elevation	724.42 ft		9/29/2008	0700	ACOE
Release	361 cfs		9/29/2008	0700	KRCD
Release Temperature	67.8 F	19.9 C	9/29/2008	0700	KRCD
Avg. Fresno Weir Water Temp	71.8 F	22.1 C	9/29/2008		

Flow and Temperature Trends



Kings River Fisheries Management Program
Hydrologic and Climatic Summary Report

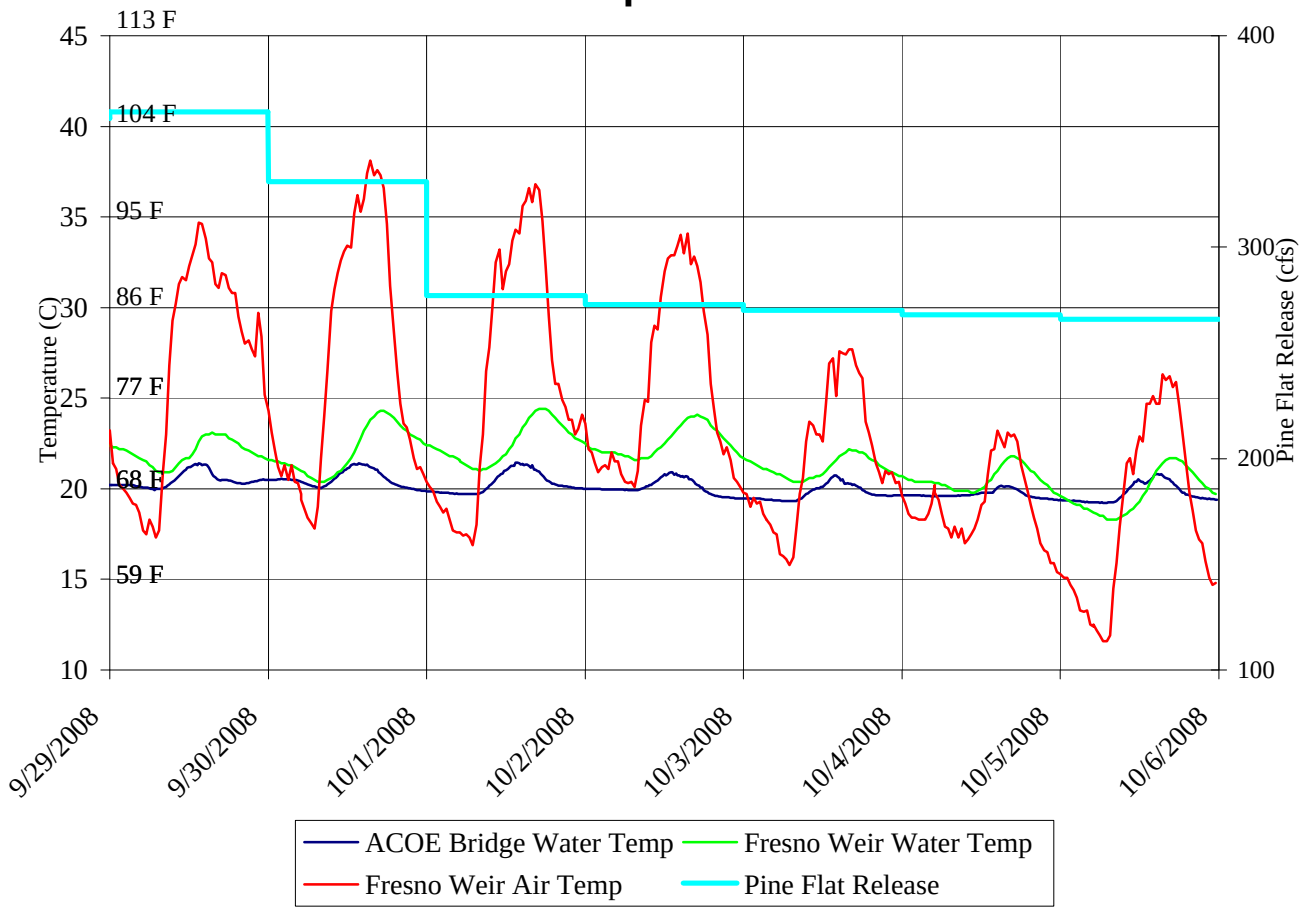
Provisional Data - Subject to Revision

10/6/2008

Flow Rates	Actual	Exhibit "C" Criteria	Date	
Kings River Below North Fork	262 cfs	NA cfs	10/6/2008	ACOE
Mill & Hughes Creeks	0 cfs	NA cfs	10/6/2008	KRWA
Piedra	266 cfs	100 cfs	10/6/2008	KRWA
Dennis Cut	50 cfs	5 cfs	10/6/2008	KRWA
At Fresno Weir	131 cfs	95 cfs	10/6/2008	KRWA
Over Fresno Weir	41 cfs	40 cfs	10/6/2008 .	KRWA

Pine Flat			Date		
Storage	120,465 af		10/6/2008	0700	ACOE
Elevation	723.71 ft		10/6/2008	0700	ACOE
Release	266 cfs		10/6/2008	0700	KRCD
Release Temperature	66.7 F	19.3 C	10/6/2008	0700	KRCD
Avg. Fresno Weir Water Temp	67.6 F	19.8 C	10/6/2008		

Flow and Temperature Trends



Kings River Fisheries Management Program
Hydrologic and Climatic Summary Report

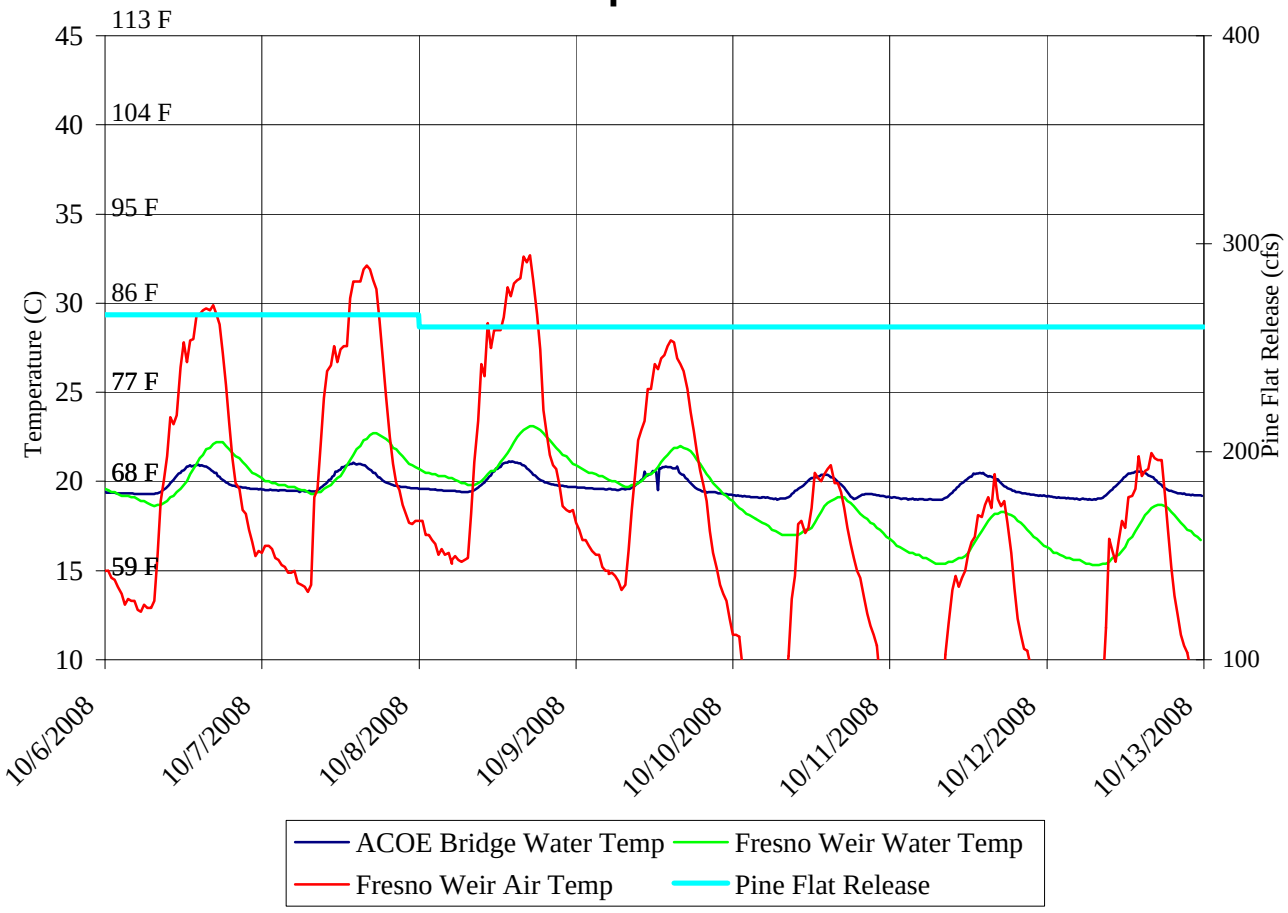
Provisional Data - Subject to Revision

10/13/2008

Flow Rates	Actual	Exhibit "C" Criteria	Date		
Kings River Below North Fork	210 cfs	NA cfs	10/13/2008		ACOE
Mill & Hughes Creeks	0 cfs	NA cfs	10/13/2008		KRWA
Piedra	260 cfs	100 cfs	10/13/2008		KRWA
Dennis Cut	50 cfs	5 cfs	10/13/2008		KRWA
At Fresno Weir	125 cfs	95 cfs	10/13/2008		KRWA
Over Fresno Weir	40 cfs	40 cfs	10/13/2008	.	KRWA

