

Bay Area Drought Relief Program (Bay DRP)

Attachment 2

DROUGHT IMPACTS



Association of Bay Area Governments
Proposition 84
Integrated Regional Water Management
2014 Drought Grant Application





Drought Impacts and Funding Need..... 1

 Drought Impacts Experienced 1

 Potential Impacts if Drought Continues..... 4

 Summary of Drought Impacts..... 5

Water Conservation Measures 6

 Water Conservation Measures Being Implemented..... 6

 Anticipated Water Conservation Measures if the Drought Continues 9

 Summary of Water Conservation Measures..... 10

The reference list and references for Attachment 2 are provided in File 2 of 3.

Supporting documents (i.e., drought declarations and conservation directives) from project sponsor agencies are provided in Attachment 2, File 3 of 3.

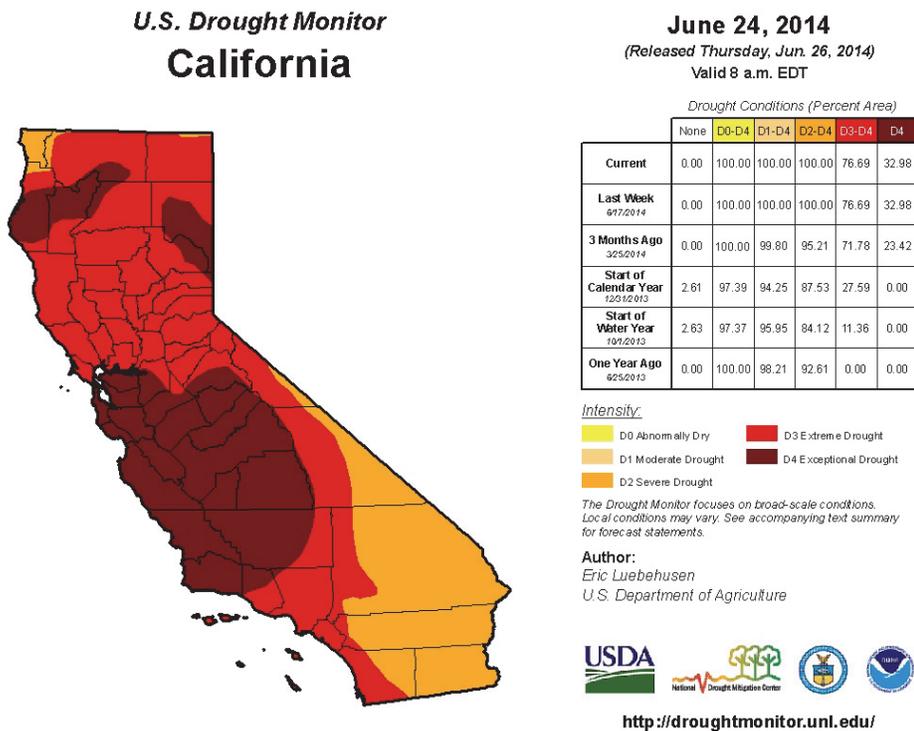
List of Acronyms and Abbreviations

ACWD	Alameda County Water District
AF	acre-feet
Bay DRP	Bay Area Drought Relief Program
cf	cubic foot
CCWD	Contra Costa Water District
CVP	Central Valley Project
DBPs	disinfection byproducts
Delta	Sacramento-San Joaquin River Delta
DSRSD	Dublin-San Ramon Services District
DWR	California Department of Water Resources
EBMUD	East Bay Municipal Utility District
gpcd	gallons per capita per day
IRWM	Integrated Regional Water Management
MCL	maximum contaminant level
MMWD	Marin Municipal Water District
MST	Milliken-Sarco-Tulocay
Proposal	the proposal being submitted in response to the 2014 IRWM
PSP	Proposal Solicitation Package
RWQCB	Regional Water Quality Control Board
San Mateo County RCD	San Mateo County Resource Conservation District
SCVWD	Santa Clara Valley Water District
SFPUC	San Francisco Public Utilities Commission
SWP	State Water Project
THMs	trihalomethanes
Zone 7	Zone 7 Water Agency

