DWR Existing Data & Tools to Support Decision-Making Under SGMA

June 3, 2016

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Department of Water Resources
Presentation Overview

- GW Data Dependent GSP Articles
- DWR Water Resource Data
- Key Groundwater Data Sites
- Thoughts on Current Data and Tools
Groundwater Dependent GSP Articles
GSP Regulation Articles

1. Introductory Provisions
2. Definitions
3. Technical and Reporting Standards
   1. Monitoring Protocols
   2. Data and Reporting Standards
   3. Data Management System
4. Procedures
   1. Information Provided by the Department
   2. Reporting Provisions
   3. Initial Notification
   4. Comments
   5. Withdrawals or Amendments
5. Plan Content
   1. Administrative Information
   2. Basin Setting
   3. Sustainable Management Criteria
   4. Monitoring Networks
   5. Projects and Management Actions
6. Department Evaluation and Assessment
7. Annual Reports and Periodic Evaluations
8. Interagency Agreements
9. Adjudicated Areas and Alternatives
Article 5. Plan Contents

1. Administrative Information
   § 354.4. General Information
   § 354.6. Agency Information
   § 354.8. Description of Plan Area
   § 354.10. Notice & Communication

2. Basin Setting
   § 354.16. Groundwater Conditions
   § 354.18. Water Budget
   § 354.20. Management Areas

3. Sustainable Management Criteria
   § 354.24. Sustainability Goal
   § 354.26. Undesirable Results
   § 354.28. Minimum Thresholds
   § 354.30. Measurable Objectives

4. Monitoring Networks
   § 354.34. Monitoring Network
   § 354.36. Representative Monitoring
   § 354.38. Assessment & Improvement
   § 354.40. Reporting Monitoring Data to the Department

5. Projects and Management Actions
   § 354.44. Projects & Management Actions

Undesirable Results

- Significant and Unreasonable
  - Lowering GW Levels
  - Reduction of Storage
  - Seawater Intrusion
  - Degraded Quality
  - Land Subsidence
  - Surface Water Depletion
Article 5. Subarticle 2
§ 354.14 Hydrogeologic Conceptual Model

✓ Regional geologic and structural setting
✓ Principal aquifers and aquitards
  • Location and extent
  • Aquifer properties
  • Significant geologic or hydrologic features
  • General water quality
  • Primary aquifers use (domestic, irrigation, or municipal supply)
✓ Cross-sections
✓ Maps
  • Topography
  • Surficial geology
  • Soil characteristics
  • Recharge and discharge areas
  • Surface water features
  • Imported water supplies
Article 5. Subarticle 2
§ 354.16 Groundwater Conditions

Description of current and historical conditions...for each sustainability indicator

§350.4 General Principles
(d) Groundwater conditions must be adequately defined and monitored to demonstrate that a Plan is achieving the sustainability goal for the basin, and the Department will evaluate the level of detail provided considering the basin setting.

- Lowering GW Levels
- Reduction of Storage
- Seawater Intrusion
- Degraded Quality
- Land Subsidence
- Surface Water Depletion
Article 5. Subarticle 2
§ 354.18. Water Budget

(a) Each Plan shall include a water budget for the basin that provides an accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the basin, including historical, current and projected water budget conditions, and the change in the volume of water stored.

**Best Available Information:** Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow.
Article 5. Subarticle 2
§ 354.18. Water Budget (General Requirements)

✓ Inflows to the basin by Water Source Type:
  • Surface water, groundwater, recycled or reused water

✓ Outflows from the basin by Water Use Sector:
  • Urban, industrial, agricultural, managed wetlands, managed recharge, native vegetation

✓ Annual Change (volume) in gw in storage:
  • Between seasonal high conditions

✓ If Overdraft conditions are occurring, as per B118, quantify during average year conditions.

✓ The water year type* associated with annual supply, demand, and change in storage.

✓ An estimate of sustainable yield for the basin

* = Information made available by DWR
Article 5. Subarticle 3.
§354.22 Sustainable Management Criteria

§350.4 General Principles
(d) Sustainable management criteria and projects and management actions shall be commensurate with the level of understanding of the basin setting, based on the level of uncertainty and data gaps, as reflected in the
DWR Water Resource Data
DWR Home Page... *we have “issues”*

[http://water.ca.gov](http://water.ca.gov)
DWR...we have “data”

http://water.ca.gov/nav/index.cfm?id=106

Agricultural Land and Water Use Estimates

The Department of Water Resources estimates irrigated crop acreages, crop evapotranspiration (ETc), evapotranspiration of applied water (ETAw), effective precipitation (Ep), and applied water (AW) for 20 crop categories each year. Data are estimated from reference evapotranspiration (ETo) or evaporation pan data (Ep), crop development over time (crop coefficients), soil characteristics, rooting depths, and the quantity and timing of precipitation. Applied water (AW) estimates reflect irrigation efficiencies as well as the water required for cultural practices such as the pruning of water in rice fields or the leaching of accumulated salts from the soil.

Data compiled by study area and year are available for download in spreadsheet (.xls) format.

To Download Data: Expand the menu under Statewide, County, Hydrologic Region (HR), or Detailed Analysis Unit (DAU), click on a year and select “Save As...”.

- Statewide
- Hydrologic Region (HR)
- Planning Area (PA)
- County
- Detailed Analysis Unit (DAU)

Note: Irrigated crop areas are in thousands of acres.

