San Joaquin River Real Time Water Quality Management Program

Project Information

1. **Proposal Title:**

   San Joaquin River Real Time Water Quality Management Program

2. **Proposal applicants:**

   Ernest Taylor, California Department of Water Resources

3. **Corresponding Contact Person:**

   Ernest Taylor
   Department of Water Resources
   San Joaquin District 3374 E. Shields Avenue Fresno, CA 93726-6913
   559 230-3352
   etaylor@water.ca.gov

4. **Project Keywords:**

   Modeling
   Water Pollution, Non-point Source
   Water Quality Management

5. **Type of project:**

   Monitoring

6. **Does the project involve land acquisition, either in fee or through a conservation easement?**

   No

7. **Topic Area**:

   Ecosystem Water and Sediment Quality

8. **Type of applicant:**

   State Agency

9. **Location - GIS coordinates:**

   Latitude: 37.3933601

   Longitude: -120.9903107

   Datum:

Describe project location using information such as water bodies, river miles, road intersections, landmarks, and size in acres.

The project area includes the San Joaquin River region from the confluence of Bear Creek and the San Joaquin River in the south, to a point on the River near Vernalis, north of Stanislaus County. It also includes the tributary rivers Merced, Tuolumne and Stanislaus to the east of the San Joaquin, and the wetlands, sloughs and minor creeks to the west of the San Joaquin River.

10. **Location - Ecozone:**

    12.1 Vernalis to Merced River, 12.2 Merced River to Mendota Pool, 13.1 Stanislaus River, 13.2 Tuolumne River, 13.3 Merced River, West San Joaquin Basin

11. **Location - County:**

    Merced, San Joaquin, Stanislaus

12. **Location - City:**

    Does your project fall within a city jurisdiction?

    No

13. **Location - Tribal Lands:**

    Does your project fall on or adjacent to tribal lands?

    No

14. **Location - Congressional District:**

    18

15. **Location:**

    California State Senate District Number: 12

    California Assembly District Number: 26

16. **How many years of funding are you requesting?**

    3

17. **Requested Funds:**
    a) Are your overhead rates different depending on whether funds are state or federal?

       No

       If no, list single overhead rate and total requested funds:

       Single Overhead Rate: 121.4

       Total Requested Funds: 1284300

b) Do you have cost share partners already identified?

Yes

If yes, list partners and amount contributed by each:

US Bureau of Reclamation 126000

US Geological Survey 20000

Department of Water Resources 96000

West Stanislaus Irrigation District 8000

c) Do you have potential cost share partners?

Yes

If yes, list partners and amount contributed by each:

Patterson Water District 8000

d) Are you specifically seeking non-federal cost share funds through this solicitation?

No

If the total non-federal cost share funds requested above does not match the total state funds requested in 17a, please explain the difference:

18. **Is this proposal for next-phase funding of an ongoing project funded by CALFED?**

Yes

If yes, identify project number(s), title(s) and CALFED program (e.g., ERP, Watershed, WUE, Drinking Water):

B81647 San Joaquin River Real Time Water Quality Management Program ERP

Have you previously received funding from CALFED for other projects not listed above?

No

19. **Is this proposal for next-phase funding of an ongoing project funded by CVPIA?**

    No

    Have you previously received funding from CVPIA for other projects not listed above?

    Yes

    If yes, identify project number(s), title(s) and CVPIA program.

4-fg-20-12010	**San Joaquin River Real-time Water Quality Management Demonstration Project**	**Challenge Grant**

20. **Is this proposal for next-phase funding of an ongoing project funded by an entity other than CALFED or CVPIA?**

    No

    Please list suggested reviewers for your proposal. (optional)

21. **Comments:**

Environmental Compliance Checklist

San Joaquin River Real Time Water Quality Management Program

1. **CEQA or NEPA Compliance**
   a) Will this project require compliance with CEQA?

      No
   b) Will this project require compliance with NEPA?

      No
   c) If neither CEQA or NEPA compliance is required, please explain why compliance is not required for the actions in this proposal.

      This project involves water quality monitoring and should have zero impact on the environment.

2. **If the project will require CEQA and/or NEPA compliance, identify the lead agency(ies).** *If not applicable, put "None".*

   CEQA Lead Agency:
   NEPA Lead Agency (or co-lead:)
   NEPA Co-Lead Agency (if applicable):

3. **Please check which type of CEQA/NEPA documentation is anticipated.**

   CEQA
   -Categorical Exemption
   -Negative Declaration or Mitigated Negative Declaration
   -EIR
   Xnone

   NEPA
   -Categorical Exclusion
   -Environmental Assessment/FONSI
   -EIS
   Xnone

   If you anticipate relying on either the Categorical Exemption or Categorical Exclusion for this project, please specifically identify the exemption and/or exclusion that you believe covers this project.

4. **CEQA/NEPA Process**
   a) Is the CEQA/NEPA process complete?

      None

   b) If the CEQA/NEPA document has been completed, please list document name(s):

5. **Environmental Permitting and Approvals** (*If a permit is not required, leave both Required? and Obtained? check boxes blank.*)

LOCAL PERMITS AND APPROVALS

Conditional use permit

Variance

Subdivision Map Act

Grading Permit

General Plan Amendment

Specific Plan Approval

Rezone

Williamson Act Contract Cancellation

Other

STATE PERMITS AND APPROVALS

Scientific Collecting Permit

CESA Compliance: 2081

CESA Compliance: NCCP

1601/03

CWA 401 certification

Coastal Development Permit

Reclamation Board Approval

Notification of DPC or BCDC

Other

FEDERAL PERMITS AND APPROVALS

ESA Compliance Section 7 Consultation

ESA Compliance Section 10 Permit

Rivers and Harbors Act

CWA 404

Other

PERMISSION TO ACCESS PROPERTY

Permission to access city, county or other local agency land.
Agency Name:

Permission to access state land.
Agency Name:

Permission to access federal land.
Agency Name:

Permission to access private land.
Landowner Name:

6. **Comments.**

Land Use Checklist

San Joaquin River Real Time Water Quality Management Program

1. **Does the project involve land acquisition, either in fee or through a conservation easement?**

   No

2. **Will the applicant require access across public or private property that the applicant does not own to accomplish the activities in the proposal?**

   Yes

3. **Do the actions in the proposal involve physical changes in the land use?**

   No

   If you answered no to #3, explain what type of actions are involved in the proposal (i.e., research only, planning only).

   This project involves water quality monitoring, data collection and research. No changes will be made to the land use.

4. **Comments.**

Conflict of Interest Checklist

San Joaquin River Real Time Water Quality Management Program

Please list below the full names and organizations of all individuals in the following categories:

- Applicants listed in the proposal who wrote the proposal, will be performing the tasks listed in the proposal or who will benefit financially if the proposal is funded.
- Subcontractors listed in the proposal who will perform some tasks listed in the proposal and will benefit financially if the proposal is funded.
- Individuals not listed in the proposal who helped with proposal development, for example by reviewing drafts, or by providing critical suggestions or ideas contained within the proposal.

The information provided on this form will be used to select appropriate and unbiased reviewers for your proposal.

Applicant(s):

Ernest Taylor, California Department of Water Resources

Subcontractor(s):

Are specific subcontractors identified in this proposal? Yes

If yes, please list the name(s) and organization(s):

Nigel Quinn	University of California, Berkeley
Les Grober	Regional Water Quality Control Board - Central Valley Region
Jerry Smithson	US Geological Survey

None	None
None	None
None	None
None	None

Helped with proposal development:

Are there persons who helped with proposal development?

Yes

If yes, please list the name(s) and organization(s):

Nigel Quinn	**University of California, Berkeley**

Les Grober **Regional Water Quality Control Board - Central Valley Region**

Comments:

Budget Summary

San Joaquin River Real Time Water Quality Management Program

Please provide a detailed budget for each year of requested funds, indicating on the form whether the indirect costs are based on the Federal overhead rate, State overhead rate, or are independent of fund source.

