Adelaida Hydrology Study

Evaluation of Groundwater Resources in the Adelaida Area, San Luis Obispo County, California

April 23, 2021

In cooperation with the San Luis Obispo County Flood Control and Water Conservation District;
Upper Salinas-Las Tablas Resource Conservation District

These data are preliminary or provisional and are subject to revision. They are being provided to meet the need for timely best science. The data have not received final approval by the U.S. Geological Survey (USGS) and are provided on the condition that neither the USGS nor the U.S. Government shall be held liable for any damages resulting from the authorized or unauthorized use of the data.
Questions and Comments

By phone:
Press *9 to “raise your hand” to make a comment or ask a question
Press *6 to unmute or mute when prompted

From your computer:
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Evaluation of Groundwater Resources in the Adelaida Area, San Luis Obispo County, California

• Presentation Outline
  • Purpose, Scope, and Objectives
  • Task 1 Summary
    • Area of Interest
    • Local Participation and Outreach
    • Data Sources and Compilation
    • Preliminary Evaluation
  • Future Work
  • Project Timeline
  • Questions

Preliminary, subject to revision. Do not cite or distribute.
Purpose and Scope, and Objectives

Purpose and Scope:
• Characterize the hydrology of the Adelaida Area, SLO County, California

Objectives:
• Compile and collect geologic, hydrologic, and hydraulic data
• Quantify the hydrologic budget
• Refine the hydrogeologic understanding of the area with respect to geographic, vertical, and temporal variations
Concerns

- Increased demand for water use likely will continue to affect groundwater levels and availability

- Adelaida Area is *not* in a DWR designated groundwater basin; comprised mostly of consolidated sedimentary rocks

- SLO County has a specific need to evaluate historic and current hydrogeologic conditions
Study Area

• Modified to conform with hydrologic boundaries

• Includes 10 local watersheds

• Areas of focus include Paso Robles Creek and Las Tablas Creek watersheds
Local Participation and Outreach

- Community Meeting August 2020

- Engage residents, vineyards, advocacy groups

- 17 stakeholders agreed to participate
  - Field visits, phone calls, email
  - Hydrogeologic data
  - Local knowledge—past and present
Local Participation and Outreach

- Site Visits – November 2020
  - Upper Salinas-Las Tablas RCD and USGS
  - Multiple stakeholders in the Adelaida Area
  - Hydrologic and anecdotal information
  - Consent forms submitted

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Photos courtesy of Amy Smart and Geoff Cromwell
Local Participation and Outreach

- Website
- Project Summary
- Interactive map
- Hydrologic information
- Select data
- Outreach
- Interactive Map
- Select publicly available data

Evaluation of Groundwater Resources in the Adelaida Area of San Luis Obispo County, California

Stakeholders in San Luis Obispo County are concerned that the increased demand for water use has, and will continue to, affect groundwater levels and availability in the Adelaida area. To address stakeholder concerns, the County of San Luis Obispo Board of Supervisors has asked the USGS to conduct a comprehensive evaluation of groundwater resources of the Adelaida area.

Interactive Map | Water Supply | Land Use | Groundwater Flow | Outreach

Groundwater is the primary source of water in the Adelaida area and local stakeholders use private domestic and commercial wells to pump groundwater from the aquifer system. There is concern among stakeholders that the increasing demand for water is negatively affecting groundwater levels and groundwater availability. In response to these concerns, the County of San Luis Obispo Board of Supervisors (County Board) seeks to evaluate groundwater management solutions in the Adelaida area and has asked the United States Geological Survey (USGS), in cooperation with the San Luis Obispo County Flood Control and Water Conservation District (SLOCF & WC), to provide a comprehensive evaluation of historic and current groundwater resources in the area.