2010
2009
2008
2007
2006
2005

LAND AND WATER USE

LAND & WATER USE Data Collections

- Crop Water Use Estimation
- Agricultural Water Use Monitoring
- Statewide Irrigation Method Survey
- California Seasonal Application Efficiency Program
- Water Use Data
- Contacts

DWR Related Links

- GIS
- DSS
- Water Use
- Urban Water Management
- Water Use Efficiency

South Central Region Office
Department of Water Resources
Phone: 209-356-3700
Street and Mailing Address:
3371 East Shields Avenue
Fresno, CA 93726-5813

Typical standardized site (irrigated pasture) with

DWR...we have “data”

http://water.ca.gov/nav/index.cfm?id=106

Agricultural Climate and Evaporation Data

DWR has been researching the relationship between crop water use, or evapotranspiration (ET), and evapotranspiration from United States Weather Bureau (U.S.W.B.) Class A evaporation pans located in irrigated pastures for over 50 years. The program began as a research effort to document data evapotranspiration in different regions of the state and for the ET of a grass-reference crop as well as the ET of important agricultural areas. The continued years of research allowed the determination of crop-specific coefficients used to estimate ET from evaporation pan data and instruments measuring ET pan evaporation rates. A statewide Agricultural data collected from this program provides data results from the program ultimately led to the development of empirical equations for determining ETc from ET pan evaporation rates. As part of the research, the South Central Region of California collected data from evaporation pans located at 13 locations surrounding the evaporation pans, and used this information to develop empirical equations for estimating ETc. The data collected from these evaporation pans, along with the empirical equations for estimating ETc, are used to calculate ETc for various crops and locations within the state.
DWR...we have “data”

http://water.ca.gov/nav/index.cfm?id=106

California Data Exchange Center - Precipitation

Choose water years to plot 8-station precipitation index:

- 1925-1924 (driest)
- 1976-1977 (2nd driest)
- 1982-1983 (wettest)
- 2000-2001
- 2001-2002
- 2006-2007
- 2011-2012
- 2012-2013
- 2013-2014
- 2014-2015
- 2015-2016 (current)

Percent of Average for this Date: 119%

Northern Sierra Precipitation: 8-Station Index, June 2, 2016

- NSC - Mount Shasta City
- SHH - Shasta Dam
- MUK - Mineral
- ORF - Orick
- BSC - Brandy Creek
- SRH - Sierra Nevada HS
- IRVM - Blue Canyon
- PCH - Pacific House

Cumulative Daily Amount Precipitation (inches)

Water Year Precipitation

Average (1922-1998) 53.0
56.9 - Current Daily Precip.
15.0 - 1923-1924 (driest)
17.1 - 1976-1977 (2nd Driest)
88.5 - 1982-1983 (Wettest)

[Graph showing precipitation data]
Key Groundwater Data Sites
Current DWR Groundwater Data & Tools

• Water Data Library (water level data)
  www.water.ca.gov/waterdatalibrary/

• CASGEM (water level data)
  www.water.ca.gov/groundwater/casgem/

• DWR Groundwater Information Center
  Main Page - www.water.ca.gov/groundwater/gwinfo/index.cfm
  Maps and Reports - www.water.ca.gov/groundwater/maps_and_reports/index.cfm

• GIC Interactive Map (water level and subsidence maps)
  www.water.ca.gov/groundwater/MAP_APP/index.cfm

• SGMA Water Management Planning Tool (boundaries map)
  Main Page - http://www.water.ca.gov/groundwater/sgm/
  Interactive map - www.water.ca.gov/groundwater/boundaries.cfm
Water Data Library

Use the map below to locate monitoring stations. You can find an area of interest if you zoom and pan the map. Quickly find an area searching for named features on a map such as the name of a city, park, landmark, lake, water feature, or zip code within California. Once at the area of interest, select the desired Site Type and click the “Refresh Map” button to show monitoring stations in the area. Additional searches by data type are possible by clicking the links on the left. For help on these and other ways to find your data click here.

WDL STATION MAP

Location Search
To find monitoring stations for a specific area, enter the placename or zip code into the text box below.

Site Type
Select the desired site type using the checkboxes:
- Groundwater Level
- Water Quality
- Continuous Data

Additional Information
- Multiple Stations at one Location
- Cluster: showing number of stations

Cursor Coordinates (WGS84)
Lat: 30.9960, Long: -122.9039

You should view the map with Internet Explorer 9, Firefox 31, Chrome 36, or Safari 4 or later versions of these browsers.
Water Data Library

Use the map below to locate monitoring stations. You can find an area of interest if you zoom and pan the map. Quickly find an area searching for named features on a map such as the name of a city, park, landmark, lake, water feature, or zip code within California. Once at the area of interest, select the desired Site Type and click the “Refresh Map” button to show monitoring stations in the area. Additional searches by data type are possible by clicking the links on the left. For help on these and other ways to find your data, click here.

WDL STATION MAP

Location Search
To find monitoring stations for a specific area, enter the place name or zip code into the text box below.

Select the desired data type using the checkboxes:
- Groundwater Level
- Water Quality
- Continuous Data
- Historic Data
- Multiple Stations at one Location
- Cluster, showing number of stations

Multiple stations at this location:
- Groundwater Level Station: 373992N1220645SW001
- Groundwater Level Station: 373992N1220645SW002
- Groundwater Level Station: 373992N1220645SW003

You should view the map with Internet Explorer 9, Firefox 31, Chrome 36, or Safari 4 or later versions of these browsers.
Groundwater Levels for Station 373992N1220645W003

Data for your selected well is shown in the tabbed interface below. To view data managed in the updated WDL tables, including data collected under the CA SGEM program, click the "Recent Groundwater Level Data" tab. To view data stored in the former WDL tables, click the "Historical Groundwater Level Data" tab. To download the data in CSV format, click the "Download CSV File" button on the respective tab.

