Draft CVPIA Fiscal Year 2013 Annual Work Plan

November 29, 2012

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	Department of Fish and Game (CDFG)	State Partner
Sina Darabzand	Department of Water Resources (DWR)	State Partner

Program Goals and Objectives for FY 2013

The Ecosystem/ Water Systems Operations Models, CVPIA Section 3406(g) program is a continuing program that began in 1994. 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 Interior Secretary's efforts in fulfilling the requirements of the CVPIA. The following are specific FY13 program objectives:

A. Water Operations Modeling - Support the continued development of CalSim 3.0, which will cover the Sacramento and San Joaquin basins. Support the continued development and dissemination of CalSim II. With significant changes to the regulatory environment, (OCAP), Reasonable and Prudent Alternatives (RPA) and proposals for altered Sacramento-San Joaquin Delta plumbing, revisions to CalSim II are necessary.

B. Water Management Modeling – Support the continued development and dissemination of the CalLite model. A CalLite model expansion that includes the San Joaquin and its major tributaries is planned. The CalLite 2 model will be enhanced by developing a San Joaquin basin module and integrating it with the rest of CalLite 2. The work involved in doing this will be to take a preliminary version of the San Joaquin Basin module and enhance it to (1) dynamically compute flow releases needed to meet Vernalis flow standards, State Water Resources Control Board (SWRCB) tributary flow standards, and water quality requirements, (2) allow the user to toggle these flow standards and also other RPA flow standards on or

off, and adjust San Joaquin River Restoration flows between interim and final flows, using the CalLite GUI (Graphical Users' Interface), and (3) add options to the GUI so the user can view flows at Vernalis and on major tributaries, and also storages in major reservoirs. The CalLite enhancements will be validated by comparing model results to CalSim II. The second phase of the CalLite GUI development effort will involve 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. The modifications will be made to the Water Resources Integrated Modeling System (WRIMS) 2.0 based CalLite. In addition, Reclamation will coordinate with partner Agencies to develop an open source solver for CalLite, CalSim II and CalSim 3.0.

C. 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. In FY13, with the carried over funds from FY12, the modelers from Reclamation and Service will work within a modeling team framework with the consultant to develop modeling protocols, pre, post, and batch processing tools that can be used to calibrate, extend, verify the San Joaquin River (SJR) temperature model so that various studies for Central Valley Project (CVP) can be undertaken.

D. Central Valley Hydrodynamic Modeling: In FY13, with the carried over funds from FY12, Reclamation will coordinate with partner Agencies to develop a hydrodynamic model or extend an existing model capable of modeling fish behavior, temperature, salinity and other water quality parameters for the Central Valley.

E. Ecosystem Modeling – Support the development of application of a fully-integrated surface and subsurface numerical model (HydroGeoSphere) related to water supply, water quality and ecosystem health at a river-basin scale. This application model would be known as Central Valley HydroGeoSphere Model (CVHGSM). CVHGSM will be valuable for evaluation of seepage at the interface of surface/subsurface flow, solute/thermal transport and impact of groundwater pumping on surface-water supply, surface-water quality, and ecosystem restoration in basin scale.

Support an ecosystem modeling project relating to steelhead habitat in the American 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.

Support further development of the inSALMO model relating alternative management actions (flow, temperature, gravel additions, juvenile rearing habitat restoration) to the number and size of out-migrating Chinook and steelhead. This project will build on current (FY12-13) development of the Clear Creek application of inSALMO and apply the model to another CVP river, such as the American or Stanislaus. Application of inSALMO to CVP rivers at the scale of the river reaches important for spawning and rearing will allow for

comparison of alternative management scenarios, resulting in more informed decisions with respect to effects on anadromous fish populations.

F. Sharing of Costs Agreement for Mitigation Projects Improvements (SCAMPI) Task Orders – in FY12, Reclamation and Service continue to coordinate with State agencies, including DWR and CDFG, to initiate the development of the cost sharing agreement and task orders. This task continues through FY13.

