Draft CVPIA Fiscal Year 2011 Annual Work Plan

January 31, 2011

Program Title

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

Responsible Entities

Staff Name	**Agency**	**Role**
Claire Hsu (MP-740)	Reclamation	Lead
Derek Hilts (BDFWO)	Service	Co-Lead

Program Goals and Objectives for FY 2011

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 FY11 program objectives:

A. Water Management Modeling – Support the continued development and dissemination of the CalLite model. To provide a user friendly environment, CalLite is being rebuilt using WRIMS and an enhancement of Graphical User Interface (GUI) is being developed. In the process, California Department of Water Resources (DWR), Reclamation and Service staffs are learning the model logic. In addition, the expansion of the CalLite model to include the San Joaquin and its major tributaries is planned.

B. Water Operations Modeling – Support the continued development and dissemination of CalSim II. With significant changes to the regulatory environment (OCAP RPAs) and proposals for altered Sacramento-San Joaquin delta plumbing, revisions to CalSim II are necessary.

C. Water Operations Modeling - Support the continued development of CalSim III, which will cover the Sacramento and San Joaquin Basins.

D. Temperature Modeling – Support the enhancement and expansion of the Sacramento temperature model (SRWQM) to include the Feather River, American River and lower Sacramento River.

E. Ecosystem Modeling – Support the ongoing development of the inSALMO model. Initiate the development of a delta smelt life cycle model. The smelt modeling needs were underscored in recent litigation.

F. HGS/CalSim Linkage – For the HGS-CalSim linkage project, the validation is expected to be completed by September, 2011. The coding for the linkage has been performed and model testing pilot project has been selected.

G. Develop Sharing of Costs Agreement for Mitigation Projects Improvements (SCAMPI) Task Orders– in FY10, Reclamation and FWS are coordinating with State, including DWR and DFG, to initiate the development of the cost sharing agreement and task orders. This task will be continued through FY11.

H. Membership and participation in professional organizations and training.

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). Service 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 III model.

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. Two phases of model development are proposed under the work plan. Phase I tasks include migrating the model from GoldSim to WRIMS (to be consistent with the CalSim application) and improvement of the GUI. Phase II tasks will focus on implementing CVP/SWP allocation methods, BO elements and San Joaquin Basin logics, etc.

In addition to supporting CalSim II and, III and CalLite model development, the program has supported the development and application of other types of river management, ecological and fishery models. These include water quality, hydrology, groundwater and fish population models used by Reclamation, Service, 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 modeling the electric conductivity (EC) in the main stem of the San Joaquin River and major tributaries such as the Merced, Tuolumne, for the purpose of managing temperature and salinity in the San Joaquin Basin.
- 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.

This program has supported the staff of both Reclamation and Service 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 2010 Accomplishments

A. Reclamation and Service 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 CalLite, CalSim II and III CVP/SWP water operations models.

B. The water quality enhancement modeling of the San Joaquin Basin (SJRSIM) was completed; salinity logic was added to the existing San Joaquin temperature model. This enhancement has proven useful in providing guidance on reservoirs operations for water quality and temperature.

C. Service and Reclamation staff continued providing guidance to the consultant responsible for improving the inSALMO model.

D. HydroGeoSphere (HGS) – The HGS-CalSim has made significant progress. The meteorological data generated by UC Davis will be ready for input into the model by January 2011. A pilot project location has been selected which is located in the Northern Sacramento Valley.

E. Reclamation modelers participated in the California Water and Environmental 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 also participated in modeling forums and professional organizations; attended conferences and training courses; and provided support for model application to partners.