Please note that the vertical datum for "recent" measurements is NAVD88, while the vertical datum for "historical" measurements is NGVD29. To change your well selection criteria, click the "Perform a New Well Search" button.

State Well Number: 06S02W22G006M
Local Well ID: 06S02W22G006
Site Code: 373992N1220645W003
Latitude (NAD83): 37.399170
Longitude (NAD83): -122.06454
Groundwater Basin (code): Santa Clara (2-9-02)

Well Use: Observation
Well Status: Active
Well Completion Report Number: 166215
Reference Point Elevation (NAVD88 ft): 59.50
Ground Surface Elevation (NAVD88 ft): 50.00
Total Depth (ft): 535
Perforated Interval Depths (ft): 363.000 333.000

[Map of Santa Clara County]
Groundwater Levels for Station 373992N1220645W003

Data for your selected well is shown in the tabbed interface below. To view data managed in the updated WDL tables, including data collected under the CASGEM program, click the “Recent Groundwater Level Data” tab. To view data stored in the former WDL tables, click the “Historical Groundwater Level Data” tab. To download the data in CSV format, click the “Download CSV File” button on the respective tab.

Please note that the vertical datum for “recent” measurements is NVD08, while the vertical datum for “historical” measurements is NGVD29. To change your well selection criteria, click the “Perform a New Well Search” button.

Download CSV File

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<th>GSE</th>
<th>RPWS</th>
<th>WSE</th>
<th>GS to...</th>
<th>Monit Code</th>
<th>CASGEM Monit</th>
<th>Agency</th>
<th>Comments</th>
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<td>-11.07</td>
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<td>274</td>
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</tbody>
</table>
Water Data Library

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WDL STATION MAP

Location Search
To find monitoring stations for a specific area, enter the place name or ZIP code into the text box below.

Site Type
Select the desired site type using the checkboxes:
- Groundwater Level
- Water Quality
- Continuous Data
- Include Historical Data
- Multiple Stations at one Location

Cursor Coordinates (WGS84)
Lat: 30.0690, Long: -122.9038

You should view the map with Internet Explorer 9, Firefox 31, Chrome 36, or Safari 4 or later versions of these browsers.
### Time Series Data

**Selected type of data and a county. The results will change after your selection. Not all combinations will have results.**

#### Type of Data Collected
- Groundwater
- County

#### Groundwater Time Series Data in All Counties

<table>
<thead>
<tr>
<th>Sites</th>
<th>Groundwater</th>
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<tr>
<td>Am. Basin Well 1 mid-shallow 396-400</td>
<td>510-650 ft</td>
</tr>
<tr>
<td>American Basin Well 1 deep screen 593-670 ft</td>
<td>X</td>
</tr>
<tr>
<td>American Basin Well 1 middle-shallow 650-750 ft</td>
<td>X</td>
</tr>
<tr>
<td>American Basin Well 1 shallow 179-250 ft</td>
<td>X</td>
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<tr>
<td>American Basin Well 2 deep screen 862-990 ft</td>
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<tr>
<td>American Basin Well 2 mid-shallow 130-300 ft</td>
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<td>American Basin Well 2 shallow 132-144 ft</td>
<td>X</td>
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<tr>
<td>American Basin Well 3 deep screen 742-755 ft</td>
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<td>American Basin Well 3 shallow 190-210 ft</td>
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<td>American Basin Well 4 deep screen 1060-1070 ft</td>
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<tr>
<td>American Basin Well 4 shallow 300-400 ft</td>
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<tr>
<td>American Basin Well 4 mid-shallow 795-815 ft</td>
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<td>American Basin Well 4 shallow 179-190 ft</td>
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<td>Anderson Valley Well 1 screen 37-48 ft</td>
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<td>Anderson Valley Well 1 screen 135-167 ft</td>
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<td>BUT 05H001M screen interval unknown</td>
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<td>BUT 07H005M screen interval 550 to 570 ft</td>
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<td>BUT 07H002M screen interval 330 to 340 ft</td>
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</tr>
<tr>
<td>BUT 11H002M screen interval 125 to 185 ft</td>
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</tbody>
</table>
California Statewide Groundwater Elevation Monitoring (CAGEM)

Authorized by SBX7 6, enacted in November 2009

CAGEM Groundwater Basin Prioritization information is posted here.

CAGEM Status Report to the Legislature and the Governor Is Now Available

DWR has completed the 2012 CAGEM Status Report, prepared for the Governor and the Legislature as required by the Water Code (§10920 et seq.). The report outlines the background of the CAGEM Program and describes the first two years of implementation. This report is the first in a series of periodic reports on the CAGEM Program that DWR will provide to the Governor and the Legislature. Subsequent reports will be provided every five years beginning in 2015.

CAGEM Online System Is Now Available

Current or prospective Monitoring Entities can notify DWR of their intent to become a Monitoring Entity, manage existing Notification information, and submit groundwater elevation data through the Monitoring Entity Login to the Online System.

Public users can view Monitoring Entities, monitored groundwater basins and wells, and groundwater elevation data, through reports, search tools, and GIS viewing by accessing the Public User Login to the Online System.