Drought Impacts and Funding Need

Water supplies for the San Francisco Bay Integrated Regional Water Management (IRWM) Region include local surface water and reservoirs, groundwater, Sierra Nevada watersheds, and the Sacramento-San Joaquin River Delta (Delta). These supplies rely on local Bay Area precipitation and runoff, precipitation and snowpack in the Sierra Nevada Mountains, and precipitation in the northern and central parts of the state, all of which have been affected by the drought declared on January 17, 2014. Precipitation in the San Francisco Bay Region was only 60% of average over the period October 1, 2013, to May 1, 2014 (DWR, 2014a). Snow water content in the San Joaquin River Basin (including the Mokelumne and Tuolumne river watersheds, which supply the Bay Area) was at 20% of average on May 1, 2014 (DWR, 2014a). Lake Oroville, the principal reservoir for the State Water Project (SWP), was at 44% of its capacity on June 25, 2014 (53% of its historical average for the date) (DWR, 2014b). Exacerbating the water shortage situation, 2014 comes on the heels of 2013, which was one of the driest calendar years on record in the Bay Region (DWR, 2014c). Notably, 2012 was also a below-average water year (DWR, 2014d).

According to the U.S. Drought Monitor (June 24, 2014), Alameda, Contra Costa, Santa Clara, San Mateo, and San Francisco counties are experiencing “exceptional drought” conditions, while Marin, Sonoma, Napa, and Solano counties in the North Bay are under “extreme drought” conditions (National Drought Mitigation Center, 2014). The graphic below illustrates drought conditions in the Bay Area and California as a whole.



Drought Impacts Experienced

The Bay Area has already experienced substantial impacts due to the 2014 drought. To date, emergency water shortage proclamations have been issued by the cities of St. Helena, Calistoga, and American Canyon in Napa County, the County of Sonoma, the Sonoma County Water Agency, Alameda County Water District, Zone 7 Water Agency, and the City of Mountain View (see File 3 of 3 for proclamations). The San Mateo County Sheriff noted in an Office of Emergency Services report of June 2, 2014, that streams “are beginning to dry up in the rural western part of the county” (Molver, 2014).

