



**LOWER TUSCAN AQUIFER
MONITORING, RECHARGE, AND DATA
MANAGEMENT PROJECT**

**FIRST QUARTER 2010
QUARTERLY REPORT**

**Butte County
Department of Water and Resource Conservation**

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LIST OF ACRONYMS AND ABBREVIATIONS

ASTM	American Society for Testing and Materials
BC	Brown and Caldwell
BCDWRC	Butte County Department of Water and Resource Conservation
BCEHD	Butte County Public Health Department, Environmental Health Division
CEQA	California Environmental Quality Act
CSU	California State University
DWR	California Department of Water Resources
GIS	Geographic Information System
IRWM	Integrated Regional Water Management
IS/MND	Initial Study/Proposed Mitigated Negative Declaration
LTA Project	Lower Tuscan Aquifer Monitoring, Recharge, and Data Management Project
MND	Mitigated Negative Declaration
QA/QC	Quality Control/Quality Assurance
State Water Board	State Water Resources Control Board
TSC	Technical Steering Committee

SECTION 1 INTRODUCTION

This report is being submitted as the First Quarter 2010 Quarterly Report concerning activities completed for the Lower Tuscan Aquifer Monitoring, Recharge, and Data Management Project (LTA Project). This Quarterly Report is intended to meet the requirements of Attachment Two Section A2.3 of the County of Butte Contract Number 18050 dated January 31, 2010 between Butte County and Brown and Caldwell (BC). The purpose of the Quarterly Reports is to provide the Butte County Department of Water and Resource Conservation (BCDWRC) and the Public progress reports on activities completed during the quarter, a summary of initial findings, and an estimate of activities that will be completed during the next quarter. The LTA Project consists of seven tasks as follows:

Task 1 – CEQA Initial Study

Task 2 – Technical Steering Committee

Task 3 – Development of GIS Geodatabase

Task 4 – Aquifer Recharge Assessment

Task 5 – Installation of Groundwater Monitoring Wells

Task 6 – Aquifer Performance Testing

Task 7 – Public Outreach

The Tuscan Aquifer system, a regional aquifer of the Sacramento Valley Groundwater Basin, is among the principal water bearing units in Butte County. For this project, the Tuscan Formation has been divided into four units, labeled A through D, as defined by Helly and Hardwood (1985). Units A and B define the LTA, the subject of this study, and units C and D define the Upper Tuscan Aquifer. The approximate extent of the LTA within the project boundaries is shown on Figure 1.

1.1 LTA Project Purpose

Butte County has been awarded grant funds from the California Department of Water Resources (DWR) through Proposition 50 (Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002) for implementation of the LTA Project. Included as part of Proposition 50 is the Integrated Regional Water Management (IRWM) Grant Program. Butte County is administering the LTA Project in partnership with the Four County Group (Butte, Glenn, Colusa, Tehama and Sutter Counties).

The LTA Project grant application included a scientific investigation that is to develop data and analytic tools to improve the understanding of the aquifer. Specifically, the LTA Project is a scientific field investigation that seeks to improve the scientific understanding of the properties of the LTA system including:

- The physical parameters affecting percolation of surface water to the LTA.
- The interaction between surface water and the LTA.
- Recharge contributions from other aquifers to the LTA.
- Measurements of standard aquifer properties and their variability.
- Identification of natural recharge areas under current hydrologic conditions.
- Identification of recharge areas under increase utilization.
- How additional pumping may impact the aquifer and surface water.

In addition, the project includes development of a comprehensive Geographic Information System (GIS) Geodatabase to store data collected during the duration of the project. As part of the GIS Geodatabase, the project also includes development of a field data collection tool that will improve quality of data collected in the field to be incorporated into the geodatabase. Finally, the project includes a public outreach program that will heighten public awareness and understanding of the aquifer.

1.2 Report Format

As stated above, the purpose of the Quarterly Reports is to provide the BCDWRC and the public progress reports on activities completed during the quarter, a summary of initial findings, and an estimate of activities that will be completed during the next quarter. As such, the format of this report has been developed based on activities completed during the Quarter. For the First Quarter 2010, activities have been conducted for all seven tasks stated in the introduction. The activities discussed in this report cover the period from January 31, 2010 to May 10, 2010.

