

Final Report Excerpt: Future Data Needs and Road Map to Additional Studies

The LTA Project provides a wide-ranging scientific investigation to develop data and analytical tools to improve the understanding of the aquifer. The field investigation was designed to improve the scientific understanding of the properties of the LTA system.

Although the LTA project was not intended to assess recharge from the Sacramento River, comparison of the hydrograph from one of the newly installed groundwater monitoring well nests with flow data from the river and stable isotope signatures provided some important insight into potential interactions. This evaluation was not part of the original scope of work but was added to the project as a result of realized efficiencies and the recognition that additional available data could substantially enhance the findings of the investigation.

Based on the findings of the Final report, future data needs and additional studies have been identified to further the overall understanding of the LTA.

Recommendation 1: Expand Isotopic Analysis to Further Assess Spatial and Seasonal Relationships

As an add-on to this project, stable isotope data were obtained at several locations. Based on the insights gained from the initial data with respect to the identification and elimination of potential major recharge areas, it is recommended that future studies include much greater emphasis on the collection and interpretation of stable isotope data.

Recommendation 2: Assess Interaction between Sacramento and Other River Stage Response to Changes in Groundwater Levels

A comparison of the river stage data for the Sacramento River with the water levels in the monitoring well at the M&T Ranch indicate a possible correlation, which is supported by the stable isotope data from the river and the same monitoring well. Given the understanding of the hydrogeology of the study area, it is very likely that the Feather River also acts in a similar fashion. It is recommended that additional studies be conducted to better assess the interaction between the river stage on the Sacramento River, Feather River, and other major tributaries with changes in groundwater levels in the LTA and other aquifers that may also provide water to the LTA.

Recommendation 3: Assess Recharge Potential of Shallow Alluvial Aquifer to LTA

The results of the LTA Project indicate that the individual stream channels, flowing across the Tuscan Formation outcrop to the east of the valley floor, are not major sources of recharge to the LTA. Yet, the limited stable isotope data

currently available suggests that appreciable recharge does occur near the eastern perimeter of the basin. One possible explanation for these observations is that the shallow alluvial aquifers overlying the Tuscan Formation near the foothills acts as a recharge source, or “sponge”, that absorb water from local precipitation and from the creeks as they enter the valley. This water subsequently percolates downward into the LTA over a broad area due to the areal extent and vertical hydraulic head within the shallow alluvium. To test this hypothesis, and further evaluate the actual sources and mechanisms of recharge along the eastern perimeter of the valley, it is recommended that a localized study of recharge potential be conducted.

Recommendation 4: Conduct Focused Recharge and Aquifer Interaction Assessments Towards Development of Management Tools Such as Groundwater Model

Although the LTA Project identified a number of hydrologic complexities, there are approaches to build upon the information gained from the study. One opportunity would be to conduct focused recharge and aquifer interaction assessments that will improve management tools such as the groundwater model. It is recommended that the guiding objective be to obtain sufficient data to develop a subregional groundwater model with sufficient detail to be able to be used as a tool for planning and management of individual projects.

Recommendation 5: Definition of stratigraphic zones.

It is recommended that a uniform set of criteria for logging of cuttings from the LTA be developed. Such an effort would need the participation and cooperation of various agencies and, researchers in the region. The criteria adopted should be such that the contacts between geologic formations are easily identifiable from the drill cuttings, such as developed by Blair and others (1991) for the Oroville area.

Recommendation 6: Development of subregional groundwater models.

The current extent of the Butte Basin Groundwater Model (BBGM) and the existing data density limit the ability of the BBGM to be used for evaluation of the potential impacts or benefits of localized projects. Development of subregional models in areas of sufficient data density, for example as discussed in the Recharge and Aquifer Assessment Recommendation, is recommended where feasible. In addition, the knowledge gained from the development and use of such models can also help identify the data needs for

projects being considered outside of an area covered by a subregional model.

In closing, the results of the LTA project have provided important insights towards understanding the recharge mechanisms and interactions with other aquifers that will assist BCDWRC's and other stakeholder's management and protection of this important regional resource. The LTA project has:

Provided a framework for following a consistent characterization of the hydrostratigraphy

Shown that LTA characteristics change from north to south indicating that management of these resources should not be conducted under broad assumed aquifer characteristics.

Provided methods for assessing aquifer properties through use of existing pumping practices

Established a baseline for using isotopic and water quality analysis to evaluate recharge

Identified potential recharge mechanisms related to stages of the Sacramento River and other regional streams within the area

Demonstrated that surface infiltration does not follow a straight vertical pathway to the underlying aquifers

Demonstrated significant storage and recharge to the LTA occurs within the overlying and underlying aquitards and aquifers.

In addition, the project has provided the framework for continuing the overall understanding of the LTA that can be used to develop future studies such as those recommended above.