G. Membership and participation in professional organizations and training.

The 3406 (g) program performance goal and objective is to produce nine types of models. Currently, 9 models of 8 model types have been developed with full or partial support from (g) program. The models are Comprehensive San Joaquin Water Quality Model (SJRSIM), CalSim II, DSM2, ECOSIM, InSALMO, C2VSIM, CalSim 3, CalLite II and HydroGeoSphere. These developed models are being modified to incorporate recent changes in water operating rules and legislative requirements, to validate and extend the models with recent data, to reflect the recent changes in water-environment and to make the models efficient and user friendly.

Status of the Program

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). Numerous improvements have been made to CalSim II in order to incorporate the modeling of baseline conditions and also alternatives such as the Isolated Facility. Improvements were made to how CalSim II simulates CVP/SWP sharing of export restrictions under the D-1641 export-inflow ratio, and releases to meet D-1641 salinity standards in the Delta in conjunction with exports.

To respond to the periodic need for more detailed analyses, both Reclamation and DWR in a joint effort are currently developing a more detailed version of the CalSim II model, referred to as CalSim 3. The CalSim 3 version of the Sacramento and San Joaquin Basins are being developed with WRIMS modeling environment and general CalSim logic. The achievements include addressing the mass balance on the West Side and a thorough review of the role of losses, groundwater, contract limits, and applied water demands. Relationships between these elements were clarified and model code was revised to avoid infeasible solutions. The code controlling the operation of San Luis Reservoir, which is now treated as a single storage pool with two accounts instead of two separate reservoirs, has also been modified to facilitate the model solution. Mainstem San Joaquin and east side tributary operations review was first facilitated by fixing Vernalis water quality standards to enable a single-cycle run. The east side demand units are now using a standardized template that is being applied basin-wide, accommodating demands, losses, operational spills, and return flows for many different kinds of operations. Operations have been mapped between CalSim II and CalSim 3.0 to identify

sources of differences in results between the two models. The disaggregated water quality mass balance calculations have been reviewed and corrected where necessary, and gaps in input salinity data were identified.

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 2.0 framework (to be consistent with CalSim 3.0 application) and the development of a new GUI are complete under Phase I tasks. Phase II tasks, which will commence in FY13, 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.

The program has also supported the development and application of the California Central Valley Simulation Model, C2VSIM. This model runs in conjunction with CalSim 3.0 to include the interactions between the ground water and surface water resources of the Central Valley in a dynamic way, as CalSim 3.0 simulation proceeds. C2VSIM has been developed and calibrated in historical simulations, and is an essential link in understanding the historical evolution of the surface water and ground water resources systems of the Central Valley of California. This model, in conjunction with CalSim 3.0 will allow for carrying out future planning studies including climate change. Specific tasks to be completed in FY13, include updating the generic surface water-groundwater model engine (IWFM), further calibration and refinement of model parameters through historical simulation runs, and developing user-friendly automated data processing packages for input/output analysis and display.

In addition to supporting CalSim II, CalSim 3.0, C2VSIM, 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 FY12, Federal agencies coordinated with State agencies to develop the FY13 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 Electro-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 of flow, water quality and mass transport processes of the Delta and a part of 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. To make inSALMO useful for real world management in the Central Valley, the Program has funded a project that will validate

inSALMO with field data from Clear Creek, expand the spatial scale of model, and (as an optional task) add freshwater life stages of steelhead.

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, evaluation of seepage at the interface of surface/ subsurface flow, solute and thermal transport and impact of groundwater pumping on surface-water supply, and basin scale ecosystem restoration.

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, and CalLite 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 tools and strategies, and (3) explore modeling opportunities that assist federal and state managers in making viable decisions relating to water quality , hydrology, groundwater, hydropower, fish population and other aspects of the CVP and SWP systems operations. These goals are achieved by developing multi-year programs in supporting state model development activities relating to five simulation models, currently applied in planning simulation studies and/or under development for that purpose.

The present adaptive management for C2VSIM model includes developing an updated generic surface water-groundwater model engine (IWFM) with modified computational grid (mesh) resolution and computational efficiency, and application of C2VSIM in historical simulation mode for calibration and alternative analysis in the first year, application of the model (C2VSIM) in the climate change simulation mode, as well as historical simulation mode for alternative analysis, in the second and the third year.

