Quality Assurance Project Plan

for the

"Shasta Water Association Dam Demobilization and Water Quality Improvements Project"

Prepared by:

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Shasta Valley Resource Conservation District

May 21, 2007

Version Number 1.0

GROUP A ELEMENTS: PROJECT MANAGEMENT

1. TITLE AND APPROVAL SHEETS

Quality Assurance Project Plan

For

PROJECT NAME: Shasta Water Association Dam Demobilization and Water Quality Improvements Project

Proposal Identification Number: 06-249-551-0

Date: May 21, 2007

NAME OF RESPONSIBLE ORGANIZATION : Shasta Valley RCD

APPROVAL SIGNATURES

GRANT ORGANIZATION:

Title:	Name:	Signature:	Date*:
Shasta Valley RCD Project Manager	Amy Hansen	Amy M Hansen	05/21/07
Shasta Valley RCD QA Officer	Dave Webb	David Webb	05/22/07
Shasta Valley RCD Monitoring Project Director	Position currently unfilled. Amy Hansen will temporarily fill this role.		

REGIONAL BOARD (SWRCB**):

Title:	Name:	Signature:	Date*:
Grant Manager	Andy Baker		6-18-07
QA Officer	Bill Ray		6/1/07

* This is a contractual document. The signature dates indicate the earliest date when the project can start.

** If the QAPP is being prepared under the jurisdiction of the State Water Resources Control Board (SWRCB) rather than a Regional Board, substitute the appropriate SWRCB information for the RWQCB information.

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3. DISTRIBUTION LIST

(If the QAPP is being prepared under the jurisdiction of the State Water Resources Control Board (SWRCB) rather than a Regional Board (RWQCB), substitute the SWRCB information for the RWQCB information.)

Title:	Name (Affiliation):	Tel. No.:	QAPP No*:
Contractor Project Manager	Amy Hansen (SVRCD)	530-859-3814	1
Contractor QA Officer	Dave Webb (SVRCD)	530-926-2460	1
Regional Board Contract Manager	Andy Baker (RWB)	707-576-2690	1
State Water Resources Control Board QA Officer	Bill Ray (SWB)	916-341-5583	1

4. PROJECT/TASK ORGANIZATION

4.1 Involved parties and roles.

Table 1. (Element 4) Personnel responsibilities.

Name	Organizational Affiliation	Title	Contact Information (Telephone number, fax number, email address.)
Amy Hansen	Shasta Valley RCD	Project Manager	530-859-3814
Dave Webb	Shasta Valley RCD	QA Officer	530-926-2460
Position not yet filled.	Shasta Valley RCD	Monitoring Program Director	530-842-6121x106
Andy Baker	Regional Water Board	Grant Manager	707-576-2690
Bill Ray	State Water Board	QA Officer	(916) 341-5583,

4.2 Quality Assurance Officer role

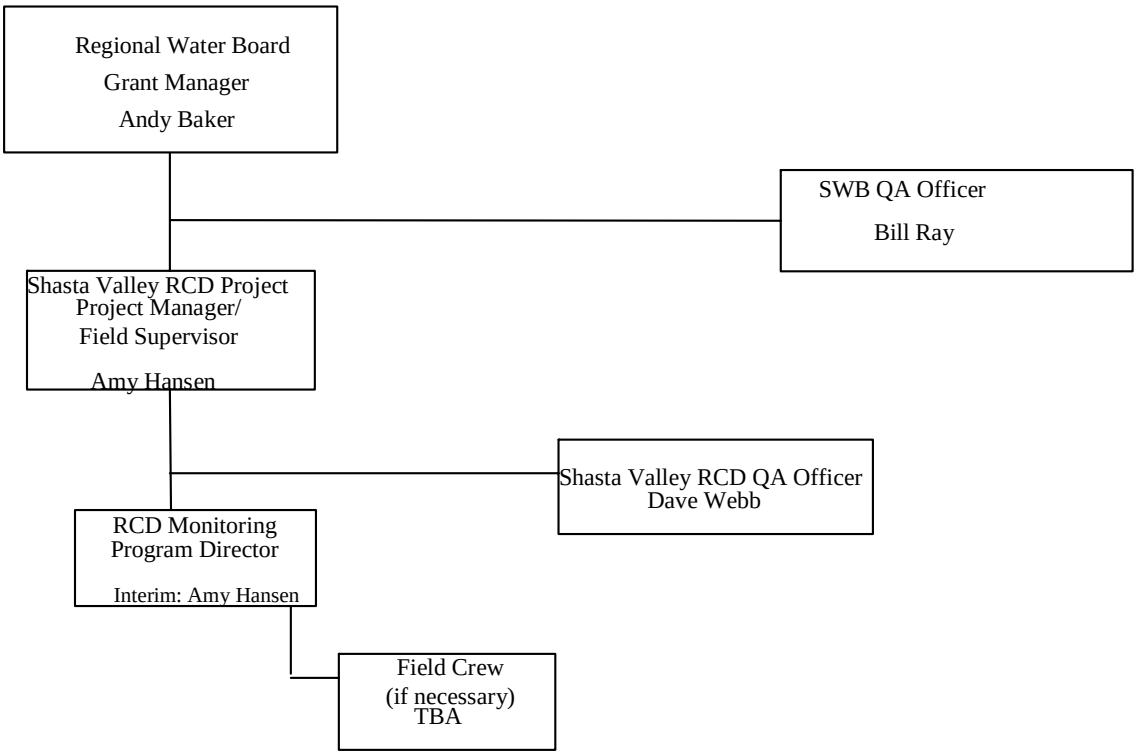
The Project's QA officer is the Senior Project Coordinator for the RCD whose task is to provide overall guidance and assistance to the RCD on projects. His role will be to provide overall Quality Assurance on monitoring activities related to this project.

