Draft CVPIA Fiscal Year 2010 Annual Work Plan

October 1, 2009

Program Title

Ecosystem and Water Systems Operations Models, CVPIA Section 3406(g)

Responsible Entities

Staff Name	Agency	Role
Claire Hsu	USBR	Lead, MP740
Derek Hilts	USFWS	Co-Lead

Program Goals and Objectives for FY 2010

The goal of the Ecosystem and Water Systems Operations Models program is to develop readily usable and broadly available models and supporting data in order to: 1) evaluate ecologic and hydrologic effects of existing and alternative water management strategies in the Sacramento, San Joaquin, and Trinity River watersheds; 2) to improve scientific understanding of ecosystems in the Sacramento, San Joaquin, and Trinity watersheds; and 3) to support the Secretary's efforts in fulfilling the requirements of the CVPIA. The following are specific FY10 program objectives:

- A. Water Operations Modeling the public release and training workshop of the CalSim III model is proposed for mid-year of FY10.
- B. Water management modeling current CalLite model has a San Joaquin River flow time series obtained from the CalSim base run. San Joaquin Valley development in CalLite can replace the time series and be used to perform dynamic operation simulations of the San Joaquin Valley.
- C. Water Quality and Temperature Modeling salinity logic and parameters are being added to the existing San Joaquin temperature model which is expected to be completed by December 2009.
- D. Ecosystem Modeling enhancing existing fishery models, evaluating riparian modeling tools, and providing additional hydrodynamic modeling assistance on Delta modeling.
- E. HGS/CalSim Linkage ongoing thermal/temperature module testing. Due to the complexity of the system, multi-parameters and balance on water budget need to be tested. The testing process will continue in FY10.
- F. Modeling Master Plan Documentation in FY09, Reclamation and FWS developed a short-term modeling plan for evaluating the modeling tools. Will continue the scope for evaluating the long-term modeling needs.
- G. Membership and Participation in Professional Organizations

Status of the Program

The Ecosystem/Water Systems Operations Models, CVPIA Section 3406(g) program is a continuing program that began in 1994. Since 1998, this program has provided a high level of support for CalSim II model development and applications. CalSim II is now readily available

for public use. It has been utilized for numerous large-scale water supply improvement studies as well as planning investigations associated with Reclamation's Central Valley Project Operations Criteria and Plan (OCAP). The U.S. Fish and Wildlife Service (FWS) has also participated in the development and application of CalSim II through an Interagency Agreement.

To respond to the periodic need for more detailed analyses, Reclamation and DWR (in a joint effort) are currently developing a more discretized version of CalSim II and III.

To respond to the periodic need for less detailed and more rapid analyses, a water management screening tool (CalLite) is also under development. This tool is available to the public through DWR's website. As with any model, improvements continue to be made. When developing the San Joaquin CalLite model to replace the flow time series, the model's capability to dynamically simulate San Joaquin Valley operations will be enhanced.

In addition to supporting CalSim II, III and CalLite model development, the program has supported the development and application of other types of river management and ecological models. These include water quality, hydrology, groundwater, fish population and riparian habitat models used by the Division of Planning, FWS, various contractors, and public interest organizations for modeling support of operations and planning. These models include:

- Comprehensive San Joaquin Water Quality Model (SJRSIM) for use in planning of reservoir releases for water temperature management in anadromous fish spawning and rearing habitats.
- DSM2 Model for use in conducting the hydrodynamic modeling on flow, water quality and mass transport processes of the Delta and the San Joaquin Basin.
- SALMOD, inSALMO and PHABSIM for use in evaluating anadromous fish survival at various life stages and in a variety of aquatic environments.
- Ecologically Cogent Operations Suite of Integrated Models (ECOSIM) for use in analyzing changes to the macroscopic water resources in California's Central Valley, particularly in support of CVPIA (b)(3) water acquisition investigations.
- HydroGeoSphere (HGS) for use in evaluating surface and subsurface hydrologic interactions related to water supply, water quality, and ecosystem restoration.
- Database and GIS Framework for use in assessing the water budget variation corresponding to environmental or refuge demand changes. The results of the water budget modeling will be used as input to various models and for the California Water Plan update.