The present adaptive management for HGS model includes developing as well as application of HGS model comprised of a linkage of Sacramento river-basin, Delta and San Joaquin river-basin models. This application model would be known as Central Valley HydroGeoSphere Model (CVHGSM). CVHGSM will be valuable for evaluation of seepage at the interface of surface/ subsurface flow, solute/thermal transport and impact of groundwater pumping on surface-water supply, surface-water quality, and ecosystem restoration in basin scale.

The present adaptive management for CalSim II model includes simulation studies in support of SWRCB Hearings, COA Agreement re-evaluations, SWP-CVP system reoperations, Sisk Dam re-operation, Franks Tract Project, Delta Facilities Planning, and BDCP alternative evaluations, and

developing user-friendly automated data processing packages for input/output analysis and display. The need for and the frequency of application of this model depends on the release date and the adoption of CalSim 3.0 as the production version of the USBR/DWR Planning Simulation Model.

The present adaptive management for CalSim 3.0 model includes developing an integrated model of the CVP-SWP system by the merging of the Reclamation's San Joaquin system module, with the Sacramento system and Sac-SJ Delta, and SWP-CVP south-of-Delta facilities, in the first year, and application of the model in simulation studies in support of SWRCB Hearings, COA Agreement re-evaluations, SWP-CVP system reoperations, Franks Tract Project, Delta Facilities Planning, and BDCP alternative evaluations, in the second and the third year.

The present adaptive management for CalLite model includes the development of the integrated CalLite that includes the San Joaquin system, development of the Forecast Allocation module (FAM-CalLite), application of the model in simulation studies in support of COA Agreement re-evaluations, as well as developing user-friendly automated data processing packages for input/output analysis and display in the first year, and application of the model in the re-evaluation of effects of implementing SWRCB mandated actions on the CVP and SWP operations, and various other alternative analysis applications in the second and the third year.

The present adaptive management for the ANN model includes training the model, whenever necessary to mimic the hydrodynamics of the Delta (channel flows and depths) that meet salinity standards in planning simulation runs and alternative analysis. Retraining of the ANN Model is required for alternatives that include either significant change in the Delta channels geometry and/or channels interconnections, and the assumptions on the potential sea level changes caused by global warming.

The present adaptive management for 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. In FY13, the modelers from Reclamation and Service will work within a modeling team framework with the consultant to develop modeling protocols, pre, post, and Batch processing tools that can be used to calibrate, extend, verify the San Joaquin River (SJR) HEC5Q model so that various studies for Central Valley Project (CVP) can be undertaken. This will support the water managers' decisions to restore fisheries in the SJR basin, to control salinity on the main-stem SJR, to analyze the affects of various water operations on the water quality, and thereby maximize the beneficial and diversified water uses in the CVP region.

Table 1. FY2013 Proposed Activities and Costs

CVPIA Section 3406 (g), Ecological & Water System Operations Models

	3406 (g) Requested Funding for Fiscal Year 2013				
	Restoration Fund	Water and Related Resources	State Cash	State In-Kind	Total All Sources
Total Funding	$600,000	$180,000	$0	$1,167,111	$1,947,111
Reclamation	$488,657	$180,000			$668,657
Service	$111,343	$0			$111,343
CA DFG			$0	$0	$0
CA DWR			$0	$1,167,111	$1,167,111

1.1	Program Management										
AWP Activity Number	Activity Name	Activity Description	Agency Name	Agency Fractional FTE	Program Performance Goal	FY2013 Projected Performance	3406 (g) Requested Funding for Fiscal Year 2013: Restoration Fund	Water and Related Resources	State Cash	State In-Kind	Total All Sources
1.1.1	Program Lead	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. (Cost Authority ESM H37-0214-2030-000-00-0-0)	BOR	0.22			$52,103				$52,103

	Sub-Total for Program Management, FY2013				
	Restoration Fund	Water and Related Resources	State Cash	State In-Kind	Total All Sources
Subtotal Funding	$52,103	$0	$0	$0	$52,103
Reclamation	$52,103	$0			$52,103
Service	$0	$0			$0
CA DFG			$0	$0	$0
CA DWR			$0	$0	$0