4.3 Persons responsible for QAPP update and maintenance.

The Shasta Valley RCD is currently seeking a Monitoring Program Director who will ultimately be tasked with maintaining and updating the approved QAPP for this project. Until someone is hired Amy Hansen, Project Manager will be charged with the up keep and maintenance of the final approved QAPP.

4.4 Organizational chart and responsibilities

Figure 1. Organizational chart.



5. PROBLEM DEFINITION/BACKGROUND

5.1 Problem statement.

Five flashboard diversions are currently utilized in the mainstem Shasta River each summer to facilitate diversion of water for irrigation of agricultural lands. The Shasta River Water Association (SRWA), one of four irrigation districts in the Shasta Valley, utilizes one of these flashboard diversions. The SRWA district serves approximately 160 water users and diverts a total of 42 cubic feet per second from the Shasta River. The SRWA diversion is one structure identified in the North Coast Regional Water Quality Control Board's (NCRWQCB) TMDL for the Shasta River (2006) and the Recovery Strategy for California Coho Salmon (2004) as a high priority project that will assist the NCWQCB and the CDFG with achieving their goals of improving water quality and restoring coho in the Shasta River. The current flashboard dam obstructs both juvenile and adult passage to colder waters upstream and refugia downstream from the diversion. The flashboard dam also creates water quality conditions in the river that is low in dissolved oxygen and high in water temperature.

5.2 Decisions or outcomes.

Upon completion of the project two boulder weirs (riffles) will replace the current cement flashboard structure. These boulder weir/riffles will provide fish passage for both juvenile and adult salmonids while at the same time reduce the surface area of impoundment and therefore improve water quality conditions in the project area. Activities included in the project also involve the narrowing of the river channel which will increase water velocties through the project area. Narrowing of the river channel in addition to the design components of the boulder riffle will assist in increasing dissolved oxygen levels and reducing fine sediment accumulation. Overall length of the impounded area will be reduced by approximately 1,300 feet and depth of impoundment on average will be reduced from 5 feet to 3.

5.3 Water quality or regulatory criteria

The Shasta River is considered an impaired water body by the Regional Water Board for dissolved oxygen (DO) and temperature with a TMDL adopted in January 2007 by the Environmental Protection Agency. Furthermore the Southern Oregon/Northern California (SONC) coho has been listed as threatened both state and federally. Activities identified in this project all correspond to goals and guidance outlined in the Shasta River TMDL, the Recovery Strategy for Coho Salmon and the Shasta River Watershed Plan.

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6. PROJECT/TASK DESCRIPTION

6.1 Work statement and produced products.

A. The project will measure in the field the approximate surface area of the ponded portion of the river and compare this to the post project ponded area to determine reduction of surface area available to aquatic vegetation and fine sediment- all known contributors to reduce dissolved oxygen levels in the river.
B. Use existing aerial photos to assist in mapping the current extent of wetted area and compare future aerial photos to see change in river surface area, increase of wetlands and reduction in non-native predatory fish habitat.
C. Track yearly purchases of chemicals purchased by the SRWA before and after the project to determine overall reduction in herbicide use due to piping of the ditches.
D. Track power consumption on a monthly basis to show quantity of water use during irrigation season before and after implementation of the project.
E. Measure DO levels with DO meters and grab samples pre and post project to determine if DO levels have changed within in the project area.
F. Collect water temperatures pre and post project to supply additional background information regard effects of project activities on the river system.
G. Set up a minimum of two photopoints that document change in impounded area pre and post project and shows that a minimum of 12 inches is provided for passage of juvenile salmonids (as required by DFG and NOAA criteria).
H. The project will provide progress reports, including collected data and analysis, during the life of the project. At the end of the project, RCD will provide a full listing and summary of the data collected.

6.2. Constituents to be monitored and measurement techniques.

Secondary: Temperature will be recorded using HOBO temperature probes that are spaced from the project area approximately 4.5 miles upstream. Placement of these temperature probes upstream of the project area will assist in gaining a picture of how water temperature varies with respect to subsurface and surface water inputs. The temperature probes may also assist the RCD in identifying future restoration efforts along this section of stream. A total of 5 temperature probes will be installed in the Shasta River. A sixth probe will be placed at the SRWA pump house to record air temperature. Prior to installation each field season the temperature probes will be calibrated using a protocol developed by the Fish Farms and Forest Communities (Appendix A). Figure 2 shows the approximate location of where the HOBO temperature probes will be located.