The USGS will gain an increased scientific understanding of the hydrologic system in the Adelaida area by compiling and collecting hydrogeologic and hydraulic data in the defined study area. The California Department of Water Resources (DWR) has not defined the highlands of the Adelaida area as a groundwater basin, therefore the area is not subject to California Sustainable Groundwater Management Act (SGMA) regulations (CADWR, 2016). The eastern border of the Adelaida area is outside of the Salinas Valley-Paso Robles Area (Paso Robles sub-basin) and Salinas Valley-Atascadero Area (Atascadero sub-basin) groundwater basins (CADWR, 2016; fig. 1). Publicly available hydrogeologic and hydraulic data (such as aquifer yield, water quality, or water availability) are limited throughout the Adelaida area, and to date, no investigation of the groundwater resources or water-bearing units of the aquifer system of the Adelaida area has been completed. The Adelaida Study (Study) will extend to the eastern area of the Paso Robles sub-basin and Atascadero sub-basin to better understand the groundwater connectivity between the sub-basin boundaries and the Adelaida area.

This Study will benefit water managers, stakeholders and potential future interested entities and studies by providing:

- an improved understanding of the aquifer system, including identifying the water-bearing units
- evaluating the historic and current impacts of groundwater use in the Adelaida area
- quantifying the groundwater resources in an undefined local aquifer system
- advancing monitoring networks in the County for groundwater and water-quality data
- providing a more thorough understanding of geological controls on water availability

https://www.usgs.gov/centers/ca-water/science/evaluation-groundwater-resources-adelaida-area-san-luis-obispo-county?qt-science_center_objects=0#qt-science_center_objects
Local Participation and Outreach

• Website
  • Project Summary
  • Interactive map
  • Hydrologic information
  • Select data
  • Outreach

• Interactive Map
  • Select publicly available data
  • Area of interest
  • USGS sites and data
  • Surface-water features
  • DWR Well Completion Reports
  • Land-use data
  • Geologic map, folds, faults

U.S. Geological Survey (2020)

Preliminary, subject to revision. Do not cite or distribute.
Data Sources and Compilation

- Public databases, reports, and local stakeholders
  - Climate (precipitation and temperature)
  - Land use
  - Streamflow
  - Surface and subsurface geology
  - Groundwater levels
  - Groundwater and surface-water chemistry
  - Groundwater recharge and discharge

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Climate (Precipitation)

- Estimated precipitation
  - USGS Basin Characterization Model (Flint and others, 2021)

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Climate (Precipitation)

- Estimated precipitation
  - USGS Basin Characterization Model (Flint and others, 2021)
  - Average precipitation - about 21 inches per year
Land use

Preliminary, subject to revision. Do not cite or distribute.

DWR Land-use Surveys

Adelaida area and sub-watersheds

California Department of Water Resources (1977, 1985, 2000); LandIQ (2017)
Land use

DOC Farmland Mapping and Monitoring Program

Adelaida area and sub-watersheds

1977 Not Available 1984

1996 2014

irrigated
- no
- usually
- water
- yes
- non-ir ag
- urban

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Land use

Irrigated agriculture

California Department of Conservation (2019)

Preliminary, subject to revision. Do not cite or distribute.
Surface-Water Flow

Preliminary, subject to revision. Do not cite or distribute.
Surface and subsurface geology

- Surface geology sources
  - Geologic maps
  - Faults and folds

- Generalized geology
  - Unconsolidated sediments
  - Consolidated sedimentary rocks
  - Composite basement rocks

Preliminary, subject to revision. Do not cite or distribute.
Surface and subsurface geology

- Subsurface geology sources
  - Drillers’ lithology logs
- Borehole geophysical logs
- Regional geophysical surveys and data
Groundwater levels

- Groundwater-level measurements
  - 1992–2021

- Length of record
  - Occasional
    - Most stakeholder wells
  - Regular
    - Klau/Buena Vista Mine
    - GeoTracker
  - Semi-continuous
    - Few stakeholder wells

California State Water Resources Control Board (2016); CH2M-Hill (2012)
Groundwater levels

- Groundwater-level altitudes from wells for 2016–2017
Groundwater levels

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Water Quality

- Groundwater and surface-water quality measurements
Water Quality

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Estimated Recharge

- Estimated Recharge
- USGS Basin Characterization Model (Flint and others, 2021)
Estimated Recharge