This program has supported the staff of both Reclamation and FWS in their participation in professional organizations, as well as training conducted by Reclamation and DWR. Beyond the regular training and coordination efforts, other stakeholders have also been trained in the use of CalSim II through funding from this program.

FY 2009 Accomplishments

- A. Reclamation and FWS modelers continued the development and application of water operations and water management tools. These activities included participation in a multi-agency effort to review and improve the CalSim II and III CVP/SWP water operations models. FWS applied CalLite to evaluate provisions in their smelt biological opinion. FWS modelers, at the behest of NOAA, applied CalSim II, ECOSIM-W and CalLite to develop feasible RPAs for their salmon biological opinion. As part of this work, some model enhancement occurred with funding from this program.
- B. The water quality modeling activities included the application of the Upper Sacramento River Water Quality Model (USRWQM) to aid the Sacramento River Temperature Task Group in making and updating plans for the summer season.
- C. FWS, in coordination with Reclamation, initiated a contract to significantly enhance the InSALMO fish population model. The majority of the contract work will be accomplished in FY10.
- D. HydroGeoSphere (HGS) The literature review of the existing linkage approaches of optimization and groundwater model has been completed. Due to the complexity of the system, the temperature module (based on field data from the San Joaquin Basin) will be continuously tested in FY10. A brain-storming session was undertaken to initiate evaluation of the linkage between optimization and fully-coupled numerical models.
- E. Reclamation modelers also participated in the California Water and Environmental Water Modeling Forum and other professional organizations; made presentations at workshops; attended conferences and training courses; prepared publications; and provided support for model application to stakeholders.
- F. Service modelers reviewed and commented on fishery models including: SALMOD, InSALMO, and Winter OBAN.
- G. Service modelers also participated in modeling forums and professional organizations; attended conferences and training courses; and provided support for model application to partners.

FY 2010 Tasks, Costs, Schedules and Deliverables

Task or Subtask				Completion	Restoration Fund	Water & Related Resources	State or Other Sources	Total All Sources
Number	Name of Activity	FTE's	Description of Activity	Date	Anticipated	Anticipated	Anticipated	Anticipated
1.1	Program Management							
1.1.1		0.12	USBR - Program Lead for Reclamation responsible for coordination of program activities, budget and work with federal and state agencies. Coordinate with FWS co-lead to review agencies modeling needs and activities.	9/30/2010	\$18,000	\$O	\$0	\$18,000
	Subtotal Costs	0.12			\$18,000	\$0	\$0	\$18,000
1.2	Program Support							
1.2.1		0.13	FWS - Program Lead for FWS responsible for coordinating program activities within FWS as well as reviewing and the development of water operation and fishery modeling tools regarding implementation of CVPIA Section 3406(b) and 3406(g).	9/30/2010	\$27,000	\$0	\$0	\$27,000
1.2.2		0.07	USBR – Supervisor - responsible for coordinating modeling activities within MP-740.	9/30/2010	\$10,000	\$0	\$0	\$10,000
	Subtotal Costs	0.20			\$37,000	\$0	\$0	\$37,000
1.3	Technical Support	~ ~=		0/00/0040	A 07 000	^	*	* - -
1.3.1		0.25	USBR TSC - Modeler responsible for development and application of water operations and water management models (see Tasks 1.13.1 & 1.13.2)	9/30/2010	\$37,000	\$0	\$0	\$37,000
1.3.2		0.1	USBR - Modeler responsible for review of the fishery model (see Task 1.13.5)	9/30/2010	\$14,500	\$0	\$0	\$14,500
1.3.3		0.25	USBR - Modeler responsible for development and implementation of model integration and database management activities (see Tasks 1.13.1 & 1.13.7)	9/30/2010	\$37,000	\$0	\$O	\$37,000
1.3.4		0.25	USBR - Modeler responsible for development and applications of water operations and water quality models (see Tasks 1.13.1 & 1.13.3)	9/30/2010	\$37,000	\$0	\$0	\$37,000
1.3.5		0.10	USFWS – Modeler work collaboratively on the development and application of fishery, riparian habitat and ecosystem models (see Task 1.13.5)	9/30/2010	\$21,000	\$0	\$0	\$21,000
1.3.6		0.25	USBR - Responsible for developing time-series data (precipitation, air temperature and radiation) for input into the linked HydroGeoSphere and CalSim model. Test thermal/temperature transport module (see Tasks 1.13.1 & 1.13.6)	9/30/2010	\$37,000	\$0	\$0	\$37,000

