

Upper Feather River Integrated Regional Water Management Plan Proposition 50 Grant Agreement No. 4600007650

Project Performance & Monitoring Report

Project No./Name: Sierra Valley Well Assessment and Basin Management Project

Project Proponent: County of Plumas

Progress Report No.: 1

Reporting Period: 2016-2018

Date of Post-Performance Report: 4/25/2019

Project Specific Output Signatures			
	Yes	No	Comments
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	The Project is two studies. Not Applicable
	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	
Project Specific Outcome Indicators			
	Yes	No	Comments
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	The Project is two studies. Not directly applicable. See narrative below.
	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	
Did you meet the goal of your project? If yes, please provide a brief description stating how you achieved this goal. If no, please comment as to why the goal was not achieved.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	See narrative below.
	<input type="checkbox"/>	<input type="checkbox"/>	
Other Standard Reporting Requirements: Please indicate other monitoring/reporting requirements you may already be required to do independent from DWR contractual obligations. For example: CDPH Title 22 Ch. 15 "Domestic Water Quality AND Monitoring Regulations," NPDES, GAMA, CASGEM, or other internal reporting requirements that may yield valuable data.			
	Yes	No	Comments
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	The Project is two studies. Not directly applicable. See narrative below.
	<input type="checkbox"/>	<input type="checkbox"/>	
What Upper Feather River IRWM Plan Objectives did your project address to support implementation of the Plan?			
	Yes	No	Comments
Restore natural hydrologic functions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	See narrative below.
Reduce potential for catastrophic wildland fires in the Region	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Balance the needs of forest health, habitat preservation, fuels reduction, forest fire	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Sierra Valley Well Assessment and Basin Management Project

prevention, and economic activity in the Upper Feather River Region				
Build communications and collaboration among water resources stakeholders in the Region	<input checked="" type="checkbox"/>	<input type="checkbox"/>		See narrative below.
Work with Department of Water Resources to develop strategies and actions for the management, operation, and control of the State Water Project facilities in the Upper Feather River Watershed in order to increase water supply, recreational and environmental benefits to the Region	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Encourage municipal service providers to participate in regional water management actions that improve water supply and water quality	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Continue to actively engage in FERC relicensing of hydroelectric facilities in the Region	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Address economic challenges of municipal service providers to serve customers	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Protect, restore, and enhance the quality of surface and groundwater resources for all beneficial uses, consistent with the Central Valley Regional Water Control Board Basin Plan	<input checked="" type="checkbox"/>	<input type="checkbox"/>		The Project has provided valuable information for the Sierra Valley Groundwater Management District to achieve compliance with SGMA regulations. See narrative.
Address water resources and wastewater needs of Disadvantaged Communities (DACs) and Native Americans	<input checked="" type="checkbox"/>	<input type="checkbox"/>		The Project has provided valuable information for the Sierra Valley Groundwater Management District to achieve compliance with SGMA regulations. See narrative.
Coordinate management of recharge areas and protect groundwater resources	<input checked="" type="checkbox"/>	<input type="checkbox"/>		This is the Project goal. See narrative below.
Improve coordination of land use and water resources planning	<input checked="" type="checkbox"/>	<input type="checkbox"/>		This is the Project goal. See narrative below.
Maximize agricultural, environmental and municipal water use efficiency	<input checked="" type="checkbox"/>	<input type="checkbox"/>		This is the Project goal. See narrative below.
Effectively address climate change adaptation and/or mitigation in water resource management	<input checked="" type="checkbox"/>	<input type="checkbox"/>		The Project was implemented in coordination with the Upper Middle Fork modeling and climate study.
Improve efficiency and reliability of water supply and other water-related infrastructure	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Enhance public awareness and understanding of water management issues and needs	<input checked="" type="checkbox"/>	<input type="checkbox"/>		The Project has provided valuable information for the Sierra Valley Groundwater Management District to

				achieve compliance with SGMA regulations. See narrative below.
Address economic challenges of agricultural producers	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Work with counties, communities, and groups to make sure staff capacity exists for actual administration and implementation of grant funding	<input type="checkbox"/>	<input checked="" type="checkbox"/>		

1. Summary of the operations of the project.

The goal of the Sierra Valley Well Assessment and Basin Management Project was to provide more sophisticated decision support tools to help the Sierra Valley Groundwater Management District (SVGMD) and both Plumas and Sierra Counties to more actively manage the Sierra Valley Groundwater Basin (SVB), given changing legislative requirements. The project successfully accomplished the following tasks:

- Identified potential Groundwater Sub-basin Management Areas based on hydrogeology and recharge characteristics;
- Developed tools to identify and characterize estimated groundwater drawdown rates and groundwater recharge rates;
- Developed a preliminary groundwater and surface water budget for the SVB and a preliminary conceptual model of the SVB aquifers and
- Prepared technical reports and public presentation materials that are being used by the SVGMD as decision support and public outreach and engagement tools for SGMA planning.