Critical: *Discreet Grab Samples for DO:* Since construction is scheduled to begin this Summer (2007) discreet DO grab samples will be taken to record pre-project DO levels in the project area. Yellow Springs Instruments DO meter YSI-55 will be used to take grab sample data. Calibration and sampling techniques will be extracted from the YSI-55 manufacture's manual (see Appendix B for protocol). Grab samples will be taken pre-dawn, in areas where the water is flowing or otherwise well enough mixed to be representative of site specific conditions. In areas where water velocity is low, the probe will be raised and lowered in the water column so as to assure a minimum of 1 ft/sec of flow past the sensor consistent with mfg recommendations for accurate sampling. Once construction activities have been completed (~Fall 2007) continuous luminescent dissolved oxygen meters will be installed and monitored (2008 and 2009). *Dissolved Oxygen Meters:* Beginning in May 2008 four luminescent-continuous, dissolved oxygen meters will be installed at the same locations where the discreet grab samples were taken to simply the direct comparison of data. The Chart below summarizes the approximately location of the grab samples/dissolved oxygen meters, the purpose of the placement, and hypothesized results of the DO data, pre and post project. Figure 1 shows the approximate location of where the grab samples and dissolved oxygen meters will be installed.

DO Meter Location	Estimated Pre-Project Results	Estimated Post-Project results
1. The upper limit of the new pond (~1,300 feet upstream from the existing pump house).	Pre-project DO grab samples will most likely show low dissolved oxygen levels at this location. The current impoundment stretches ~3,300 feet upstream from the	Results may show higher levels of dissolved oxygen at this site due to reduction in linear feet of the impoundment. Estimated reduction is 2,000 feet.

	SRWA pump house.	
2. Pump station.	Pre-project DO grab samples will most likely show low DO levels at this location.	Results will should show slightly higher DO levels at this site since the stream channel will be narrowed which should increase water flow velocities and the height of impounded water is expected to be reduced by 2 feet.
3. Immediately above the crest of the lowest riffle (at the existing flashboard dam site).	DO levels at this location should also be low.	DO levels should be slightly higher at this location. This area will still be impounded but overall water impoundment depth should decrease from 5 feet to 3 feet.
4. Upper limits of pre-project pond.	DO levels at this location should be low. Note: Depending on timing of final approval of the QAPP and funding agreements it may be possible to install a dissolved oxygen meter at this location Summer 2007.	DO levels should be higher at this location because the impoundment is estimated to be reduced by 2,000 feet and therefore this section of the river should not be affected by impounded water from the project area.

Prior to installation of the DO meters a series of grab samples will be taken to assist with the meter's calibration. The RCD will follow recommendations and procedures outline in the manufacturers guidelines for the meter's installation, calibration and operation.

Critical: Surface area of wetted channel will be established by installing pre and post project cross sections in order to measure width of wetted channel. The RCD will establish representative cross sections throughout the project area that will reflect overall change as a result of project activities. Comparison of pre-project aerial photography in combination with on-the-ground field measurements will be compared with post project field results.

Critical: Photo points will be established using *Photopoint Monitoring Handbook (PNW-GTR-526, USFS 2005*) in order to document change in wetted channel and that fish passage criteria have been met.

6.3 Project schedule

Table 2. (Element 6) Project schedule timeline.

Activity	**Date (MM/DD/YY)**		**Deliverable**	**Deliverable Due Date**
	Anticipated Date of Initiation	**Anticipated Date of Completion**		
Start project	May 2007	May 2007	None	
Calibrate, install and record water and air temperatures using HOBO temperature probes.	May 2007	August 2009	Progress reports at the end of each field season (field season is typically (April 1 – October 1)	60 days after end of field season (December 1)
Take discreet DO grab samples prior to beginning of construction.	May 2007	July 2007	Progress reports at the end of each field season (field season is typically (April 1 – October 1)	60 days after end of field season (December 1)

Calibrate, install and DO meters at locations identified in 6.2 above.	May 2008	August 2009	Progress reports at the end of each field season (field season is typically (April 1 – October 1)	60 days after end of field season (December 1)
Measure changes in wetted channel	May 2007	August 2009	Progress reports at the end of each field season (field season is typically (April 1 – October 1)	60 days after end of field season (December 1)
Document changes in wetted channel and fish passage requirements using photopoints.	May 2007	August 2009	Progress reports at the end of each field season (field season is typically (April 1 – October 1)	60 days after end of field season (December 1)
Track changes in power consumption and costs of herbicide.	May 2007	August 2009	Progress reports at the end of each field season (field season is typically (April 1 – October 1)	60 days after end of field season (December 1)
Summarize Data	08/01/09	09/01/09	Complete data set and summary	09/01/09
Draft Final Report	09/15/09	10/31/09	Draft Final Report for Review	10/31/09
Final Report	10/15/09	11/31/09	Final Report	11/31/09

6.4 Geographical setting

The Shasta River flows from the base of Mt. Shasta north to where it enters the Klamath River in Siskiyou County. The project area is located approximately 15.5 miles upstream from its confluence with the Klamath River (see Figure 3). The project is located in Township 44 North, range 6 West, Section 3; Latitude 41.68667 North and Longitude 122.53144 West.