• Relative estimated recharge by watershed
• USGS Basin Characterization Model (Flint and others, 2021)
Task 1 Summary

• Stakeholder outreach and project website

• Comprehensive hydrogeologic data compilation
  • Historic changes in climate and land use
  • Groundwater and surface-water flow and quality
  • Estimates of groundwater recharge

• Foundation for integrated analysis

• Need for additional historic groundwater-level measurements
Proposed Future Work

• Data Collection
  • Hydrologic data
    • Surface-water monitoring
    • Groundwater-level monitoring
    • Water quality
  • Geophysical Data
    • Downhole geophysical logs
    • Direct-current resistivity surveys
  • Groundwater storage
    • Repeat microgravity surveys
    • InSAR

• Hydrogeologic Framework Model
• Evaluation and interpretation
• Reporting
  • USGS SIR, Factsheet, and data releases
• Project Website and Outreach
  • Annual community meetings

All collected data will be publicly available through the USGS National Water Information System database, GeoLog Locator, or ScienceBase Data Release

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Proposed Future Work - Data Collection

- Hydrologic Data
  - Surface-water monitoring
    - Streamgage installation
    - Discrete and continuous measurements
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• Hydrologic Data
  • Surface-water monitoring
    • Streamgage installation
    • Discrete and continuous measurements

• Groundwater-level monitoring
  • Expand participation network
  • Discrete and continuous measurements

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Proposed Future Work - Data Collection

• Hydrologic Data
  • Surface-water monitoring
    • Streamgage installation
    • Discrete and continuous measurements
  • Groundwater-level monitoring
    • Expand participation network
    • Discrete and continuous measurements
• Water quality
  • Major ions, stable isotopes, tritium, carbon-14
Proposed Future Work- Data Collection

- Geophysical Data Collection
- Downhole geophysical logs
Proposed Future Work - Data Collection

• Geophysical Data Collection
  • Downhole geophysical logs
  • Direct-Current Resistivity Surveys

Example results along the Colorado River, Arizona

Kennedy and others (2017)
Proposed Future Work - Data Collection

- Estimates of Groundwater Storage Change
  - Repeated Microgravity Surveys

A and B: Absolute-gravity stations
C: Relative-gravity platform

Kennedy and others (2017)
Proposed Future Work- Data Collection

- Estimates of Groundwater Storage Change
  - Repeated Microgravity Surveys
  - InSAR (Interferometric Synthetic Aperture Radar)

Example results from the Coachella Valley, California

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Sneed and Brandt (2020)
Proposed Future Work- Hydrogeologic Framework Model

- Hydrogeologic Framework Model
  - Three-dimensional representation of subsurface hydrogeologic units
- Aquifer characterization

Preliminary results from the San Antonio Creek groundwater basin, Santa Barbara County, California

Cromwell and others (in review)
Proposed Project Timeline

• Proposed work to SLO County Board of Supervisors Summer 2021

• Data collection 2021-2024
  • Field visits beginning Summer/Fall 2021

• Framework and analysis 2022-2024

• Anticipated completion of study late 2025

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Opportunities to Engage

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Sign up for EMAIL LIST at:

https://www.slocounty.ca.gov/AdelaidaStudy

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Websites:

Upper Salinas – Las Tablas Resource Conservation District:
https://www.us-ltrcd.org/adelaida-hydrology-study

San Luis Obispo County Flood Control and Water Conservation District:
https://www.slocounty.ca.gov/AdelaidaStudy

U.S. Geological Survey:
https://www.usgs.gov/centers/ca-water/science/evaluation-groundwater-resources-adelaida-area-san-luis-obispo-county?qt-science_center_objects=0#qt-science_center_objects
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• Cromwell, G., Sweetkind, D.S., and O’Leary, D.O., in review, Three-dimensional hydrogeology of the San Antonio Creek Valley Groundwater Basin, Santa Barbara County, California.
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