Federal Funds

Year 1												
Task No.	**Task Description**	**Direct Labor Hours**	**Salary *(per year)***	**Benefits *(per year)***	**Travel**	**Supplies & Expendables**	**Services or Consultants**	**Equipment**	**Other Direct Costs**	**Total Direct Costs**	**Indirect Costs**	**Total Cost**
D1	Program Management	260	9236	4618	0					13854.0	7900	21754.00
D2	Equipment							31200	16000	47200.0		47200.00
D3	Installation, operation and Maintenance of DWR stations	1000	25888	12944						38832.0	25628	64460.00
D4	Modeling and general program activities	970	26723	13362						40085.0	28887	68972.00
D5	Contingency fund (10%)								20300	20300.0		20300.00
R1	Regional Board Activities						158600			158600.0		158600.00
B1	University of California, Berkeley Activities						58200			58200.0		58200.00
G1	USGS Activities						17200			17200.0		17200.00
		2230	61847.00	30924.00	0.00	0.00	234000.00	31200.00	36300.00	394271.00	62415.00	456686.00

Year 2												
Task No.	**Task Description**	**Direct Labor Hours**	**Salary *(per year)***	**Benefits *(per year)***	**Travel**	**Supplies & Expendables**	**Services or Consultants**	**Equipment**	**Other Direct Costs**	**Total Direct Costs**	**Indirect Costs**	**Total Cost**
D1	Program Management	260	9236	4618						13854.0	7900	21754.00
D2	Equipment									0.0		0.00
D3	Installation, operation and Maintenance of DWR stations	1000	25888	12944						38832.0	25628	64460.00
D4	Modeling and general program activities	970	26723	13362						40085.0	28887	68972.00
D5	Contingency fund (10%)									0.0	16700	16700.00
R1	Regional Board Activities						158600			158600.0		158600.00
B1	University of California, Berkeley Activities						58200			58200.0		58200.00
G1	USGS Activities						13200			13200.0		13200.00
		2230	61847.00	30924.00	0.00	0.00	230000.00	0.00	0.00	322771.00	79115.00	401886.00

Year 3												
Task No.	**Task Description**	**Direct Labor Hours**	**Salary *(per year)***	**Benefits *(per year)***	**Travel**	**Supplies & Expendables**	**Services or Consultants**	**Equipment**	**Other Direct Costs**	**Total Direct Costs**	**Indirect Costs**	**Total Cost**
D1	Program Management	260	9236	4618						13854.0	7900	21754.00
D2	Equipment									0.0		0.00
D3	Installation, operation and Maintenance of DWR stations	1000	25888	12944						38832.0	25628	64460.00
D4	Modeling and general program activities	970	26723	13362						40085.0	28887	68972.00
D5	Contingency fund (10%)									0.0	16700	16700.00
R1	Regional Board Activities						158600			158600.0		158600.00
B1	University of California, Berkeley Activities						58200			58200.0		58200.00
G1	USGS Activities						13200			13200.0		13200.00
		2230	61847.00	30924.00	0.00	0.00	230000.00	0.00	0.00	322771.00	79115.00	401886.00

Grand Total=<u>1260458.00</u>

Comments.

Budget Justification

San Joaquin River Real Time Water Quality Management Program

Direct Labor Hours. Provide estimated hours proposed for each individual.

Senior Engineer, Program Manager 1080 Associate Engineer 2460 Engineering Technician II 3190 Student Assistant 600

Salary. Provide estimated rate of compensation proposed for each individual.

Salary Per Hour Senior Engineer, Program Manager $35.52 Associate Engineer $32.37 Engineering Technician II $24.37 Student Assistant $9.00

Benefits. Provide the overall benefit rate applicable to each category of employee proposed in the project.

Benefits Per hour Senior Engineer, Program Manager $17.76 Associate Engineer $16.18 Engineering Technician II $12.19 Student Assistant $4.50

Travel. Provide purpose and estimate costs for all non-local travel.

Vehicle costs ($30,000/5yrs=$6,000/yr) At $6,000/yr the total 3-year program = $18,000. No other anticipated non-local travel for this program.

Supplies & Expendables. Indicate separately the amounts proposed for office, laboratory, computing, and field supplies.

Full station for SJR @ Maze Rd. Bridge Datalogger $3,000 GOES telemetry receiver/transceivers $3,000 Stage measuring equip $1,600 YSI EC/temperature sensor $2,200 Station house $1,500 Concrete pad, conduit, wiring, etc $2,700 5 - GOES telemetry receiver/transceivers $3,000 each YSI EC/temperature sensor Patterson WD $2,200 Laptop Computer $3,500 2 - Handheld YSI Conductivity meter $1,500 each Spare YSI EC/temp sensor $2,200 Miscellaneous equipment $1,300

Services or Consultants. Identify the specific tasks for which these services would be used. Estimate amount of time required and the hourly or daily rate.

Regional Water Quality Control Board Tasks 1 Program Management 2 Water quality sampling 3 Modeling and general program activities Hourly rate Les Grober, Senior Geologist $81.74 Eric Oppenheimer, Envir Spec $67.21 Student Assistant $20.71 Hours Other Total Direct Charges Costs First Year Costs 3,460 57,500 158,600 Second Year Costs 3,460 57,500 158,600 Third Year Costs 3,460 57,500 158,600 Total RWQCB $475,800 ---------- University of California, Berkeley Tasks 1 Program Management (Principal Investigator) 2 Modeling and general program activities Hourly rate J. Dracup, P/I Director (summer salary) $187.20 Nigel Quinn, Asst. Research Engineer $94.26 Mark Hanna, Student Assistant $43.43 Hours Other Total Direct Charges Costs First Year Costs 790 5,300 58,200 Second Year Costs 790 5,300 58,200 Third Year Costs 790 5,300 58,200 Total UCB $174,600 ---------- US Geological Survey Tasks 1 USGS station Tuolumne River near Modesto 2 Install GOES telemetry equip in 4 stations Service Other Total Contract Direct Charges Costs First Year Costs - 16,000 1,200 17,200 Second Year Costs - 12,000 1,200 13,200 Third Year Costs - 12,000 1,200 13,200 Total USGS Subcontractor Costs $43,600

Equipment. Identify non-expendable personal property having a useful life of more than one (1) year and an acquisition cost of more than $5,000 per unit. If fabrication of equipment is proposed, list parts and materials required for each, and show costs separately from the other items.

No equipment over $5,000 is anticipated. See supplies and expendables section for equipment under $5,000.

Project Management. Describe the specific costs associated with insuring accomplishment of a specific project, such as inspection of work in progress, validation of costs, report preparation, giving presentatons, reponse to project specific questions and necessary costs directly associated with specific project oversight.

Program management costs are included in direct labor and salaries. More detail can be found in the full proposal package.

Other Direct Costs. Provide any other direct costs not already covered.

A contingency fund of 10% for each year was included in DWR costs and each of the subcontractors. These funds will be used for covering unanticipated costs such as replacement and repair of field equipment, salary raises, and unexpected travel needs.

Indirect Costs. Explain what is encompassed in the overhead rate (indirect costs). Overhead should include costs associated with general office requirements such as rent, phones, furniture, general office staff, etc., generally distributed by a predetermined percentage (or surcharge) of specific costs.

Overhead rate includes general services such as rent, phones, electricity, office staff, and upper line management. Overhead Rate Per Hour Senior Engineer, Program Manager $30.39 Associate Engineer $35.12 Engineering Technician II $24.51 Student Assistant $9.23

Executive Summary

San Joaquin River Real Time Water Quality Management Program

Executive Summary Title of Project: San Joaquin River Real-time Water Quality Management Program Requested Amount: $1,284,300 Applicant: California Department of Water Resources Ernest Taylor, Associate Engineer, Water Resources 3374 E. Shields Avenue Phone: (559) 230-3352 Fresno, CA 93726 Email: etaylor@water.ca.gov This project funds the continued operation, upgrade and maintenance of flow and water quality monitoring stations that are part of an effort to assess and manage water quality conditions on the San Joaquin River. This project also provides funds for the operation of the San Joaquin River Input/Output Daily (SJRIODAY) model used to present forecasts of flow and water quality conditions at compliance locations on the River. The San Joaquin River is the dominant environmental feature of the San Joaquin Valley and a major hydrologic contributor to the Sacramento-San Joaquin Delta. Eight major rivers and 15 minor streams feed the SJR, which runs over 350 miles from its Sierra Nevadan origin to its delta terminus. Its many uses have resulted in a significant degrading of water quality, fish and wildlife habitat, flood protection capacity and recreation opportunities. Salinity, selenium and boron have been identified as being the most important water quality parameters in the SJR system. The operation of the SJRIODAY will provide information on existing and forecast flow and water quality conditions to SJR water managers. Improved management and coordination of agricultural and wetland drainage flows, and east-side tributary releases could reduce the frequency with which water quality objectives for salinity are exceeded at the key compliance point along the SJR near Vernalis. By reducing the frequency of exceeding Vernalis EC objectives, the project may reduce the number and/or magnitude of high quality releases (e.g. releases of Stanislaus River flows from New Melones Reservoir) made specifically for meeting Vernalis EC objectives. The water saved can be used later to increase SJR basin streamflow during critical periods for anadromous fish restoration efforts.