6.5 Constraints

Instream construction activities are scheduled to begin July 1, 2007. Due to the short timeline between when this QAPP is approved and when construction activities are scheduled to begin pre-construction monitoring activities will be limited. Depending on location and construction activities it may be possible to take discreet temperature and DO grab samples throughout the construction season however it construction activities may alter the results.

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7. QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

Data Quality Objectives

Measurement or Analyses Type	Applicable Data Quality Objective
Field Measurements, Dissolved Oxygen	*Accuracy, Precision, Completeness*
Field Measurements, Temperature	*Accuracy, Precision, Completeness*
Field Measurements, Surface Area	NA
Photpoint documentation	NA
Tracking of electrical and herbicide costs	NA

(Describe how each DQO above will be determined.)

Accuracy will be determined by using HOBO and DO Meters, assuring that these devices are calibrated correctly and replicating grab samples to assure the most accurate results. Manufacture protocol for calibration and installation will be strictly followed.

Precision measurements will be determined on field replicates.

Completeness is the attention to detail and complete discussion of results, changes in protocol and overall analysis of data.

Field and Laboratory Measurements Data Quality Objectives Tables

Table 3. (Element 7) Data quality objectives for field measurements.

Group	Parameter	Accuracy	Precision	Recovery	Target Reporting Limit	Completeness
Field Testing	*Dissolved Oxygen*	*±0.5 mg/L*	*No SWAMP requirement; will use ± 0.5 or 10%*	*NA*	*0.2 mg/L*	*No SWAMP requirement; will use 90%.*
Field Testing	*Temperature*	± 0.5 °C	No SWAMP requirement – suggest ± 0.5 or 5%	NA	No SWAMP requirement – suggest 90%	± 0.5 °C
Measurement of wetted channel	*NA*	NA	NA	NA	NA	NA
Photopoint Documentation	*NA*	NA	NA	NA	NA	NA
Tracking of yearly herbicide and electrical costs	*NA*	NA	NA	NA	NA	NA

8. SPECIAL TRAINING NEEDS/CERTIFICATION

8.1 Specialized training or certifications.
No specialized training or certifications is required for this project.

8.2 Training and certification documentation.
NA

8.3 Training personnel.
NA

Table 4. (Element 8) Specialized personnel training or certification.

Specialized Training Course Title or Description	Training Provider	Personnel Receiving Training/ Organizational Affiliation	Location of Records & Certificates *
NA	NA	NA	NA

*If training records and/or certificates are on file elsewhere, then document their location in this column. If these training records and/or certificates do not exist or are not available, note this.

9. DOCUMENTS AND RECORDS

The RCD will collect data using predetermined field data sheets. GPS data will also be collected in the field and will show the location of the temperature, dissolved oxygen, transects and photo monitoring sites. This information will also be recorded on field data sheets. At the end of day the field data sheets will be copied and placed in a project data folder housed at the RCD's main office. A copy of the data sheets will be also housed in a secondary location approved by the Project Manager. During the field season, project data will be entered into a QAPP approved database. The Monitoring Project Director, (person not yet determined), will maintain this database and all other information collected on this project. Until a person has been hired Amy Hansen (Project Manager) will act as an interim Monitoring Project Coordinator.

Copies of the project's approved QAPP will be distributed to all parties involved with the project, including field data collectors. Any future amended QAPPs will be held and distributed in the same fashion. All originals of this first and subsequent amended QAPPs will be held at the RCD's main office. Copies of versions, other than the most current, will be discarded so as not to create confusion.

Persons responsible for maintaining records for this project are as follows. Amy Hansen, Interim Monitoring Project Coordinator and Field Supervisor will maintain all sample collection and field data forms. Once a Monitoring Project Coordinator is hired by the RCD this person will take over Monitoring Project Coordinating duties described here. The Monitoring Project Coordinator will maintain the database. Project Manager Amy Hansen will oversee the actions of these persons and will arbitrate any issues relative to records retention and any decisions to discard records.

All records will be passed to the Regional Water Board Contract Manager Andy Baker at project completion. Copies of the records will be maintained at the RCD for five years after project completion then discarded, except for the database, which will be maintained without discarding.

Table 5. (Element 9) Document and record retention, archival, and disposition information.