Pine Flat			Date		
Storage	120,388 af		10/13/2008	0700	ACOE
Elevation	723.67 ft		10/13/2008	0700	ACOE
Release	260 cfs		10/13/2008	0700	KRCD
Release Temperature	66.2 F	19.0 C	10/13/2008	0700	KRCD
Avg. Fresno Weir Water Temp	62.1 F	16.7 C	10/13/2008		

Flow and Temperature Trends



Kings River Fisheries Management Program
Hydrologic and Climatic Summary Report

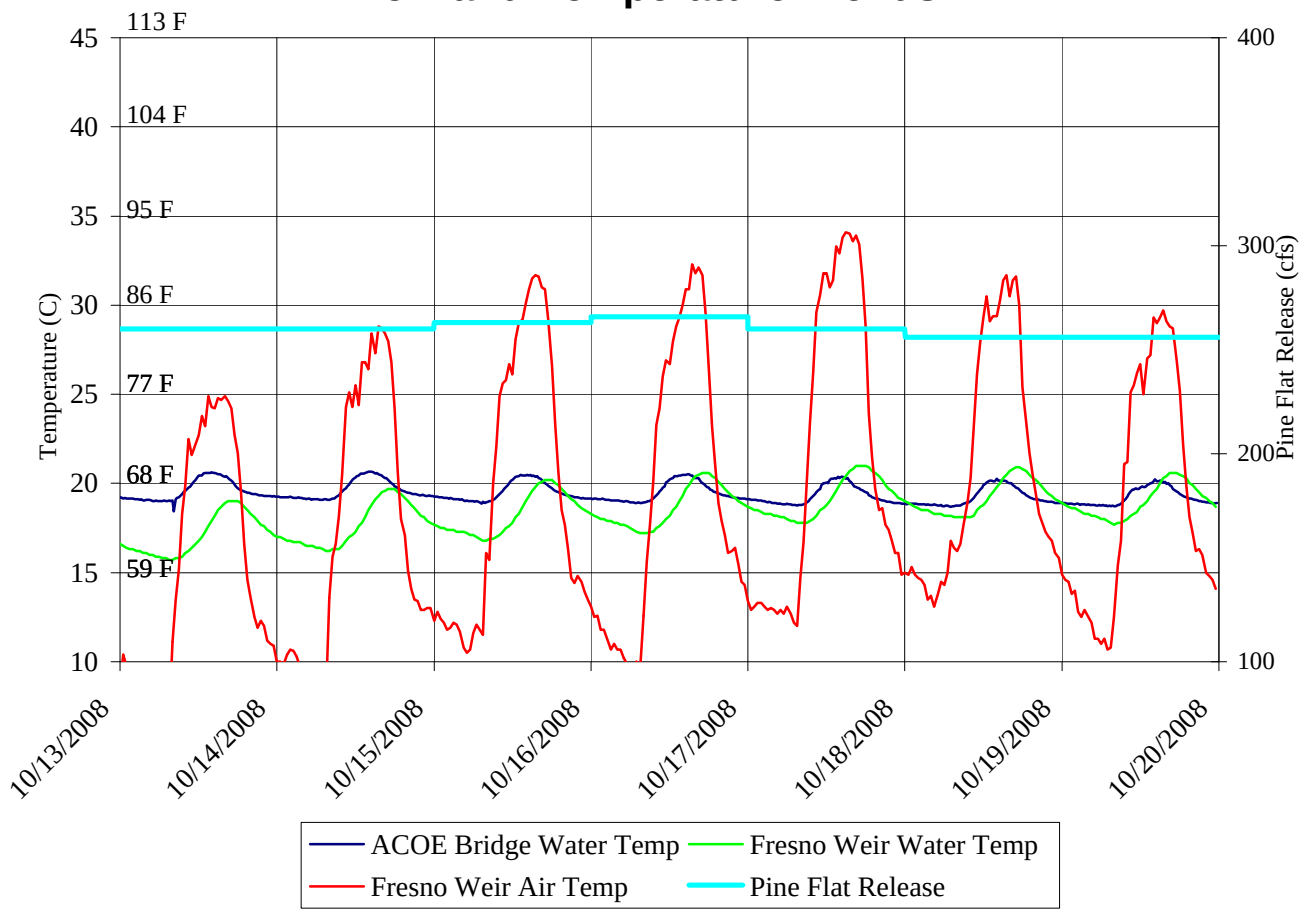
Provisional Data - Subject to Revision

10/20/2008

Flow Rates	Actual	Exhibit "C" Criteria	Date	
Kings River Below North Fork	198 cfs	NA cfs	10/20/2008	ACOE
Mill & Hughes Creeks	0 cfs	NA cfs	10/20/2008	KRWA
Piedra	256 cfs	100 cfs	10/20/2008	KRWA
Dennis Cut	45 cfs	5 cfs	10/20/2008	KRWA
At Fresno Weir	126 cfs	95 cfs	10/20/2008	KRWA
Over Fresno Weir	41 cfs	40 cfs	10/20/2008 .	KRWA

Pine Flat			Date		
Storage	120,003 af		10/20/2008	0700	ACOE
Elevation	723.47 ft		10/20/2008	0700	ACOE
Release	256 cfs		10/20/2008	0700	KRCD
Release Temperature	65.7 F	18.7 C	10/20/2008	0700	KRCD
Avg. Fresno Weir Water Temp	66.2 F	19.0 C	10/20/2008		