Proposal

California Department of Water Resources

San Joaquin River Real Time Water Quality Management Program

Ernest Taylor, California Department of Water Resources

Executive Summary

Title of Project:	San Joaquin River Real-time Water Quality Management Program
Requested Amount:	$1,284,300
Applicant:	California Department of Water Resources
	Ernest Taylor, Associate Engineer, Water Resources
	3374 E. Shields Avenue Phone: (559) 230-3352
	Fresno, CA 93726 Email: etaylor@water.ca.gov

This project funds the continued operation, upgrade and maintenance of flow and water quality monitoring stations that are part of an effort to assess and manage water quality conditions on the San Joaquin River. This project also provides funds for the operation of the San Joaquin River Input/Output Daily (SJRIODAY) model used to present forecasts of flow and water quality conditions at compliance locations on the River. The San Joaquin River is the dominant environmental feature of the San Joaquin Valley and a major hydrologic contributor to the Sacramento-San Joaquin Delta. Eight major rivers and 15 minor streams feed the SJR, which runs over 350 miles from its Sierra Nevadan origin to its delta terminus. Its many uses have resulted in a significant degrading of water quality, fish and wildlife habitat, flood protection capacity and recreation opportunities. Salinity, selenium and boron have been identified as being the most important water quality parameters in the SJR system.

The operation of the SJRIODAY will provide information on existing and forecast flow and water quality conditions to SJR water managers. Improved management and coordination of agricultural and wetland drainage flows, and east-side tributary releases could reduce the frequency with which water quality objectives for salinity are exceeded at the key compliance point along the SJR near Vernalis. By reducing the frequency of exceeding Vernalis EC objectives, the project may reduce the number and/or magnitude of high quality releases (e.g. releases of Stanislaus River flows from New Melones Reservoir) made specifically for meeting Vernalis EC objectives. The water saved can be used later to increase SJR basin streamflow during critical periods for anadromous fish restoration efforts.

Problem and Justification

The San Joaquin River is the dominant environmental feature of the San Joaquin Valley and a major hydrologic contributor to the Sacramento-San Joaquin Delta. The San Joaquin River basin is bounded by the crest of the Sierra Nevada on the east and the Coast Range on the west, and by the Kings River on the south (Figure 1). Eight major rivers and 15 minor streams feed the SJR, which runs over 350 miles from its Sierra Nevadan origin to its delta terminus. Its many uses have resulted in a significant degrading of water quality, fish and wildlife habitat, flood protection capacity and recreation opportunities.

In 1990, the California legislature authorized the establishment of the San Joaquin River Management Program (SJRMP) to identify the problems facing the river system and to prepare a plan that would identify solutions to improve, restore and enhance currently degraded conditions. A water quality subcommittee (SJRMP-WQS) was formed to identify the river's major water quality problems and to work towards the implementation of solutions. Members of the SJRMP-WQS include representatives of the California Department of Water Resources (DWR), University of California, Berkeley (UCB), U.S. Bureau of Reclamation (USBR) and the California Regional Water Quality Control Board, Central Valley Region (RWQCB-CVR). The committee identified salinity, selenium and boron as being the most important water quality parameters in the SJR system. The committee also concluded that improved management and coordination of agricultural and wetland drainage flows, and east-side tributary releases could reduce the frequency with which water quality objectives for salinity are exceeded at the key compliance point along the SJR near Vernalis. It further identified the need to provide information on existing and forecast flow and water quality conditions to SJR water managers.

After seeking funds from several sources, in September 1994, the USBR issued a $250,000 Challenge Grant to the SJRMP-WQS via DWR, to demonstrate improved water quality management through the use of telemetered water quality and flow monitoring stations (USBR Agreement No. 4-FG-20-12010). This initial phase showed the feasibility of monitoring and modeling the salinity of the lower SJR on a daily basis. A series of workshops were held and technical papers were written to describe the results of 18 months of flow and water quality forecasting on the San Joaquin River. The demonstration project accomplished the following:

- Expanded the number of monitoring sites temporarily providing telemetered stage and water quality data, and reinstated full operation of gaging stations
- Developed analytical tools to collect, process and display daily streamflow and salinity data (and by extension, SJR assimilative capacity)
- Executed a $50,000 service contract with Systech Engineering, Inc. to develop a Windows -based graphical user interface (GUI) computer program to display forecast model input and results (discharge, salinity, and remaining assimilative capacity) along a 60-mile reach of the lower SJR
- Developed weekly water quality forecasts of daily Vernalis discharge and salinity and post forecasts in arrears on an electronic bulletin board operated by the USBR
- Established a memorandum of understanding (MOU) to express a commitment to the operation, maintenance and expansion of the Program's network
- Established a trained interagency staff

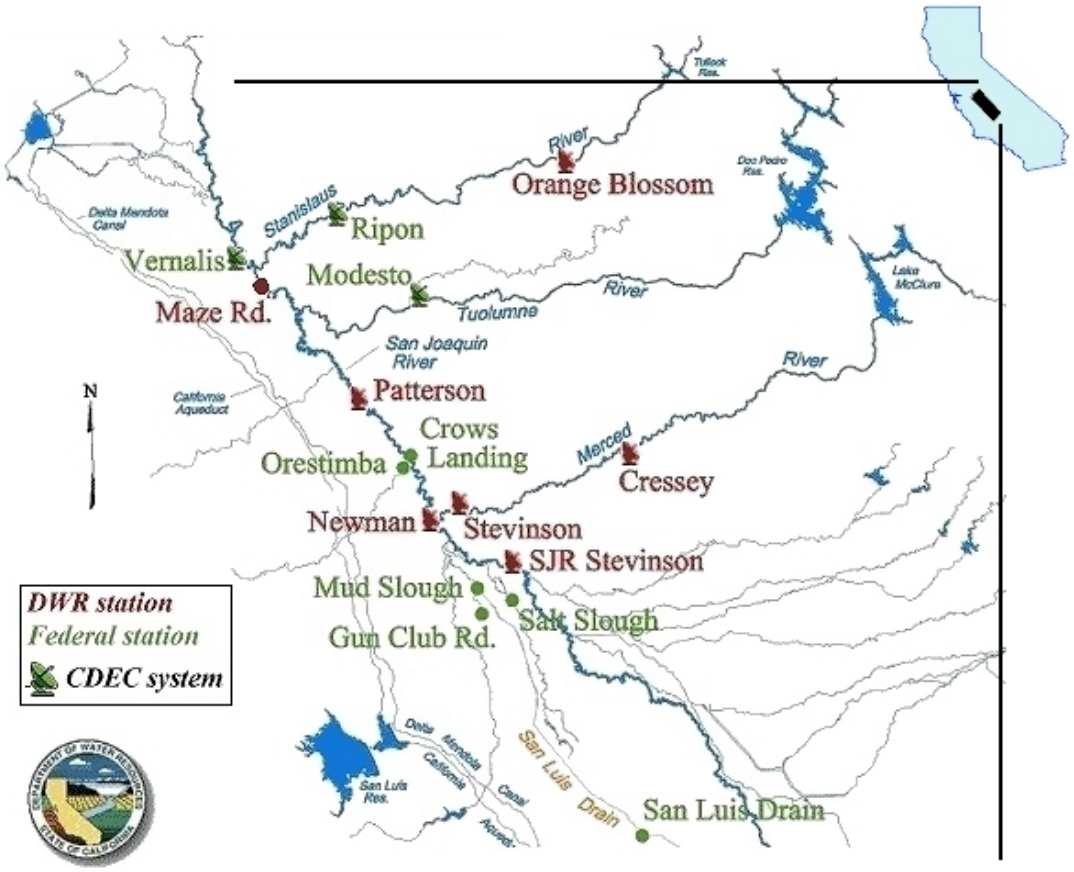


Figure 1

The SJRMP-WQS concluded its demonstration of water quality modeling and management activities in July 1997 with the termination of USBR Challenge Grant. The SJRMP-WQS sought funding from the CALFED Bay-Delta Programs 1997 Category III Ecosystem Restoration Project for Phase II of the San Joaquin River Real-time Water Quality Management Program (SJRRWQMP). CALFED selected the program for funding in September 1, 1998, agreement number B81647. Originally a two-year project, Phase II of the SJRRWQMP began in January 1, 1999 and was recently extended through the amendment process to December 31, 2001. In Phase II, the scope of work included:

- Reinitiate operation of the SJRIODAY water quality model weekly on a real-time basis and post to DWR website
- Upgrade and expand the surface water monitoring station network with EC and temperature sensors
- Install and maintain sensors at key monitoring sites (including new west-side tributary locations and the San Luis Drain)
- Conduct water quality grab sampling and analysis at key sites in the San Joaquin River basin
- Upgrade the graphical user interface
- Increase utilization of the results of these activities by CALFED organizations and beneficiaries

Unless extended, Phase II will be completed December 31,2001. Phase III of the SJRRWQMP will involve:

- continuing the operation and forecasting of the current SJRIODAY model
- upgrading the remaining stations that relay data via modem to fully telemetered real-time connections via satellite
- transitioning modeling activities to the DSM2 model
- coordinating with other water quality management efforts on the SJR

The SJRRWQMP uses telemetered stream stage and salinity data and computer models to simulate and forecast water quality conditions along the lower SJR. The main objective of the project is to facilitate the control and timing of wetland and agricultural drainage to coincide with periods when dilution flow is sufficient to meet Vernalis salinity objectives. By increasing the frequency of meeting Vernalis EC objectives, the project may reduce the number and/or magnitude of high quality releases (e.g. releases of Stanislaus River flows from New Melones Reservoir) made specifically for meeting Vernalis EC objectives. The water saved can be used later to increase SJR basin streamflow during critical periods for anadromous fish restoration efforts. Besides chinook salmon and steelhead trout, species and species groups benefitting from increased SJR streamflow include delta smelt, longfin smelt, splittail, white and green sturgeon, striped bass, estuarine fishes, large invertebrates, and Bay-Delta aquatic foodweb organisms.

Currently the Real-time program has completed all of the primary upgrades to the monitoring network. However there have been some additional needs identified that were not anticipated in the original contract. For Phase III of our program, four key USGS stations, three located in the wetlands and one on the San Joaquin River mainstem, are accessible by modem only and do not provide true real-time access. We propose to upgrade these stations to real-time Internet access with Geosynchronous Operational Environmental Satellites (GOES) transmitters. This would automate the data downloading process, saving time and allowing real-time access to important wetland stations like Mud and Salt Sloughs. These upgrades would also speed up the transition from our current San Joaquin River Input Output Daily (SJRIODAY) model to a more sophisticated model called the Delta Simulation Model 2 - San Joaquin Extension (DSM2) developed by DWR's Delta Modeling section. One of the advantages of DSM2 is its high degree of automation; the model could be operated virtually at anytime with real-time data available on the Internet. This would allow model runs to be performed for various scenarios during the course of a day with data as current as the last hour. Another advantage of this new model is its flexibility; in addition to electrical conductivity (EC), this model can be modified to include other water quality parameters.

SJRRWQMP has coordinated with the U.S. Bureau of Reclamation Water Operations Division for the past three years, providing flow and water quality information during the Vernalis Adaptive Management Plan (VAMP) period in the spring. The USBR in turn provides us with detailed release schedules during the same period. SJRRWQMP is currently working with the local water agencies West Stanislaus Irrigation District, Patterson Water District and Grasslands Water District collecting and exchanging flow and water quality data. Streamflow temperature data from stations operating on the Stanislaus River are being used for the development of river temperature models. Species benefitting from such adaptive stream temperature management as possible modifications to reservoir facilities and stream channels include white and green

sturgeon, chinook salmon, steelhead trout, and American shad. Future plans are developing to work with programs researching the dissolved oxygen depletion problem in the Stockton Deep Water Channel.

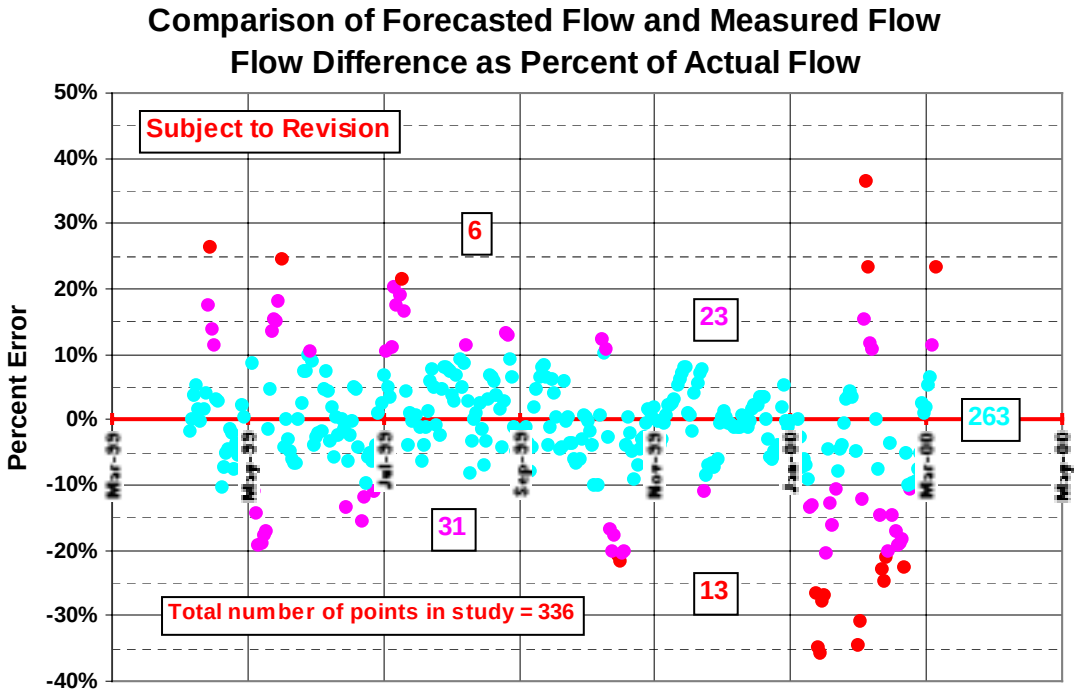
Approach/Tasks/Schedule

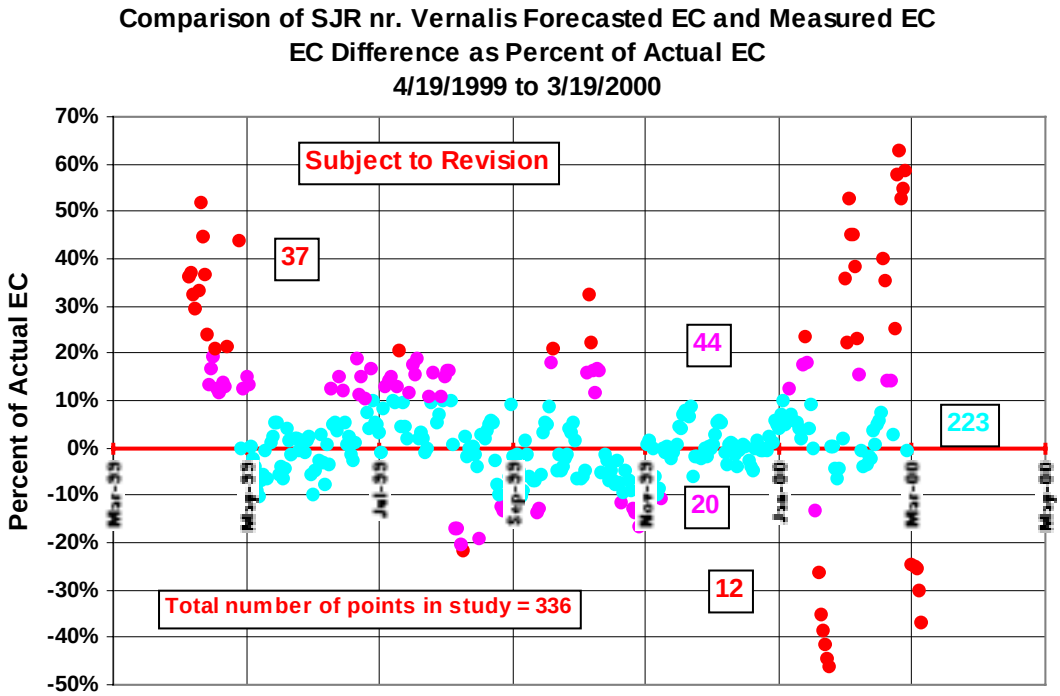
The Program will work closely with the RWQCB Salt and Boron TMDL amendment process to encourage SJRMP participants to voluntarily reduce water quality impacts on the SJR. Currently the RWQCB has salinity may soon release new Salt and Boron TMDL objectives for One Program goal is to reduce the number of days salinity levels exceed water quality objectives at the key compliance point on the SJR at Vernalis. Tasks shall involve:

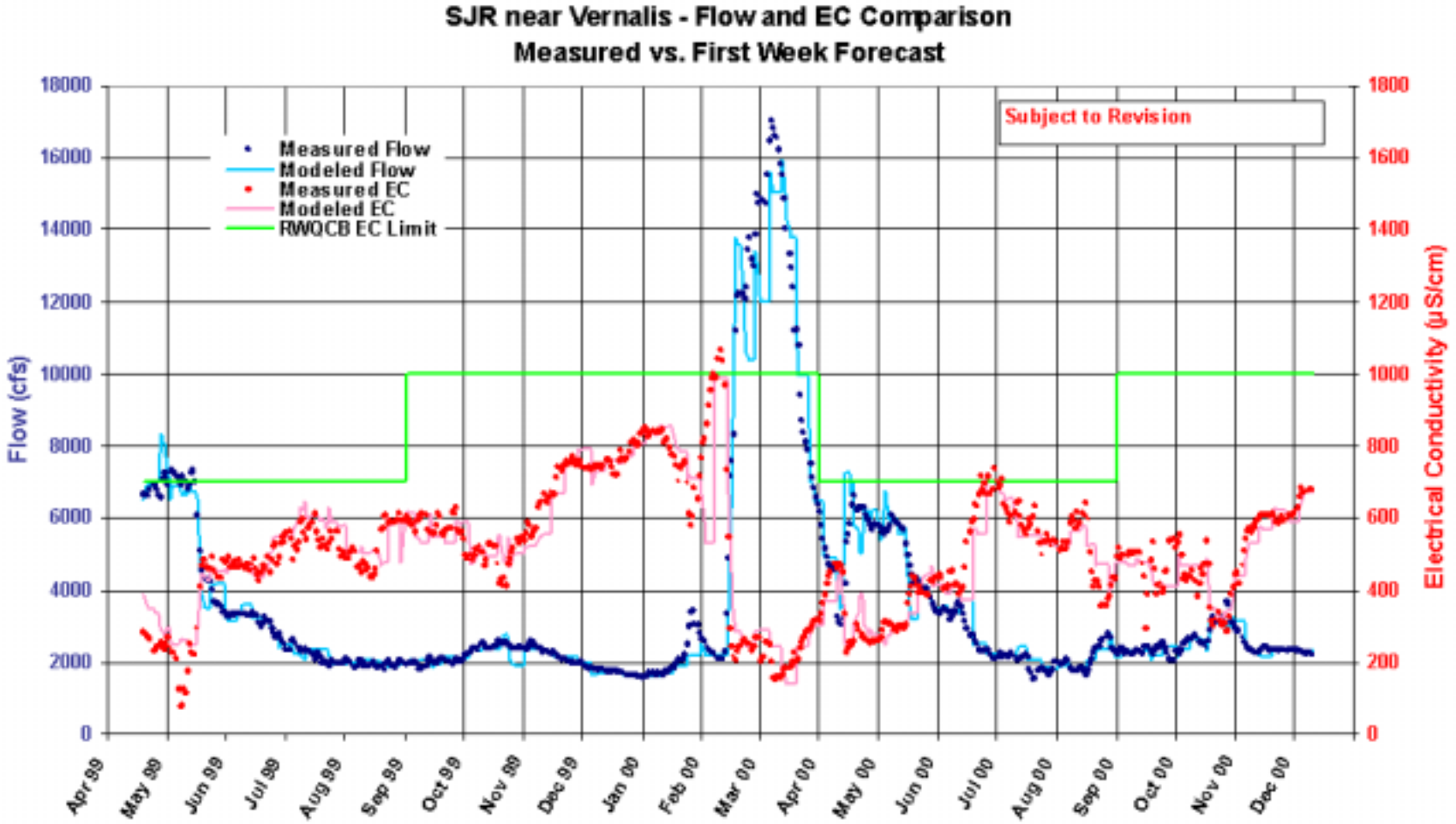
- Upgrade of all key stations with GOES transmitters for true real-time capacity. This will allow for continuous measurements of flow and EC from all key stations.
- Continue operation and maintenance of real-time network EC and temperature sensors.
- Conduct continuous water flow and water quality measurements
- Modeling, assembling data and other program activities

Feasibility

This program is fully implementable scientifically. Monitoring flow and EC on a continuous real-time basis has already been achieved in Phase II of our program. Our Program has also demonstrated that modeling flow and EC at Vernalis and forecasting these parameters is feasible. The graphs below indicate comparisons between measured and modeled flow and EC that are results of Phase II work.


Comparison of Forecasted Flow and Measured Flow
Flow Difference as Percent of Actual Flow
Percent Error
50%
40%
30%
20%
10%
0%
-10%
-20%
-30%
-40%
Subject to Revision
6
23
263
31
13
Total number of points in study = 336
Mar-99
May-99
Jul-99
Sep-99
Nov-99
Jan-00
Mar-00
May-00


Comparison of SJR nr. Vernalis Forecasted EC and Measured EC
EC Difference as Percent of Actual EC
4/19/1999 to 3/19/2000
Percent of Actual EC
70%
60%
50%
40%
30%
20%
10%
0%
-10%
-20%
-30%
-40%
-50%
Subject to Revision
37
44
223
20
12
Total number of points in study = 336
Mar-99
May-99
Jul-99
Sep-99
Nov-99
Jan-00
Mar-00
May-00


SJR near Vernalis - Flow and EC Comparison
Measured vs. First Week Forecast
Subject to Revision
Measured Flow
Modeled Flow
Measured EC
Modeled EC
RWQCB EC Limit
Flow (cfs)
Electrical Conductivity (µS/cm)
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
1800
1600
1400
1200
1000
800
600
400
200
0
Apr 99
May 99
Jun 99
Jul 99
Aug 99
Sep 99
Oct 99
Nov 99
Dec 99
Jan 00
Feb 00
Mar 00
Apr 00
May 00
Jun 00
Jul 00
Aug 00
Sep 00
Oct 00
Nov 00
Dec 00

Performance Measures

Deliverables will include quarterly fiscal reports, three annual summary reports and one final summary report. Weekly water quality forecasts will be compared to actual measured flow and EC to determine accuracy of forecasts.

Data Handling and Storage

Data and forecasts produced by the Program will be viewable on the DWR - San Joaquin District website. At the end of each year, a project dataset will accompany the annual summary report.

Expected Products/Outcome

Weekly forecasts and modeling of lower SJR flow and EC of flow and EC, collection of flow, EC and temperature data at key monitoring stations in the SJR basin, DWR web pages dedicated to SJR Real-time Water Quality Management, quarterly fiscal reports, annual summary reports, and reduction of days exceeding salinity objectives on the SJR at Vernalis.

Applicability to CALFED ERP and Science Program Goals and Implementation Plan

Salinity and temperature have been identified by the CALFED Water Quality Technical Group as water quality stressors of concern in the SJR. The project may reduce the number and/or magnitude of high quality made specifically for meeting Vernalis EC objectives. The water saved can be used later to increase SJR basin streamflow during critical periods for anadromous fish restoration efforts. Besides chinook salmon and steelhead trout, species and species groups benefitting from increased SJR streamflow include delta smelt, longfin smelt, splittail, white and green sturgeon, striped bass, estuarine fishes, large invertebrates, and Bay-Delta aquatic foodweb organisms.
The program provides increased water use efficiency and water quality improvements compatible with CALFED goals.