SECTION 2 CEQA INITIAL STUDY

BCDWRC, acting as the California Environmental Quality Act (CEQA) Lead Agency, has determined that the proposed LTA Project would not have a significant effect on the environment pursuant to CEQA. Because the Lead Agency finds no substantial evidence that the project or any of its aspects may cause a significant impact on the environment with mitigation, a Proposed Mitigated Negative Declaration (MND) was prepared. BC with teaming partner Galloway Consulting are responsible for preparation of the Draft CEQA Initial Study/Proposed Mitigated Negative Declaration (IS/MND). A summary of activities conducted for preparation of this document during the First Quarter 2010 and planned activities for Second Quarter 2010 are presented in the following Sections.

2.1 Activities Completed - First Quarter 2010

During the First Quarter 2010, the Draft IS/MND was completed and submitted to the State Clearinghouse on May 10, 2010. In preparation of this document, several site visits were conducted in February, March, and April 2010 to assess existing gauging stations along streams, evaluate stream reaches for proposed stream gauging field activities, and review proposed locations for the drilling of groundwater monitoring wells and performance of aquifer testing.

2.2 Planned Activities - Second Quarter 2010

The 30 day public comment period for the Draft IS/MND began on May 10, 2010 and will be on file for public review and comment until June 11, 2010, at the Butte County Planning Division, 7 County Center Drive, Oroville, California. Public comments will also be accepted at the June 8, 2010 Butte County Board of Supervisor meeting and adoption of the MND is anticipated at the Butte County Board of Supervisor June 22, 2010 Meeting.

SECTION 3 TECHNCIAL STEERING COMMITTEE

A Technical Steering Committee (TSC) has been formed to provide input and recommendations to help guide the progress of the project and the quality of the data. The TSC is comprised of qualified scientists selected from within the Four County area and includes representatives from State and local agencies, the academic community and various special districts throughout the Northern Sacramento Valley. The TSC will meet on an as needed basis throughout the duration of the project and will act solely in an advisory capacity to Butte County and the BC Project Team.

3.1 Activities Completed - First Quarter 2010

During the First Quarter 2010, the BCDWRC formed the members of the TSC. A list of these members and the organization they represent are in the Table 1.

Table 1. TSC Members

TSC Member	Organization
Four County Group Members	
Vickie Newlin	BCDWRC
Allan Fulton	Tehama County
Lester Messina	Glenn County, Department of Agriculture
Steve Hackney	Colusa County, Planning and Building Department
Dan Peterson	Water Resources, Sutter County Department of Public Works
External TSC Members	
Joe Connell	University of California Cooperative Extension
Brendon Flynn	Pacific Farms & Orchards
Dr. Steffan Mehl	California State University (CSU) Chico
Dr. Todd Greene	CSU Chico
Benn Pennock	Glenn Colusa Irrigation District
Ted Trimble	Western Canal Water District
Kelly Stanton	DWR, Northern District
Tracy McReynolds	Department of Fish and Game
John Lane	Chico Environmental Science and Planning
Mark Kimmelshue	Armco
Dr. Lev Kavvas	Hydraulic Research Laboratory, California Hydrologic Research Laboratory
Carol Perkins	Butte Environmental Council

3.2 Planned Activities - Second Quarter 2010

The first TSC Meeting is scheduled for May 26, 2010 in Oroville.

SECTION 4 GIS GEODATABASE

As stated in Section 1, the project includes development of a comprehensive GIS Geodatabase to store data collected during the duration of the project. This system will be an important tool for the BCDWRC to monitor conditions in the groundwater basin and promote education regarding the local water resources and will allow qualification and quantification of surface water and groundwater properties from the LTA Project area including:

- Aquifer transmissivity and hydraulic conductivity;
- Aquifer storage values (storativity or specific yield);
- Surface water and groundwater temperature;
- Streambed and soil infiltration capacities;
- Monitoring well location and construction;
- Extraction well location, construction, yield, drawdown and specific capacity.

As part of this task, the BC Project Team is also developing a field data collection tool that will improve the quality of the data collected in the field to be incorporated into the geodatabase.

4.1 Activities Completed - First Quarter 2010

During the First Quarter 2010, the BC Project team completed development of the initial data schema for the project and the structure of the forms for the field data tool. In development of these systems, a needs analysis was conducted to define the requirements of the system through a series of facilitated workshops. These workshops enable members of the project team to define specific requirements and included a meeting with the Four County Group to discuss the overall structure and content of the database on February 26, 2010.

Based on the needs analysis, the BC Project team designed the geodatabase that included design of spatial relationships (coordinates of locations), data associated with the spatial points, relationship, development of specific objects for use such as tables, any interfaces such as an output interface to models and an input interface for the field data collection tool, and QA/QC procedures.