Attention CAGEM Online System Users: CAGEM will undergo routine maintenance on June 8, 2016, from 5:00 pm to 7:00 pm. There will be an interruption in website access during this time. We apologize for any inconvenience this may cause.

Overview of CAGEM

On November 4, 2009 the State Legislature amended the Water Code with SBx7-6, which mandates a statewide groundwater elevation monitoring program to track seasonal and long-term trends in groundwater elevations in California’s groundwater basins. To achieve that goal, the amendment requires collaboration between local monitoring entities and Department of Water Resources (DWR) to collect groundwater elevation data. Collection and evaluation of such data on a statewide scale is an important fundamental step toward improving management of California’s groundwater resources.

In accordance with this amendment to the Water Code, DWR developed the California Statewide Groundwater Elevation Monitoring (CAGEM) program. The intent of the CAGEM program is to establish a permanent, locally-managed program of regular and systematic monitoring in all of California’s alluvial groundwater basins. The CAGEM program will rely and build on the many established local long-term groundwater monitoring and
Welcome to the California Statewide Groundwater Elevation Monitoring (CASGEM) Online System

The CASGEM Online System now allows you to:

- Register as an “Administrator” for a Monitoring Entity to maintain the Monitoring Entity’s profile and create and maintain user accounts for yourself and collaborating agencies.
- Submit a Notification that your organization intends to assume the role of Monitoring Entity for a California groundwater basin, sub-basin, or portion of a sub-basin, including:
  - Organization details and contact information
  - The monitoring entity authority that best describes you (Water Code Section 10927)
  - GIS shapefiles that define the boundary of the area you intend to monitor
  - A groundwater management plan and/or monitoring plan
  - CASGEM well construction details and location information
- Submit groundwater elevation data (including batch uploads)
- View lists of local agencies, counties and associations who have volunteered to serve as CASGEM Monitoring Entities providing groundwater data statewide
- View CASGEM Monitoring Plans and Groundwater Management Plans (via hyperlink)
- Search and view groundwater elevation data in tabular format
- View hydrographs for single wells and compare hydrographs for multiple wells
- Search and view groundwater monitoring well information
- View mapped locations of CASGEM wells, monitoring area boundaries, and other geographic information
- Measure distances between wells and size of monitoring areas and basins
- Download well information, groundwater data, hydrographs and maps
- Download summary reports on wells, groundwater elevations, Monitoring Entities and basin information

Please click on one of the above tabs to begin. Please look at this help file for answers to common questions.
<table>
<thead>
<tr>
<th>Local Well Designation</th>
<th>Basin</th>
<th>Portion</th>
<th>State Well Number</th>
<th>CASGEM Well Number</th>
<th>Well Use</th>
<th>Depth</th>
<th>View On Map</th>
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<td>Santa Maria River Valley</td>
<td>San Luis Obispo County FC &amp; WC District's Area</td>
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<td>KRCDA9C06</td>
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<td>Tulare Lake</td>
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<td>363503N197000W001</td>
<td>Observation</td>
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<td>SYWD#7</td>
<td>Scolls Valley</td>
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<td>370533N122007W001</td>
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<td>View On Map</td>
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<tr>
<td>Malin #5</td>
<td>Upper Klamath Lake Basin - Tulare Lake</td>
<td></td>
<td>41512E151001W</td>
<td>Other</td>
<td>333</td>
<td>View On Map</td>
<td></td>
</tr>
</tbody>
</table>
Areas Not being Monitored as of 6/2/2016

<table>
<thead>
<tr>
<th>Groundwater Basin/Subbasin name</th>
<th>Groundwater Basin/Subbasin number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laytonville Valley</td>
<td>1-12</td>
</tr>
<tr>
<td>Little Lake Valley</td>
<td>1-13</td>
</tr>
<tr>
<td>Lower Klamath River Valley</td>
<td>1-14</td>
</tr>
<tr>
<td>Bray Town Area</td>
<td>1-17</td>
</tr>
<tr>
<td>Red Rock Valley</td>
<td>1-18</td>
</tr>
<tr>
<td>Garcia River Valley</td>
<td>1-20</td>
</tr>
<tr>
<td>Fairchild Swamp Valley</td>
<td>1-22</td>
</tr>
<tr>
<td>Prairie Creek Area</td>
<td>1-25</td>
</tr>
<tr>
<td>Redwood Creek Area</td>
<td>1-26</td>
</tr>
<tr>
<td>Big Lagoon Area</td>
<td>1-27</td>
</tr>
<tr>
<td>Mattole River Valley</td>
<td>1-28</td>
</tr>
<tr>
<td>Honeydew Town Area</td>
<td>1-29</td>
</tr>
<tr>
<td>Butte Valley</td>
<td>1-3</td>
</tr>
<tr>
<td>Pepperwood Town Area</td>
<td>1-30</td>
</tr>
<tr>
<td>Weott Town Area</td>
<td>1-31</td>
</tr>
<tr>
<td>Garberville Town Area</td>
<td>1-32</td>
</tr>
<tr>
<td>Larabee Valley</td>
<td>1-33</td>
</tr>
<tr>
<td>Dinsmore's Town Area</td>
<td>1-34</td>
</tr>
<tr>
<td>Hyamporn Valley</td>
<td>1-35</td>
</tr>
<tr>
<td>Hettanshaw Valley</td>
<td>1-36</td>
</tr>
<tr>
<td>Cottonwood Creek Valley</td>
<td>1-37</td>
</tr>
</tbody>
</table>
Internal “GWIDs” Tool for Monitoring Well Data

Main Menu

- View / Edit Grid Well Data
- Add Grid Well
- View CASGEM Well Data
- E-Mail Hydrographs to Well Owners
- View Wells and Measurements In Google Earth
- Print Reports or Charts
- Export Data to Excel
- Database Administration (Mulder or Humbert)
- Database Management
- Exit GWIDS
- Exit to Access (Mulder or Humbert Only)
- Turn Off Sounds

Grid Well Information Database System

The CASGEM-BRR tables are imported to a local server to improve processing time. The tables should periodically be refreshed to ensure that this system contains the most recent data.