Primary Applicant Qualifications

Ernest D. Taylor, P.E., DWR Associate Engineer, Water Resources
Mr. Taylor has worked as a Water Resources Engineer for the Department of Water Resources for 17 years. His work at the Department has involved agricultural drainage monitoring, agricultural drainage water treatment, water resources planning, groundwater trends analysis, and conjunctive water use planning. For the last three years, he has been the program manager for the SJR Real-time Water Quality Management Program and has chaired the SJRMP Water Quality Subcommittee.

Les Grober, CRWQCB-CVR Senior Land and Water Use Analyst
Mr. Grober has earned a B.S. in Geology and a M.S. in Hydrologic Science. He has extensive background in hydrologic, hydraulic, and water quality modeling. He currently supervises flow and water quality monitoring for the CRWQCB program that monitors agricultural discharges in the SJR basin. He also provides modeling support to the State and local agencies to evaluate the management strategies on SJR water quality.

Nigel Quinn, PhD, P.E., Asst. Research Engineer, UC Berkeley
Dr. Quinn is a Water Resources Engineer and Research Hydrogeologist specializing in the application and development of wateshed scale models to solve salinity, selenium and related water quality problems in the San Joaquin Valley. He has worked as a consultant to the US Bureau of Reclamation for the past 13 years and is currently under contract with that institution leading projects on regional groundwater model development and real-time water quality monitoring and modeling of the SJR and managed wetlands within the Grassland Basin.

SJR Real-time Water Quality Monitoring -- Three Year Budget

Project Task/Sub-task	Direct Labor Hours	Direct Labor Salary	Labor Benefits	Labor Overhead	Service Contracts & Agreements	Equip. Costs	Misc., Travel & Other Direct Costs	Total Costs
Department of Water Resources Tasks								
First Year Costs	2,230	61,900	31,000	62,500	0	31,200	36,300	222,900
Second Year Costs	2,160	60,200	30,100	60,700	0	0	32,700	183,700
Third Year Costs	2,160	60,200	30,100	60,700	0	0	32,700	183,700
Total DWR Program Costs	**6,550**	**182,300**	**91,200**	**183,900**	**0**	**31,200**	**101,700**	**590,300**
Regional Water Quality Control Board Tasks - Interagency Agreement								
First Year Costs	3,460	43,900	13,200	44,000	0	0	57,500	158,600
Second Year Costs	3,460	43,900	13,200	44,000	0	0	57,500	158,600
Third Year Costs	3,460	43,900	13,200	44,000	0	0	57,500	158,600
Total RWQCB Subcontractor Costs	**10,380**	**131,700**	**39,600**	**132,000**	**0**	**0**	**172,500**	**475,800**
University of California, Berkeley Tasks - Interagency Agreement								
First Year Costs	790	23,400	11,800	17,700	0	0	5,300	58,200
Second Year Costs	790	23,400	11,800	17,700	0	0	5,300	58,200
Third Year Costs	790	23,400	11,800	17,700	0	0	5,300	58,200
Total UCB Subcontractor Costs	**2,370**	**70,200**	**35,400**	**53,100**	**0**	**0**	**15,900**	**174,600**
US Geological Survey Tasks - Cooperative Agreement								
First Year Costs	-	0	0	0	16,000	0	1,200	17,200
Second Year Costs	-	0	0	0	12,000	0	1,200	13,200
Third Year Costs	-	0	0	0	12,000	0	1,200	13,200
Total USGS Subcontractor Costs	-	**0**	**0**	**0**	**40,000**	**0**	**3,600**	**43,600**
Total Three Year Program								
First Year Costs	6480	129,200	56,000	124,200	16,000	31,200	100,300	456,900
Second Year Costs	6410	127,500	55,100	122,400	12,000	0	96,700	413,700
Third Year Costs	6410	127,500	55,100	122,400	12,000	0	96,700	413,700
Total Program Costs	**19,300**	**384,200**	**166,200**	**369,000**	**40,000**	**31,200**	**293,700**	**1,284,300**

SJR Real-time Water Quality Monitoring -- First Year Budget

No.	Project Task/Sub-task	Direct Labor Hours	Direct Labor Salary	Labor Benefits	Labor Overhead	Service Contracts & Agreements	Equip. Costs	Misc., Travel & Other Direct Costs	Total Costs
	Department of Water Resources Tasks								
1	**Program Management (DWR Senior Engr.)**	260	9,236	4,618	7,900				21,754
2	**Equipment**								
	5 - GOES telemetry receiver/transceiver						15,000		15,000
	1 - Full station for SJR @ Maze Rd. Bridge						14,000		14,000
	1- YSI EC/temperature sensor for Patterson WD diversion						2,200		2,200
	Computer, handheld meter, misc. materials.							10,000	10,000
	Vehicle costs ($30,000/5yrs=$6,000/yr)							6,000	6,000
3	**Installation, operation and maintenance of DWR stations**								
	Supervision, planning and scheduling (Senior Engr., WR)	100	3,552	1,776	3,039				8,367
	Acquisition of equipment (Assoc. Engr, WR)	50	1,618	809	1,756				4,184
	Operation and maintenance of monitoring stations (Tech II)	850	20,718	10,359	20,833				51,910
4	**Modeling and general program activities**								
	Assemble and pre-process real-time data (Student Assistant)	100	900	450	923				2,273
	Input and maintain processed data (Student Assistant)	100	900	450	923				2,273
	Poll water managers on current activities (Assoc. Engr, WR)	50	1,618	809	1,756				4,184
	Run forecasting model (Assoc. Engr, WR)	100	3,237	1,618	3,512				8,367
	Maintain and archive data (Assoc. Engr, WR)	100	3,237	1,618	3,512				8,367
	Transition to and incorporate DSM2 model operations (Assoc. E	100	3,237	1,618	3,512				8,367
	Conduct workshops, meetings and demonstrations (Assoc. Engr	210	6,797	3,399	7,375				17,571
	Write reports and bulletins (Assoc. Engr. WR)	210	6,797	3,399	7,375				17,571
	Subtotal	**2,230**	**61,847**	**30,924**	**62,415**	**0**	**31,200**	**16,000**	**202,386**
	Contingency fund (10% of subtotal, roundup)							20,300	20,300
	Total DWR Program Costs (roundup)	**2,230**	**61,900**	**31,000**	**62,500**	**0**	**31,200**	**36,300**	**222,900**
	Regional Water Quality Control Board Tasks								
1	**Program Management (Senior Engr. Geol.)**	100	3,552	1,066	3,556				8,174
2	**Water quality sampling**								
	Weekly & daily sample collection, processing and analysis for B and Se (CRWQCB-CVR student)	2,860	25,740	7,722	25,766				59,228
	Lab analysis for B and Se collected weekly (520 samples per year at $35 per sample)							19,000	19,000
	Lab analysis for B and Se collected daily (513 samples per year at $35 per sample)							19,000	19,000
	Lab analysis for TDS samples (250 samples per year at $16 per sample).							5,000	5,000
3	**Modeling and general program activities**								
	Run forecasting model (Env. Spec. III)	100	2,921	876	2,924				6,721
	Maintain and archive data (Env. Spec. III)	100	2,921	876	2,924				6,721
	Transition to and incorporate DSM2 model operations (Env. Spe	100	2,921	876	2,924				6,721
	Conduct workshops, meetings and demonstrations (Env. Spec. I	100	2,921	876	2,924				6,721
	Write reports and bulletins (Env. Spec. III)	100	2,921	876	2,924				6,721
	Subtotal	**3,460**	**43,896**	**13,169**	**43,940**	**0**	**0**	**43,000**	**144,004**
	Contingency fund (10% of subtotal)							14,400	14,400
	Total RWQCB Subcontractor Costs	**3,460**	**43,900**	**13,200**	**44,000**	**0**	**0**	**57,500**	**158,600**
	University of California, Berkeley Tasks								
1	**Program Management (Principal Investigator)**	40	3,310	1,668	2,509				7,488
2	**Modeling and general program activities**								
	Assemble and pre-process real-time data (Student Asst.)	100	1,920	968	1,455				4,343
	Poll water managers on current activities (Research Engr)	50	2,084	1,050	1,579				4,713
	Run forecasting model (Student Asst.)	100	1,920	968	1,455				4,343
	Maintain and archive data (Student Asst.)	100	1,920	968	1,455				4,343
	Transition to and incorporate DSM2 model operations (Student A	100	1,920	968	1,455				4,343
	Conduct workshops, meetings and demonstrations (Research E	100	4,167	2,100	3,159				9,426
	Attend meetings and workshops (Student Asst.)	100	1,920	968	1,455				4,343
	Write reports and bulletins (Research Engr)	100	4,167	2,100	3,159				9,426
	Subtotal	**790**	**23,320**	**11,757**	**17,683**	**0**	**0**	**0**	**52,768**
	Contingency fund (10% of subtotal)							5,277	5,277
	Total UCB Subcontractor Costs	**790**	**23,400**	**11,800**	**17,700**	**0**	**0**	**5,300**	**58,200**
	US Geological Survey Tasks								
1	**USGS station Tuolumne River near Modesto**					12,000			12,000
2	**Installation of GOES telemetry equipment in 4 stations**					4,000			4,000
	Subtotal	-	**0**	**0**	**0**	**16,000**	**0**	**0**	**16,000**
	Contingency fund (10% of subtotal)							1,200	1,200
	Total USGS Subcontractor Costs	-	**0**	**0**	**0**	**16,000**	**0**	**1,200**	**17,200**
	Total Program Costs	**6,480**	**129,200**	**56,800**	**124,200**	**16,000**	**31,200**	**100,300**	**456,900**