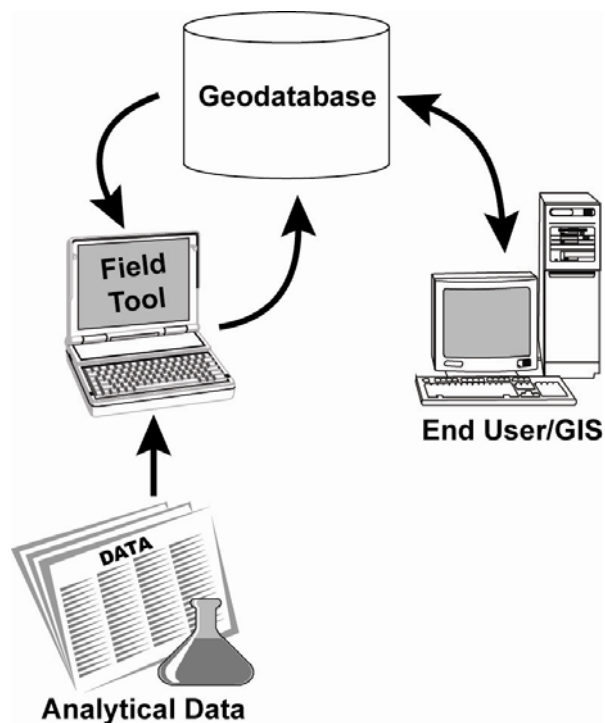


Figure 2. Simplified Overview of Geodatabase Relationships and Process

In addition, the structure of the forms that will be used for the field data tool have been developed and ready for testing in the field. Snapshots of example forms are provided in Figures 3 and 4.

4.2 Planned Activities - Second Quarter 2010

During the second quarter 2010, the field data collect tool will be field tested during initial stream gauging activities. The geodatabase will also be beta-tested (using example data) during this period then tested with real time data collected during field activities conducted during the quarter.

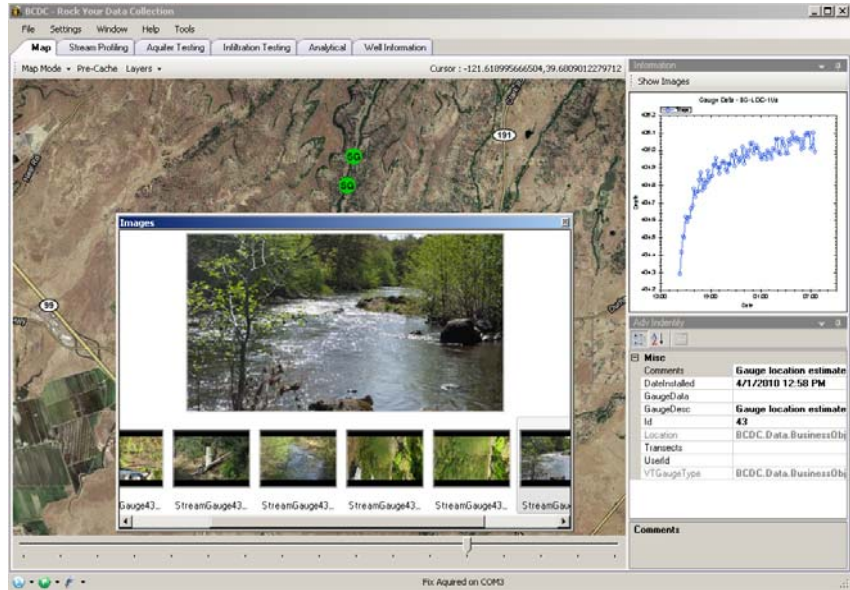


Figure 3. Snapshot of Field Form Showing Basemap with Locations, Photographs of Location, and Chart of Data