	Identify Type Needed	Retention	Archival	Disposition
Field Records	Temperature	Yes	5 years after completion of the contract	Yes
	Dissolved Oxygen-Grab Samples and Meters	Yes	5 years after completion of the contract	Yes
	Photopoint Records	Yes	5 years after completion of the contract	Yes
	Wetted Channel Measurements	Yes	5 years after completion of the contract	Yes
	GPS Data	Yes	5 years after completion of the contract	Yes
Data Collection	Tracking of yearly electrical and herbicide costs.	Yes	5 years after completion of the contract	Yes
Database	QAPP Database	Yes	Yes	No

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GROUP B: DATA GENERATION AND ACQUISITION

10. SAMPLING PROCESS DESIGN

1. Calibrate and install 5 HOBO temperature probes from the project area south to Hwy A-12 in order to monitor pre and post project water temperatures and gain better pictures as to how subsurface and surface water inputs affect water temperatures in the project area. A sixth probe will be installed at the pump station to monitor air temperature. See Figure 2 for potential location of the HOBO probes. Depending on the depth of water at specific locations, temperature probes will be placed at locations that are not directly exposed to sunlight and/or a shade device will be placed with the probe to reduce direct heat gain by the sun.

2. Take discreet grab samples of DO at locations identified in 6.2 and Figure 1 so to correlate pre-project DO levels with post-project DO levels measured with DO meters. Grab samples will be taken pre-dawn, in areas where the water is flowing or otherwise well enough mixed to be representative of site specific conditions. In areas where water velocity is low, the probe will be raised and lowered in the water column so as to assure a minimum of 1 ft/sec of flow past the sensor consistent with mfg recommendations for accurate sampling. Calibration protocols identified in the YSI-55 manual will be followed (See Appendix B).

3. Calibrate and install 4 dissolved oxygen meters in locations identified in 6.2 and Figure 1. Installation and calibration will be done per manufacture instructions.

5. Measure changes in surface area to determine reduction of impounded surface area by establishing cross sections throughout the project area that will best represent changes to the project area as a result of construction activities. Correlate changes in surface area to changes in available habitat for rooted aquatic plants that reduce dissolved oxygen content as well as area of fine sediment deposition (with high Biological Oxygen Demand). Compare field measurements with existing aerial photos to verify data accuracy and any future changes in wetted channel and increase of wetland habitat. For on-the-ground field measurements a series of permanent cross sections will be established to measure changes of wetted channel pre and post construction.

6. Gather baseline power consumption last 2 years plus this year in KWH. Graph and compare to future years on monthly basis.

7. Documentation of improved fish passage—annual photo monitoring at time of annual installation of screens to assure a maximum 12” jump height. Protocol used to conduct photo point monitoring is the Photopoint Monitoring Handbook (PNW-GTR-526, USFS 2005).

8. Gather baseline chemical usage and track reduction (or increase) of chemical usage as a result of pipeline construction activities. Graph results.

11. SAMPLING METHODS

Dissolved Oxygen Sampling Methods:

The project has selected luminescent dissolved oxygen meters as the tool to measure DO levels in the project area. Dissolved oxygen sampling will occur at four locations in the project area. Due to the estimated start of construction activities (Summer 2007), discreet grab samples will be taken for pre-project data and compared with data collected from continuous luminescent DO meters installed post-project. Grab samples will be taken pre-dawn, in areas where the water is flowing or otherwise well enough mixed to be representative of site specific conditions. In areas where water velocity is low, the probe will be raised and lowered in the water column so as to assure a minimum of 1 ft/sec of flow past the sensor consistent with mfg recommendations for accurate sampling. Grab samples and DO meter samples will be taken at the following locations (Figure 1):

1. Upper limits of existing pre-project ponded area.
2. Upper limits of estimated post-project ponded area.
3. Pump station
4. Above existing flashboard dam (pre-project) and above crest of lower boulder weir (post-project).

Temperature Sampling Methods:

Temperature will be measured by HOBO temperature probes. Temperature probes will be calibrated and located in areas identified in Figure 2 per instructions outlined in the Fish, Families and Forest Communities protocol (Appendix A). HOBO temperature probes will be placed along the Shasta River from Hwy A-12 to the project site-pending landowner approval. Figure 2 shows approximate locations of where temperature probes could be placed. Temperature probes in this area will assist with providing the big-picture of water temperature along this section of river. Temperature probe #1 will be placed at the SRWA pump house in order to measure air temperature. Once installed dissolved oxygen meters will provide dual DO and temperature data.

Field Measurements of Wetted Channel:

A series of cross sections will be established pre-project and monitored over time to determine whether width of wetted channel has changed. Cross sections will be used each year to monitor and record changes of wetted channel as a result of project activities. Wetted channel will be measured twice a year by field monitoring staff. Data from a local USGS weir will be used to record river flows on the day of data collection.

12. SAMPLE HANDLING AND CUSTODY

Sample handling and custody of DO and temperature data is not addressed in Appendix 2 and therefore does not appear to applicable to this project.

Table 6. (Element 12). Sample handling and custody.

Parameter	Container	Volume	Initial Preservation	Holding Time
NA	NA	NA	NA	NA

(Identify chain of custody procedure. Form may be attached.)

Not applicable to this project.

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13. Analytical Methods

Table 7. (Element 13) Field analytical methods.