SJR Real-time Water Quality Monitoring -- Second Year Budget

No.	Project Task/Sub-task	Direct Labor Hours	Direct Labor Salary	Labor Benefits	Labor Overhead	Service Contracts & Agreements	Equip. Costs	Misc., Travel & Other Direct Costs	Total Costs
	Department of Water Resources Tasks								
1	**Program Management (DWR Senior Engr.)**	260	9,236	4,618	7,900				21,754
2	**Equipment**								
	5 - GOES telemetry receiver/transceiver	installed							
	1 - Full station for SJR @ Maze Rd. Bridge	installed							
	1- YSI EC/temperature sensor for Patterson WD diversion	installed							
	Computer, handheld meter, misc. materials.							10,000	10,000
	Vehicle costs ($30,000/5yrs=$6,000/yr)							6,000	6,000
3	**Installation, operation and maintenance of DWR stations**								
	Supervision, planning and scheduling (Senior Engr., WR)	100	3,552	1,776	3,039				8,367
	Acquisition of equipment (Assoc. Engr, WR)	50	1,618	809	1,756				4,184
	Operation and maintenance of monitoring stations (Tech II)	780	19,011	9,506	19,118				47,635
4	**Modeling and general program activities**								
	Assemble and pre-process real-time data (Student Assistant)	100	900	450	923				2,273
	Input and maintain processed data (Student Assistant)	100	900	450	923				2,273
	Poll water managers on current activities (Assoc. Engr, WR)	50	1,618	809	1,756				4,184
	Run forecasting model (Assoc. Engr, WR)	100	3,237	1,618	3,512				8,367
	Maintain and archive data (Assoc. Engr, WR)	100	3,237	1,618	3,512				8,367
	Transition to and incorporate DSM2 model operations (Assoc. E	100	3,237	1,618	3,512				8,367
	Conduct workshops, meetings and demonstrations (Assoc. Engr	210	6,797	3,399	7,375				17,571
	Write reports and bulletins (Assoc. Engr. WR)	210	6,797	3,399	7,375				17,571
	Subtotal	**2,160**	**60,141**	**30,071**	**60,699**	**0**	**0**	**16,000**	**166,911**
	Contingency fund (10% of subtotal, roundup)							16,700	16,700
	Total DWR Program Costs (roundup)	**2,160**	**60,200**	**30,100**	**60,700**	**0**	**0**	**32,700**	**183,700**
	Regional Water Quality Control Board Tasks								
1	**Program Management (Senior Engr. Geol.)**	100	3,552	1,066	3,556				8,174
2	**Water quality sampling**								
	Weekly & daily sample collection, processing and analysis for B and Se (CRWQCB-CVR student).	2,860	25,740	7,722	25,766				59,228
	Lab analysis for B and Se collected weekly (520 samples per year at $35 per sample)							19,000	19,000
	Lab analysis for B and Se collected daily (513 samples per year at $35 per sample)							19,000	19,000
	Lab analysis for TDS samples (250 samples per year at $16 per sample).							5,000	5,000
3	**Modeling and general program activities**								
	Run forecasting model (Env. Spec. III)	100	2,921	876	2,924				6,721
	Maintain and archive data (Env. Spec. III)	100	2,921	876	2,924				6,721
	Transition to and incorporate DSM2 model operations (Env. Spec	100	2,921	876	2,924				6,721
	Conduct workshops, meetings and demonstrations (Env. Spec. I	100	2,921	876	2,924				6,721
	Write reports and bulletins (Env. Spec. III)	100	2,921	876	2,924				6,721
	Subtotal	**3,460**	**43,896**	**13,169**	**43,940**	**0**	**0**	**43,000**	**144,004**
	Contingency fund (10% of subtotal)							14,400	14,400
	Total RWQCB Subcontractor Costs	**3,460**	**43,900**	**13,200**	**44,000**	**0**	**0**	**57,500**	**158,600**
	University of California, Berkeley Tasks								
1	**Program Management (Principal Investigator)**	40	3,310	1,668	2,509				7,488
2	**Modeling and general program activities**								
	Assemble and pre-process real-time data (Student Asst.)	100	1,920	968	1,455				4,343
	Poll water managers on current activities (Research Engr)	50	2,084	1,050	1,579				4,713
	Run forecasting model (Student Asst.)	100	1,920	968	1,455				4,343
	Maintain and archive data (Student Asst.)	100	1,920	968	1,455				4,343
	Transition to and incorporate DSM2 model operations (Student A	100	1,920	968	1,455				4,343
	Conduct workshops, meetings and demonstrations (Research E	100	4,167	2,100	3,159				9,426
	Attend meetings and workshops (Student Asst.)	100	1,920	968	1,455				4,343
	Write reports and bulletins (Research Engr)	100	4,167	2,100	3,159				9,426
	Subtotal	**790**	**23,320**	**11,757**	**17,683**	**0**	**0**	**0**	**52,768**
	Contingency fund (10% of subtotal)							5,277	5,277
	Total UCB Subcontractor Costs	**790**	**23,400**	**11,800**	**17,700**	**0**	**0**	**5,300**	**58,200**
	US Geological Survey Tasks								
1	**USGS station Tuolumne River near Modesto**					12,000			12,000
2	**Installation of GOES telemetry equipment in 4 stations**	complete							
	Subtotal	-	**0**	**0**	**0**	**12,000**	**0**	**0**	**12,000**
	Contingency fund (10% of subtotal)							1,200	1,200
	Total USGS Subcontractor Costs	-	**0**	**0**	**0**	**12,000**	**0**	**1,200**	**13,200**
	Total Program Costs	**6,410**	**127,500**	**55,100**	**122,400**	**12,000**	**0**	**96,700**	**413,700**

