SCUBA Metadata Catalogue

The SCUBA data warehouse serves as a central repository for granular water use information from local water utilities in California, as well as for related contextual datasets.

Overview of data in SCUBA

The data include regular monthly/bimonthly billing information such as amount of water consumed, date of use, and customer classification. Some utilities also provide context such as evapotranspiration, household size and landscape area. Utility-specific customer classes have been standardized into statewide classifications aligned with the Department of Water Resources (single family residential, multi-family residential, commercial, industrial, irrigation, institutional and other).

In many cases information is also available about which customers participated in water efficiency rebate programs like turf removal or high efficiency toilet rebates and the date of their participation.

In addition, SCUBA enriches utility-provided data with key contextual attributes. This includes socioeconomic information from the American Community Survey (ACS), reference evapotranspiration from the California Irrigation Management Information System (CIMIS) and latitude/longitude information obtained by geocoding customer addresses.

SCUBA currently holds metered use for 11 retailers, shown in the table and maps (Figures 1 & 2) below:

Supplier	Acronym
Western Municipal Water District of Riverside	WMWD
Moulton Niguel Water District	MNWD
Eastern Municipal Water District	EMWD
Las Virgenes Municipal Water District	LVMWD
Santa Rosa City of	CSR
Monte Vista Water District	MVWD
El Toro Water District	ETWD
Santa Monica City of	SMC
Sacramento City of	SAC
Irvine Ranch Water District	IRWD
Santa Margarita Water District	SMWD

The heatmap in Figure 3 below shows a high-level overview of water use data in SCUBA. The x-axis displays months going forward in time while the y-axis labels each utility. Color corresponds to the number of meter reads in each month, normalized for each row where dark blue to purple indicate more customers and orange to red indicate fewer. A number of data quality issues that would be of interest to researchers using SCUBA metered use data are highlighted in red text.

In general, most utilities have provided at least 6 years of continuous data, with some providing much more and some having less actionable data because of data quality issues. For months where all data is available, an average of 593000 customer accounts are represented in the data.

Plans for Future Expansion

- More granular commercial and industrial categorizations (e.g. restaurant, hospital, church, etc.)
- Higher resolution evapotranspiration by utilizing spatial CIMIS or other future sources instead of readings directly from CIMIS stations.