Date and time of last refreshment:
12/9/2015 8:14:24 AM

Water Trivia
How much water does it take to process one barrel of beer?
1,500 gallons

To vepo eina zoei/
Greek
GWIDs Tool

Google earth Map Interface w/Attributes
## Summary Statistics of Depth to Water below Ground Surface by Month and Entire Measurement History

**State Well Number:** 20N02E24C001M  
**Period of Record:** 01/04/2000 to 08/04/2015 (15.6 Years)

### Continuous Measurements

<table>
<thead>
<tr>
<th>Month</th>
<th>Lowest Level</th>
<th>10th Percentile</th>
<th>25th Percentile</th>
<th>50th Percentile</th>
<th>75th Percentile</th>
<th>90th Percentile</th>
<th>Highest Level</th>
<th>Number of Values</th>
<th>Number of Years</th>
<th>Most Recent Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>54.8</td>
<td>53.2</td>
<td>52.3</td>
<td>36.9</td>
<td>35.4</td>
<td>34.3</td>
<td>33.2</td>
<td>183</td>
<td>6</td>
<td>52.2 feet on 01/31/2015 (26.40% percentile)</td>
</tr>
<tr>
<td>February</td>
<td>53.2</td>
<td>51.1</td>
<td>49.9</td>
<td>34.9</td>
<td>33.6</td>
<td>32.3</td>
<td>30.9</td>
<td>169</td>
<td>6</td>
<td>50.5 feet on 02/28/2015 (19.70% percentile)</td>
</tr>
<tr>
<td>March</td>
<td>53.4</td>
<td>50.0</td>
<td>47.4</td>
<td>34.4</td>
<td>32.2</td>
<td>30.2</td>
<td>28.0</td>
<td>214</td>
<td>7</td>
<td>50.4 feet on 03/31/2015 (6.70% percentile)</td>
</tr>
<tr>
<td>April</td>
<td>54.6</td>
<td>49.9</td>
<td>46.6</td>
<td>34.3</td>
<td>32.3</td>
<td>30.8</td>
<td>28.0</td>
<td>210</td>
<td>7</td>
<td>53.6 feet on 04/30/2015 (2.00% percentile)</td>
</tr>
<tr>
<td>May</td>
<td>61.4</td>
<td>58.6</td>
<td>54.9</td>
<td>43.4</td>
<td>37.5</td>
<td>33.2</td>
<td>31.6</td>
<td>217</td>
<td>7</td>
<td>60.8 feet on 05/31/2015 (1.00% percentile)</td>
</tr>
<tr>
<td>June</td>
<td>64.6</td>
<td>60.9</td>
<td>58.8</td>
<td>44.6</td>
<td>41.3</td>
<td>38.5</td>
<td>34.4</td>
<td>210</td>
<td>7</td>
<td>63.8 feet on 06/30/2015 (1.50% percentile)</td>
</tr>
<tr>
<td>July</td>
<td>70.2</td>
<td>65.9</td>
<td>62.5</td>
<td>48.8</td>
<td>44.1</td>
<td>42.2</td>
<td>40.2</td>
<td>217</td>
<td>7</td>
<td>70.2 feet on 07/31/2015 (0.00% percentile)</td>
</tr>
<tr>
<td>August</td>
<td>77.2</td>
<td>73.6</td>
<td>69.1</td>
<td>48.2</td>
<td>44.5</td>
<td>43.3</td>
<td>42.3</td>
<td>186</td>
<td>7</td>
<td>77.2 feet on 08/04/2015 (0.00% percentile)</td>
</tr>
<tr>
<td>September</td>
<td>85.5</td>
<td>81.6</td>
<td>76.8</td>
<td>44.3</td>
<td>41.5</td>
<td>40.2</td>
<td>37.0</td>
<td>150</td>
<td>5</td>
<td>58.4 feet on 09/30/2014 (19.50% percentile)</td>
</tr>
<tr>
<td>October</td>
<td>60.0</td>
<td>57.9</td>
<td>54.6</td>
<td>43.8</td>
<td>40.2</td>
<td>39.0</td>
<td>37.1</td>
<td>155</td>
<td>5</td>
<td>57.4 feet on 10/31/2014 (17.60% percentile)</td>
</tr>
<tr>
<td>November</td>
<td>59.8</td>
<td>57.8</td>
<td>55.8</td>
<td>42.1</td>
<td>39.7</td>
<td>37.2</td>
<td>36.7</td>
<td>150</td>
<td>5</td>
<td>56.1 feet on 11/30/2014 (22.90% percentile)</td>
</tr>
<tr>
<td>December</td>
<td>56.4</td>
<td>54.5</td>
<td>53.5</td>
<td>40.1</td>
<td>39.0</td>
<td>37.4</td>
<td>36.4</td>
<td>155</td>
<td>5</td>
<td>53.5 feet on 12/31/2014 (25.40% percentile)</td>
</tr>
</tbody>
</table>