SJR Real-time Water Quality Monitoring -- Third Year Budget

No.	Project Task/Sub-task	Direct Labor Hours	Direct Labor Salary	Labor Benefits	Labor Overhead	Service Contracts & Agreements	Equip. Costs	Misc., Travel & Other Direct Costs	Total Costs
	Department of Water Resources Tasks								
1	**Program Management (DWR Senior Engr.)**	260	$ 9,236	$ 4,618	$ 7,900				$ 21,754
2	**Equipment**								
	5 - GOES telemetry receiver/transceiver	installed							
	1 - Full station for SJR @ Maze Rd. Bridge	installed							
	1- YSI EC/temperature sensor for Patterson WD diversion	installed							
	Computer, handheld meter, misc. materials.							$ 10,000	$ 10,000
	Vehicle costs ($30,000/5yrs=$6,000/yr)							$ 6,000	$ 6,000
3	**Installation, operation and maintenance of DWR stations**								
	Supervision, planning and scheduling (Senior Engr., WR)	100	$ 3,552	$ 1,776	$ 3,039				$ 8,367
	Acquisition of equipment (Assoc. Engr, WR)	50	$ 1,618	$ 809	$ 1,756				$ 4,184
	Operation and maintenance of monitoring stations (Tech II)	780	$ 19,011	$ 9,506	$ 19,118				$ 47,635
4	**Modeling and general program activities**								
	Assemble and pre-process real-time data (Student Assistant)	100	$ 900	$ 450	$ 923				$ 2,273
	Input and maintain processed data (Student Assistant)	100	$ 900	$ 450	$ 923				$ 2,273
	Poll water managers on current activities (Assoc. Engr, WR)	50	$ 1,618	$ 809	$ 1,756				$ 4,184
	Run forecasting model (Assoc. Engr, WR)	100	$ 3,237	$ 1,618	$ 3,512				$ 8,367
	Maintain and archive data (Assoc. Engr, WR)	100	$ 3,237	$ 1,618	$ 3,512				$ 8,367
	Transition to and incorporate DSM2 model operations (Assoc. E	100	$ 3,237	$ 1,618	$ 3,512				$ 8,367
	Conduct workshops, meetings and demonstrations (Assoc. Engr	210	$ 6,797	$ 3,399	$ 7,375				$ 17,571
	Write reports and bulletins (Assoc. Engr. WR)	210	$ 6,797	$ 3,399	$ 7,375				$ 17,571
	Subtotal	**2,160**	**$ 60,141**	**$ 30,071**	**$ 60,699**	**$ -**	**$ -**	**$ 16,000**	**$ 166,911**
	Contingency fund (10% of subtotal, roundup)							$ 16,700	$ 16,700
	Total DWR Program Costs (roundup)	**2,160**	**$ 60,200**	**$ 30,100**	**$ 60,700**	**$ -**	**$ -**	**$ 32,700**	**$ 183,700**
	Regional Water Quality Control Board Tasks								
1	**Program Management (Senior Engr. Geol.)**	100	$ 3,552	$ 1,066	$ 3,556				$ 8,174
2	**Water quality sampling**								
	Weekly & daily sample collection, processing and analysis for B and Se (CRWQCB-CVR student).	2,860	$ 25,740	$ 7,722	$ 25,766				$ 59,228
	Lab analysis for B and Se collected weekly (520 samples per year at $35 per sample)							$ 19,000	$ 19,000
	Lab analysis for B and Se collected daily (513 samples per year at $35 per sample)							$ 19,000	$ 19,000
	Lab analysis for TDS samples (250 samples per year at $16 per sample).							$ 5,000	$ 5,000
3	**Modeling and general program activities**								
	Run forecasting model (Env. Spec. III)	100	$ 2,921	$ 876	$ 2,924				$ 6,721
	Maintain and archive data (Env. Spec. III)	100	$ 2,921	$ 876	$ 2,924				$ 6,721
	Transition to and incorporate DSM2 model operations (Env. Spec	100	$ 2,921	$ 876	$ 2,924				$ 6,721
	Conduct workshops, meetings and demonstrations (Env. Spec. I	100	$ 2,921	$ 876	$ 2,924				$ 6,721
	Write reports and bulletins (Env. Spec. III)	100	$ 2,921	$ 876	$ 2,924				$ 6,721
	Subtotal	**3,460**	**$ 43,896**	**$ 13,169**	**$ 43,940**	**$ -**	**$ -**	**$ 43,000**	**$ 144,004**
	Contingency fund (10% of subtotal)							$ 14,400	$ 14,400
	Total RWQCB Subcontractor Costs	**3,460**	**$ 43,900**	**$ 13,200**	**$ 44,000**	**$ -**	**$ -**	**$ 57,500**	**$ 158,600**
	University of California, Berkeley Tasks								
1	**Program Management (Principal Investigator)**	40	$ 3,310	$ 1,668	$ 2,509				$ 7,488
2	**Modeling and general program activities**								
	Assemble and pre-process real-time data (Student Asst.)	100	$ 1,920	$ 968	$ 1,455				$ 4,343
	Poll water managers on current activities (Research Engr)	50	$ 2,084	$ 1,050	$ 1,579				$ 4,713
	Run forecasting model (Student Asst.)	100	$ 1,920	$ 968	$ 1,455				$ 4,343
	Maintain and archive data (Student Asst.)	100	$ 1,920	$ 968	$ 1,455				$ 4,343
	Transition to and incorporate DSM2 model operations (Student A	100	$ 1,920	$ 968	$ 1,455				$ 4,343
	Conduct workshops, meetings and demonstrations (Research E	100	$ 4,167	$ 2,100	$ 3,159				$ 9,426
	Attend meetings and workshops (Student Asst.)	100	$ 1,920	$ 968	$ 1,455				$ 4,343
	Write reports and bulletins (Research Engr)	100	$ 4,167	$ 2,100	$ 3,159				$ 9,426
	Subtotal	**790**	**$ 23,328**	**$ 11,757**	**$ 17,683**	**$ -**	**$ -**	**$ -**	**$ 52,768**
	Contingency fund (10% of subtotal)							$ 5,277	$ 5,277
	Total RWQCB Subcontractor Costs	**790**	**$ 23,400**	**$ 11,800**	**$ 17,700**	**$ -**	**$ -**	**$ 5,300**	**$ 58,200**
	US Geological Survey Tasks								
1	**USGS station Tuolumne River near Modesto**					$ 12,000			$ 12,000
2	**Installation of GOES telemetry equipment in 4 stations**	complete							
	Subtotal	-	$ -	$ -	$ -	$ 12,000	$ -	$ -	$ 12,000
	Contingency fund (10% of subtotal)							$ 1,200	$ 1,200
	Total USGS Subcontractor Costs	-	$ -	$ -	$ -	$ 12,000	$ -	$ 1,200	$ 13,200
	Total Program Costs	**6,410**	**$ 127,500**	**$ 55,100**	**$ 122,400**	**$ 12,000**	**$ -**	**$ 96,700**	**$ 413,700**

Salary Rates

DWR	Monthly Salary	Base Salary Per Hour	Benefits	Overhead	Total Rate Charged	Benefit %	Overhead %	Benefit & Overhead %	First Year Total Hours	Total Costs
Senior Engineer, Program Manager	$ 6,181	$35.52	$ 17.76	$ 30.39	$ 83.67	50%	57%	236%	360	$ 30,121
Associate Engineer	$ 5,632	$32.37	$ 16.18	$ 35.12	$ 83.67	50%	72%	258%	820	$ 68,609
Engineering Technician II	$ 4,241	$24.37	$ 12.19	$ 24.51	$ 61.07	50%	67%	251%	850	$ 51,910
Student Assistant		$ 9.00	$ 4.50	$ 9.23	$ 22.73	50%	68%	253%	200	$ 4,546
									2230	$ 155,186
RWQCB										
Les Grober, Senior Geologist	$ 6,181	$35.52	$ 10.66	$ 35.56	$ 81.74	30%	77%	230%	100	$ 8,174
Eric Oppenheimer, Environmental Specialist	$ 5,082	$29.21	$ 8.76	$ 29.24	$ 67.21	30%	77%	230%	500	$ 33,603
Student Assistant		$ 9.00	$ 2.70	$ 9.01	$ 20.71	30%	77%	230%	2860	$ 59,228
									3460	$ 101,004
UCB										
J. Oracup, P/I Director (summer salary)	$14,400	$82.76	$ 41.71	$ 62.73	$187.20	50%	50%	226%	40	$ 7,488
Nigel Quinn, Asst. Research Engineer	$ 7,251	$41.67	$ 21.00	$ 31.59	$ 94.26	50%	50%	226%	250	$ 23,565
Mark Hanna, Student Assistant	$ 3,341	$19.20	$ 9.68	$ 14.55	$ 43.43	50%	50%	226%	500	$ 21,715
									790	$ 52,768

DWR	Total 3-year Hours
Senior Engineer, Program Manager	1080
Associate Engineer	2460
Engineering Technician II	3190
Student Assistant	600
RWQCB	
Les Grober, Senior Geologist	300
Eric Oppenheimer, Environmental Specialist	1500
Student Assistant	8580
UCB	
J. Oracup, P/I Director (summer salary)	120
Nigel Quinn, Asst. Research Engineer	750
Mark Hanna, Student Assistant	1500