<p>At risk of not meeting existing drinking water demands</p>	<p>The Bay Area’s water supply is a mix of local groundwater, surface water, and water sources from outside the region (Sierra Nevada Mountains and Delta). While Bay Area water agencies are managing their local and imported water sources for maximum efficiency, several agencies are at risk of not meeting existing drinking water demands:</p> <ul style="list-style-type: none"> • The Zone 7 Water Agency (Zone 7), the primary wholesaler for the Alameda-Livermore Valley (in the East Bay), will not meet all its drinking water demands this year. Zone 7 will receive only 5% of its SWP allotment this year (SWP normally provides 80% of Zone 7’s annual supply). As a result, Zone 7 must rely on approximately 18,300 acre-feet (AF) of SWP Carryover Water and 20,500 AF of available groundwater supplies in 2014. This supply will only provide approximately 75% of Zone 7’s water demands. The population Zone 7 serves is approximately 216,000 people (Zone 7 Water Agency, 2010: p. 2-6). • The Santa Clara Valley Water District (SCVWD), the primary wholesaler for Santa Clara County (South Bay), is receiving 50% of its Central Valley Project (CVP) municipal and industrial water allocation and only 5% of its SWP normal-year allocation. Due to these cutbacks, existing drinking water demands will not be met and the agency has reduced treated drinking water deliveries by 20% (SCVWD, 2014a: p. 4). Overall, the total estimated 2014 supply for Santa Clara County is 238,000 AF (SCVWD, 2014b: p. 3), which is about 60% of average (SCVWD, 2013a: p. 14). SCVWD serves 2 million people (SCVWD, 2013b). • In Napa County (North Bay), the lack of surface water supplies has triggered increased pumping in the already-overdrafted Milliken-Sarco-Tulocay (MST) groundwater basin, a declared Groundwater Deficiency Area that serves approximately 4,800 people. Landowners who have lost access to groundwater have begun to truck in their potable water supply. Calistoga (population 5,155) is currently in a Stage II Water Emergency with mandatory 20% conservation required. Calistoga is receiving only 5% of its SWP allotment this year and is relying almost completely on carryover water to accommodate the water demand. If the drought continues, Calistoga may run out of water supply next year. • In the Town of La Honda in San Mateo County, the local domestic water supplier has requested a 20% reduction in water use and is considering mandatory 50% water rationing for all customers (Cuesta La Honda Guild, 2014a; Cuesta La Honda Guild, 2014b). Some individual residents have already begun trucking in water from other areas. Alpine Creek, which may become dry over the summer months, is the only source of water for approximately 70 customers in the La Honda community, as well Camp Glenwood Boys Ranch and Sam McDonald Park. The County has informed the State and County Offices of Emergency Services, the State Department of Public Health, and other agencies of this potential emergency (County of San Mateo Department of Public Works, 2014a). • The Stinson Beach County Water District has implemented a Water Rationing Ordinance requiring a 20% reduction in domestic water use.
<p>At risk of not meeting existing agricultural water demands</p>	<p>The Bay Area is world renowned for its viticulture and has significant agricultural water demand in the South and North subregions. The Bay Area is at risk of not meeting agricultural demands due to the drought, whether from reductions in SWP/CVP allotments or unavailability of local surface supplies:</p> <ul style="list-style-type: none"> • SCVWD is discontinuing deliveries of raw surface water to agricultural customers (SCVWD, 2014c: p. 3). The District’s CVP agricultural allocation for 2014 is zero. • Due to the drought, several agricultural landowners in the Los Carneros area of Napa County are trucking in water for use on their crops. A June 2014 survey in Carneros indicated that most irrigation supply pond levels are less than 33% of normal this year. Most growers have increased groundwater use to make up deficits in addition to truck imports. • Because of the drought, agricultural water demands in San Mateo County will not be met. The San Gregorio Creek Watermaster sent notices (May 16, 2014) to curtail irrigation water use to 2 days per week and curtail outside domestic use and commercial stock watering in the watershed (Fulwiler, 2014).
<p>At risk of not meeting ecosystem water</p>	<p>The Bay Area Region is home to sensitive habitats and many endangered and threatened species, including salmonids such as steelhead and salmon, which spawn and rear in freshwater streams. Examples of ecosystem impacts due to the drought are described below:</p>

