Draft CVPIA Fiscal Year 2012 Annual Work Plan

14 Dec 2011

Program Title:

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

Responsible Entities:

Staff Name	Agency	Role
Junaid As-Salek (MP-740)	Reclamation	Lead
Derek Hilts (BDFWO)	Service	Co-Lead
Fred Jurick	CDFG	State Partner
Sina Darabzand	DWR	State Partner

Program Goals and Objectives for FY 2012

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) improve scientific understanding of ecosystems in the Sacramento, San Joaquin, and Trinity watersheds; and 3) support the Secretary's efforts in fulfilling the requirements of the CVPIA. The following are specific FY12 program objectives:

A. Water Operations Modeling - Support the continued development of CalSim 3, which will cover the Sacramento and San Joaquin Basins.

B. Water Management Modeling – Support the continued development and dissemination of the CalLite model. A CalLite 2.0 beta model has been released for public use in Oct 2011. In addition, a CalLite model expansion that includes the San Joaquin and its major tributaries is planned. CalLite GUI Phase II involves modification of existing GUI functionality for Hydro-climate and water facilities, development of custom output, enhanced graphics, software alignment with agency practices, and Java code enhancement.

C. 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.

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

water temperature modeling. This will make the analytical toolset used to evaluate effects of proposed operations (planning studies) and real-time management of water temperatures more consistent. Reclamation proposes to coordinate with DFG to develop a hydrodynamic model or extend an existing model capable of modeling temperature, salinity and other water quality parameters for the San Joaquin Basin for FY12.

E. Ecosystem Modeling – Support an ecosystem modeling project relating to steelhead habitat in the Stanislaus River (RPA actions III.2.3 and III.2.1). This project aims to study the impact of redistributions of the gravel material on floodplain habitat in the river and along its banks.

F. Continued Development of Sharing of Costs Agreement for Mitigation Projects Improvements (SCAMPI) Task Orders – in FY11, Reclamation and FWS continue to coordinate with State agencies, including DWR and DFG, to initiate the development of the cost sharing agreement and task orders. This task continues through FY12.

G. Membership and participation in professional organizations and training.

The 3406 (g) program performance goal and objective is to produce nine types of models.

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 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 Service has also participated in the development and application of CalSim II.

To respond to the periodic need for more detailed analyses, both Reclamation and DWR in a joint effort are currently developing a more discretized version of the CalSim II model, referred to as CalSim 3.

To respond to the periodic need for less detailed and more rapid analyses, a water management screening tool (CalLite) is also being developed. This tool is publicly available through DWR's website. As with any model, improvements continue to be made. Two phases of model development are proposed under the work plan. Model development in the WRIMS framework (to be consistent with the CalSim application) and the development of a new GUI are almost complete under Phase I tasks. Phase II tasks, which will commence in FY12, focus on developing San Joaquin Basin logic and data, as well as implementing the ability to simulate recent biological opinions' Reasonable and Prudent Alternatives (RPAs) actions.

In addition to supporting CalSim II, CalSim 3, 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, the Service, various contractors, and public interest organizations for modeling support of operations and planning. In FY11, Federal agencies coordinated with State agencies to develop the FY12 annual work plan. The following models have either been developed or supported by the program:

- 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 and 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.

Currently, the Comprehensive San Joaquin Water Quality Model (SJRSIM) is complete; four models are complete, but are being updated (CalSim II, DSM2, ECOSIM and HydroGeoSphere); and three models are not completed (CalSim 3, CalLite, and InSALMO)

This program has supported both Reclamation and Service staff participating 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 to use CalSim II, CalLite, and the SJRSIM and Sacramento temperature models through funding from this program.

Adaptive Management

Modeling program staff routinely work with their State partners to: (1) refine and improve data collection, (2) develop modeling strategies, and (3) explore modeling opportunities that assist management in making viable decisions on managing topics that relate to water quality , hydrology, groundwater, hydropower, fish population and other aspects of the CVP and SWP systems.