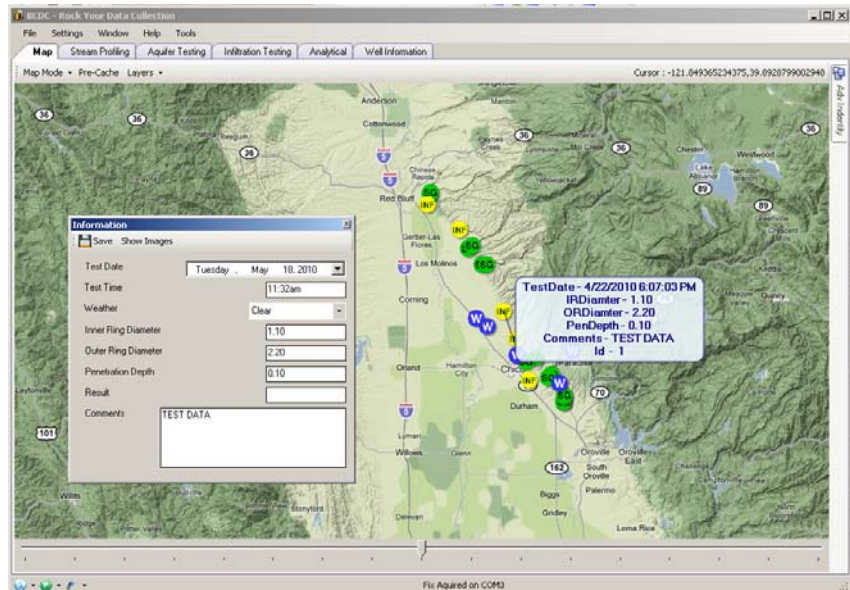


Figure 4. Snapshot of Field Form Showing Locations, Location Information, and Data Entry Table

SECTION 5 AQUIFER RECHARGE ASSESSMENT

The aquifer recharge assessment is intended to gain a better understanding of the flow pathways by which surface water enters the subsurface and recharges the LTA. Three subtasks have been identified to assess the potential for recharge from surface water sources: Subtask 1 – Soil Infiltration Testing; Subtask 2 – Stream Gauging; and Subtask 3 – Stream-Aquifer Temperature Gradient Evaluation.



Figure 5. Existing Staff Gauges within Butte Creek

The soil infiltration testing (Subtask 1) will be performed at 10 locations (Figure 1). Each test location will include the performance of basic geologic outcrop mapping in the immediate vicinity of the test location. One double-ring infiltrometer tests will be performed at each of the ten proposed sites following American Society for Testing and Materials (ASTM) Standard D-3385-03. The stream gauging task (Subtask 2) is intended to provide estimates of discharge, and potential recharge to the LTA, from 6 primary streams within the drainage basin overlying and intersecting the LTA. These streams include: Antelope Creek, Mill Creek, Deer Creek, Big Chico Creek, Butte Creek, and Little Dry Creek (Figure 1). The Stream-aquifer interaction task (Subtask 3) includes three components which relate to the ability for the stream channels to act as primary recharge conduit to the LTA. The three tasks to be implemented here include a temperature gradient evaluation, slug testing of shallow piezometers, and seepage meter evaluation. Details of each of these tasks are presented in the Draft IS/MND.



Figure 6. Existing Staff Gauges at Big Chico Creek

5.1 Activities Completed - First Quarter 2010

During First Quarter 2010, the BC Project Team reviewed existing model data associated with recharge parameters and conducted a site visit on January 27, 2010 to assess existing gauging stations and access issues for future field activities. During the site visit, existing stream gauges were identified on Butte and Big Chico Creeks that will be used for this assessment.



Figure 7. Field Test of StreamPro ADCP at Big Chico Creek

Specific reaches of each of the six streams listed above that will be used for the recharge assessment were outlined and presented in the Draft CEQA IS/MND.

The BC Project Team also conducted an assessment of equipment needs for the completion of the field programs associated with this task. Based on this assessment, BC recommended purchase of a StreamPro ADCP by Teledyne RD Instruments for stream gauging. Figure 7 shows a field test of this instrument conducted at Big Chico Creek.

5.2 Planned Activities - Second Quarter 2010

During the Second Quarter 2010, all field activities for this task are expected to be initiated. Specific activities that are expected to be conducted included stream gauging, performance of soil infiltrometer tests, soil and geologic mapping, installation of temperature gradient well points, installation of staff gauges, and development of stream profiles.

SECTION 6 INSTALLATION OF GROUNDWATER MONITORING WELLS

Over the past few years, dedicated groundwater monitoring infrastructure (monitoring wells) have been installed in the Northern Sacramento Valley, which has contributed to a better understanding and quantification of the region. The LTA Project includes the installation of additional monitoring wells to further contribute to groundwater monitoring databases. The purpose of this task is to:

- Establish a reliable baseline of hydrogeologic data,
- Fill data gaps,
- Measure drawdown during aquifer performance tests,
- Monitor groundwater recharge, and
- Evaluate well performance and pumping impacts.

Dedicated groundwater monitoring wells provide data regarding the depths of different aquifers. Small diameter PVC pipes with perforations at varying depths will be placed near an existing production well and measurements of groundwater depth and quantity are made at different times to assess local groundwater recharge and recovery. The proposed monitoring wells cannot be used for or retrofitted for groundwater extraction or production of water. Once the monitoring project is complete, the monitoring wells will be integrated into the cooperative DWR-BCDWRC groundwater monitoring network.