Table 1. FY 2011 Activities and Costs

AWP Activity Number	Type of Activity	# of FTE's	Activity Name & Description	NMFS OCAP RPA#	Performance Metric	Performance Target	Complete this FY? Y/N	Total Project Cost	FY2011 Anticipated Funding			
									Restoration Fund	Water and Related Resources	State or Other Sources*	Total All Sources
1.1	**Program Management**											
1.1.1	Program Management	0.130	Reclamation - Program Lead for Reclamation responsible for coordinating program activities, budget and work with federal and state agencies. Coordinate with FWS co-lead to review agencies modeling needs and activities of 3406 (g) Program.				Y	$30,000	$30,000	$0	$0	$30,000
		0.13				***Subtotal Funding***		30000.00	30000.00	0.00	0.00	30000.00
						Reclamation		$30,000	$30,000	$0	$0	$30,000
						Service		$0	$0	$0	$0	$0
						Other		$0	$0	$0	$0	$0
1.2	**Program Support**											
1.2.1	Program Support	0.032	USFWS - Program Lead for Service responsible for coordinating program activities within Service as well as reviewing and the development of water operation and fishery modeling tools regarding implementation of CVPIA Section 3406(b) and 3406(g).					$7,000	$7,000	$0	$0	$7,000
1.2.2	Program Support	0.070	MP740 Supervisor (Reclamation) – responsible for coordinating modeling activities within Reclamation Divisions.					$16,000	$16,000	$0	$0	$16,000
1.2.3	Program Admin.	0.026	R8 Program Administration (PA) contribution					5612.00	5612.00	0.00	0.00	5612.00
		0.128				***Subtotal Funding***		$28,612	$28,612	$0	$0	$28,612
		0.070				***Reclamation***		$16,000	$16,000	$0	$0	$16,000
		0.058				***Service***		$12,612	$12,612	$0	$0	$12,612
						Other		$0	$0	$0	$0	$0

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									Restoration Fund	Water and Related Resources	State or Other Sources*	Total All Sources
1.3	**Technical Support**											
1.3.1	Modeling Support	0.174	Reclamation- Modeler responsible for development and application of water operations and water management models (see Tasks 1.13.1 & 1.13.7).					$40,000	$40,000	$0	$0	$40,000
1.3.2		0.174	Reclamation - Modeler responsible for coordinating CalSim II and III model development tasks (see Tasks 1.13.1).					$40,000	$40,000	$0	$0	$40,000
1.3.3		0.201	USFWS – Modeler work collaboratively on the development and application of fishery, riparian habitat and ecosystem models (see Task 1.13.3).					$44,000	$44,000	$0	$0	$44,000
1.3.4		0.174	Reclamation- Modeler responsible for development and implementation of water management and ecosystem models (see Tasks 1.13.2 & 1.13.3).					$40,000	$40,000	$0	$0	$40,000
1.3.5		0.169	USFWS - Modeler work on review and development of water operation and fishery modeling tools regarding implementation of CVPIA Section 3406(b) and 3406(g) (see Task 1.13.2).					$37,000	$37,000	$0	$0	$37,000
1.3.6		0.174	Reclamation - Modeler responsible for development and applications of water operations, water management and water quality models (see Tasks 1.13.2, 1,13.8 & 1.13.9).					$40,000	$40,000	$0	$0	$40,000
1.3.7		0.174	Reclamation - Modeler responsible for developing linkage of HGS model and CalSim. The coding for a generic linage has been performed and an initial pilot project has been selected for verifying the linkage (see Tasks 1.13.6).					$40,000	$40,000	$0	$0	$40,000
1.3.8		0.174	Reclamation - Modeler responsible for development and application of HGS and CalSim linkage. The HGS Sacramento Valley Model calibration project is expected to be completed by January 2011 (see Tasks 1.13.6).					$40,000	$40,000	$0	$0	$40,000
1.3.9		0.201	USFWS– Modeler work collaboratively on the development and application of temperature, hydrodynamic and fishery models (see Task 1.13.2,1.13.5 &1.13.9).					$44,000	$44,000	$0	$0	$44,000
1.3.10		0.174	Reclamation - Modeler responsible for developing DSM2 information for use in conducting the hydrodynamic modeling on flow, water quality and mass transport processes of the Delta and the San Joaquin Basin (see Task 1.13.7).					$40,000	$40,000	$0	$0	$40,000
		1.789				***Subtotal Funding***		$405,000	$405,000	$0	$0	$405,000
		1.217				***Reclamation***		$280,000	$280,000	$0	$0	$280,000
		0.572				***Service***		$125,000	$125,000	$0	$0	$125,000
						Other		$0	$0	$0	$0	$0