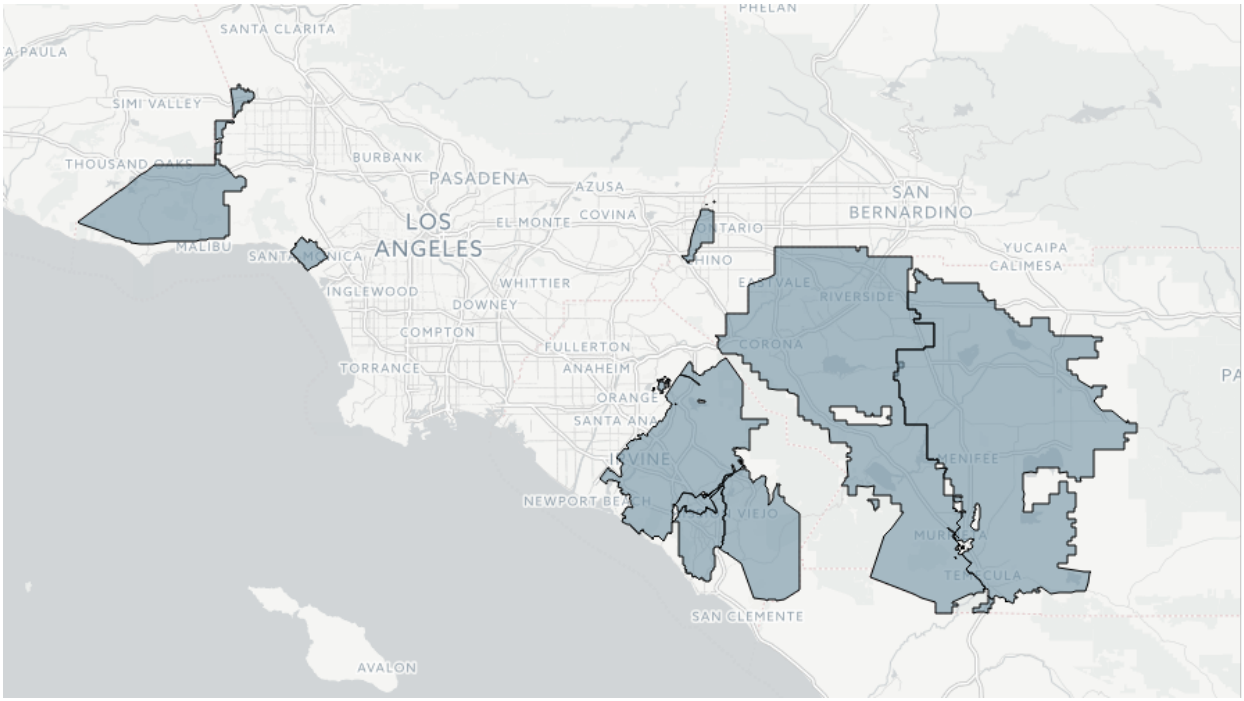


Figure 1: SCUBA Utilities in Southern California

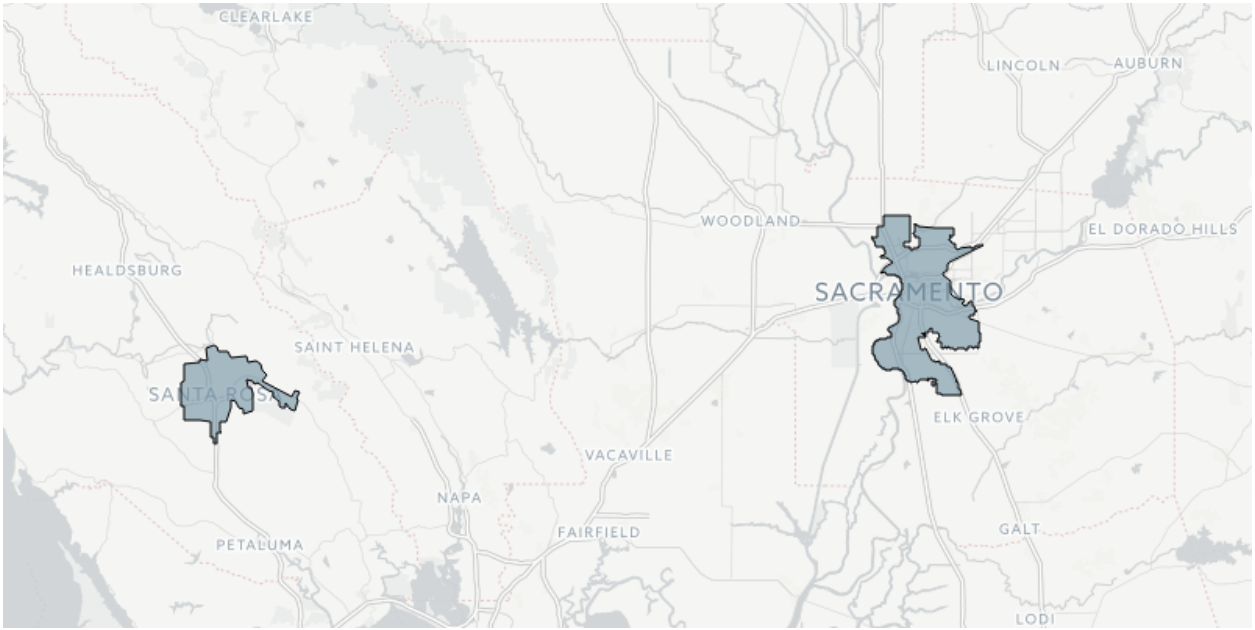


Figure 2: SCUBA Utilities in Northern California

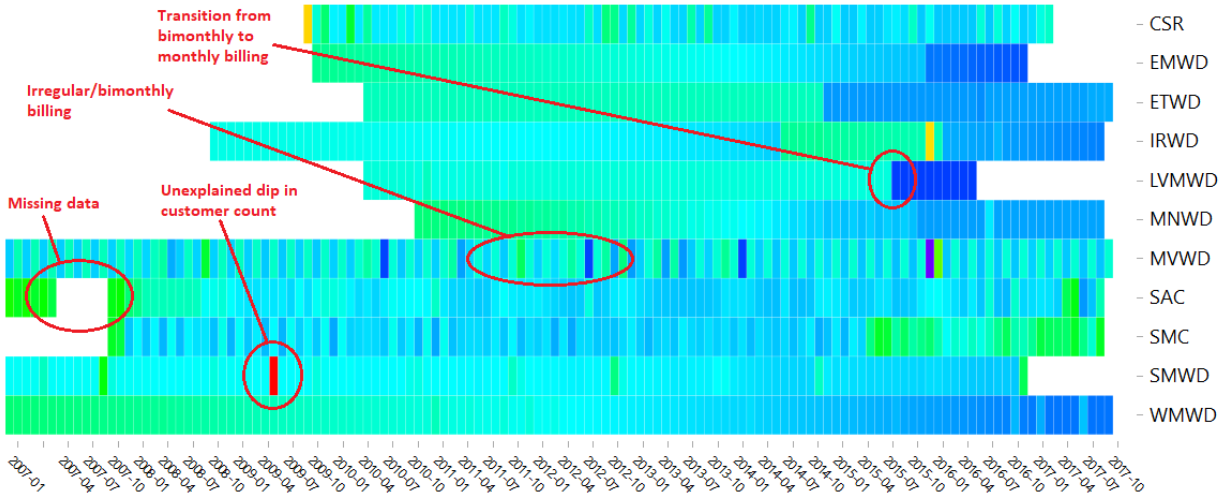


Figure 3: Figure 3. Heatmap of customer counts over time for each utility. More detailed data quality assessments are available for approved researchers.

Example studies and potential questions

We are always open to creative new applications, but please see the following links for some ideas for potential questions to answer using this data.

http://californiadatacollaborative.org/blog/2016/7/19/request-for-ideas-demand-effects-of-water-rates