Flow and Temperature Trends



Kings River Fisheries Management Program
Hydrologic and Climatic Summary Report

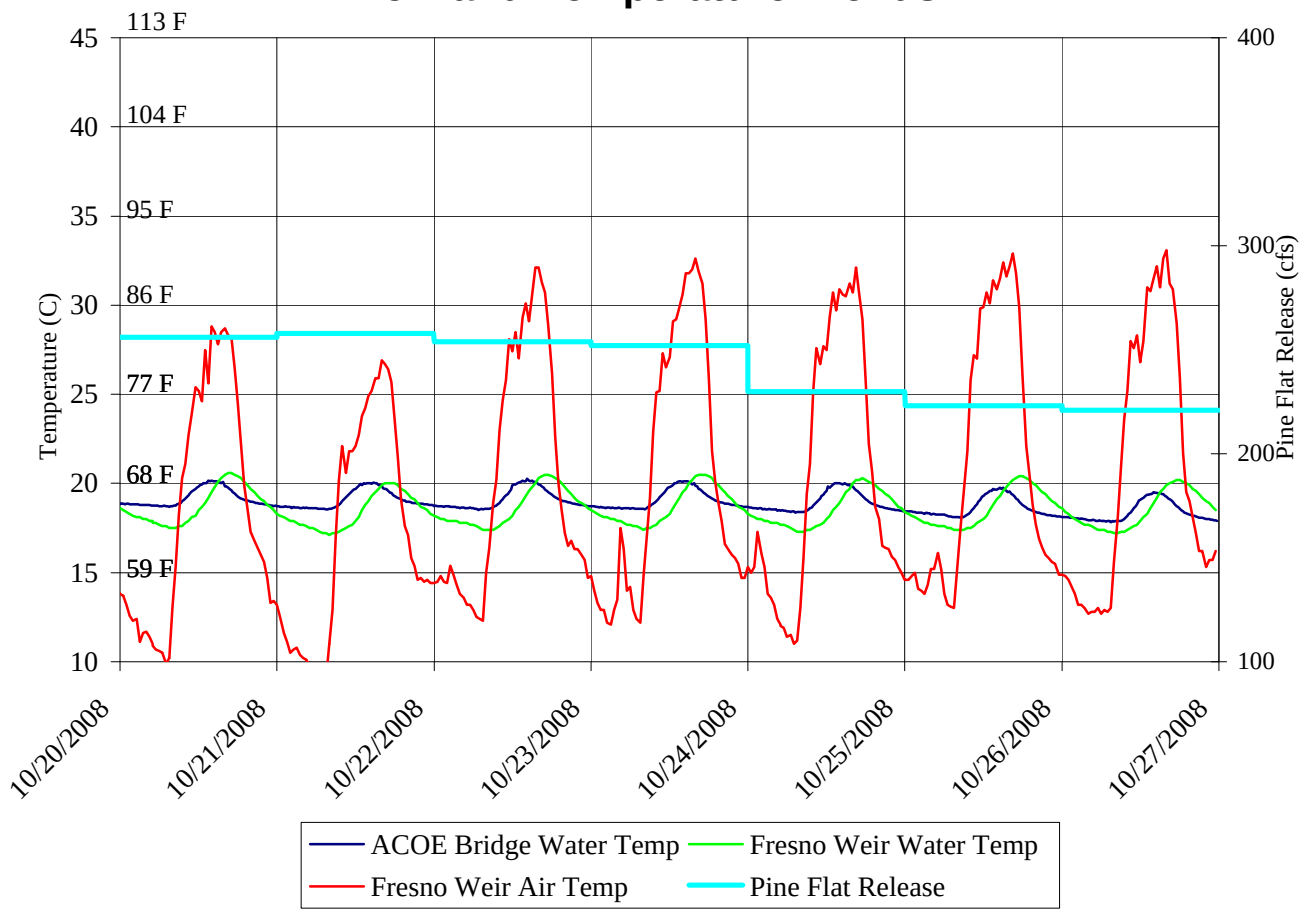
Provisional Data - Subject to Revision

10/27/2008

Flow Rates	Actual	Exhibit "C" Criteria	Date		
Kings River Below North Fork	185 cfs	NA cfs	10/27/2008		ACOE
Mill & Hughes Creeks	0 cfs	NA cfs	10/27/2008		KRWA
Piedra	221 cfs	100 cfs	10/27/2008		KRWA
Dennis Cut	40 cfs	5 cfs	10/27/2008		KRWA
At Fresno Weir	101 cfs	95 cfs	10/27/2008		KRWA
Over Fresno Weir	86 cfs	40 cfs	10/27/2008	.	KRWA

Pine Flat			Date		
Storage	121,199 af		10/27/2008	0700	ACOE
Elevation	724.09 ft		10/27/2008	0700	ACOE
Release	221 cfs		10/27/2008	0700	KRCD
Release Temperature	63.9 F	17.7 C	10/27/2008	0700	KRCD
Avg. Fresno Weir Water Temp	65.3 F	18.5 C	10/27/2008		

Flow and Temperature Trends



Kings River Fisheries Management Program
Hydrologic and Climatic Summary Report

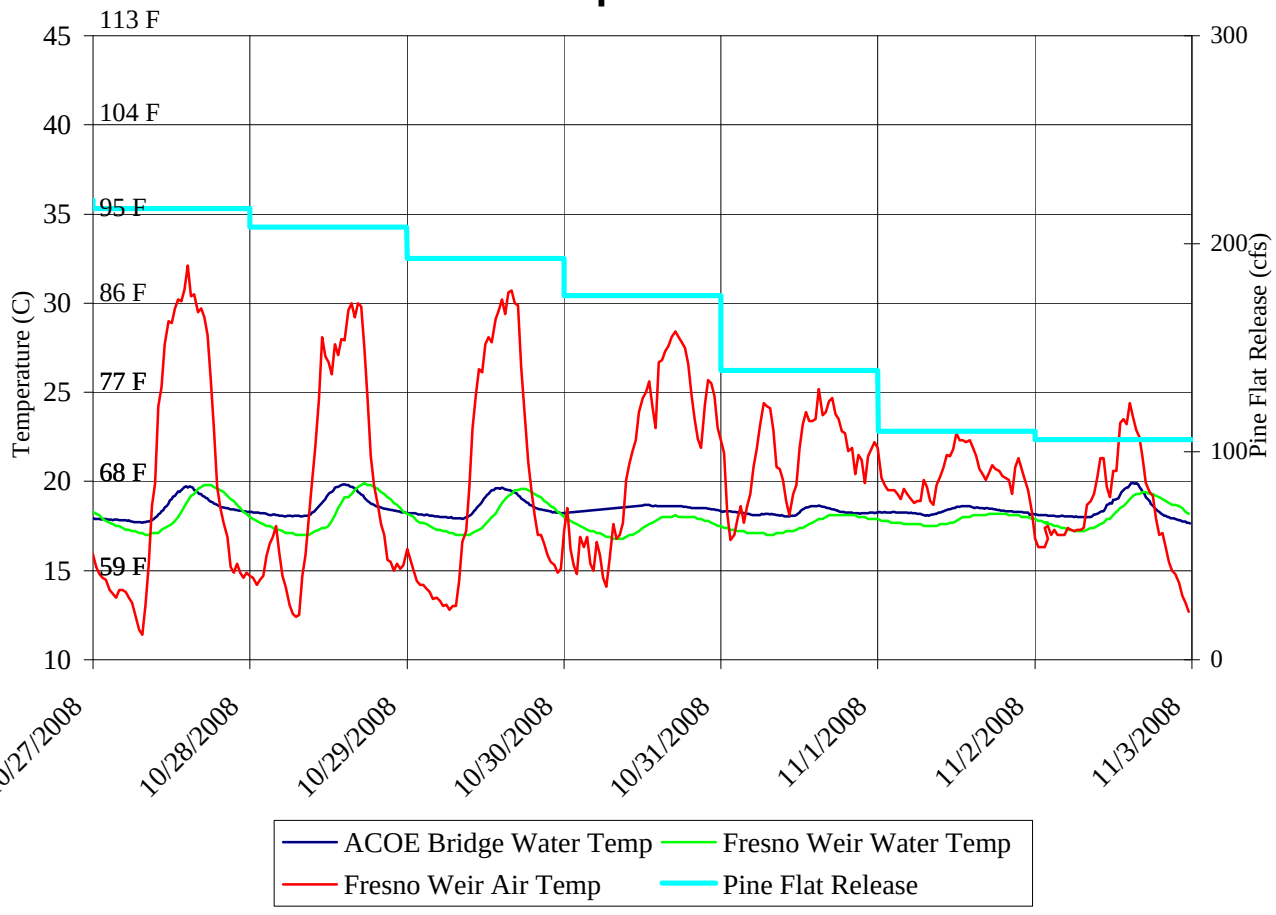
Provisional Data - Subject to Revision

11/3/2008

Flow Rates	Actual	Exhibit "C" Criteria	Date		
Kings River Below North Fork	1044 cfs	NA cfs	11/3/2008		ACOE
Mill & Hughes Creeks	0 cfs	NA cfs	11/3/2008		KRWA
Piedra	100 cfs	100 cfs	11/3/2008		KRWA
Dennis Cut	5 cfs	5 cfs	11/3/2008		KRWA
At Fresno Weir	95 cfs	95 cfs	11/3/2008		KRWA
Over Fresno Weir	90 cfs	40 cfs	11/3/2008	.	KRWA

Pine Flat			Date		
Storage	121,199 af		11/3/2008	0700	ACOE
Elevation	726.99 ft		11/3/2008	0700	ACOE
Release	100 cfs		11/3/2008	0700	KRCD
Release Temperature	63.3 F	17.4 C	11/3/2008	0700	KRCD
Avg. Fresno Weir Water Temp	64.6 F	18.1 C	11/3/2008		