### All Measurements

- **Lowest March Measurement:** 53.4 feet on 03/15/2015
- **Highest March Measurement:** 28.9 feet on 03/28/2000
- **Lowest October Measurement:** 60.0 feet on 10/12/2014
- **Highest October Measurement:** 37.1 feet on 10/23/2000
- **Overall Lowest Measurement:** 77.2 feet on 06/04/2015
- **Overall Highest Measurement:** 28.8 feet on 04/27/2000

**Note:** The statistical summary shown above is based on an inverse distribution function that assumes a continuous distribution model. Nulls and Questionable Measurements are ignored in the calculation. The statistical summary is shown only if 10 or more measurements were taken in a given month over an interval of at least 10 years. **Bold red** values in the table indicate the closest statistic to the most recent measurement for that month. A measurement must have been taken in the last two years to be considered recent.
GWIDs Tool
Radius of Interest Hydrographs
Introduction

The Groundwater Information Center is DWR’s portal for groundwater information, groundwater management plans, water well basics, and statewide and regional reports, maps and figures. California’s groundwater provides approximately 30 to 46 percent of the state’s total water supply, depending on wet or dry years, and serves as a critical buffer against drought and climate change. Some communities in California are 100 percent reliant upon groundwater for urban and agricultural use.

DWR has a long-standing history of collecting and analyzing groundwater data, investigating and reporting groundwater conditions, implementing local groundwater assistance grants, encouraging integrated water management, and providing the technical expertise needed to improve groundwater management practices. DWR will continue to work with local agencies and regional organizations to provide data that enables sustainable groundwater management. The Groundwater Information Center website will be updated as new information becomes available.

Recent Announcements

California Water Commission Approved GSP Emergency Regulations
DWR released the GSP Emergency Regulations on May 10, 2016, for public review. The California Water Commission unanimously approved the proposed regulations, as written, on May 18, 2016. DWR will submit the Final GSP Emergency Regulations and the Notice of Proposed Emergency Rulemaking to the Office of Administrative Law. Access and review the GSP Emergency Regulations here
Maps and Reports

Groundwater data and related information can be reported in a variety of formats, including maps, figures, and written reports.

This page provides access to PDF documents which report groundwater conditions in a variety of formats. Documents are organized by report type (for example, “Groundwater Level Change Maps”) and by region. Statewide reports, or reports that cover large regions of the state are found on this page, whereas local reports are available at Region Office Reports and Data below. Please note that data reports and other information is being added to this page regularly.

Statewide and Regional Maps

Spring Groundwater Level Change Maps (click here to view)

- Yearly
- 3-Year
- 5-Year
- 10-Year
Maps and Reports

Statewide and Regional Reports

Public Update for Drought Response – November 30, 2014
Groundwater Basins with Potential Water Shortages, Gaps in
Groundwater Monitoring, Monitoring of Land Subsidence, and
Agricultural Land Fallowing

Selected Report Figures (click here to view)

Summary of Recent, Historical, and Estimated Potential for Future
Land Subsidence in California – 2014

Geology of the Northern Sacramento Valley, California, June 2014

Public Update for Drought Response – April 30, 2014
Groundwater Basins with Potential Water Shortages and Gaps in
Groundwater Monitoring

Report Figures 1-27 (click here to view)

Reports and Data Organized by Regional Office

Groundwater data collection, management, and reporting typically occurs at a regional level, and is
conducted by staff at one of the Department Region Offices.

Northern Region
North Central Region
South Central Region
Southern Region

GROUNDWATER HOME

GROUNDWATER INFORMATION CENTER

Groundwater Basics
Maps and Reports
GIC Interactive Map Application
Groundwater Management
Groundwater Well Information
DWR Well Inquiry Contacts
Well Completion Reports
OSWCR
Local Permitting Agencies

Monitoring and Data Collection
CASGEM
Water Data Library
Groundwater Contacts
SUSTAINABLE GROUNDWATER MANAGEMENT
CASGEM
BULLETIN 118

Highlights

NASA Subsidence Report
Water Mgmt. Planning Tool
Initial Basin Prioritization for SGM
Geology of the Northern Sacramento Valley
Groundwater Information Center Interactive Map Application

Select Data Type:
- Depth
- Elevation
- Change

Select Layer Group:
- Spring 2016 Elevation

Show Layers:
- Points
  - Groundwater Elevation Measurement
- Contours
  - Sea Level
  - Primary Contour
  - Secondary Contour
- ColorRamp
  - 300 feet
  - 0 feet mean sea level
  - -300 feet

Groundwater Elevation
Updated May 2016

These layers show groundwater elevation. Groundwater elevations are shown as feet above or below mean sea level (positive values indicate groundwater elevations above mean sea level, negative values indicate groundwater elevations below mean sea level).

Points show the depth to groundwater values collected from wells. The contours and color ramp layers provide a smoothed approximation of the groundwater elevation "surface" based on the measurement data. The measurement values may not exactly match the contour or color ramp values because of the surface and contour smoothing process.

Water level measurements are selected based on measurement date and well construction information (when available) and approximate groundwater elevations in the unconfined to uppermost semiconfined aquifers.