Analyte	Laboratory / Organization	Project Action Limit (units, wet or dry weight)	Project Quantitation Limit (units, wet or dry weight)	Analytical Method		Achievable Laboratory Limits	
				Analytical Method/ SOP	Modified for Method yes/no	MDLs (1)	Method (1)
Dissolved Oxygen-Grab Samples	Same	< 5 mg/L	0.1 mg/L	YSI-55 Manual and Calibration protocol.	No	NA	NA
Dissolved Oxygen-Meter	Same	< 5 mg/L	0.1 mg/L	Manufacturer specific guidelines and protocol.			
Temperature	Same	None	-5 ° C	Fish, Families, Forest Communities Calibration Protocol	Timing of temperature will be 45 minutes not 10 minutes for calibration.	NA	NA
Cross sections.	Same	None	None	NA	No		

(*) *Standard Methods for the Examination of Water and Wastewater*, 20th edition.

Table 8. (Element 13) Laboratory analytical methods.

Analyte	Laboratory / Organization	Project Action Limit (units, wet or dry weight)	Project Quantitation Limit (units, wet or dry weight)	Analytical Method		Achievable Laboratory Limits	
				Analytical Method/ SOP	Modified for Method yes/no	MDLs (1)	Method (1)
NA	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*

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14. QUALITY CONTROL

In order to monitor the sampling process, the SVRCD Quality Assurance Officer will randomly observe sampling processes and conduct grab samples to compare with DO meter results.

Field Measurements
All field measurement grab samples will be made in triplicate. Each result will be recorded along with the average of the three results.

15. INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE

Table 9. (Element 15) Testing, inspection, maintenance of sampling equipment and analytical instruments.

Equipment / Instrument	Maintenance Activity, Testing Activity or Inspection Activity	Responsible Person	Frequency	SOP Reference
Luminescence DO Meter	Inspection	Monitoring Project Director	Three times during the field season.	NA
Luminescence DO Meter	Calibration	Monitoring Project Director	At beginning and middle of each field season.	NA
Luminescence DO Meter	Maintenance	Monitoring Project Director	As necessary.	NA
HOBO Temperature Probes	Inspection	Monitoring Project Director	Three times during the field season.	NA
HOBO Temperature Probes	Calibration	Monitoring Project Director	At beginning of field season.	NA
HOBO Temperature Probes	Maintenance	Monitoring Project Director	As necessary.	NA

16. INSTRUMENT/EQUIPMENT CALIBRATION AND FREQUENCY

Table 10. (Element 16) Testing, inspection, maintenance of sampling equipment and analytical instruments.

Equipment / Instrument	SOP reference	Calibration Description and Criteria	Frequency of Calibration	Responsible Person
DO Meters	NA	Manufacturer's standards for calibration and maintenance of the DO meter will be followed.	3x/field season	RCD Monitoring Project Coordinator
HOBO temperature probes.	NA	Manufacturer's standards for calibration and maintenance of the DO meter will be followed.	Beginning of each field season.	RCD Monitoring Project Coordinator

17. INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

The only supplies required for the project are 4 dissolved oxygen meters and 8 temperature probes. Once received this equipment will be inspected for damage.

18. NON-DIRECT MEASUREMENTS (EXISTING DATA)

Aerial photography will be used to compare changes of wetted channel as a result of the project. USGS orthoquads (1998 and 2003) and NRCS National Agricultural Image Program (2005) photos will be used to compare wetted channel widths.

Other baseline DO data discussed in the Shasta River TMDL will be used for comparison and information during data analysis. The DO data referenced in the Shasta River TMDL was Dissolved was collected by Regional Water Quality Control Board staff. The Shasta River TMDL has been approved by the Regional and State Water Boards as well as the EPA.

19. DATA MANAGEMENT

Field data will be brought into the Shasta Valley RCD main project office and copied at the end of each work week. The original field data sheets will be stored in a project specific data monitoring file. A second field data sheet will be housed in a secondary location away from the main RCD office. Field data will be recorded monthly into an Excel spreadsheet which is compatible with most other software. Compiling, analyzing and transmitting the data will be done by the project's Monitoring Project Director.

GROUP C: ASSESSMENT AND OVERSIGHT

20. ASSESSMENTS & RESPONSE ACTIONS

Monthly all field data sheets will be entered into the Project's Monitoring Excel spreadsheet by the Monitoring Project Coordinator. Once the data has been entered an electronic copy of this excel spreadsheet will be provided to the SVRCD's QA office for review. In addition the Monitoring Project Coordinator will provide a summary to the RCD's QA officer of any observed unpredicted changes, or concerns regarding the quality of the data. Once the RCD's QA officer is notified of the need for corrective actions immediate steps will be taken by the QA and the Monitoring Project Coordinator to address the problem.

21. REPORTS TO MANAGEMENT

Table 11. (Element 21) QA management reports.