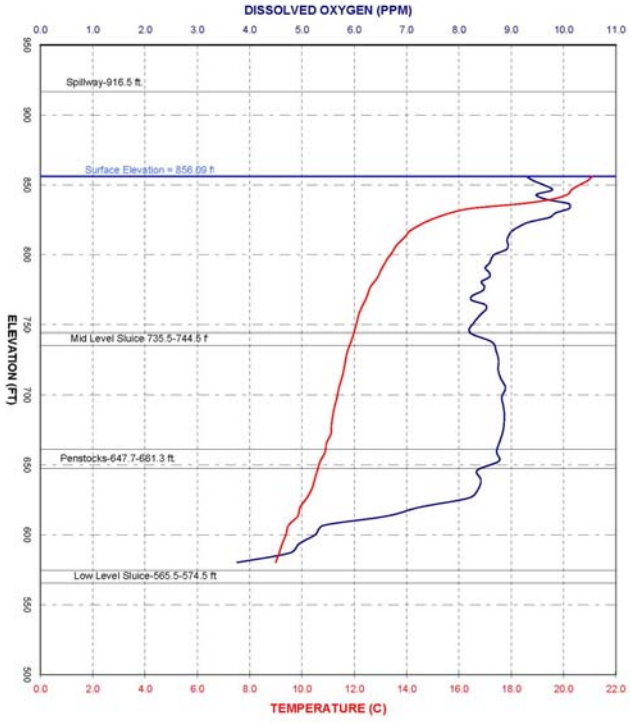
Flow and Temperature Trends



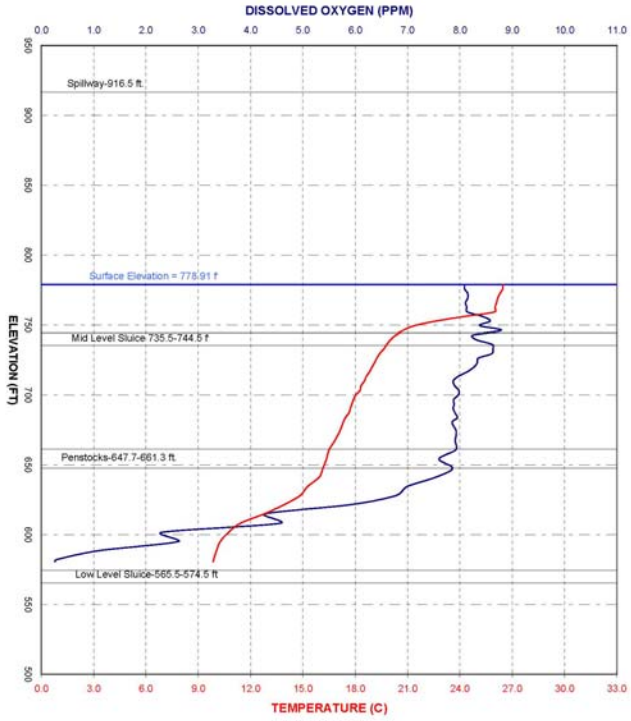
APPENDIX C

Pine Flat Reservoir Temperature and Dissolved Oxygen Profiles from May 2008 through May 2009 (on following pages)

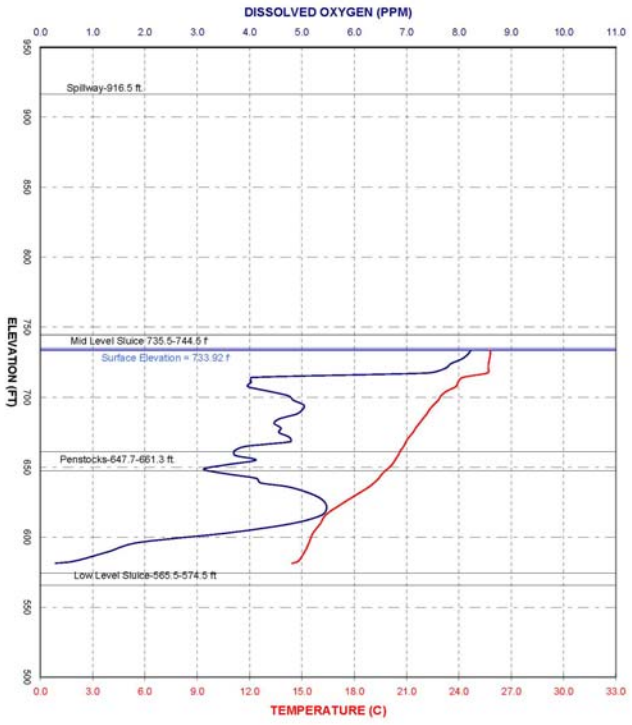
PINE FLAT RESERVOIR 06/03/08 New Buoy Line Placement
(0.57 miles upstream of Dam) Reservoir Elevation in Feet = 856.09



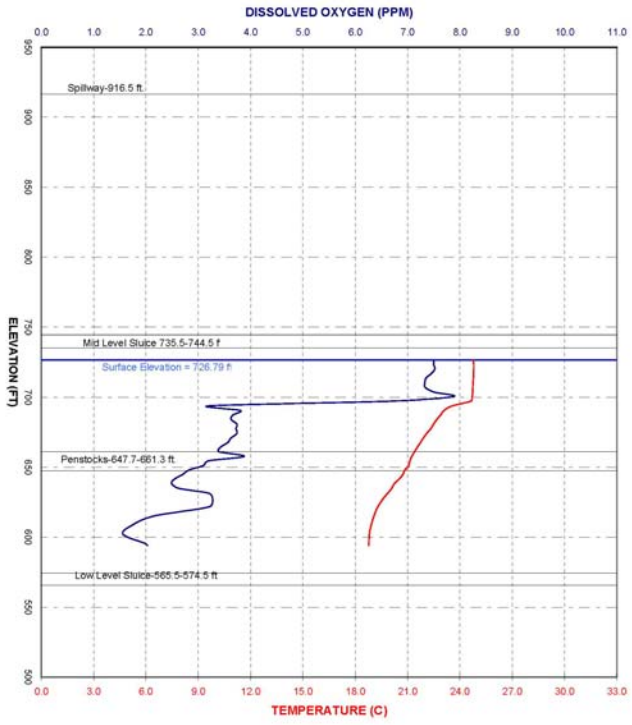
PINE FLAT RESERVOIR 07/22/08 New Buoy Line Placement
(0.57 miles upstream of Dam) Reservoir Elevation in Feet = 778.91

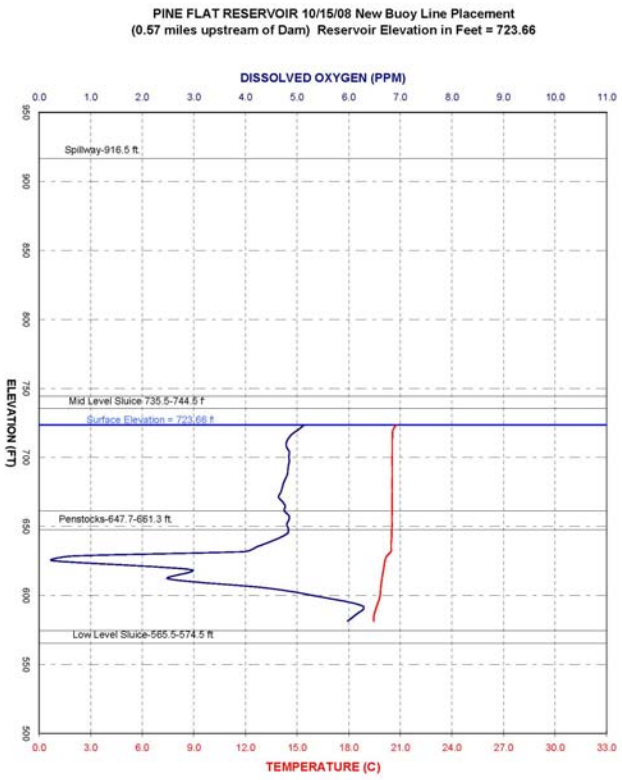


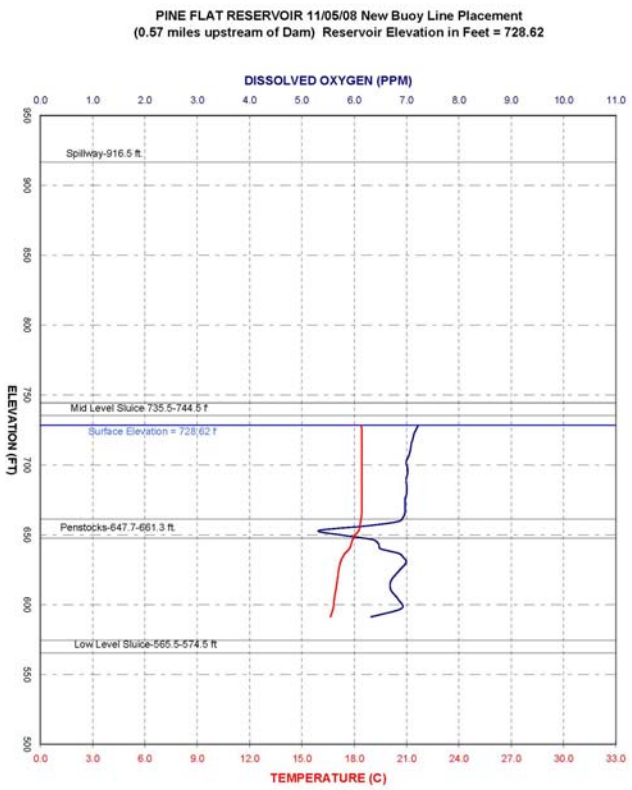
PINE FLAT RESERVOIR 08/19/08 New Buoy Line Placement
(0.57 miles upstream of Dam) Reservoir Elevation in Feet = 733.92