Table 1. FY2012 Activities and Costs

	CVPIA Section: 3406 (g)
	CVPIA Program: Ecol\Water System Ops Model

	2012 Requested Funding					
	State Cash	State In-Kind	Restoration Fund	Water and Related Resources	Other Sources*	Total All Sources
Total Funding	$0	$1,171,575	$700,000	$0	$0	$1,871,575
Reclamation			$599,388	$0	$0	$599,388
Service			$100,612	$0	$0	$100,612
CA DFG	$0	$50,000			$0	$50,000
CA DWR	$0	$1,121,575			$0	$1,121,575
Other	$0	$0			$0	$0

AWP Activity Number	Type of Activity	# of FTE's	Activity Name & Description	Agency	NMFS OCAP RPA#	Performance Metric	Performance Target	2012 Requested Funding: State Cash	State In-Kind	Restoration Fund	Water and Related Resources	Other Sources*	Total All Sources
1.1	**Program Management**												
1.1.1		0.22	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, activities, modeling tools development for the 3406 (g) program.	BOR	-	g:# of Eco Models developed	9.0	$0	$0	$50,000	$0	$0	$50,000

	Anticipated Funding: State Cash	State In-Kind	Restoration Fund	Water and Related Resources	Other Sources*	Total All Sources
Subtotal Funding	$0	$0	$50,000	$0	$0	$50,000
Reclamation			$50,000	$0	$0	$50,000
Service			$0	$0	$0	$0
CA DFG	$0	$0			$0	$0
CA DWR	$0	$0			$0	$0
Other*	$0	$0			$0	$0

*** List other funding source here:** None

1.2	**Program Support**												
1.2.1		0.03	Program Lead for Service responsible for coordinating program activities within Service as well as reviewing and the developing water operation and fishery modeling tools regarding implementation of CVPIA Section 3406 (b) and 3406 (g).	FWS	-	g:# of Eco Models developed	9.0	$0	$0	$7,000	$0	$0	$7,000
1.2.2		0.07	Responsible for coordinating modeling activities within Reclamation divisions (CVO, Environmental Affairs Division, etc.) and State agencies	BOR	-	g:# of Eco Models developed	9.0	$0	$0	$16,000	$0	$0	$16,000
1.2.3		0.03	R8 Program Administration (PA) contribution	FWS	-	g:# of Eco Models developed	9.0	$0	$0	$5,612	$0	$0	$5,612

	Anticipated Funding: State Cash	State In-Kind	Restoration Fund	Water and Related Resources	State or Other Sources*	Total All Sources
Subtotal Funding	$0	$0	$28,612	$0	$0	$28,612
Reclamation			$16,000	$0	$0	$16,000
Service			$12,612	$0	$0	$12,612
CA DFG	$0	$0			$0	$0
CA DWR	$0	$0			$0	$0
Other*	$0	$0			$0	$0

*** List other funding source here:** None

	CVPIA Section: 3406 (g)
	CVPIA Program: Ecol\Water System Ops Model

	2012 Requested Funding					
	State Cash	State In-Kind	Restoration Fund	Water and Related Resources	Other Sources*	Total All Sources
Total Funding	$0	$1,171,575	$700,000	$0	$0	$1,871,575
Reclamation			$599,388	$0	$0	$599,388
Service			$100,612	$0	$0	$100,612
CA DFG	$0	$50,000			$0	$50,000
CA DWR	$0	$1,121,575			$0	$1,121,575
Other	$0	$0			$0	$0

AWP Activity Number	Type of Activity	# of FTE's	Activity Name & Description	Agency	NMFS OCAP RPA#	Performance Metric	Performance Target	2012 Requested Funding: State Cash	State In-Kind	Restoration Fund	Water and Related Resources	Other Sources*	Total All Sources
1.3	**Technical Support**												
1.3.1		0.17	Modeler responsible for coordinating CalSim II and Calsim 3 model development tasks.	BOR	-	g:# of Eco Models developed	9.0	$0	$0	$40,000	$0	$0	$40,000
1.3.2		0.26	Modeler responsible for development and application of water quality, fishery and ecosystem models.	BOR	-	g:# of Eco Models developed	9.0	$0	$0	$60,000	$0	$0	$60,000
1.3.3		0.17	Modeler responsible for development and application of CalLite GUI, DSM2 and water quality models.	BOR	-	g:# of Eco Models developed	9.0	$0	$0	$40,000	$0	$0	$40,000
1.3.4		0.17	Modeler responsible for development and application of CalLite and CalSim models.	BOR	-	g:# of Eco Models developed	9.0	$0	$0	$40,000	$0	$0	$40,000
1.3.5		0.17	Modeler responsible for development and application of DSM2 and water quality models	BOR	-	g:# of Eco Models developed	9.0	$0	$0	$40,000	$0	$0	$40,000
1.3.6		0.17	Modeler to work on review and development of water operation and fishery modeling tools regarding implementation of CVPIA Section 3406 (b) and 3406 (g).	FWS	-	g:# of Eco Models developed	9.0	$0	$0	$37,000	$0	$0	$37,000
1.3.7		0.20	Modeler to work collaboratively with Reclamation on the development and application of temperature, hydrodynamic and fishery models.	FWS	-	g:# of Eco Models developed	9.0	$0	$0	$44,000	$0	$0	$44,000
1.3.8		0.17	Modeler to work collaboratively with State agencies on the development and application of surface and subsurface model.	BOR	-	g:# of Eco Models developed	9.0	$0	$0	$40,000	$0	$0	$40,000