<p>demands</p>	<ul style="list-style-type: none"> • In Santa Clara County, the lack of rainfall and cutbacks in imported water have reduced streamflow and affected habitat for special-status species, including steelhead (SCVWD 2014d). SCVWD has curtailed releases to creeks resulting in dry creek. Rodeo, Regnart, Calabazas, Saratoga, Alamitos and Calero Creeks in Santa Clara County were dry as of May 2014 and will remain dry until significant rainfall occurs (SCVWD, 2014d). • In coastal San Mateo County, flows in the San Gregorio Watershed are 10% of average this year (USGS, 2013; USGS, 2014). This perennial stream will dry up this summer and affect fish and wildlife such as California red-legged frog, coho salmon, steelhead, and tidewater goby. The photo on the right shows a steelhead stranded in a shallow pool in La Honda Creek (tributary to San Gregorio Creek). • At Stinson Beach in western Marin County, surface water sources in small creeks that drain the coast side of Bolinas Ridge are greatly reduced, resulting in reduced water supply for the Stinson Beach County Water District and fish and wildlife that share the limited surface water resources. 
<p>Drinking water MCL violations</p>	<p>Drinking water maximum contaminant level (MCL) violations will occur if the drought continues and treated water providers are forced to use alternate water supply sources with poorer water quality. This is a regional issue across the Bay Area and is illustrated by conditions at SCVWD's Rinconada Water Treatment Plant in Los Gatos. The quality of source water for the treatment plant has declined due to the drought. Since January 2014, source water delivered to the plant has been high in total dissolved solids, total organic carbon, and bromide, which are precursors to formation of disinfection byproducts (DBPs) such as trihalomethanes (THMs). SCVWD has been forced to apply costly water treatment additives (i.e., powdered activated carbon). Without this treatment additive, concentrations of THMs in drinking water supplies will exceed MCLs. MCL violations for THMs have not occurred yet in 2014, but THM levels have come close to reaching the MCL. As the drought continues, contaminant levels will exceed allowable limits without additional treatments or use of additives.</p>
<p>Groundwater basin overdraft</p>	<p>Groundwater basins in the Bay Area support potable and agricultural water demand. Due to the drought and reduced surface water supply, groundwater pumping has increased in the region, particularly where agricultural irrigation demand is high. The Bay Area Drought Relief Program (Bay DRP) will address groundwater drought impacts:</p> <ul style="list-style-type: none"> • Increased pumping in Santa Clara County has lowered groundwater levels and increased overdraft. In April 2014, groundwater levels in San Jose were about 22 feet lower than in April 2013, and 21 feet lower than the 5-year average (SCVWD, 2014e). SCVWD's groundwater recharge program has been significantly reduced due to the drought. The SCVWD estimates only 25% (about 25,000 AF) of the normal recharge water supply will be available for recharge into local basins in 2014 (SCVWD, 2014c: p. 2). • The drought has worsened groundwater overdraft in the MST basin in Napa County. The MST is in overdraft by an estimated 2,000 AF/year. The MST area includes both rural residential properties and agricultural properties that rely solely on groundwater. Of the groundwater pumped, 45% is used for agriculture, 29% for open-space irrigation, and 27% for domestic use. The drought has significantly reduced natural aquifer recharge to the basin.

Discharge water TMDL violations	<p>Over 200 water bodies in the Bay Area are water quality impaired. The Regional Water Quality Control Board (RWQCB) has established 12 TMDLs to address these impairments. San Francisco Bay dischargers are restricted from discharging sediment, mercury, and certain toxic substances in excess of TMDL requirements. Under the current drought conditions, water supplies are reduced, but water pollutants will likely continue to be discharged to the Bay. With implementation of the recycled water projects included in this Proposal, wastewater discharges to the Bay will be reduced over time to help protect against future exceedances of water quality standards (by reducing discharge of water quality contaminants carried in treated wastewater). Without the recycled water projects included in this Proposal, wastewater discharge contaminants in the future may exceed TMDL requirements.</p>
Other drought-related adverse impacts	<p>The drought has resulted in other adverse impacts, including impacts to recreation and park closures. Many parks along the coast have limited water storage and are dependent upon small streams (which are in turn dependent on regular local rainfall) and are therefore vulnerable to fluctuations in climate and precipitation:</p> <ul style="list-style-type: none"> • Lack of water in Pescadero Creek has prompted San Mateo County to close the Memorial Park Campground for the 2014 camping season (Murtert, 2014). Beginning June 16, water was shut off to drinking fountains, showers, and toilets. The 2,250 people who made reservations to camp in the park in 2014 will have the option of either receiving a refund, transferring their reservations to the 2015 season, or, in some cases, making reservations to camp at other county parks. This closure is the first in the park's history (Murtert, 2014).

As described above, the Bay Area Region is already experiencing six of the seven specific drought impacts identified on page 20 of the Proposal Solicitation Package (PSP): at risk of not meeting existing drinking water demands; at risk of not meeting existing agricultural water demands; at risk of not meeting ecosystem water demands; drinking water MCL violations; groundwater basin overdraft; and other drought-related adverse impacts (i.e., recreational impacts). The Bay Area Region is **severely** impacted by 2014 regional drought conditions. Documentation of drought declarations and conservation directives issued by Proposal project sponsors is provided in Attachment 2, File 3 of 3.