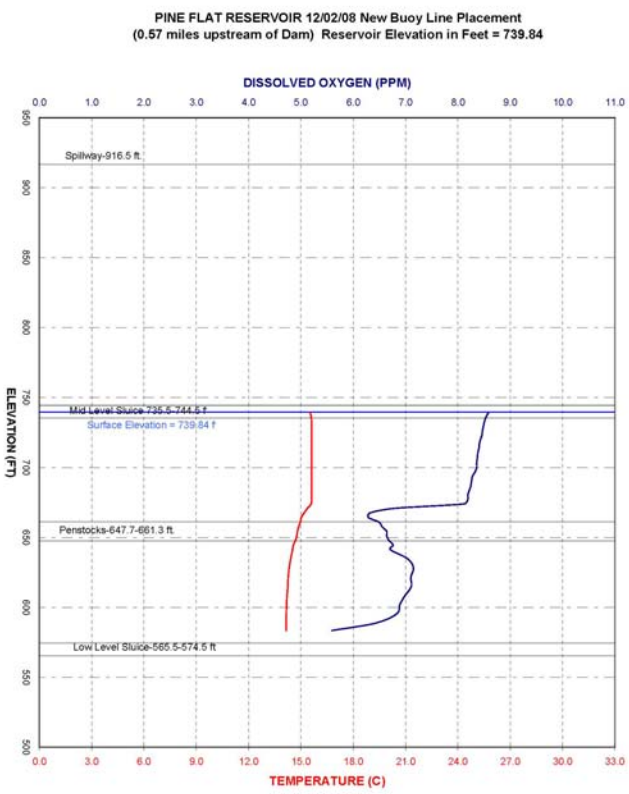


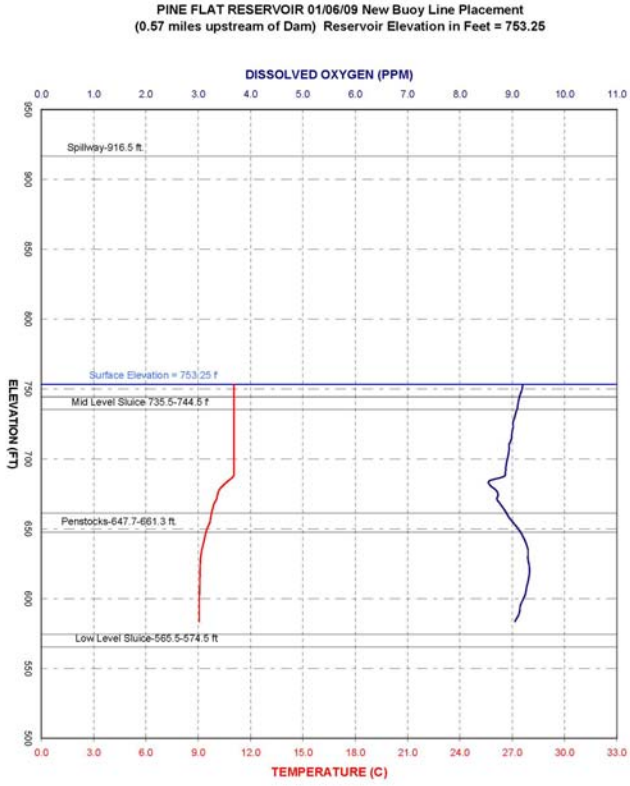
PINE FLAT RESERVOIR 09/02/08 New Buoy Line Placement
(0.57 miles upstream of Dam) Reservoir Elevation in Feet = 726.79

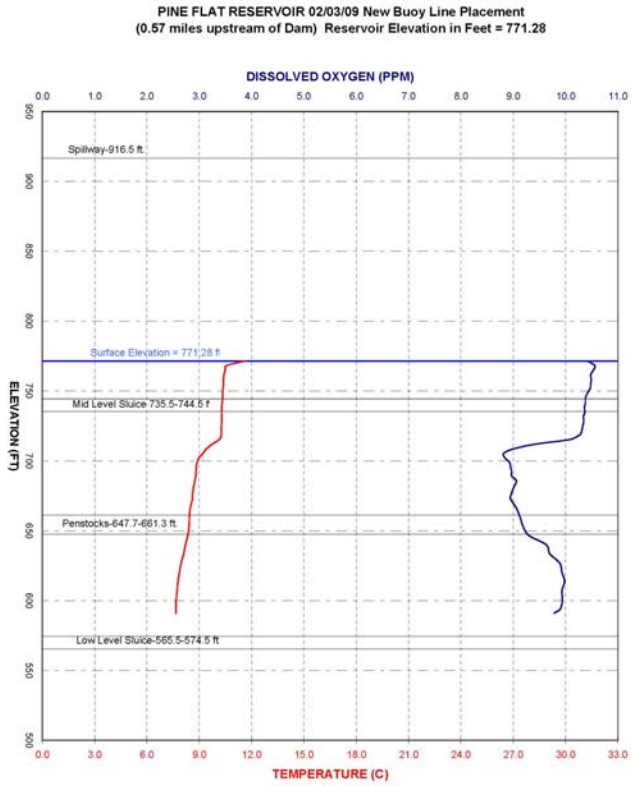


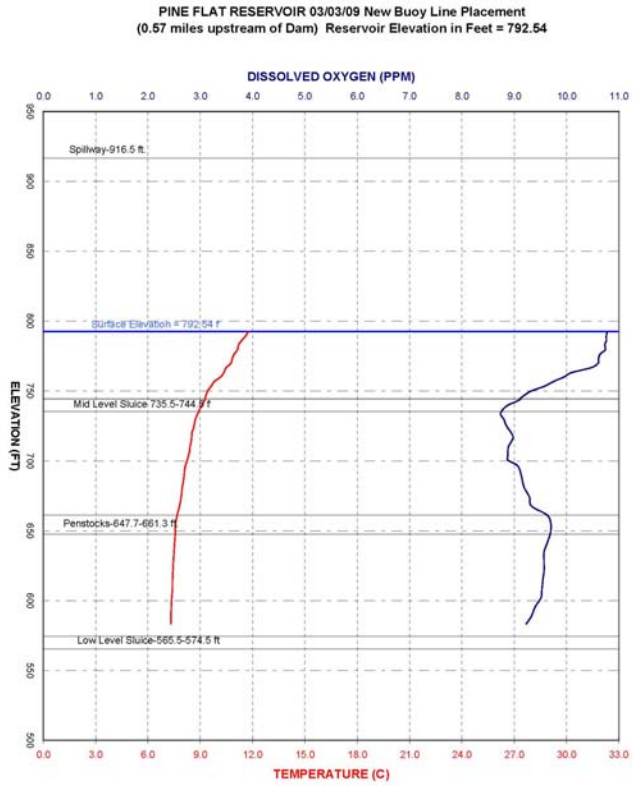

PINE FLAT RESERVOIR 10/15/08 New Buoy Line Placement
(0.57 miles upstream of Dam) Reservoir Elevation in Feet = 723.66
DISSOLVED OXYGEN (PPM)
0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0
Spillway-916.5 ft.
Mid Level Sluice 735.5-744.5 f
Surface Elevation = 723.66 f
Penstocks-647.7-661.3 ft.
Low Level Sluice-565.5-574.5 ft.
ELEVATION (FT)
950 900 850 800 750 700 650 600 550 500
0.0 3.0 6.0 9.0 12.0 15.0 18.0 21.0 24.0 27.0 30.0 33.0
TEMPERATURE (C)

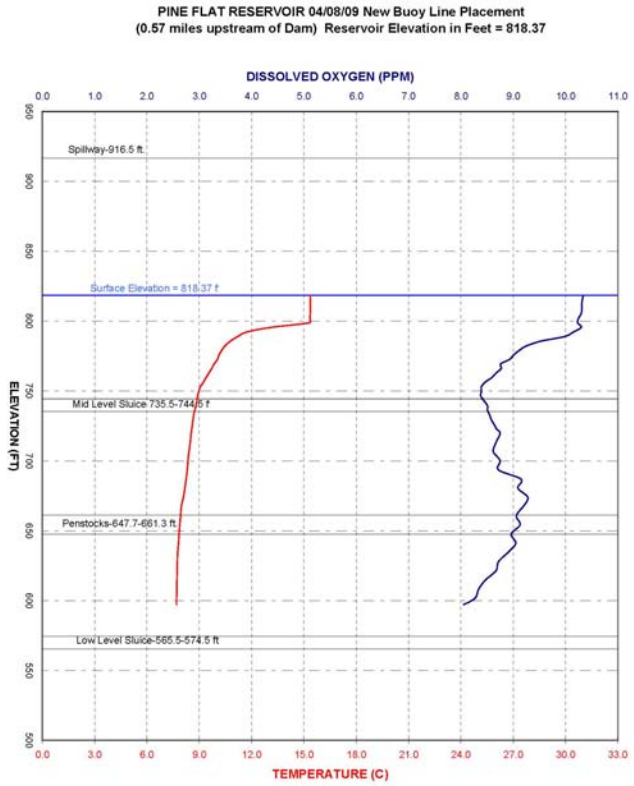

PINE FLAT RESERVOIR 11/05/08 New Buoy Line Placement
(0.57 miles upstream of Dam) Reservoir Elevation in Feet = 728.62
DISSOLVED OXYGEN (PPM)
0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0
Spillway-916.5 ft.
Mid Level Sluice 735.5-744.5 f
Surface Elevation = 728.62 f
Penstocks-647.7-661.3 ft.
Low Level Sluice-565.5-574.5 ft.
ELEVATION (FT)
950 900 850 800 750 700 650 600 550 500
0.0 3.0 6.0 9.0 12.0 15.0 18.0 21.0 24.0 27.0 30.0 33.0
TEMPERATURE (C)