Type of Report	Frequency (daily, weekly, monthly, quarterly, annually, etc.)	Projected Delivery Dates(s)	Person(s) Responsible for Report Preparation	Report Recipients
Seasonal Progress Reports	Annually	30 days after the end of field work.	Monitoring Project Coordinator	SVRCD QA Officer SVRCD Project Manager RWCB Grant Manager RWCB QA Officer
In-house Draft Monitoring Report	End of final 2009 field season.	09/01/09	Monitoring Project Coordinator	SVRCD QA Officer SVRCD Project Manager
Draft Monitoring Report	30 days prior to project close out	10/31/09	Monitoring Project Coordinator	SVRCD QA Officer SVRCD Project Manager RWCB Grant Manager RWCB QA Officer
Final Monitoring Report	At project closeout	11/31/09	Monitoring Project Coordinator	SVRCD QA Officer SVRCD Project Manager RWCB Grant Manager RWCB QA Officer

GROUP D: DATA VALIDATION AND USABILITY

22. DATA REVIEW, VERIFICATION, AND VALIDATION REQUIREMENTS

Data verification will be preformed by the Monitoring Project Coordinator monthly as the data is entered into the Project-specific Excel spreadsheet. The Monitoring Project Coordinator will review the data generated against the objectives cited in Element 7 and QA and QC practices in Elements 14, 15, and 17 and discuss any variances from these elements in the seasonal progress reports. Data review will occur in-house for examination by the QA officer to ensure that the data have been recorded, transmitted, and processed correctly at the end of each field season-prior to submittal of the seasonal progress reports. This includes checking for data entry, transcription and calculation errors.

23. VERIFICATION AND VALIDATION METHODS

All data records will be checked visually and recorded as checked by initials and dates. The RCD's QA Officer will do all reviews and RCD's Project Manager will perform a check of 10% of the reports. Issues will be noted and any corrections will be done by a committee composed of RCD's QA Officer, Project Manager; and Monitoring Project Coordinator. Any corrections require a unanimous agreement that the correction is appropriate.

24. RECONCILIATION WITH USER REQUIREMENTS

Once all the data has been compiled and analyzed a Final Monitoring Report will be prepared which will discuss what was learned, and observed from the data. In addition the report will discuss whether the objectives outlined in the project's PAEP tables have been met and if not list reasons as to why they were not.

APPENDIX A

Fish, Family, Forest Communities
Temperature Probe Calibration Protocol.

Prior to use, all thermograph units should be calibrated at room temperature and in an ice water bath to insure
that they are operating within the manufacture's specified accuracy range. Also confirm that thermograph batteries have sufficient charges for the entire monitoring period (will the length of the upcoming field season fit into the life expectancy of the unit's lithium batteries?). Calibrate all thermograph units with a high quality laboratory thermometer (no standard recommended, just one of higher quality than a pocket, field-type thermometer) to room temperature and freezing point as follows:

1.When launching, synchronize all thermograph units to a common watch/clock that will be used to time the recording intervals of the reference thermometer. Set the record interval of each thermograph to a short period, six to 30 seconds.

2.Place the reference thermometer and the thermographs in a five gallon pail filled with about three gallons of water that has stabilized overnight to room temperature. Make sure the casings of all thermograph units are completely submerged. Stir the water, just prior to, and during the calibration period to prevent any thermal stratification.

3.After allowing 10 minutes for the thermographs to stabilize; record the time, the reference thermometer temperature, and the thermograph temperatures - for the time interval set when the units were launched for 10 minutes. After all readings are completed, calculate the difference between the reference thermometer and each of the thermograph units for each reading and calculate the mean difference.

4.Any thermographs not operating within their specified accuracy range should be considered suspect. If a particular unit is off on individual temperature readings, but is still precise, then a correction factor (addition or substraction) could be applied to the data. However, if units are inaccurate and imprecise do not use them. Always consider placing the most accurate thermograph units in stream reaches where excessive temperatures are suspected.

5.Using the same water bath, add enough ice to nearly fill the bucket and bring the temperature down to nearly freezing. Stir the ice bath to achieve and maintain a constant water temperature. Place the reference thermometer and the thermographs in the five gallon pail. Again, make sure that the casings are completely submerged.

6.Repeat step #3 with ice water bath.

7.Calibration should also be repeated when thermographs are retrieved at the end of the sampling season.

8.Always refer to each thermograph by serial number when recording calibration results.

APPENDIX B

YSI 55-D DISSOLVED OXYGEN METER CALIBRATION

Proper calibration of the D.O. Meter is essential to securing reliable values for dissolved oxygen in the stream. Calibration procedure is as follows:

1. Remove probe from storage compartment, and check that there are no bubbles visible behind the membrane, that there are no drops of water on the membrane, and that the sponge in the storage compartment is wet. If dry, add a small amount of distilled water. Return probe to the storage compartment.

2. Turn meter **on**, and allow it to reach a stable reading (usually 15 minutes is sufficient, leaving it on longer is ok). If meter will not stabilize, suspect damaged membrane or contaminated probe components below the membrane. Replace membrane and try again. Do not touch the working area of the membrane—finger oils will restrict oxygen movement across the membrane. <u>The meter must be re-calibrated each time it is turned on</u>.