Data from groundwater level monitoring, in combination with modeling simulations and isotope analyses provided in coordination with the Upper Middle Fork Project model development, have assisted the SVGMD in making legalized, authorized, and scientifically substantiated water management decisions under the Sustainable Groundwater Management Act for which the SVGMD is the designated Groundwater Sustainability Agency (GSA). An example where the studies have proved useful to SVGMD include using the Well Inventory Report to support ordinance development for the restriction of new high capacity wells in specific areas of the basin experiencing chronic lowering of groundwater levels.

Specifically, the project collected and analyzed data on inactive, abandoned, and active domestic drinking water wells in Sierra Valley. Well inventory records were digitized into a database, historical water quality data was reviewed, and 27 Department of Water Resources (DWR) and SVGMD monitoring wells (previously sampled in 2002) were resampled. Additionally, 51 other monitoring wells (sampled before 2002) were resampled. A 3-D presentation of groundwater quality data was developed.

Groundwater flow and sources were identified by looking at fracture trace analyses and water chemistry/isotope analyses to determining groundwater basin areas with upland recharge/water source areas. Groundwater pumping volumes were utilized to create a hydrologic assessment of groundwater sources and pathways into and through the SVB. Education and outreach and the presentation of project findings and conclusions to SVGMD and Plumas County was ongoing throughout the study period, both in reports and also through two public workshops after the conclusion of the studies.

Specifically, the SV Well Inventory and Aquifer Delineation in coordination with the UC Davis Upper Middle Fork watershed/climate models that were funded with Proposition 50 are now some of the scientific baseline analyses that are being used to develop future monitoring and data collection needs for the Sierra Valley GSP proposal due in May-August of 2019.

Well Inventory Study Summary

Sierra and Plumas County parcel maps populated with well locations were reviewed and a scope of work area was defined and mapped. A GIS map was created with all identified parcels and was used in combination with field maps obtained from the DWR to conduct field identification of wells. During the inspection, wells of concern were identified by GPS for future mapping, casing diameter measured, and if possible, measured for total depth of well and depth to static water level. Information was reviewed and confirmed with the land owners during inspections, as well as looking at capping versus sealing options. Data was collected and documented in a field log and entered into an Excel spreadsheet with the following information: Parcel Number, Owner, Physical Address, and Mailing Address. The majority of the wells identified were 3-inch steel-cased wells, ranging from 10 feet (ft) deep to over 200 ft deep. According to oral history, these small cased wells were drilled in the 1940s for livestock water. The majority of these wells were artesian or had very high static water levels in which a windmill would be installed to pump the water. Approximately 450 wells were identified by GPS. Including the 120+ wells identified through the Plumas and Sierra County well records, the inventory totaled over 500. Approximately 36 wells were identified for destruction and approximately 36 wells for capping. The remainder of identified wells are being addressed through the SVGMD's recently adopted Well Registration Ordinance, and through conversations with SVB landowners, which are ongoing as the monitoring network proposal continues to be developed.

Aquifer Delineation Study Summary

Aerial photos covering the Sierra Valley Basin were obtained and analyzed to map the structural geology and Basin perimeter. Through June 30, 2015, various streams and ditches in southern Sierra Valley were sampled to identify the influence of the Little Truckee diversion on groundwater recharge in the SVB. Fourteen monitoring wells operated by SVGMD were resampled to document and assess the current database for groundwater water quality and temperatures, which will be utilized for assessing groundwater source, flow, and duration dynamics. Samples were submitted to labs for chemical and isotope analysis. In 2016, SVB geothermal waters were sampled, including resampling the boiling well on a private ranch. A number of additional tributary streams and springs were sampled for isotopes and four precipitation samples were collected. An additional 24 isotope and 5 chemistry samples were submitted to the labs.

Plumas Geo-Hydrology continued to interface with the UC Davis modeling group to refine the alluvial aquifer delineation, and to assist them in developing the geologic model for the SVB. The geologic model, prepared with the Groundwater Modeling System (GMS), was reviewed and recommendations provided for refinement. Plumas Geo-Hydrology continued to draft a narrative describing the Sierra Valley Basin structural geology and conceptual hydrologic basin model. Efforts were also made to match results of the 1963 gravity survey with the structural geology.

The ongoing interpretation of groundwater chemistry and isotope data continued, and Plumas Geo-Hydrology began matching isotope and chemistry data with the depth in selected wells to assess the hydraulic connection between deep and shallow aquifers. Additionally, further assessment of groundwater quality was conducted. Various sources in southern Sierra Valley were sampled to obtain more representative samples of geothermal water.