1.2	Program Support										
AWP Activity Number	Activity	Activity Name & Description	Agency		Program Performance Goal	FY2013 Projected Performance	3406 (g) Requested Funding for Fiscal Year 2013				
			Name	Fractional FTE			Restoration Fund	Water and Related Resources	State Cash	State In-Kind	Total All Sources
1.2.1	Program Co-Lead	Coordinating program activities within Service as well as reviewing and the development of water operation and fishery modeling tools (Cost Authority FRFR4833-0832OS0).	FWS	0.03			$6,560				$6,560
1.2.2	Supervisory Support	Oversee the modeling activities of Reclamation (Cost Authority ESM H37-0214-2030-000-00-0-0)	BOR	0.07			$16,578				$16,578
1.2.3	FWS Regional Program Administration	Provide regional management and administration (PA) (Cost Authority FRFR4833-0832OS0).	FWS	0.02			$4,602				$4,602
1.2.4	FWS Financial Support	Provide Regional contracting, budget and finance support. (P2O) (Cost Authority FRFR4833-0832OS0)	FWS	0.02			$3,529				$3,529
							Sub-Total for Program Support, FY2013				
							Restoration Fund	Water and Related Resources	State Cash	State In-Kind	Total All Sources
						Subtotal Funding	$31,269	$0	$0	$0	$31,269
						Reclamation	$16,578	$0			$16,578
						Service	$14,691	$0			$14,691
						CA DFG			$0	$0	$0
						CA DWR			$0	$0	$0

1.3	Technical Support										
AWP Activity Number	Activity	Activity Name & Description	Agency		Program Performance Goal	FY2013 Projected Performance	3406 (g) Requested Funding for Fiscal Year 2013				
			Name	Fractional FTE			Restoration Fund	Water and Related Resources	State Cash	State In-Kind	Total All Sources
1.3.1	CalSim Coordinator	Coordinate CalSim II and 3 model development tasks (Cost Authority ESM H37-0214-2030-000-00-0-0).	BOR	0.17			$40,522				$40,522
1.3.2	Modeler - Water Quality, Fishery, Ecosystem	Develop and apply water quality, fishery and ecosystem models (Cost Authority ESM H37-0214-2030-000-00-0-0) .	BOR	0.37			$88,621				$88,621
1.3.3	Modeler - CalLite, DSM2, HEC5Q	Develop, coordinate, perform project management and apply CalLite GUI, DSM2, HEC5Q and other water quality models (Cost Authority ESM H37-0214-2030-000-00-0-0).	BOR	0.42			$99,785				$99,785
1.3.4	Modeler - CalLite, CalSim	Develop and apply CalLite and CalSim models. (Cost Authority ESM H37-0214-2030-000-00-0-0)	BOR	0.23			$53,946				$53,946
1.3.5	Modeler - DSM2, Water Quality	Develop and apply DSM2 and water quality models (Cost Authority ESM H37-0214-2030-000-00-0-0)	BOR	0.20			$46,841				$46,841
1.3.6	Modeler - CVP/SWP Operations	Review and improve hydrologic models regarding actual CVP/SWP operations, especially regarding implementation of CVPIA Section 3406 (b)(1), (b)(2) & (b)(3). (Cost Authority FRFR4833-0832OS0)	FWS	0.13			$28,426				$28,426
1.3.7	Modeler - Water Temperature	Assist the development and review of water temperature models, especially regarding the suitability for use with real-time CVP/SWP operations and planning studies (Cost Authority FRFR4833-0832OS0).	FWS	0.15			$32,799				$32,799
1.3.8	Modeler - Surface, Subsurface	Collaborate on the development and application of surface and subsurface model. (Cost Authority ESM H37-0214-2030-000-00-0-0)	BOR	0.13			$30,260				$30,260
1.3.9	Fish Model Coordination	Oversee InSalmo development and the comparison with SALMOD. Coordinate with NMFS, especially regarding their Salmon Life Cycle Model development. Expand use of inSALMO in waterways in addition to Clear Creek and apply inSALMO for additional fish species. Advise and coordinate with NMFS on the development of Salmon Life Cycle Model, a full life cycle salmon model. (Cost Authority FRFR4833-0832OS0).	FWS	0.13			$28,426				$28,426