Layer Attribute Explanation:
- Site Code: Unique Well ID
- Local Well Name: Well ID defined by local agency or well owner
- State Well Number: DWR State Well Number
- WCR Number: Well Completion Report number (DWR form 108)
- Well Time: intended use of well
- Missn Date: Date water level measurement was collected
- Missn Agency: Agency that collected the water level measurement
- WSEL: Groundwater Surface Elevation (ft-msl), NAVD88
- GDB5: Groundwater Depth Below Ground Surface - (ft), NAVD88
- Reference Point Elevation: Elevation of measurement reference point (ft-msl)
- Ground Surface Elevation: Elevation of ground surface at well (ft-msl)
- Missn Issue: Questionable measurement comment
- Missn Comment: General measurement comment
- Latitude: Latitude, NAD83
- Longitude: Longitude, NAD83
- Link: Hyperlink to well information in the DWR Water Data Library

Back to top

Groundwater Elevation Change

Download
Subsidence

The purpose of this map is to summarize recent and historical subsidence and estimate the potential for future subsidence. Specifically, the following documentation and associated interactive map is intended to be used as a screening tool to identify areas where the potential for subsidence due to groundwater extraction may persist and to act as a guide to focus site-specific subsidence studies. Click on features in the map or see below for more information:

Active Extensometers: This layer depicts the location and approximate trends (subsiding or not subsiding) of 27 active extensometers, monitored by DWR, USGS, and local agencies. For more detailed information see the summary report: [Summary Report](http://pbo.unavco.org/accessed 4/30/2014).

CGPS Cumulative Subsidence: This layer depicts the location and cumulative subsidence at continuous GPS stations that have subsiding trends (http://pbo.unavco.org/ accessed 4/30/2014). For more detailed information see the summary report: [Summary Report](http://pbo.unavco.org/ accessed 4/30/2014).

Subsidence Trends: This layer depicts the location and approximate trend (subsiding or not subsiding) of the vertical displacement data from 319 CGPS stations within groundwater basins. (http://pbo.unavco.org/ accessed 4/30/2014). For more detailed information see the summary report: [Summary Report](http://pbo.unavco.org/ accessed 4/30/2014).

Change in Groundwater Level: Groundwater level data from wells was used only if the period of record was 10 years or more (long-term monitoring wells). Data from all types of wells (ag production, NRI production, and monitoring wells were used). In addition, data from all wells were used, regardless of well depth. Groundwater data were compiled and analyzed from the California Statewide Groundwater Elevation Monitoring (CAGEM) Program and the Water Data Library (WDL) groundwater level database as of May 19th, 2014. For more detailed information see the summary report: [Summary Report](http://pbo.unavco.org/ accessed 4/30/2014).

Reported Subsidence Location: Unavailable
Welcome

The Department of Water Resources wants you to join OSWCR (say "Oscar"), our new Online System for Well Completion Reports! The new system allows drillers to submit their well completion reports online, replacing the former method of mailing in paper forms. OSWCR is now in its soft-launch; training and documentation will soon follow. Please subscribe to our mailing list to keep up to date on scheduled training sessions.

Users will create an account based on their C-57 license that DWR will validate. Upon approval users will be able to submit Well Completion Reports.

Click here to set up your account to submit a Well Completion Report

Please read more about the background of Well Completion Reports, questions and answers and check out the project timeline. To join our mailing list, please click here and subscribe.

Information about changes to the confidentiality of content on Well Completion Reports can be found here, under the heading Public Access to Well Completion Reports.
Groundwater Data & Monitoring

Northern Region
Well Completion Report Data

Well Completion Reports: Well Count Maps

Well count maps using the Well Completion Report data have been created that show the minimum, maximum, and average well depths for Butte, Colusa, Glenn, and Tehama counties. These maps also show the count of wells per section by well use.

Butte County

Plate 1: Butte County Domestic Well Count by Section.pdf
Plate 2: Butte County Large Production Well Counts by Section.pdf
Plate 3: Butte County Domestic Well Depth Summary for Wells Screened less than 150 feet in depth.pdf
Plate 4: Butte County Domestic Well Depth Summary for Wells Screened greater than 150 feet in depth.pdf

Colusa County

Plate 1: Colusa County Domestic Well Counts by Section.pdf
Plate 2: Colusa County Large Production Well Counts by Section.pdf
Plate 3: Colusa County Domestic Well Depth Summary for Wells Screened less than 150 feet in depth.pdf
Plate 4: Colusa County Domestic Well Depth Summary for Wells Screened greater than 150 feet in depth.pdf

Glenn County

Plate 1: Glenn County Domestic Well Counts by Section.pdf
Plate 2: Glenn County Large Production Well Counts by Section.pdf
Plate 3: Glenn County Domestic Well Depth Summary for Wells Screened less than 150 feet in depth.pdf
Plate 4: Glenn County Domestic Well Depth Summary for Wells Screened greater than 150 feet in depth.pdf

Tehama County

Plate 1: Tehama County Domestic Well Counts by Section.pdf
Plate 2: Tehama County Large Production Well Counts by Section.pdf
Plate 3: Tehama County Domestic Well Depth Summary for Wells Screened less than 150 feet in depth.pdf
Plate 4: Tehama County Domestic Well Depth Summary for Wells Screened greater than 150 feet in depth.pdf
Large Production Well Count Distribution

1 to 5 large production wells per section
6 to 10 large production wells per section
11 to 15 large production wells per section
16 to 20 large production wells per section
21 to 25 large production wells per section
26 to 30 large production wells per section

Sacramento Valley Basin boundary
County boundaries

This map provides an overview of the regional and local extent of groundwater development. The number of wells identified within each section is based on well completion reports submitted to DWR through December 2004. It’s important to note that a number of wells have been constructed without the submission of a well completion report and have not been included in this tabulation. The number of wells falling into this category is unknown.