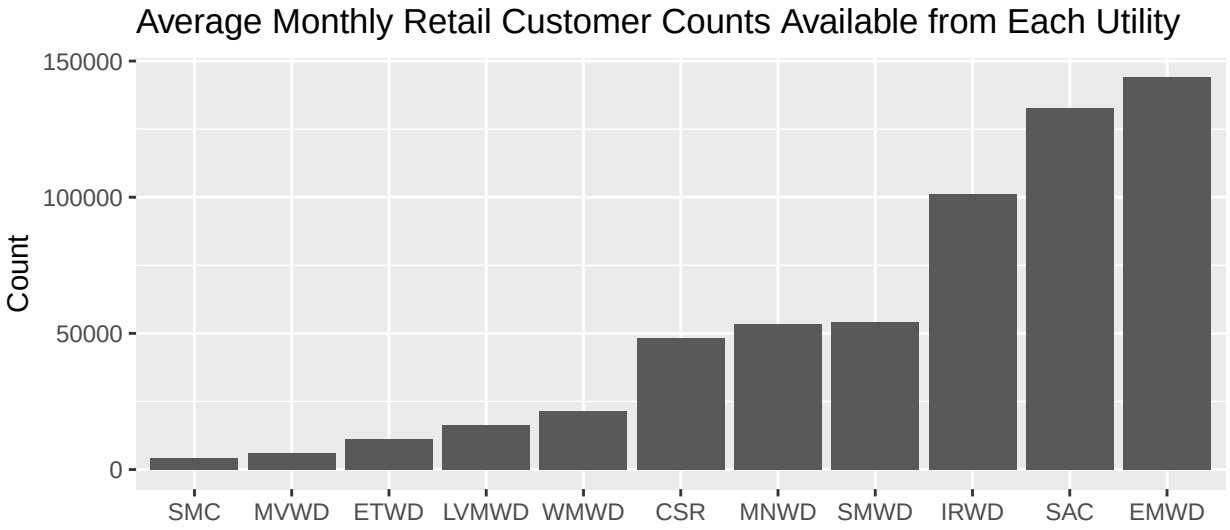
Data Sharing

Data may be provided at no cost to qualified researchers with explicit written permission from member utilities. If you would like to gain access to data, please reach out with a project description including the following:

1. Purpose statement
2. Initial assumptions
3. Source(s) of data
4. Project partners
5. Timeline
6. Budget
7. Deliverables
8. Links to any relevent qualifications (e.g. CV, Google Scholar, faculty bio, etc.).

Your proposal will be circulated with utility staff and you may be asked to discuss your ideas in a call or webinar with whichever of our Data Action Teams is most relvant to your proposal. Interested member utilities will provide their written consent, and you will need to sign a nondisclosure agreement.

This process is expected to take several months, after which you will be provided with data from all utilities who have given their consent. Please reach out to info@CaliforniaDataCollaborative.com with any requests.



Partial Data Dictionary

Usage data

Data Field	Description
cust_id_from_utility	unique id for each customer assigned by the utility
usage_et_amount	reference evapotranspiration (inches) rpovided by utility
usage_outdoor_budget_ccf	CCF allocated in outdoor tier of water budget rate structure
usage_indoor_budget_ccf	CCF allocated in the indoor tier of water budget rate structure
usage_total_bill	total price paid for that billing period
usage_start_date	beginning date in the billing period
usage_end_date	ending date in the billing period
usage_month	month of the ending date
usage_year	year of the ending date
usage_ccf	amount of water used between start and ending date
cust_loc_id	unique ID for accounts that changes to track attribute changes
cust_loc_class_from_utility	customer rate code from the utility
usage_et_amount_default	reference evapotranspiration (inches) from nearby CIMIS stations

Customer/Account Information

Data Field	Description
cust_loc_class_from_utility	customer rate code from the utility
cust_loc_class	standardized customer classification aligned with DWR
cust_loc_hhsize	number of residents used for setting the indoor water budget
cust_loc_water_type	potable / raw / recycled
cust_loc_is_master_meter	whether a meter measures use from multiple units
cust_loc_irr_area_sf	square feet of irrigable area for that customer
cust_loc_apn	assessor parcel number for the customer's location
cust_loc_street_num	Street number from address
cust_loc_street_name	Street name from address

Data Field	Description
cust_loc_city	City from address
cust_loc_zip	Zip code from address
cust_loc_info_start_date	he day a new customer's info begins
cust_loc_info_end_date	the day the customer leaves that location
et_zone_from_utility	Et zone or CIMIS station number used for the customer
cust_loc_latitude	Geographic coordinates of a customer or meter
cust_loc_longitude	Geographic coordinates of a customer or meter
cust_loc_meter_size	size of the meter delivering to the customer
cust_loc_pressure_zone	pressure/elevation/pumping zone for a customer

Rebate Program Data

Data Field	Description
rebate_instance_type	Type of rebate (turf, high efficiency clothes washer, weather based irrigation controller, etc.)
rebate_instance_payment	Amount paid by the rebate
rebate_instance_quantity	Amount rebated (number of square feet of turf removed, devices replaced, etc.)
rebate_instance_post_date	Date the post inspection occurred
cust_id_from_utility	Unique ID the utility assigns to the customer that took the rebate
location_id_from_utility	Unique ID the utility assigns to the location where the rebate occurred
rebate_instance_check_date	Date the rebate check was issued
rebate_instance_received_date	Date the rebate application was received

American Community Survey

Using the geocoded coordinates for each customer, the utility data above can be joined with socioeconomic information from the American Community Survey (ACS). SCUBA currently contains the following data from the 2015 ACS 5-year survey for each census block group in California.