	Anticipated Funding: State Cash	State In-Kind	Restoration Fund	Water and Related Resources	State or Other Sources*	Total All Sources
Subtotal Funding	$0	$0	$341,000	$0	$0	$341,000
Reclamation			$260,000	$0	$0	$260,000
Service			$81,000	$0	$0	$81,000
CA DFG	$0	$0			$0	$0
CA DWR	$0	$0			$0	$0
Other*	$0	$0			$0	$0

*** List other funding source here:** None

	CVPIA Section: 3406 (g)
	CVPIA Program: Ecol\Water System Ops Model

	2012 Requested Funding					
	State Cash	State In-Kind	Restoration Fund	Water and Related Resources	Other Sources*	Total All Sources
Total Funding	$0	$1,171,575	$700,000	$0	$0	$1,871,575
Reclamation			$599,388	$0	$0	$599,388
Service			$100,612	$0	$0	$100,612
CA DFG	$0	$50,000			$0	$50,000
CA DWR	$0	$1,121,575			$0	$1,121,575
Other	$0	$0			$0	$0

AWP Activity Number	Type of Activity	# of FTE's	Activity Name & Description	Agency	NMFS OCAP RPA#	Performance Metric	Performance Target	2012 Requested Funding: State Cash	State In-Kind	Restoration Fund	Water and Related Resources	Other Sources*	Total All Sources
1.7	**Outreach and Public Involvement**												
1.7.1		-	Membership and participation in California Water and Environmental Water Modeling Forum (CWEMF) and other professional organizations, attend workshops and conferences, prepare publications and provide support for model application to stakeholders.	BOR	-	-		$0	$0	$10,000	$0	$0	$10,000
1.7.2		-	Membership and participation in CWEMF and other professional organizations, attend workshops and conferences, prepare publications and provide support for model application to stakeholders.	FWS	-	-		$0	$0	$7,000	$0	$0	$7,000

	Anticipated Funding					
	State Cash	State In-Kind	Restoration Fund	Water and Related Resources	State or Other Sources*	Total All Sources
Subtotal Funding	$0	$0	$17,000	$0	$0	$17,000
Reclamation			$10,000	$0	$0	$10,000
Service			$7,000	$0	$0	$7,000
CA DFG	$0	$0			$0	$0
CA DWR	$0	$0			$0	$0
Other*	$0	$0			$0	$0

*** List other funding source here:** None

	CVPIA Section: 3406 (g)
	CVPIA Program: Ecol\Water System Ops Model

	2012 Requested Funding					
	State Cash	State In-Kind	Restoration Fund	Water and Related Resources	Other Sources*	Total All Sources
Total Funding	$0	$1,171,575	$700,000	$0	$0	$1,871,575
Reclamation			$599,388	$0	$0	$599,388
Service			$100,612	$0	$0	$100,612
CA DFG	$0	$50,000			$0	$50,000
CA DWR	$0	$1,121,575			$0	$1,121,575
Other	$0	$0			$0	$0