Potential Impacts if Drought Continues

If drought or dry-year conditions continue into 2015, remaining water supplies in the Bay Area Region would be further reduced, which would necessitate mandatory and severe rationing (targeting 40-60% reductions for some areas). Water quality impacts (e.g., formation of DBPs, increased salinity), ecosystem impacts, groundwater overdraft, and other regional water management and resource impacts would also worsen. Examples of potential impacts if the drought continues into 2015 are presented below and are organized by sub-region.

East Sub-Region: Dublin-San Ramon Services District (DSRSD) and the East Bay Municipal Utility District (EBMUD) are at risk of not meeting drinking water and other demands if the drought continues into 2015. DSRSD supplies potable and recycled water to approximately 18,000 customers in Alameda and Contra Costa counties (DSRSD, 2011: p. 1), while EBMUD serves approximately 1.34 million people in the East Bay (EBMUD, 2011: p. 1-2). DSRSD's available water supply has been reduced by more than 25% in 2014 and the District has issued a 25% mandatory conservation ordinance. DSRSD purchases its entire water supply from Zone 7, which, as mentioned above, will receive only 5% of its SWP allotment in 2014. DSRSD is already in Stage 3 of its Water Shortage Contingency Plan. If the drought continues and storage cannot meet public health and safety needs, DSRSD would then declare Stage 4, which could result in discontinuation of service to non-essential facilities in 2015.

EBMUD's available water supply is well below average. EBMUD obtains 90% of its water supply from the Mokelumne River watershed in the Sierra Nevada Mountains. Due to the 2014 drought, EBMUD's post-1914 water right supply from the Mokelumne River was reduced by 4,000 AF as of May 2014 and may continue at this reduced level until water conditions improve in the state (SWRCB, 2014). As of June 2014, precipitation in the Mokelumne River watershed (including snowfall) is only 54% of average and the EBMUD storage system is at 71% capacity (EBMUD, 2014a). EBMUD has a limited drought-year supplemental supply through a CVP contract with the U.S. Bureau of Reclamation. This supply was reduced by 50% this year and is expected to be further reduced next year if the drought continues.

The Contra Costa Water District (CCWD) could face significant water quality impacts if the drought continues into 2015. CCWD receives 100% of its supply from the Delta and serves 500,000 people in the Cities of Antioch, Concord,

Martinez, and Pittsburg. While it normally blends water obtained from the Delta with higher quality water from Los Vaqueros Reservoir during the summer months to reduce salinity levels, this year salt levels have been rising earlier than normal (Sommer, 2014: p. 4). While treatment plants can handle high salinity levels, poor water quality raises their operating costs (Sommer, 2014: p. 4).

South Sub-Region: If the drought continues, SCVWD may need to implement Stage 5 of its Water Shortage Contingency Plan, which could require water use reductions of up to 50%. As SCVWD is the wholesale water provider for the Santa Clara Valley, such mandatory cutbacks would affect many cities (e.g., City of Sunnyvale), people, and businesses in the Bay Area. Existing drinking water demands and agricultural water demands would not be met, and more creeks and ponds would go dry. Ongoing water quality and groundwater overdraft issues would be exacerbated.

West Sub-Region: The San Francisco Public Utilities Commission (SFPUC), which is the retail water provider to San Francisco, much of the Peninsula, and also a wholesale provider to numerous cities and agencies in the South and East Sub-Regions, has requested 10% voluntary rationing across its service area in 2014. Assuming its customers continue to heed that call for conservation, SFPUC is not immediately faced with the prospect of mandatory rationing. If the drought continues into the winter of 2014/15 and beyond, SFPUC will need to maintain or increase rationing and possibly move to mandatory cutbacks. That could result in rationing of some individual wholesale customers up to 40%.

In San Mateo County, ongoing drinking water and agricultural water supply shortages, ecosystem impacts, and other adverse impacts (e.g., recreation facility closures) would continue and worsen if the drought persists. Drinking water would require continued trucking in and agricultural water users in the area would be forced to fallow fields. MCL violations could also occur as Skylonda Mutual Water Company and Cuesta La Honda Guild both have water quality problems that arise when surface water supplies are low. Skylonda has low-producing wells with high barium levels. Cuesta La Honda has an unlined reservoir with turbidity issues when water levels are low.