Data Field	Description
pop_density_acs_2015	Population density
total_population	Total population
total_households	Total number of households
avg_hhsize	Average household size
pop_25_and_over	Population over age 25
education	Counts and percentages in several educational attainment categories (less than high school, bachelor's degree, etc)
median_hh_income	Median household income
median_year_structure_built	Median year of construction for homes

Water Rate Structure

The CaDC has also begun the process of collecting detailed water pricing information for utilities through California. This data us recorded using the Open Water Rate Specification (OWRS) and is available to the public here. The easiest way to analyze this data is using RateParser - a software package written in the `R`

programming language that takes as input water usage data (like that stored in SCUBA) and OWRS data to calculate water bills. Using this approach is it possible to easily calculate the usage and marginal cost of water in different pricing tiers, both within and across utilities.

Utility-level Usage Data (supplier_report)

Monthly water production for California's major urban water suppliers obtained from the State Water Resources Control Board. This data is then enriched with context like average evapotranspiration from nearby CIMIS stations and landscape area from the CaDC/CGU land cover data set. This data powers the CaDC Statewide Efficiency Explorer.

Data Field	Description
report_id	Unique ID for each monthly usage record
report_agency_name	Name of the urban water supplier
report_pwsid	The primary unique identifier of the urban water supplier (may have more than one system)
report_hydrologic_region	Name of the principal hydrologic region in the state (10 total) encompassing the supplier
report_has_restrictions	Mandatory restrictions on outdoor irrigation
report_actions_implemented	Description of the enforcement actions taken by the water supplier to meet conservation standards
report_total_production_af	Total amount of potable water produced during the Reporting Month in acre-feet
report_total_production_af_2013	Total amount of potable water produced during the same Reporting Month in 2013 in acre-feet
report_cii_production_af	Amount of potable water used by commercial, industrial, and institutional customers during the Reporting Month in acre-feet
report_ag_production_af	Amount of potable water used for commercial agriculture during the Reporting Month in acre-feet
report_ag_production_af_2013	Amount of potable water used for agriculture during the same Reporting Month in 2013 in acre-feet
report_recycled_production_af	Amount of recycled water beneficially used during the Reporting Month in acre-feet
report_population	Estimate of the number of permanent residents served potable water during the Reporting Month
report_percent_residential	Percentage of total water production that went to residential customers during the Reporting Month
report_gpcd_reported	Supplier estimate of the number of residential gallons-per-capita-day for the Reporting Month
report_gpcd_calculated	Calculated R-GPCD in accordance with the formula (Current Production * Percent Residential Use)/(Days-in-Month * Population Served)
report_ag_cert	Indication that the supplier has exemption to reduce current and 2013 production by current and 2013 agricultural water use respectively
report_production_calculated	The Production_Reported converted to gallons and adjusted by Ag_Cert exemption
report_production_calculated_2013	The 2013_Production_Reported converted to gallons and adjusted by Ag_Cert exemption
report_percent_reduction	Water supplier's state-mandated target percent reduction in water consumption since June 2015 through the most recent Reporting Month relative to the same period in 2013
report_complaints	Number of water waste or violation of conservation rules complaints received by the supplier during the Reporting Month

Data Field	Description
report_followups	Number of follow-up activities to Complaints done by the supplier during the Reporting Month
report_warnings	Number of drought-related conservation warnings issued to customers by the supplier during the Reporting Month
report_penalties_rate	Number of fines issued to consumers for using water over a certain allocation as part of the supplier rate structure during the Reporting Month
report_penalties_other	Number of penalties issued by the supplier during the Reporting Month for violations of local ordinances and/or the Water Board's statewide prohibitions
report_irr_area_sf	Parcel-level square footage of residential turf, shrubs and trees aggregated to utility-level
report_eto	Inverse distance-weighted average of ET readings from nearest CIMIS stations
utility_id	Unique id assigned to each supplier by CaDC