AWP Activity Number	Type of Activity	# of FTE's	Activity Name & Description	Agency	NMFS OCAP RPA#	Performance Metric	Performance Target	2012 Requested Funding					
								State Cash	State In-Kind	Restoration Fund	Water and Related Resources	Other Sources*	Total All Sources
1.13	**Modeling**												
1.13.1		-	Water Operations Models/CalSim 3 - simulations performed to evaluate alternative operations of CVP/SWP operations. In FY 12, Reclamation and DWR will work toward an integrated CalSim 3 Sacramento and San Joaquin Basin model.	BOR	III.1.2	g:# of Eco Models developed	9.0	$0	$0	$50,000	$0	$0	$50,000
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. Under FY11 development goal, the CalLite model will have the same platform as the CalSim II model and an enhanced GUI. The tasks to add the San Joaquin Basin to the CalLite model are proposed in the FY12 work plan.	BOR	IV.2	g:# of Eco Models developed	9.0	$0	$0	$50,000	$0	$0	$50,000
1.13.3		-	Joint San Joaquin Basin Hydrodynamic model development - DFG and Reclamation are interested in collaborating to develop a hydrodynamic model (or expand an excising model) that can be used to model temperature, water quality and other water quality parameters.	BOR	III.2	g:# of Eco Models developed	9.0	$0	$50,000	$120,000	$0	$0	$170,000
1.13.4		-	Stanislaus Habitat Restoration Project - the funding will be used to model a topographic surface design to be created by the redistributed gravel material and to run a 2D hydraulic model to estimate the spawning and rearing habitat conditions that will be created by the design.	BOR	III.2.3	g:# of Eco Models developed	9.0	$0	$0	$43,388	$0	$0	$43,388
1.13.5		-	Delta Hydrodynamics ANN model - development of flow salinity relationships in key locations of the Delta. ANN mimics DSM2 and is used in CalSim to meet salinity standards.	CDWR	III.1.2	g:# of Eco Models developed	9.0	$0	$163,860	$0	$0	$0	$163,860
1.13.6		-	C2VSim model development and application - understanding the historical evolution of the surface and ground water systems of California's Central Valley through the development of a simulation model that will allow for carrying out future planning studies, including climate change.	CDWR	III.1.2	g:# of Eco Models developed	9.0	$0	$123,283	$0	$0	$0	$123,283
1.13.7		-	CalSim II model development and application - maintain and/or develop added features and formulations to the current production version of the planning simulation model of the CVP and SWP to respond to water resources planning needs for DWR and Reclamation, as well as other State, Federal and local agencies.	CDWR	IV.2.3	g:# of Eco Models developed	9.0	$0	$257,692	$0	$0	$0	$257,692
1.13.8		-	Water Operations Models/CalSim 3 - simulations performed to evaluate alternative operations of CVP/SWP operations. In FY 12, Reclamation and DWR will work toward an integrated CalSim 3 Sacramento and San Joaquin Basin model.	CDWR	III.1.2	g:# of Eco Models developed	9.0	$0	$407,541	$0	$0	$0	$407,541

	CVPIA Section: 3406 (g)
	CVPIA Program: Ecol\Water System Ops Model

	2012 Requested Funding					
	State Cash	State In-Kind	Restoration Fund	Water and Related Resources	Other Sources*	Total All Sources
Total Funding	$0	$1,171,575	$700,000	$0	$0	$1,871,575
Reclamation			$599,388	$0	$0	$599,388
Service			$100,612	$0	$0	$100,612
CA DFG	$0	$50,000			$0	$50,000
CA DWR	$0	$1,121,575			$0	$1,121,575
Other	$0	$0			$0	$0

AWP Activity Number	Type of Activity	# of FTE's	Activity Name & Description	Agency	NMFS OCAP RPA#	Performance Metric	Performance Target	2012 Requested Funding: State Cash	State In-Kind	Restoration Fund	Water and Related Resources	Other Sources*	Total All Sources
1.13.9		-	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. Under FY11 development goal, the CalLite model will have the same platform as the CalSim II model and an enhanced GUI. The tasks to add the San Joaquin Basin to the CalLite model are proposed in the FY12 work plan.	CDWR	IV.2	g:# of Eco Models developed	9.0	$0	$169,199	$0	$0	$0	$169,199

	Anticipated Funding: State Cash	State In-Kind	Restoration Fund	Water and Related Resources	State or Other Sources*	Total All Sources
Subtotal Funding	$0	$1,171,575	$263,388	$0	$0	$1,434,963
Reclamation			$263,388	$0	$0	$263,388
Service			$0	$0	$0	$0
CA DFG	$0	$50,000			$0	$50,000
CA DWR	$0	$1,121,575			$0	$1,121,575
Other*	$0	$0			$0	$0