3. Once reading is stable, press **up arrow and down arrows** simultaneously to enter calibration mode.

4. The number visible is the elevation divided by 100. Enter the elevation where you are calibrating the instrument. This is done by pressing the up or down arrows to increase or decrease the elevation value. This should be the same as the elevation where the measurements will be made. Once the correct elevation is entered, press **enter** (do not press mode).

5. The screen will now display the calculated calibration value in the lower right, and the current d.o. reading in the middle of the screen. The current reading isn't important at this time. To continue the process, press **enter** again (do not press mode).

6. The screen will now show the salinity value to be entered. For fresh water, the correct value is zero. Verify that you have zero showing, and press **enter** again (do not press mode).

7. Calibration is complete. The large number in the middle of the display is dissolved oxygen in percent saturation, and the smaller numbers in the lower right is temperature in degrees C. With the probe in the calibration chamber, the D.O. value should be within 2% of the calculated air sat. DO value. If not, repeat the calibration process.

8. Once calibration is complete, you can press **mode** to shift to showing D.O. in Mg/L.

9. You can now make measurements of D.O. in the stream. Lower the probe into the water. If the water is not moving, raise and lower the probe continuously while keeping it completely below the water surface. Movement of 2-3 inches per second is sufficient to assure that the probe will read the actual value.

10. The meter reads actual mg/l at the elevation and temperature observed, or % of what saturation at sea level would be for the temperature observed. When calibrating, the value for % sat shown in the lower right of the display shows what total saturation is at the elevation set as compared to what it would be if at sea level.

Note: if you press **mode** instead of **enter** during the calibration process, the steps and screens will appear identical, but no calibration will be done, and the D.O value in the calibration chamber will probably not match the calculated value. Be careful.

Figure 1: Locations of Dissolved Oxygen Grab Samples/Meters for the Shasta River Water Association Project

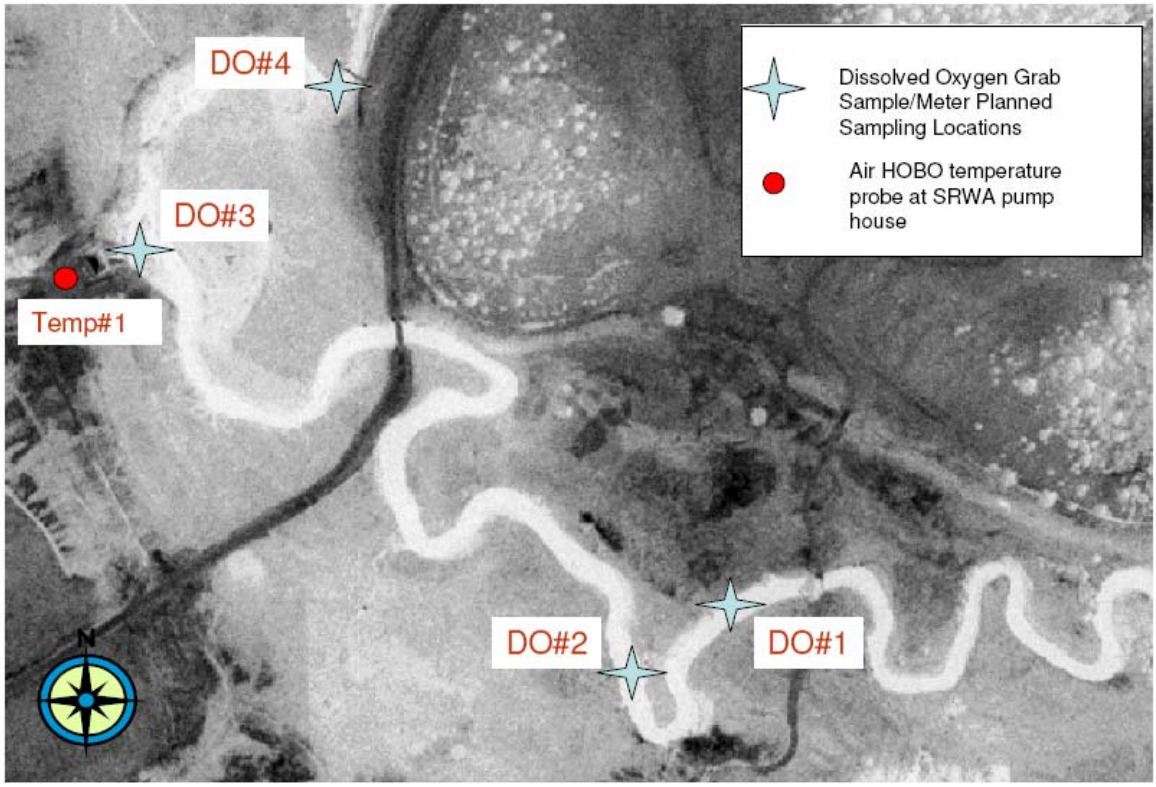

Figure 2:
Planned locations for HOBO Temperature Probes- Shasta River Water Association.

Planned locations for HOBO temp probes

Project Area

FIGURE 3: Shasta River Watershed Boundary and Shasta Water Association Project Area.