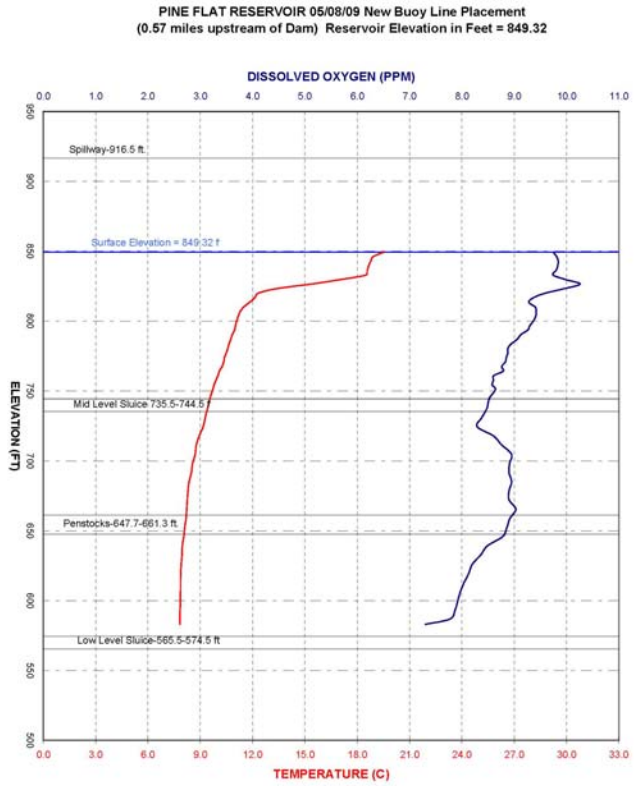

PINE FLAT RESERVOIR 12/02/08 New Buoy Line Placement
(0.57 miles upstream of Dam) Reservoir Elevation in Feet = 739.84
DISSOLVED OXYGEN (PPM)
0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0
Spillway-916.5 ft
Mid Level Sluice 735.5-744.5 ft
Surface Elevation = 739.84 ft
Penstocks-647.7-661.3 ft
Low Level Sluice-565.5-574.5 ft
ELEVATION (FT)
950 900 850 800 750 700 650 600 550 500
0.0 3.0 6.0 9.0 12.0 15.0 18.0 21.0 24.0 27.0 30.0 33.0
TEMPERATURE (C)


PINE FLAT RESERVOIR 01/06/09 New Buoy Line Placement
(0.57 miles upstream of Dam) Reservoir Elevation in Feet = 753.25
DISSOLVED OXYGEN (PPM)
0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0
Spillway-916.5 ft
Surface Elevation = 753.25 ft
Mid Level Sluice 735.5-744.5 ft
Penstocks-647.7-661.3 ft
Low Level Sluice-565.5-574.5 ft
ELEVATION (FT)
950 900 850 800 750 700 650 600 550 500
0.0 3.0 6.0 9.0 12.0 15.0 18.0 21.0 24.0 27.0 30.0 33.0
TEMPERATURE (C)


PINE FLAT RESERVOIR 02/03/09 New Buoy Line Placement
(0.57 miles upstream of Dam) Reservoir Elevation in Feet = 771.28
DISSOLVED OXYGEN (PPM)
0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0
Spillway-916.5 ft
Surface Elevation = 771.28 ft
Mid Level Sluice 735.5-744.5 ft
Penstocks-647.7-661.3 ft
Low Level Sluice-565.5-574.5 ft
ELEVATION (FT)
950 900 850 800 750 700 650 600 550 500
0.0 3.0 6.0 9.0 12.0 15.0 18.0 21.0 24.0 27.0 30.0 33.0
TEMPERATURE (C)

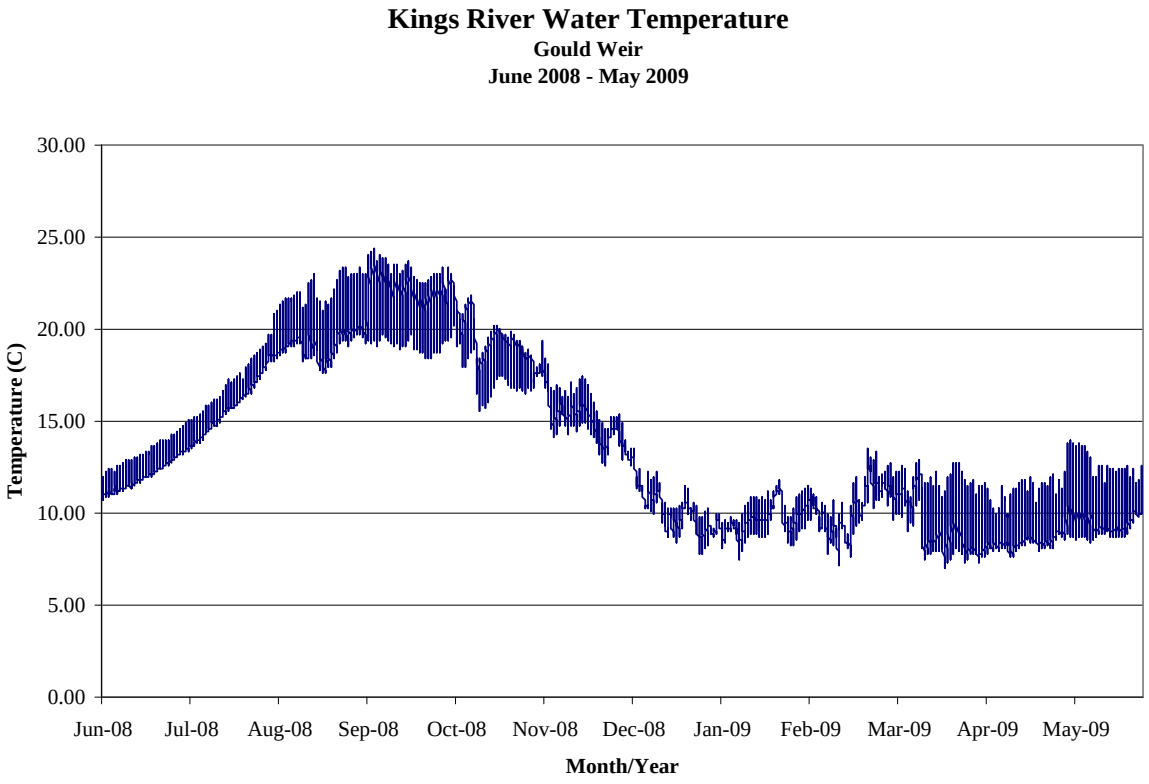

PINE FLAT RESERVOIR 03/03/09 New Buoy Line Placement
(0.57 miles upstream of Dam) Reservoir Elevation in Feet = 792.54
DISSOLVED OXYGEN (PPM)
0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0
Spillway-916.5 ft
Surface Elevation = 792.54 ft
Mid Level Sluice 735.5-744.5 ft
Penstocks-647.7-661.3 ft
Low Level Sluice-565.5-574.5 ft
ELEVATION (FT)
950 900 850 800 750 700 650 600 550 500
0.0 3.0 6.0 9.0 12.0 15.0 18.0 21.0 24.0 27.0 30.0 33.0
TEMPERATURE (C)


PINE FLAT RESERVOIR 04/08/09 New Buoy Line Placement
(0.57 miles upstream of Dam) Reservoir Elevation in Feet = 818.37
DISSOLVED OXYGEN (PPM)
0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0
Spillway-916.5 ft.
Surface Elevation = 818.37 f
Mid Level Sluice 735.5-744.5 f
Penstocks-647.7-661.3 ft.
Low Level Sluice-565.5-574.5 ft
ELEVATION (FT)
950 900 850 800 750 700 650 600 550 500
0.0 3.0 6.0 9.0 12.0 15.0 18.0 21.0 24.0 27.0 30.0 33.0
TEMPERATURE (C)


PINE FLAT RESERVOIR 05/08/09 New Buoy Line Placement
(0.57 miles upstream of Dam) Reservoir Elevation in Feet = 849.32
DISSOLVED OXYGEN (PPM)
0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0
Spillway-916.5 ft.
Surface Elevation = 849.32 f
Mid Level Sluice 735.5-744.5
Penstocks-647.7-661.3 ft.
Low Level Sluice-565.5-574.5 ft
ELEVATION (FT)
950 900 850 800 750 700 650 600 550 500
0.0 3.0 6.0 9.0 12.0 15.0 18.0 21.0 24.0 27.0 30.0 33.0
TEMPERATURE (C)

APPENDIX D

Results of Water Temperature Monitoring at Gould Weir
(on following page)


Kings River Water Temperature
Gould Weir
June 2008 - May 2009
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Temperature (C)
Jun-08
Jul-08
Aug-08
Sep-08
Oct-08
Nov-08
Dec-08
Jan-09
Feb-09
Mar-09
Apr-09
May-09
Month/Year

