

## Work Plan for Fiscal Year 2004

**I. Program Title:** Ecological/Water Systems Operations Models, CVPIA  
Section 3406 (g)

**II. Responsible Entities**

	<b>Agency</b>	<b>Name</b>	<b>Role</b>
Lead	USBR	Lloyd E. Peterson,	Program Manager
Co-Lead	USFWS	Andrew Hamilton	Program Manager

**III. Program Objective for FY 2004**

The objective is to develop readily usable and broadly available models and supporting data to evaluate the ecologic and hydrologic effects of existing and alternative management strategies of public and private water facilities and systems in the Sacramento, San Joaquin, and Trinity watersheds. Specific to FY 04 are:

- A. **CALSIM II Development** CALSIM II is a reservoir system model jointly developed (Reclamation and DWR). CALSIM II continues to be the model most applied to water management questions of the Central Valley Project.
- B. **Process Based CALSIM Module Development** CALSIM II manages water supply but depends on processed based modules, such as delta water quality, San Joaquin water quality and reservoir and river temperature models to calculate constraints and requirements.
- C. **CALSIM Review and Documentation** Rigorous quality control and documentation are required to preserve credibility
- D. **CALSIM Training** This training is also necessary to efficiently train new agency and private sector staff.
- E. **Fishery Model Development** Continuing development of models of life stages of relevant fish species
- F. **Membership and Participation in Professional Organizations**

**IV. Status of the Program**

The Ecological/Water Systems Operations Models, CVPIA Section 3406(g) program is a continuing program that started in 1994.

The program has supported the Ecosystem Modeling Consensus Project, review and update of the Central Valley Ground-Surface water model (CVGSM); development of a graphical user interface (GUI) and database for PROSIM and SANJASM (note: This GUI effort was abandoned because CALSIM replaced PROSIM and SANJASM, as well as DWRSIM); development of the 3-D temperature model for Whiskeytown Reservoir, development of CALSIM II, and hydrologic input for CALSIM.

Since 1998 this program has supported a steadily increasing level of support for CALSIM II development and application with FY 2003 demanding more staff

and resources than any earlier year. The California Department of Water Resources and Reclamation have made a large investment in CALSIM and it is essential for Interior to participate in and guide its development and application. CALSIM II is now available for public use and has been applied to water supply improvement studies.

This program also supports new development of reservoir and river temperature models used by the Division of Planning and private contractors for modeling support for operations and planning. Also important is the development of staff capable of developing and implementing these models. The Mid-Pacific Region Division of Planning, the U.S. Fish and Wildlife Service, the California Department of Water Resources, and private contractors all of staff capable of applying these models who have been trained under funding from this program.

This program has also provided a platform for staff to solicit and manage funds from other sources.

## **V. FY 2003 Accomplishments**

- A. The staff of the River Systems Analysis Branch (MP-710), Reclamation's Technical Service Center, Derek Hilts (USFWS), and private contractors developed code and data and reviewed CALSIM II, and conducted one three day training session.
- B. Comprehensive review of CALSIM II including detailed annotation of the code and documentation.
- C. Updated present and future conditions hydrology for the San Joaquin Valley.
- D. A manual describing the procedure for developing the various time series of input that are required for CALSIM supporting review of data and serves to replace what had been left to corporate memory.
- E. Continuing development of the Land-Atmosphere-Water-Simulator (LAWS) model. This modeling system utilizes software that can extract from LADSAT imagery crop types and acreage thus supporting development of data to more accurately model consumptive use.
- F. Continuing development of an algorithm with CALSIM II to simulate revised interpretation of (b)(2) was supported through a contract to a private contractor. This work is underway.
- G. A series of workshops open to planning and operations staffs of Reclamation and DWR were conducted with the goal of developing a strategy for improving the allocation process within CALSIM II.
- H. An initial effort at building a GIS representation of the CALSIM II coverage in support of improved documentation was completed.
- I. Funding was provided to the USFWS for a distribution copy of Sacramento River Chinook salmon life history model.
- J. Reclamation provided active support for the CALSIM ANN Refinement Team (CART)
- K. Advancement in CALSIM II's simulation of the Stanislaus Basin

## VI. Tasks, Costs, Schedules, and Deliverables

Narrative Explanation of Tasks (note these are in order of priority)