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									Restoration Fund	Water and Related Resources	State or Other Sources*	Total All Sources
1.7	**Outreach and Public Involvement**											
1.7.1	BOR		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 (salary plus registration fee).					$20,000	$20,000	$0	$0	$20,000
1.7.2	USFWS		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 (salary plus registration fee).					$7,000	$7,000	$0	$0	$7,000
						Subtotal Funding		$27,000	$27,000	$0	$0	$27,000
						Reclamation		$20,000	$20,000	$0	$0	$20,000
						Service		$7,000	$7,000	$0	$0	$7,000
						Other		$0	$0	$0	$0	$0
1.13	**Modeling**											
1.13.1	Contract		Water Operations Models - CalSim III - simulations performed to evaluate alternative operations of CVP/SWP operations. In FY11, CalSim III will have an integrated Sacramento and San Joaquin Basin model.	Action III.1.1, III.1.2. and III.1.3	Develop broadly available and readily usable models	A suite of 9 integrated model types	N	$50,000	$50,000	$0	$0	$50,000
1.13.2	Contract		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. CalLite model has been used to conduct the study for 2008 FWS and 2009 NMFS Biological Opinion Reasonable and Prudent Alternative Actions. In FY11, the CalLite model will have the same platform as the CalSim II model and an enhanced GUI to assist the user.	Action IV.2.3	Develop broadly available and readily usable models	A suite of 9 integrated model types	N	$50,000	$50,000	$0	$0	$50,000
1.13.3	Contract		inSALMO Fishery Model – 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.	Action I.1.6	Develop broadly available and readily usable models	A suite of 9 integrated model types	N	$34,388	$34,388	$0	$0	$34,388
1.13.4	Contract		Sacramento Temperature Modeling - Engage service of consultant to provide independent review on the water temperature modeling.	Action II.3	Develop broadly available and readily usable models	A suite of 9 integrated model types	N	$50,000	$50,000	$0	$0	$50,000

AWP Activity Number	Type of Activity	# of FTE's	Activity Name & Description	NMFS OCAP RPA#	Performance Metric	Performance Target	Complete this FY? Y/N	Total Project Cost	FY2011 Anticipated Funding			
									Restoration Fund	Water and Related Resources	State or Other Sources*	Total All Sources
1.13.5	Technical Support		Assist DFG in extending the San Joaquin Fall-run salmon model to the Sacramento Basin (and Mokelumne) for implementing Hatchery Management Plans. These are the objectives: 1. Assess the relative importance of tributary flow upon juvenile, thence adult, population abundance that are advocated to influence population trends over time. 2. Determine which ecosystem (inland, delta, ocean) has the most influence upon production trends over time.	Action II.6.3			N	$25,000	$25,000	$0	$0	$25,000
1.13.6	Technical Support		HydroGeoSphere (HGS) – In support of BDCP modeling, Reclamation is in the processes of applying HGS model to develop a Central Valley HydroGeoSphere (CVHGSM) for evaluation of eco-hydrologic issues related to water supply reliability, water quality and ecological health over Central Valley.		Develop broadly available and readily usable models	A suite of 9 integrated model types	N	$0	$0	$0	$0	$0
1.13	**Modeling continued**											
1.13.7	Technical Support		Delta Hydrodynamic Model (DSM2) - Model will be used to assist biologists in analyzing effects of CVP/SWP operations under various scenarios. This effort aims to assist the modeling need of the Bay Delta Conservation Plan process.	Action IV.2.1	Develop broadly available and readily usable models	A suite of 9 integrated model types	N	$0	$0	$0	$0	$0
1.13.8	In-house skill development		Training Reclamation staff in the use of Java, Visual Basic (being used as part of hydrologic models' GUIs), SWARM and other computer software in order to apply inSALMO, IOS and HEC5Q model.				N	$50,000	$50,000	$0	$0	$50,000
1.13.9	In-house skill development		Training Service staff in the use of Java, Visual Basic (being used as part of hydrologic models' GUIs), SWARM and other computer software in order to apply inSALMO, IOS and HEC5Q model. (Reclamation staff will train Service staff on the use of Sacramento and San Joaquin temperature Models facilitating expansion of the models to other tributaries.)				N	$50,000	$50,000	$0	$0	$50,000
						Subtotal Funding		$309,388	$309,388	$0	$0	$309,388
						Reclamation		$250,000	$250,000	$0	$0	$250,000
						Service		$59,388	$59,388	$0	$0	$59,388
						Other		$0	$0	$0	$0	$0