APPENDIX E

Water Quality Constituent Monitoring Results as provided by Ag-Waiver Program
(on following page)

Site	Constituent	Field/Lab	BPO	Units	Sample Month and Results		
					Irrigation	Irrigation	Irrigation
					6/17/08	7/16/08	8/14/08
Manning Ave	Flow	KRWA		cfs	3025	2390	990
Page 1 of 2	EC	Field	200	umhos/cm	24.6	22.3	30.9
	EC dup	Field	200	umhos/cm	24.6	22.6	31
	pH	Field	6.5-8.3	pH	6.05	6.97	7.03
	pH dup	Field	6.5-8.3	pH	6.27	6.99	7.05
	Temperature	Field		Celsius	12.6	16.6	22.1
	Temperature dup	Field		Celsius	12.5	16.6	22.1
	Dissolved Oxygen	Field	7	mg/L	10.9	9.01	7.91
	Dissolved Oxygen dup	Field	7	mg/L	10.54	8.95	7.81
	TDS	APPL		mg/L	21	14	15
	Turbidity	APPL		NTU	1.1	0.92	3.9
	Nitrate-N	APPL		mg/L	0.74	0.75	0.79
	Nitrite-N	APPL		mg/L	ND	ND	ND
	Orthophosphate-P	APPL		mg/L	ND	ND	ND
	Ammonia-N	APPL	25 ug/L	mg/L	0.22 J	0.56	0.13 J
	TKN	APPL		mg/L	ND	ND	0.63
	Color	APPL		APHA	34	13	12
	Phosphorus	APPL		ug/L	ND	11.2 J	16.3 J
	Arsenic	APPL		ug/L	0.6	0.62	1
	Boron	APPL		ug/L	5.5 J	ND	8.4 J
	Cadmium	APPL		ug/L	0.16 J	0.04 J	0.37
	Copper	APPL		ug/L	0.8	0.98	0.92
	Lead	APPL		ug/L	0.15 J	0.21	0.35
	Nickel	APPL		ug/L	0.67	0.85	2.9
	Selenium	APPL		ug/L	ND	0.39 J	ND
	Zinc	APPL		ug/L	3.6 J	3.9 J	12.4 J
	Hardness	APPL		mg/L	9.8	0.21	12.1
	Atrazine	APPL	1	ug/L	ND	ND	ND
	Cyanazine	APPL		ug/L	ND	ND	ND
	Simazine	APPL	4	ug/L	ND	ND	ND
	Methamidophos	APPL		ug/L	ND	ND	ND
	DDE	APPL		ug/L	ND	ND	ND
	DDT	APPL		ug/L	ND	ND	ND
	DDD	APPL		ug/L	ND	ND	ND
	Dicofol	APPL		ug/L	ND	ND	ND

Notes

1. "J" indicates value reported below PQL
2. "B" indicates analyte found in method blank
3. No sediment toxicity reported
Sample on Oct 16
Control = 96.3% survival
Sample = 98.8% survival

Site	Constituent	Field/Lab	BPO	Units	Sample Month and Results		
					Irrigation	Irrigation	Irrigation
					6/17/08	7/16/08	8/14/08
Manning Ave Page 2 of 2	Dieldrin	APPL		ug/L	ND	ND	ND
	Endrin	APPL	2	ug/L	ND	ND	ND
	Methoxychlor	APPL		ug/L	ND	ND	ND
	Bifenthrin	APPL		ug/L	ND	ND	ND
	Cyfluthrin	APPL		ug/L	ND	ND	ND
	Cypermethrin	APPL		ug/L	ND	ND	ND
	Esfenvalerate	APPL		ug/L	ND	ND	ND
	Lamba cyhalothrin	APPL		ug/L	ND	ND	ND
	Permethrin	APPL		ug/L	ND	ND	ND
	Aldicarb	APPL		ug/L	ND	ND	ND
	Carbaryl	APPL		ug/L	ND	ND	ND
	Carbofuran	APPL	18	ug/L	ND	ND	ND
	Diuron	APPL		ug/L	ND	ND	ND
	Linuron	APPL		ug/L	ND	ND	ND
	Methiocarb	APPL		ug/L	ND	ND	ND
	Methomyl	APPL		ug/L	ND	ND	ND
	Oxamyl	APPL	50	ug/L	ND	ND	ND
	Azinphosmethyl	APPL		ug/L	ND	ND	ND
	Chlorpyrifos	APPL		ug/L	ND	ND	ND
	Diazinon	APPL		ug/L	ND	ND	ND
	Dimethoate	APPL		ug/L	ND	ND	ND
	Disulfoton	APPL		ug/L	ND	ND	ND
	Malathion	APPL		ug/L	ND	ND	ND
	Methidathion	APPL		ug/L	ND	ND	ND
	Molinate	APPL	20	ug/L	ND	ND	ND
	Parathion, methyl	APPL		ug/L	ND	ND	ND
	Phorate	APPL		ug/L	ND	ND	ND
	Phosmet	APPL		ug/L	ND	ND	ND
	Thiobencarb	APPL	70	ug/L	ND	ND	ND
	Glyphosate	APPL	700	ug/L	ND	ND	ND
	Paraquat	APPL		ug/L	ND	ND	ND
	TOC	APPL		mg/L	1.6	1.6	1.8 B
	Toxicity, minnow	SFL		96h			
	Toxicity, water flea	SFL		48h			
	Toxicity, algae	SFL		48h			

Notes
1. "J" indicates value reported below PQL
2. "B" indicates analyte found in method blank

Site	Constituent	Field/Lab	BPO	Units	Sample Month and Results		
					Irrigation	Irrigation	Irrigation
					6/17/08	7/16/08	8/14/08
Manning Ave Duplicate Page 1 of 2	TDS	APPL		mg/L	18	17	
	Turbidity	APPL		NTU	2.4	1.1	
	Nitrate-N	APPL		mg/L	0.75	0.75	
	Nitrite-N	APPL		mg/L	ND	ND	
	Orthophosphate-P	APPL		mg/L	ND	ND	
	Ammonia-N	APPL	25 ug/L	mg/L	ND	0.6	
	TKN	APPL		mg/L	ND	ND	
	Color	APPL		APHA	36	12	
	Phosphorus	APPL		ug/L	10.0 J	11.0 J	
	Arsenic	APPL		ug/L	0.45	0.62	
	Boron	APPL		ug/L	6.0 J	ND	
	Cadmium	APPL		ug/L	0.043 J	0.15 J	
	Copper	APPL		ug/L	0.83	1.1	
	Lead	APPL		ug/L	0.27	0.57	
	Nickel	APPL		ug/L	0.95	0.93	
	Selenium	APPL		ug/L	ND	0.28 J	
	Zinc	APPL		ug/L	24	6.4 J	
	Hardness	APPL		mg/L	9.6	8.9	
	Atrazine	APPL	1	ug/L	ND	ND	
	Cyanazine	APPL		ug/L	ND	ND	
	Simazine	APPL	4	ug/L	ND	ND	
	Methamidophos	APPL		ug/L	ND	ND	
	DDE	APPL		ug/L	ND	ND	
	DDT	APPL		ug/L	ND	ND	
	DDD	APPL		ug/L	ND	ND	
	Dicofol	APPL		ug/L	ND	ND	

Notes
1. "J" indicates value reported below PQL
2. "B" indicates analyte found in method blank

Site	Constituent	Field/Lab	BPO	Units	Sample Month and Results		
					Irrigation	Irrigation	Irrigation
					6/17/08	7/16/08	8/14/08
Manning Ave Duplicate Page 2 of 2	Dieldrin	APPL		ug/L	ND	ND	
	Endrin	APPL	2	ug/L	ND	ND	
	Methoxychlor	APPL		ug/L	ND	ND	
	Bifenthrin	APPL		ug/L	ND	ND	
	Cyfluthrin	APPL		ug/L	ND	ND	
	Cypermethrin	APPL		ug/L	ND	ND	
	Esfenvalerate	APPL		ug/L	ND	ND	
	Lamba cyhalothrin	APPL		ug/L	ND	ND	
	Permethrin	APPL		ug/L	ND	ND	
	Aldicarb	APPL		ug/L	ND	ND	
	Carbaryl	APPL		ug/L	ND	ND	
	Carbofuran	APPL	18	ug/L	ND	ND	
	Diuron	APPL		ug/L	ND	ND	
	Linuron	APPL		ug/L	ND	ND	
	Methiocarb	APPL		ug/L	ND	ND	
	Methomyl	APPL		ug/L	ND	ND	
	Oxamyl	APPL	50	ug/L	ND	ND	
	Azinphosmethyl	APPL		ug/L	ND	ND	
	Chlorpyrifos	APPL		ug/L	ND	ND	
	Diazinon	APPL		ug/L	ND	ND	
	Dimethoate	APPL		ug/L	ND	ND	
	Disulfoton	APPL		ug/L	ND	ND	
	Malathion	APPL		ug/L	ND	ND	
	Methidathion	APPL		ug/L	ND	ND	
	Molinate	APPL		ug/L	ND	ND	
	Parathion, methyl	APPL		ug/L	ND	ND	
	Phorate	APPL		ug/L	ND	ND	
	Phosmet	APPL		ug/L	ND	ND	
	Thiobencarb	APPL		ug/L	ND	ND	
	Glyphosate	APPL		ug/L	ND	ND	
	Paraquat	APPL		ug/L	ND	ND	
	TOC	APPL		mg/L	1.5	1.7	
	Toxicity, minnow	SFL		96h			
	Toxicity, water flea	SFL		48h			
	Toxicity, algae	SFL		48h			