	Sub-Total for Technical Support, FY2013				
	Restoration Fund	Water and Related Resources	State Cash	State In-Kind	Total All Sources
Subtotal Funding	$449,627	$0	$0	$0	$449,627
Reclamation	$359,976	$0			$359,976
Service	$89,652	$0			$89,652
CA DFG			$0	$0	$0
CA DWR			$0	$0	$0

2.3	Outreach and Public Involvement										
AWP Activity Number	Activity	Activity Name & Description	Agency		Program Performance Goal	FY2013 Projected Performance	3406 (g) Requested Funding for Fiscal Year 2013				
			Name	Fractional FTE			Restoration Fund	Water and Related Resources	State Cash	State In-Kind	Total All Sources
2.3.1	Professional & Public Outreach	Membership and participation in California Water and Environmental Modeling Forum (CWEMF) and other professional organizations, attend workshops and conferences, prepare publications and provide support for model application to stakeholders (organizational membership fee for BOR and discounted registration fee for BOR modelers for meeting participation). (Cost Authority ESM H37-0214-2030-000-00-0-0)	BOR	0.00	Complete the development of 9 Eco Models	Particiapting in the CWEMF Annual Conference and other CWEMF activities	$10,000				$10,000
2.3.2	Professional & Public Outreach	Membership and participation in California Water and Environmental Modeling Forum (CWEMF) and other professional organizations, attend workshops and conferences, prepare publications and provide support for model application to stakeholders (organizational membership fee for FWS and discounted registration fee for FWS modelers for meeting participation). (Cost Authority FRFR4833-0832OS0).	FWS	0.00	Complete the development of 9 Eco Models	Particiapting in the CWEMF Annual Conference and other CWEMF activities	$7,000				$7,000
							Sub-Total for Outreach and Public Involvement, FY2013				
							Restoration Fund	Water and Related Resources	State Cash	State In-Kind	Total All Sources
						Subtotal Funding	$17,000	$0	$0	$0	$17,000
						Reclamation	$10,000	$0			$10,000
						Service	$7,000	$0			$7,000
						CA DFG			$0	$0	$0
						CA DWR			$0	$0	$0

4.3	Modeling										
AWP Activity Number	Activity	Activity Name & Description	Agency		Program Performance Goal	FY2013 Projected Performance	3406 (g) Requested Funding for Fiscal Year 2013				
			Name	Fractional FTE			Restoration Fund	Water and Related Resources	State Cash	State In-Kind	Total All Sources
4.3.1	CalSim 3.0 Development	Water Operations Models - CalSim III - simulations performed to evaluate alternative operations of CVP/SWP operations. Reclamation and DWR will be working together to have an integrated CalSim III will have an integrated Sacramento and San Joaquin Basin model. (Cost Authority ESM H37-0214-2030-000-00-0-0)	BOR	0.17	Complete the development of 9 Eco Models	Progress toward completion of Model Type 6: Water operations models - CVP and SWP operations.		$40,262			$40,262
4.3.2	CalLite Development	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. The CalLite model will have the WRIMS 2.0 platform and an enhanced GUI. Phase II tasks will 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.(Cost Authority ESM H37-0214-2030-000-00)	BOR	0.20	Complete the development of 9 Eco Models	Progress toward completion of Model Type 9: Water management modeling to include firm CVP yield.		$47,367			$47,367
4.3.3	Development & Enhancement of Temparature Models	Joint San Joaquin Basin Hydrodynamic model development - the modelers from Reclamation and Service will work within modeling team framework with the consultant to develop modeling protocols, pre, post, and Batch processing tools that can be used to calibrate, extend, verify the San Joaquin River (SJR) HEC5Q model so that various studies for Central Valley Project (CVP) can be undertaken. (Cost Authority ESM H37-0214-2030-000-00-0-0)	BOR	0.26	Complete the development of 9 Eco Models	Progress toward completion of Model Type 2: Related water quality conditions, including temperature perdition related to storage.		$61,577			$61,577