AWP Activity Number	Type of Activity	# of FTE's	Activity Name & Description	NMFS OCAP RPA#	Performance Metric	Performance Target	Complete this FY? Y/N	Total Project Cost	FY2011 Anticipated Funding			
									Restoration Fund	Water and Related Resources	State or Other Sources*	Total All Sources
	TOTAL FUNDING							**$800,000**	**$800,000**	**$0**	**$0**	**$800,000**
	Total Funding Breakdown by Agency:											
	Reclamation							$596,000	$596,000	$0	$0	$596,000
	Service							$204,000	$204,000	$0	$0	$204,000
	Other							$0	$0	$0	$0	$0
1.16	**Unfunded Needs**											
1.16.1	Temperatu re Modeling Support		Sacramento Temperature Modeling (phase II) - Model w ill be expanded to include the American River and the low er Sacramento. Updating current Sacramento Basin temperature model for use in implementing NMFS temperature requirement.						$100,000	$0	$0	$100,000
1.16.2	Ecosim Hydrologic Update		Tasks to update the hydrologic data in ECOSIM-W to facilitate w ater acquisition and global climate change studies as w ell as provide a corroboration tool for CalSim studies.						$150,000	$0	$0	$150,000
	Total Unfunded Need								$250,000	$0	$0	$250,000

Table 2. FY 2011 Budget Breakout

Task	Agency	FTE	LABOR		CONTRACTS		USBR Only Misc. Costs	Total Costs
			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/		
1.1 Program Management	FWS	0.000	$0	$0	$0	$0		$0
	USBR	0.130	$30,000		$0		$0	$30,000
1.2 Program Support	FWS	0.058	$10,338	$2,274	$0	$0		$12,612
	USBR	0.070	$16,000		$0		$0	$16,000
1.3 Technical Support	FWS	0.572	$102,459	$22,541	$0	$0		$125,000
	USBR	1.217	$280,000		$0		$0	$280,000
1.7 Outreach and Public Involvement	FWS	0.000	$0	$0	$7,000	$0		$7,000
	USBR	0.000	$0		$0		$20,000	$20,000
1.13 Modeling	FWS	0.000	$0	$0	$59,388	$0		$59,388
	USBR	0.000	$0		$250,000		$0	$250,000
Administrative Total - FWS			$112,797	$24,815		$0		$137,612
Contracts, Grants and Agreements Total - FWS					$66,388			$66,388
FWS Total Costs		0.630	$112,797	$24,815	$66,388	$0		$204,000
Administrative Total - USBR			$326,000				$20,000	$346,000
Contracts, Grants and Agreements Total - USBR					$250,000			$250,000
USBR Total Costs		1.417	$326,000		$250,000		$20,000	$596,000
TOTAL ALL		**2.047**	**$438,797**	**$24,815**	**$316,388**	**$0**	**$20,000**	**$800,000**

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.

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.

Table 3. FY 2012 – 2014 Three-Year Budget Plan

($ amounts in thousands)

Year	Description of Activities	Requested RF Funding	Requested W&RR Funding
2012	1. Support both Reclamation and Service staff's time on models development, models review and projects technical support. ($395,000) 2. Continue supporting water operations/water management tools development (CalLite/CalSim III model calibration and enhancement). ($100,000) 3. Support phase II fall-run salmon model development task (conduct statistical analyses between the salmon population and habitat variables). ($50,000) 4. Continue supporting the current Sacramento temperature model to include the American River and the lower Sacramento model for use in implementing NMFS and FWS RPAs temperature requirement. ($100,000) 5. Develop hydrologic inputs for ECOSIM-W for water acquisition and climate change analyses. ($150,000) 6. Develop a basin wide integrated Delta/ecosystem modeling tool (phase I) (100,000)	$895	
2013	1. Support both Reclamation and Service staff time on models development, models review and projects technical support. ($395,000) 2. Continue enhancing water operations/water management tools (new applications) to assist CVP/SWP projects needs ($100,000) 3. Continuing support phase III Fall-run salmon modeling task (construct an empirically driven mechanistic life-cycle model that could be used by biologists to evaluate the effects of different habitat management scenarios). ($100,000) 4. Expand Delta/ecosystem modeling capability to assist BDCP and other CVP projects (phase II). ($100,000). 5. Continue basin wide integrated Delta/ecosystem modeling tool development (phase II) (100,000). 6. Investigate integrated basin wide watershed/groundwater modeling needs ($100,000)	$895	
2014	1. Support both Reclamation and Service staff time on models development, models review and projects technical support. ($400,000) 2. Continuing support water operations/water management tools development to assist CVP/SWP projects needs. ($100,000) 3. Expand Delta/ecosystem modeling capability to assist BDCP and other CVP projects. ($100,000) 4. Continue basin wide integrated Delta/ecosystem modeling tool development. (100,000) 5. Investigate integrated basin wide watershed/groundwater modeling needs. ($100,000) 6. Develop fish and flow management tool for both Sacramento and San Joaquin Basins. ($100,000)	$900	

Note: The FY 2012 – 2014 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.