Task or Subtask				Completion	Restoration Fund	Water & Related Resources	State or Other Sources	Total All Sources
Number	Name of Activity	FTE's	Description of Activity	Date	Anticipated	Anticipated	Anticipated	Anticipated
1.3.7		0.21	USBR - Responsible for development and application of HydroGeoSphere for modeling the integrated surface/subsurface hydrologic and water quality processes of study areas. Test thermal/temperature transport module (see Tasks 1.13.1 & 1.13.6)	9/30/2010	\$31,000	\$0	\$0	\$31,000
1.3.8		0.12	USBR - Modeler responsible for development and applications of water 9/30/2010 \$18,500 \$0 management models (see Task 1.13.1 and 1.13.2)		\$0	\$0	\$18,500	
	Subtotal Costs	1.53			\$233,000	\$0	\$0	\$233,000
1.7	Outreach and Public							
1.7.1	Reclamation	0.07	Membership and participation in California Water and Environmental Water Modeling Forum and other professional organizations, attend workshops and conferences, prepare publications and provide support for model application to stakeholders.	9/30/2010	\$10,000	\$0	\$0	\$10,000
1.7.2	FWS	0.01	Membership and participation in California Water and Environmental Water Modeling Forum and other professional organizations, attend workshops and conferences, prepare publications and provide support for model application to stakeholders.	9/30/2010	\$2,000	\$0	\$0	\$2,000
	Subtotal Costs	0.08			\$12,000	\$0	\$0	\$12,000
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1.13	Modeling							
1.13.1			Water Operations Models - CalSim II & III - simulations performed to evaluate alternative operations of CVP/SWP and effects of 3406 (b2) supplies. CalSim model can be linked to water temperature, water quality and riparian habitat models. DWR is a major cost-sharing partner and typically exceeds CVPIA funding by a factor of 5 on an annual basis. CalSim models and hydrologic data inputs are routinely updated to better represent changes in the CVP/SWP operations. CalSim model has been used to conduct the study for 2008 FWS and 2009 NMFS Biological Opinion Reasonable and Prudent Alternative Actions (CVPIA Act: model type #1). Contract	9/30/2010	\$50,000	\$0	\$0	\$50,000
			1, 2 and 3	0/00/0040	\$ 50.000	* 0	^	*5 0,000
1.13.2			water Management Screening Model - CalLite - simulates the hydrology of the Central Valley reservoir operations, project operations and delivery allocation decisions, delta salinity responses to river flow and export changes, and habitat-ecosystem flow. This tool can be used to bridge the gap between more detailed system model (CalSim)	9/30/2010	\$5U,UUU	\$U	\$U	\$50,000