Throughout the project water chemistry and isotope data were entered into a database for analysis and further assessment of groundwater quality was conducted. Various sources in southern Sierra Valley were sampled to obtain more representative samples of geothermal water. The distribution of nitrate and boron data in Sierra Valley groundwater were analyzed and compared to geothermal sample data. This new geothermal water data indicated that there is a deep source of water, the origin of which cannot be pinpointed anywhere in the region surrounding the Sierra Valley Basin. The deep water did not have the isotope characteristics typical of geothermal water and appeared to mix with recharge water flowing into the basin. More than 230 isotope data points (including at least 20 literature isotope data sets), and more than 70 water chemistry data sets were obtained for this analysis. Characterizing the relationship between deep and shallow aquifer sections, by identifying vertical groundwater mixing trends proved to be quite challenging.

Two major sources of water in Sierra Valley were identified through the project. One source of groundwater in the northern valley floor is the highlands that make Dixie Mountain. The second source is associated with groundwater discharge in southern Sierra Valley, in particular Cold Creek and the Yuba Pass area. Finally, the project identified a new SVB contaminant. A combination of water chemistry and isotope data revealed high TDS waters in the northern valley floor, near Beckworth north of State Highway 70. Its source is not clear, but it was not originating from geothermal water because it lacked the oxygen shift which is characteristic of geothermal water.

The Project Assessment and Evaluation Plan (PAEP) was completed for the Grizzly Pipeline Project and was submitted with the original grant proposal. Subsequent to the project, a maintenance agreement between the DWR and the Plumas County Flood Control District has been executed. The Grizzly Pipeline Project provided matching funds for the Project.

2. Discuss project benefits to water quality, water supply, and the environment.

As seminal studies, the Project provided and continues to provide a scientific basis for the SVGMD ordinance development and management actions needed to reduce undesirable results under SGMA. The project and Plumas Geo-Hydrology also continues to help frame the rationale for additional studies and data collection for the Sierra Valley GSP development process. Specifically, the project has accomplished the following;

- Generated useful information about the complexity and the non-uniformity of shallow and deep aquifer interactions in the SVB;
- Assisted in the identification and ranking (by volume) of SVB shallow and deep groundwater recharge sources;
- Assisted in the identification of naturally occurring and anthropogenic constituent sources, and in the preliminary conceptual characterization of groundwater storage, and groundwater flow pathways; and
- Identified research gaps and research needs relating to the conservation of freshwater marsh ecology in the SVB and the identification of upland spring habitats and upland recharge areas important for sustaining the ecology values and the generally high ambient water quality in the SVB.

3. Comparison and explanation of any differences between expected versus actual project success in meeting IRWM priorities as stated in the original IRWM Implementation Grant application.

Although the project pre-dates SGMA legislation and regulations, the project has provided both documentation and scientific justification for determining that the SVB is a closed basin, and as such, is not beset with problems associated with managing interconnected groundwater basins under SGMA. On the other hand, characterizing groundwater dynamics and especially “safe yield” under post-project SGMA regulations has proved to be more challenging. In hindsight, the two project studies would have benefited from SGMA Best Management Practice (BMP) guidance and regulations that was unavailable during the timeframe of the project. Given the complexity of groundwater dynamics in the SVB, providing SGMA-specific decision support tools would have still been difficult within the Proposition 50 funding and time constraints even if SGMA had preceded rather than followed Proposition 50 funding support. The project has determined that the SVB is not a uniform basin structurally or hydrologically. Therefore, desirable and undesirable “results” and their enhancement or reversal under SGMA will not be uniform. The conceptual model and water budget work undertaken by the project with Proposition 50 funds and in coordination with the Proposition 50-funded Upper Middle Fork watershed and climate model may be continued as prioritized by the SVGMD and Plumas County through the GSP planning grant development process. See more discussion in #4 below.

4. Summary of any additional costs and/or benefits deriving from the project.

Subsequent to the completion of the project, the Feather River Land Trust (FRLT), an overlying landowner in the SVB, was able to solicit and receive funding from UC Davis for more in-depth recharge analysis in the SVB for the SVGMD. When the active recharge potential in the Sierra Valley floor was determined to be inadequate to justify further analysis and development, the FRLT was able to negotiate a change in the work scope for the UC Davis funding to support the development of the Sierra Valley GSP proposal for the summer-fall GSP planning grant solicitation by DWR. Phil Bachand and Associates will be presenting initial findings from their science review and gap analysis for available baseline SVB data and studies, including project studies, at the SVGMD’s upcoming meeting in April 2019.

5. Additional information relevant to or generated by the continued operation of the project.

Subsequent to the completion of the project, Plumas County, the SVGMD, and Plumas Geo-Hydrology have developed a study concept for refining the existing water budget for the SVB for the purpose of supporting sub-basin groundwater recharge and storage analysis for interested overlying landowners and the SVGMD. The water budget refinement study concept and the post-Project PowerPoint presentations on the project are available from Plumas County.