6.1 Activities Completed - First Quarter 2010

During the First Quarter 2010, the BC Project team identified 7 groundwater monitoring sites as shown on Figure 1 and discussed in detail in the CEQA IS/MND. The monitoring well locations are all located in Butte County either adjacent to active agricultural land or within previously disturbed areas. Based on existing funding, it is estimated that approximately three of these wells will be installed; however, all seven sites were evaluated for access issues. In addition, access agreements have been obtained from the property owners of the three initial drilling locations.

In addition, approximately three existing wells have been identified that with agreement from the owners, will be



**Figure 8. Existing Nested Monitoring Wells
Located Near Palermo Road**

added to groundwater monitoring network. Discussions with these owners have been initiated. On Figure 1 these wells are labeled as MW-LTR-1, MW-ESQ-w, and MW-PNZ-1.

6.2 Planned Activities - Second Quarter 2010

During the Second Quarter 2010, well permits will be obtained from the Butte County Public Health Department, Environmental Health Division (BCEHD). As part of obtaining the permits, a work plan will be prepared outlining the methods and procedures that will be used to drill, sample, install, and develop the wells. This work plan will be submitted to the TSC and BCDWRC for review and comment prior to submitting to the BCEHD. After obtaining the permits, drilling and installation of the wells will begin. In addition, with agreement from owners, the three existing wells that have been identified will be outfitted with pressure transducers and added to the groundwater monitoring network.

SECTION 7

AQUIFER PERFORMANCE TESTING

This task consists of two subtasks, a review of existing aquifer performance testing and the performance of up to three aquifer performance tests. Up to 6 detailed reviews of existing aquifer performance tests will be conducted. The review will include the evaluation of test design, test implementation, the data collected during the test, and the analysis of the test data. If the analysis of the data is found to be inconsistent with industry standards the data will be re-analyzed to verify results.

Aquifer performance testing will be conducted on three existing production wells. The production wells to be utilized are existing groundwater pumping wells and are connected to irrigation distribution systems. The water extracted will be used as part of existing irrigation practices and distributed according to normal operating conditions at each location. These tests will be compliant with the Regional Water Quality Control Board General Discharge Permit, where applicable and no additional permitting would be required.

7.1 Activities Completed - First Quarter 2010

The BC Project Team began assessment of existing model data associated with aquifer parameters and identification of existing aquifer tests whereby results can be reviewed. Existing aquifer tests identified to date include one conducted at Deer Creek by the DWR, a test conducted at Rancho Esquon by the property owner, and several tests conducted at the Koppers Company Superfund site located in Oroville California. In addition, three production wells were identified to conduct the aquifer performance tests for the LTA Project. These wells are located on Rancho Esquon, M&T Ranch, and Shelton Property (Figure 1). Access to these wells has been obtained from the property owners.

7.2 Planned Activities - Second Quarter 2010

During the Second Quarter 2010, data from identified existing aquifer tests will be obtained and initial review of these tests will be conducted. The aquifer performance tests for the LTA Project will not be conducted until 2011. However, pressure transducers may be installed within existing production wells and monitoring wells to assess conditions during the pumping and non-pumping seasons. This information will be valuable for interpretation of the results of the aquifer tests that will be performed for the LTA Project.

SECTION 8 PUBLIC OUTREACH

The purpose of the public outreach task is to educate regional and county decision makers and the public about the aquifer investigation's objectives, progress, and results. Public outreach as part of the LTA Project will primarily consist of stakeholder and public meetings, with support in the form of quarterly reports, a website, and newsletters. This website would provide a means of sharing the project schedule, status, and outreach materials with the public and stakeholders. The website will be updated monthly and can contain content such as: project schedule, CEQA documentation, quarterly reports, meeting minutes, outreach meeting schedules, project data, newsletters, and links to other related websites.

8.1 Activities Completed - First Quarter 2010

Public outreach activities that were conducted during the First Quarter 2010 included preparation for and attendance at the February 26, 2010 Four County Meeting to discuss development of GIS/Geodatabase and provide a general overview of the LTA Project. A similar presentation was conducted at the May 5, 2010 Butte County Water Commission Meeting. In addition, the website for the project can be accessed at:

<http://www.buttecounty.net/Water%20and%20Resource%20Conservation/Tuscan%20Aquifer%20Project.aspx>



Figure 9. Copy of LTA Project Website

8.2 Planned Activities - Second Quarter 2010

A presentation of the LTA Project and overview of the CEQA IS/MND will be presented at the June 8, 2010 Butte County Supervisor Meeting. The first Public Outreach meeting will also be conducted in mid-July 2010. A notice for this meeting will be published on the website and in local newspapers.