4.3	Modeling										
AWP Activity Number	Activity	Activity Name & Description	Agency		Program Performance Goal	FY2013 Projected Performance	3406 (g) Requested Funding for Fiscal Year 2013				
			Name	Fractional FTE			Restoration Fund	Water and Related Resources	State Cash	State In-Kind	Total All Sources
4.3.4	American River Habitat Restoration Project	To model a topographic surface design to be created by the redistributed material and to run a hydraulic model to estimate the spawning and rearing habitat that will be created by the design. (Cost Authority ESM H37-0214-2030-000-00-0-0)	BOR	0.13	Complete the development of 9 Eco Models	Progress toward completion of Model Type 5: Ecosystem modeling - flow to restore and maintain natural channel and riparian habitat values.		$30,794			$30,794
4.3.5	C2VSIM Model Development & Application	C2VSim model development and application - Understanding the historical evolution of the surface water and ground water resouces systems of the Central Valley of California through the development of a simulation model that will allow for carrying out future planning studies including climate change.	CDWR	0.00	Complete the development of 9 Eco Models	Progress toward completion of Model Type 3: Surface-ground and stream-wetland interactions.				$164,629	$164,629
4.3.6	CalSim II Model Development & Application	CalSim II Model development and application - Develop, 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 the water resources planning needs of DWR and USBR, as well as other state, federal and local agencies.	CDWR	0.00	Complete the development of 9 Eco Models	Progress toward completion of Model Type 9: Water management modeling to include firm CVP yield.				$289,923	$289,923

4.3	Modeling										
AWP Activity Number	Activity	Activity Name & Description	Agency		Program Performance Goal	FY2013 Projected Performance	3406 (g) Requested Funding for Fiscal Year 2013				
			Name	Fractional FTE			Restoration Fund	Water and Related Resources	State Cash	State In-Kind	Total All Sources
4.3.7	CalSim 3.0 Model Development & Application	CalSim 3.0 Model Development and Applications - Simulation model development, and applications to evaluate alternative operations of the CVP/SWP. In FY 13, Reclamation and DWR will be working together to have an integrated CalSim 3.0 that merges the Reclamation's San Joaquin River Basin Model, with the Sacramento River and the Sacramento-San Joaquin Delta.	CDWR	0.00	Complete the development of 9 Eco Models	Progress toward completion of Model Type 9: Water management modeling to include firm CVP yield.				$402,073	$402,073
4.3.8	CalLite Model Development & Application	CalLite Model Development & Application- Simulation model development, and applications to evaluate alternative operations of the CVP/SWP. Reclamation and DWR will be working together to have an integrated CalLite that merges the Reclamation's San Joaquin River Basin Model, with the Sacramento River and the Sacramento-San Joaquin Delta.	CDWR	0.00	Complete the development of 9 Eco Models	Progress toward completion of Model Type 9: Water management modeling to include firm CVP yield.				$221,673	$221,673
4.3.9	Development & Application of ANN Model	Development of Flow salinity relationships in Key locations of the Delta. ANN is trained by multiple runs of the Delta Simulation Model (DSM2) and is used in CalSim simulation runs to meet flow requirements that are consistent with the Delta salinity standards.	CDWR	0.00	Complete the development of 9 Eco Models	Progress toward completion of Model Type 1: Comprehensive water budget of surface and groundwater supplies.				$88,813	$88,813

4.3	Modeling										
AWP Activity Number	Activity	Activity Name & Description	Agency		Program Performance Goal	FY2013 Projected Performance	3406 (g) Requested Funding for Fiscal Year 2013				
			Name	Fractional FTE			Restoration Fund	Water and Related Resources	State Cash	State In-Kind	Total All Sources
4.3.10	SELFE Model Extension for Central Valley	An agreement to extend, calibrate, verify SELFE model to the Central Valley region so that various studies for Central Valley Project (CVP) can be undertaken. Interagency Agreement between DWR and BOR (Cost Authority ESM H37-0214-2030-000-00-0-0)	0	0.00	Complete the development of 9 Eco Models	Progress toward completion of Model Type 9: Water management modeling to include firm CVP yield.	$50,000				$50,000
							Sub-Total for Modeling, FY2013				
							Restoration Fund	Water and Related Resources	State Cash	State In-Kind	Total All Sources
						Subtotal Funding	$50,000	$180,000	$0	$1,167,111	$1,397,111
						Reclamation	$50,000	$180,000			$230,000
						Service	$0	$0			$0
						CA DFG			$0	$0	$0
						CA DWR			$0	$1,167,111	$1,167,111

Table 2 – Intentionally left blank