Notes
1. "J" indicates value reported below PQL
2. "B" indicates analyte found in method blank

Site	Constituent	Field/Lab	BPO	Units	Sample Month and Results	
					Storm	Irrigation
					2/17/09	3/26/09
Manning Ave	Flow	KRWA		cfs	100 (est)	450
Page 1 of 2	EC	Field	200	umhos/cm	123.2	43.9
	EC dup	Field	200	umhos/cm	123.2	44
	pH	Field	6.5-8.3	pH	7.33	7.25
	pH dup	Field	6.5-8.3	pH	7.31	7.32
	Temperature	Field		Celsius	9.9	12.3
	Temperature dup	Field		Celsius	9.9	12.3
	Dissolved Oxygen	Field	7	mg/L	10.86	10.64
	Dissolved Oxygen dup	Field	7	mg/L	10.75	10.52
	TDS	APPL		mg/L	71	38
	Turbidity	APPL		NTU	2.2	1.1
	Nitrate-N	APPL		mg/L	2.3	ND
	Nitrite-N	APPL		mg/L	ND	ND
	Orthophosphate-P	APPL		mg/L	ND	ND
	Ammonia-N	APPL	25 ug/L	mg/L	ND	ND
	TKN	APPL		mg/L	0.28 J	ND
	Color	APPL		APHA	2	12
	Phosphorus	APPL		ug/L	20.2 J	8.9 J
	Arsenic	APPL		ug/L	0.95	0.64
	Boron	APPL		ug/L	17.3	10.3
	Cadmium	APPL		ug/L	ND	ND
	Copper	APPL		ug/L	1.2	1.3
	Lead	APPL		ug/L	0.22	ND
	Nickel	APPL		ug/L	1.3	0.82
	Selenium	APPL		ug/L	0.65 J	ND
	Zinc	APPL		ug/L	2.6 J	ND
	Hardness	APPL		mg/L	40.9	20.6
	Atrazine	APPL	1	ug/L	ND	ND
	Cyanazine	APPL		ug/L	ND	ND
	Simazine	APPL	4	ug/L	0.38 J	ND
	Methamidophos	APPL		ug/L	ND	ND
	DDE	APPL		ug/L	ND	ND
	DDT	APPL		ug/L	ND	ND
	DDD	APPL		ug/L	ND	ND
	Dicofol	APPL		ug/L	ND	ND

Notes
1. "J" indicates value reported below PQL
2. "B" indicates analyte found in method blank

Site	Constituent	Field/Lab	BPO	Units	Sample Month and Results	
					Irrigation	Irrigation
					2/17/09	3/26/09
Manning Ave Page 2 of 2	Dieldrin	APPL		ug/L	ND	ND
	Endrin	APPL	2	ug/L	ND	ND
	Methoxychlor	APPL		ug/L	ND	ND
	Bifenthrin	APPL		ug/L	ND	ND
	Cyfluthrin	APPL		ug/L	ND	ND
	Cypermethrin	APPL		ug/L	ND	ND
	Esfenvalerate	APPL		ug/L	ND	ND
	Lamba cyhalothrin	APPL		ug/L	ND	ND
	Permethrin	APPL		ug/L	ND	ND
	Aldicarb	APPL		ug/L	ND	ND
	Carbaryl	APPL		ug/L	ND	ND
	Carbofuran	APPL	18	ug/L	ND	ND
	Diuron	APPL		ug/L	0.22 J	ND
	Linuron	APPL		ug/L	ND	ND
	Methiocarb	APPL		ug/L	ND	ND
	Methomyl	APPL		ug/L	ND	ND
	Oxamyl	APPL	50	ug/L	ND	ND
	Azinphosmethyl	APPL		ug/L	ND	ND
	Chlorpyrifos	APPL		ug/L	ND	ND
	Diazinon	APPL		ug/L	ND	ND
	Dimethoate	APPL		ug/L	ND	ND
	Disulfoton	APPL		ug/L	ND	ND
	Malathion	APPL		ug/L	ND	ND
	Methidathion	APPL		ug/L	ND	ND
	Molinate	APPL	20	ug/L	ND	ND
	Parathion, methyl	APPL		ug/L	ND	ND
	Phorate	APPL		ug/L	ND	ND
	Phosmet	APPL		ug/L	ND	ND
	Thiobencarb	APPL	70	ug/L	ND	ND
	Glyphosate	APPL	700	ug/L	ND	ND
	Paraquat	APPL		ug/L	ND	ND
	TOC	APPL		mg/L	2.1	3.4
	Toxicity, minnow	SFL		96h	no sample	no sample
	Toxicity, water flea	SFL		48h	no sample	no sample
	Toxicity, algae	SFL		48h	no sample	no sample

Notes
1. "J" indicates value reported below PQL
2. "B" indicates analyte found in method blank

Site	Constituent	Field/Lab	BPO	Units	Sample Month and Results	
					Irrigation	Irrigation
					2/17/09	3/26/09
Manning Ave Duplicate Page 1 of 2	TDS	APPL		mg/L	78	
	Turbidity	APPL		NTU	2.3	
	Nitrate-N	APPL		mg/L	2.3	
	Nitrite-N	APPL		mg/L	ND	
	Orthophosphate-P	APPL		mg/L	ND	
	Ammonia-N	APPL	25 ug/L	mg/L	ND	
	TKN	APPL		mg/L	0.36 J	
	Color	APPL		APHA	2	
	Phosphorus	APPL		ug/L	19.1 J	
	Arsenic	APPL		ug/L	1.1	
	Boron	APPL		ug/L	18.6	
	Cadmium	APPL		ug/L	ND	
	Copper	APPL		ug/L	1.3	
	Lead	APPL		ug/L	ND	
	Nickel	APPL		ug/L	1.5	
	Selenium	APPL		ug/L	1.4	
	Zinc	APPL		ug/L	3.2 J	
	Hardness	APPL		mg/L	40	
	Atrazine	APPL	1	ug/L	ND	
	Cyanazine	APPL		ug/L	ND	
	Simazine	APPL	4	ug/L	0.41 J	
	Methamidophos	APPL		ug/L	ND	
	DDE	APPL		ug/L	ND	
	DDT	APPL		ug/L	ND	
	DDD	APPL		ug/L	ND	
	Dicofol	APPL		ug/L	ND	

Notes
1. "J" indicates value reported below PQL
2. "B" indicates analyte found in method blank

Site	Constituent	Field/Lab	BPO	Units	Sample Month and Results	
					Irrigation	Irrigation
					2/17/09	3/26/09
Manning Ave Duplicate Page 2 of 2	Dieldrin	APPL		ug/L	ND	
	Endrin	APPL	2	ug/L	ND	
	Methoxychlor	APPL		ug/L	ND	
	Bifenthrin	APPL		ug/L	ND	
	Cyfluthrin	APPL		ug/L	ND	
	Cypermethrin	APPL		ug/L	ND	
	Esfenvalerate	APPL		ug/L	ND	
	Lamba cyhalothrin	APPL		ug/L	ND	
	Permethrin	APPL		ug/L	ND	
	Aldicarb	APPL		ug/L	ND	
	Carbaryl	APPL		ug/L	ND	
	Carbofuran	APPL	18	ug/L	ND	
	Diuron	APPL		ug/L	0.30 J	
	Linuron	APPL		ug/L	ND	
	Methiocarb	APPL		ug/L	ND	
	Methomyl	APPL		ug/L	ND	
	Oxamyl	APPL	50	ug/L	ND	
	Azinphosmethyl	APPL		ug/L	ND	
	Chlorpyrifos	APPL		ug/L	ND	
	Diazinon	APPL		ug/L	ND	
	Dimethoate	APPL		ug/L	ND	
	Disulfoton	APPL		ug/L	ND	
	Malathion	APPL		ug/L	ND	
	Methidathion	APPL		ug/L	ND	
	Molinate	APPL		ug/L	ND	
	Parathion, methyl	APPL		ug/L	ND	
	Phorate	APPL		ug/L	ND	
	Phosmet	APPL		ug/L	ND	
	Thiobencarb	APPL		ug/L	ND	
	Glyphosate	APPL		ug/L	ND	
	Paraquat	APPL		ug/L	ND	
	TOC	APPL		mg/L	2.7	

Notes
1. "J" indicates value reported below PQL
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