Task or					Restoration	Water & Related	State or Other	Total All
Subtask	Name of Activity	ETE's	Description of Activity	Completion	Fund	Resources	Sources	Sources
Number			for rapid and interactive policy evaluations. CalLite can be applied to assist in the screening of a variety of water management options and to educate decision makers on system responses. CalLite model has been used to conduct the study for 2008 FWS and 2009 NMFS Biological Opinion Reasonable and Prudent Alternative Actions (CVPIA Act: model type #1). (High Priority). Contract	Date	Anticipateu	Anticipateu	Аппораеч	Anticipateu
1.13.3			1, 2 and 3 Water Temperature Models - The phase I San Joaquin Basin temperature model with EC parameters enhancement will be completed on FY10. DFG has been participated with Reclamation on the model development. Both agencies will review the model application and investigate if further work is needed to assist fishery agencies on the temperature modeling task. (High Priority). Work performed by Reclamation Technical staff (see Task 1.3 for staffing)	9/30/2010	\$0	\$0	\$0	\$0
1.13.4			Ecosystem Models - DSM2 – this is a river, estuary, and land modeling system model – model simulates stages, flows, velocities; many mass transport processes, including salts, multiple non-conservative constituents, temperature, THM formation potential and individual particles (CVPIA Law: model type #4). (High Priority). Work performed by Reclamation Technical Staff (See Task 1.3 for staffing)		\$0	\$0	\$0	\$0
1.13.5			 Ecosystem Models – In Aug 2009, FWS and Reclamation worked together to engage the service of the consultants to update the full life cycle model (inSALMO). The intent of this model update is to prepare this model for application to real management problems. SALMOD - simulations performed to evaluate the effects of alternative operations of CVP/SWP on anadromous fish survival. SALMOD can be linked directly to USRWQM for flow and water temperature inputs. SALMOD is a fully functional model that is regularly used for planning studies such as the CALFED storage investigations (CVPIA Law: model type #4). (High Priority). Work performed by Reclamation and FWS Technical Staff (see Task 1.3 for staffing) 		\$0	\$0	\$0	\$0

Task or Subtask		ETEL.		Completion	Restoration Fund	Water & Related Resources	State or Other Sources	Total All Sources
1.13.6	Name of Activity	FIES	HydroGeoSphere (HGS) – Develop spatially-distributed time-series meteorological data for input into the new linked HydroGeoSphere and CalSim model. The linkage will provide the capability of modeling the coupled impacts on hydrology and water allocation that related to climate change. Model testing, calibration and validation will be continued for FY10 (CVPIA Act: model type #3).	Date	\$0	\$0	\$0	\$0
1.13.7			Database and GIS Frame work – Tasks aim to develop effective methods of managing data to be used in modeling. Reclamation, in coordination with the California Department of Water Resources (DWR) has completed development of models to manage collected agricultural and urban water use data. The results of the water budget modeling will be used as inputs to various models and for the California Water Plan update. Staff will coordinate with CVPIA Data Manager on the database design.		\$0	\$0	\$0	\$0
	Subtotal Costs				\$100,000	\$0	\$0	\$100,000
	Total Costs	1.85			\$400.000	\$0	\$0	\$400.000
	Reclamation	1.62			\$350.000	\$0	\$0	\$350.000
	FWS	0.23			\$50,000	\$0	\$0	\$50,000
1.15	Unfunded Needs							
1.15.1	CalLite San Joaquin Module	1.33	<u>Unfunded Needs/Claire Hsu</u> – Tasks to develop the CalLite San Joaquin module with DWR in improving the CalLite modeling capability of the San Joaquin Basin.	9/30/2010	\$200,000	\$0	\$0	\$200,000
1.15.2	ECOSIM Hydrologic Update	0.71	<u>Unfunded Needs/Derek Hilts</u> - Tasks to update the hydrologic data in ECOSIM-W to facilitate water acquisition and global climate change studies as well as provide a check of CalSim studies.	9/30/2010	\$150,000	\$0	\$0	\$150,000
1.15.3	In-house Skill Development	1.13	Unfunded Needs/Derek Hilts - Train USBR and USFWS staff in the use of GoldSim (developer's version) in order to use and enhance IOS. Train USBR and USFWS staff to use SWARM and other computer software in order to apply inSALMO model.	9/30/2010	\$250,000	\$0	\$0	\$250,000
	Total Unfunded Needs	3.23			\$600,000	\$0	\$0	\$600,000