*** List other funding source here:** None

	CVPIA Section: 3406 (g)
	CVPIA Program: Ecol\Water System Ops Model

	2012 Requested Funding					
	State Cash	State In-Kind	Restoration Fund	Water and Related Resources	Other Sources*	Total All Sources
Total Funding	$0	$1,171,575	$700,000	$0	$0	$1,871,575
Reclamation			$599,388	$0	$0	$599,388
Service			$100,612	$0	$0	$100,612
CA DFG	$0	$50,000			$0	$50,000
CA DWR	$0	$1,121,575			$0	$1,121,575
Other	$0	$0			$0	$0

AWP Activity Number	Type of Activity	# of FTE's	Activity Name & Description	Agency	NMFS OCAP RPA#	Performance Metric	Performance Target	2012 Requested Funding: State Cash	State In-Kind	Restoration Fund	Water and Related Resources	Other Sources*	Total All Sources
1.16	**Unfunded Needs**												
1.16.1		-	Develop an individual based model to predict salmonids deterrence efficiency of a non-physical fish barrier - The barrier is composed of sound, light, and bubble stimuli and has been deployed at the head of Old River (2009 and 2010) and Georgiana Slough (2011). Fish movement data collected with juvenile Chinook salmon during these three deployments will be used to calibrate and validate the mathematical model (i.e. Eulerian-Lagrangian Agent Method (ELAM)).	BOR	IV.2.3	g:# of Eco Models developed	9.0	$0	$0	$150,000	$0	$0	$150,000

	Anticipated Funding: State Cash	State In-Kind	Restoration Fund	Water and Related Resources	State or Other Sources*	Total All Sources
Subtotal Funding	$0	$0	$150,000	$0	$0	$150,000
Reclamation			$150,000	$0	$0	$150,000
Service			$0	$0	$0	$0
CA DFG	$0	$0			$0	$0
CA DWR	$0	$0			$0	$0
Other*	$0	$0			$0	$0

*** List other funding source here:** None

Table 2. Three-Year Funding Plan FY 2013 – 2015 ($ amounts in thousands)

FY Year	Description of Activities	Funding Needs				
		RF	W&RR	Other	DFG	DWR
2013	1.1 Support both Reclamation and the Service's staff time on model development, model review and project technical support.	$300				
	1.2 Continue supporting water operations/water management tools development (CalLite/CalSim III model calibration and enhancement).	$100				
	1.3 Coordinate with the DFG to develop a hydrodynamic water quality model for the San Joaquin Basin.	$120				
	1.4 Expand Delta/ecosystem modeling capability to assist BDCP and other CVP projects.	$100				
	1.5 Develop hydrologic inputs of ECOSIM-W for water acquisition and climate change analyses	$100				
	1.6 Lower American River Juvenile Salmonid Monitoring Project	$40				
	1.7 Modeling support for floodplain restoration and inundations flows in winter or spring (RPA action III.2.2).	$50				
	Total	**$810**				
2014	1.1 Support both Reclamation and the Service's staff time on model development, model review and project technical support.	$320				
	1.2 Continue supporting water operations/water management tools development (CalLite/CalSim III model calibration and enhancement).	$120				
	1.3 Basin-wide integrated Delta/ecosystem modeling tool development.	$100				
	1.4 Expand Delta/ecosystem modeling capability to assist BDCP and other CVP projects.	$150				
	1.5 Lower American River Juvenile Salmonid Monitoring Project.	$40				
	1.6 Modeling floodplain restoration & inundation flows in winter or spring (RPA action III.2.2).	$50				
	Total	**$780**				

Table 2 (continued..). Three-Year Funding Plan FY 2013 – 2015 ($ amounts in thousands)

FY Year	Description of Activities	Funding Needs				
		RF	W&RR	Other	DFG	DWR
2015	1.1 Support both Reclamation and the Service's staff time on model development, model review and project technical support.	$320				
	1.2 Continue supporting water operations/water management tools development (CalLite/CalSim III model calibration and enhancement).	$120				
	1.3 Basin-wide integrated Delta/ecosystem modeling tool development.	$100				
	1.4 Expand Delta/ecosystem modeling capability to assist BDCP and other CVP projects.	$150				
	1.5 Lower American River Juvenile Salmonid Monitoring Project.	$40				
	1.6 Develop fish and flow management tool for both the Sacramento and San Joaquin Basins.	$150				
	Total	**$880**				

Note: The FY 2013 -2015 Budget Plan provides estimates of capability only. The amounts that are displayed might be reasonably appropriated each year. These figures do not reflect the future Congressional Appropriations process. All of these estimates will be adjusted pending appropriations and annual Restoration fund collections.