Large production wells include irrigation, municipal, public, and industrial wells.
Introduction

The Department of Water Resources (DWR) has developed a Strategic Plan for its Sustainable Groundwater Management (SGM) Program. DWR’s SGM Program will implement the new and expanded responsibilities identified in the 2014 Sustainable Groundwater Management Act (SGMA). Some of these expanded responsibilities include: (1) developing regulations to revise groundwater basin boundaries; (2) adopting regulations for evaluating and implementing Groundwater Sustainability Plans (GSPs) and coordination agreements; (3) identifying basins subject to critical conditions of overdraft; (4) identifying water available for groundwater replenishment; and (5) publishing best management practices for the sustainable management of groundwater.

Announcements

- GSA notification received
  DWR has received a notification of formation of a Groundwater Sustainability Agency. View the notification here.

- California Water Commission Approved GSP Emergency Regulations
  DWR released the GSP Emergency Regulations on May 10, 2016, for public review. The California Water Commission unanimously approved the proposed regulations, as written, on May 18, 2016. DWR will submit the Final GSP Emergency Regulations and the Notice of Proposed Emergency Rulemaking to the Office of Administrative Law. Access and review the GSP Emergency Regulations here.

Water Available for Replenishment White Paper Now Available

DWR has developed a White Paper discussing water available for replenishment, which is available on the Water Available For Replenishment webpage here. The White Paper, written in coordination with SGMA advisory and stakeholder groups, describes the technical and policy foundations as well as the proposed content of the Water Available for Replenishment Report, to be published by December 31, 2016, as directed by SGMA.

Groundwater Sustainability Program Draft Strategic Plan

DWR has developed a Draft Strategic Plan for its Sustainable Groundwater Program. The draft plan describes DWR’s responsibilities and vision for carrying out the Sustainable Groundwater Management Act, a package of laws that aim to protect the groundwater basins that provide more than half of the water Californians use in dry years. The draft plan outlines key actions DWR will undertake over the next several years to position itself to better support local agencies across California to achieve sustainable groundwater management. To read the plan, click here.

California Groundwater: The Sustainable Groundwater Management Act (SGMA)

The California Groundwater website offers links to partners involved in the SGMA Implementation, multi-agency news and information, a groundwater blog, and the text of the SGMA legislation. More info...
GSA Interactive Map

This interactive map shows the location of local agencies that have decided to become or form groundwater sustainability agencies (GSAs). The boundaries of the GSAs are based on information submitted to DWR by those local agencies. While DWR makes every effort to provide accurate information, DWR has not reviewed the GSA boundary information contained in this map and makes no warranties as to the suitability of this map for any particular purpose. Where multiple local agencies have claimed the same portion of a groundwater basin in their GSA formation notice (within 80 days of the initial posted notice), the areas of overlap are indicated by a darker color within the GSA boundaries. These areas of overlap must be resolved before a local agency can be identified by DWR as an exclusive GSA. (Water Code §10720.6(c) and (d))

In addition to GSA boundaries, the interactive map application shows the following: (1) Bulletin 118-2003 groundwater basins; (2) CASGEM basin prioritization; and (3) adjudicated areas listed in Water Code §10720.6 (full list available after April 2016). The information available by selecting a particular portion of a basin includes: date the GSA notice was first posted; local agency name; local agency or GSA website; and a link to the GSA formation notice. The GSA Formation Table should be referenced to determine if a GSA shown on the interactive map has been identified as an exclusive GSA. Not all GSA areas are shown on the map, as GIS shapefiles may not have been provided. Local agencies or GSAs should be consulted to determine parcel-level detail for GSA areas.

If you have questions related to GSAs or have comments related to the Interactive map please contact Mark Nordberg at Mark.Nordberg@water.ca.gov. The GSA Interactive Map was last updated on June 2, 2016.
Boundaries Map

This application contains a variety of boundaries that could be useful to water management planners. Click on features in the map or see below for more information.

DATA DISCLAIMER
All information provided by the Department of Water Resources on its Web pages and Internet sites, is made available to provide immediate access for the convenience of interested persons. While the Department believes the information to be reliable, human or mechanical error remains a possibility. Therefore, the Department does not guarantee the accuracy, completeness, timeliness, or correct sequencing of the information. Neither the Department of Water Resources nor any of the sources of the information shall be responsible for any errors or omissions, or for the use or results obtained from the use of this information.

The following layers are contained in the map (scroll down for brief descriptions):

- County Boundaries
- Region Office Service Areas
- Hydrologic Regions
- Prop 84 Funding Areas
- Regional Water Quality Control Board Boundaries
- Tribal Lands
- Regional Flood Planning Boundaries
- Reclamation Districts
- CA State Park Lands
- Federal Lands
- CASGEM Groundwater Basin Prioritization
- Groundwater Management Plans
- IRWM Regions
- Adjacent Groundwater Basins
- Disadvantaged Communities Block Groups
- Disadvantaged Communities Tracts
- Disadvantaged Communities Places

Unavailable
Some thoughts on current data & tools

- Lots of data in lots of places...hunt and peck syndrome
- Data is largely program generated, funded, and managed
- User interface is not always intuitive, interactive, or map-based
- Options for data downloads are limited
- Data access and speed can be an Issue
- Quality of the data isn’t always clear
- Statewide variability in the quantity and quality of data