Table 2. Budget Breakdown

			L/	ABOR	CONT	RACTS		Total Costs
Task	Agency	FTE	Direct Salary and Benefits Costs ^{1/}	FWS Only Overhead Assess: 22% of Direct Salary and Benefits Costs ^{2/}	Contract, Grant, and Agreement Costs	FWS Only Overhead Assess: 6% Contract Costs ^{2/}	USBR Only Misc. Costs	
1.1 Program	FWS		\$0	\$0	\$0	\$0		\$0
Management	USBR	0.12	\$18,000		\$0		\$0	\$18,000
1.2 Program	FWS	0.13	\$21,060	\$5,940	\$0	\$0		\$27,000
Support	USBR	0.07	\$10,000		\$0		\$0	\$10,000
1.3 Technical Support	FWS	0.10	\$16,380	\$4,620	\$0	\$0		\$21,000
	USBR	1.43	\$212,000		\$0		\$0	\$212,000
1.7 Outreach	FWS	0.01	\$1,560	\$440	\$0	\$0		\$2,000
and Public Involvement	USBR	0.07			\$0		\$10,000	\$10,000
1.13	FWS		\$0	\$0	\$0	\$0		\$0
Modeling	USBR		\$0		\$100,000		\$0	\$100,000
Administrative FWS	Total -		\$39,000	\$11,000		\$0		\$50,000
Contracts, Grants and Agreements Total - FWS					\$0			\$0
FWS Total Co	sts	0.24	\$39,000	\$11,000	\$0	\$0		\$50,000
Administrative Total - USBR			\$240,000				\$10,000	\$250,000
Contracts, Grants and Agreements Total - USBR					\$100,000			\$100,000
USBR Total C	osts	1.69	\$240,000		\$100,000		\$10,000	\$350,000
TOTAL ALL		1.93	\$279,000	\$11,000	\$100,000	\$0	\$10,000	\$400,000

1/ For FWS only: The FWS develops a bio-rate which is the combination of both the salary/benefit and related administrative costs. The FWS simple definition reads, "It is an average \$\$ rate that is developed and used for estimating project costs. It incorporates a biologists' salary and benefits, supervisory, clerical and biologist support costs and all other office operating costs related to completing project tasks.

 $\underline{2}$ / FWS assesses an O/H Burden charge of 6% on all contracts/agreements related to budget object codes starting with 25, 41, and 32, and a charge of 22% on costs under all other budget object codes.

Three Year Budget FY 2011-2013

(\$ amounts in thousands)

Year	Description of Activities	Requested RF	Requested W&RR
-		Funding	Funding
2011	1. Coordinate water operations/water management modeling needs. 2.	\$822	
	Evaluate basin wide water quality modeling opportunities and		
	constraints. 3. Explore Delta/ecosystem models opportunities. 4.		
	Conduct basin wide watershed/groundwater modeling analysis. 5.		
	Evaluate basin wide integrated modeling needs. 6 Continue development		
	of modeling long-term master plan. 7. Expand CalLite San Joaquin		
	module model development.		
2012	1. Coordinate water operations/water management tools development. 2.	\$847	\$500
	Explore basin wide water quality modeling needs. 3. Expand		
	Delta/ecosystem modeling opportunities. 4. Investigate future basin wide		
	watershed/groundwater modeling needs. 5. Evaluate basin wide		
	integrated modeling needs. 6. Coordinate with CVPIA Data Manager to		
	develop a CVP wide integrated database system.		
2013	1. Coordinate water operations/water management tools development. 2.	\$871	\$500
	Explore basin wide water quality modeling needs. 3. Expand		
	Delta/ecosystem modeling opportunities. 4. Investigate future basin wide		
	watershed/groundwater modeling needs. 5. Evaluate basin wide		
	integrated modeling needs.		

Note: The FY 2011 – 2013 Budget Plan provides estimates of capability only. The amounts are displayed are those that might be reasonably appropriated each year. These figures do not reflect the future Congressional Appropriations process. All of these estimates will be adjusted annually as RF collections are realized.