3406(g) Narrative Explanation of FY 04 Tasks		
Program Objective ID*	Task #	Narrative Explanation of Task
A-F	1	Program management – Managing this program and administration of contracts
C	2	Continuing review and documentation of CALSIM II code. This code has been developed by CADWR, Reclamation, and private sector staff. Reclamation, with CADWR, recognizes the need for this quality control effort
A	3	Continuing Reclamation development of CALSIM
A	4	US Fish and Wildlife Service staff provides CALSIM oversight and review
B	5	Initiate development of a water temperature model of the American River from Folsom Lake to the confluence of the Sacramento River. The model will operate on a daily, or shorter (6-hour), time-step. Both Folsom Lake and Lake Natoma should be modeled explicitly. The model will be used for planning studies and real time operation.
C	6	Hydrology documentation as a continuation of work initiated in FY 02, but not funded in FY 03.
B	7	Support for a module of the Land-Atmosphere-Water-Simulator (LAWS) model that provides simulation of historic or current consumptive use. These data may be incorporated into the CALSIM II. LAWS integrates geographical information systems (ArcGIS), satellite remote sensing (LANDSAT), historic and near real-time weather data collection (CIMIS), and weather forecasting (MM5) technologies. This modeling system utilizes software that can extract from LADSAT imagery crop types and acreage thus supporting development of data to more accurately model consumptive use. These results will be useful for studies on reservoir operations, conjunctive use of surface and ground water, water transfers involving water conservation or land fallowing, and re-use of agricultural drainage.
F	8	Membership and Participation in Professional Organizations including membership in the California Water and Environmental Modeling Forum and conferences with organizations such as American Society of Civil Engineers and American Water Resources Association

### Additional Program Needs

E	Sacramento River chinook model Calibration and analysis. Calibration and analysis will include testing of existing model output and individual examination of two life stage modules, calibrating them against available data and then using the calibrated modules for pilot analyses of important management issues.
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### Key to Objective ID

- A. CALSIM II Development
- B. Process Based CALSIM Module Development
- C. CALSIM Review and Documentation,
- D. CALSIM Training
- E. Fishery Model Development
- F. Membership and Participation in Professional Organizations

**B. Schedule and Deliverables**

#	Task	Dates		Deliverable
		Start	Complete	
1	Program Management	10/1/03	9/30/04	Annual work plans; awarding and management of grants; supervision of staff on 3406(g) funded projects
2	CALSIM Review/Documentation	10/1/03	9/30/04	Refined and commented WRESL code in CALSIM
3	CALSIM Development (USBR)	10/1/03	9/30/04	Coding to improve elements of model such as EWA, (b)(2), and allocation simulation
4	USFWS CALSIM Oversight	10/1/03	9/30/04	Reviews of CALSIM, participation in development meetings
5	American River temperature model	10/1/03	9/30/04	American River shorter time step
6	Hydrology Documentation	10/1/03	9/30/04	Completed manual
7	LAWS Consumptive Use Module	10/1/03	9/30/04	Coding and process for consumptive use calculation
8	Participation in Prof. Organizations	10/1/03	9/30/04	Shared technology
Additional Program Needs				
	Salmon life-history model	10/1/03	9/30/04	Sacramento River chinook model Calibration and analysis.

**C. Summary of Program Costs and Funding Sources**

#	Task	Total Cost	W&RR	DWR
1	Program Management	\$75,000	\$75,000	
2	CALSIM Review/Documentation	\$100,000	\$50,000	\$50,000
3	CALSIM Development (USBR)	\$250,000	\$125,000	\$125,000
4	USFWS CALSIM Oversight	\$50,000	\$50,000	
5	American River temperature model	\$120,000	\$120,000	
6	Hydrology Documentation	\$50,000	\$25,000	\$25,000
7	LAWS Consumptive Use Module	\$200,000	\$50,000	
8	Participation in Prof. Organizations	\$5,000	\$5,000	
Additional Program Needs				
	Salmon life-history model	\$150,000	\$150,000	

#### D. CVPIA Program Budget

#	Task	FTE	Direct Salary and Benefits Costs	Contracts Costs	Misc Costs	Admin Costs	Total Costs
1	Program Management	0.50	\$37,500			\$37,500	<b>\$75,000</b>
2	CALSIM Review/Documentation	1.0	\$46,000			\$4,000	<b>\$50,000</b>
3	CALSIM Development (USBR)	0.50	\$25,000			\$25,000	<b>\$125,000</b>
4	USFWS CALSIM Oversight	0.34	\$42,372			\$7,628	<b>\$50,000</b>
5	American River temperature model	0.60	\$30,000	\$86,000		\$4,000	<b>\$120,000</b>
6	Hydrology Documentation			\$22,500		\$2,500	<b>\$25,000</b>
7	LAWS Consumptive Use Module	0.04		\$46,500		\$3,500	<b>\$50,000</b>
8	Participation in Prof. Organizations	0.03	\$2,000		\$3,000		<b>\$5,000</b>
	<b>Total by Category</b>				<b>\$3,000</b>		<b>\$500,000</b>
	<b>Additional Program Needs</b>						
	Salmon life-history model (calibration)			\$143,250		\$6,750	\$150,000

#### VII. Future Years Commitments/Actions

Certain CALSIM applications will require a smaller time step than a month. DWR has initiated development at a smaller time step (especially useful for the delta part of the model and assessment of flood operation). Reclamation will participate as time and funding permit. The ANN delta water quality module will be expanded to simulate more stations. A more process based simulation of San Joaquin water quality is needed to more correctly assess projects affecting irrigation drainage or added storage at Friant. CALSIM routines for managing ground water will require refinement as specific conjunctive use projects are identified. Current CALSIM II treats deliveries on the Friant-Kern canal as a time series (based on historical demand). Future development will explicitly include the Friant service area.