North Sub-Region: If the drought continues into 2015, ongoing water supply and groundwater overdraft issues in the Napa Valley would continue and worsen. Landowners in Napa Sanitation District's service area are already trucking in water, and the need for this practice would continue and worsen into 2015. Other agricultural water users in the area already overpump groundwater and will also likely be forced to truck in water or allow fields to go fallow if groundwater levels decline further into 2015, such that groundwater wells are no longer productive.

The City of Calistoga faces the real possibility of running out of water if the drought continues into 2015. About 50% of the City's current water supply is from the SWP and the balance is from Kimball Reservoir (a local surface water supply reservoir). The City is currently meeting its demands with SWP carry-over water. If the drought continues and the carry-over water ceases, the City could run out of water in 2015. If the drought continues and flows in the Napa River are reduced further, the City's existing treated wastewater effluent discharges may result in TMDL and discharge permit violations (i.e., reduced mixing with Napa River flows and increased nutrient concentrations).

If the drought continues into 2015, Marin Municipal Water District (MMWD) could be forced to implement mandatory rationing, potentially up to 50%. Currently, a request for 25% voluntary reduction in water use remains in effect, and greater mandatory cutbacks may be necessary in the future. MMWD's water supply is extremely vulnerable because it depends upon regular local rainfall. Local storage is limited, so even when maximized, the supply does not last long.

Similar to MMWD, Stinson Beach's water supply is extremely vulnerable to variations in precipitation and climate. If the drought continues into 2015, Stinson Beach County Water District will enact more severe water rationing (beyond the current mandatory 20%), likely resulting in park closures and recreational impacts. Each year large numbers of summer vacationers visit the Town of Stinson Beach, Mt. Tamalpais State Park, and the Golden Gate National Recreational Area surrounding the town, increasing SBCWD's water demand from 3 million gallons per month in the winter to 6 million gallons per month in the summer.

Summary of Drought Impacts

In summary, the Bay Area Region has experienced numerous impacts from the 2014 drought, including being at risk to not meet drinking water, agricultural, and ecosystem water demands. The drought has also caused water quality and groundwater impacts in the Region. As described above, these impacts will become greater and more severe if the drought continues into 2015. The projects included in this Proposal will provide immediate relief to people, wildlife, and the economy of the Region by helping to alleviate these impacts. Many of the projects included in the Proposal would support water supply reliability and delivery of safe drinking water to Bay Area communities in need.

Water Conservation Measures

As a result of the 2014 drought, water conservation measures and restrictions have been implemented by virtually all water service providers in the San Francisco Bay Region, including the member agencies in this Proposal. New 2014 measures and restrictions are being implemented on top of past and ongoing conservation efforts that have been in place for many years. The Bay Area's per-capita water use is 157 gallons per capita per day (gpcd), among the lowest in the state (BAIRWMP, 2013: p. 4-21). This low usage rate is the result of past and ongoing conservation programs and incentives.

Regional and agency-wide conservation has been implemented since 2012 through the Bay Area Regional Conservation Program (see Project 10). Water conservation efforts have included rebates and incentives for high-efficiency devices and lawn-to-landscape conversions, education and workshops on conservation, and direct installation of water-saving devices. While these efforts have accomplished significant water use reduction, more conservation is needed. Due to the severity of the 2014 drought, voluntary and mandatory cutbacks have already proven necessary across the Bay Area despite the Region's relatively low existing water usage. More severe rationing will likely be required without additional conservation programs.

Water Conservation Measures Being Implemented

Table 2-1 summarizes our proposal team's current conservation measures to address the 2014 drought. The project proponents included in this Proposal represent the major water providers in the Bay Area, and their conservation measures represent region-wide conservation efforts. Documentation of all water conservation directives is provided in Attachment 2, File 3 of 3.

Table 2-1. 2014 Conservation Measures Implemented by Proposal Project Proponents

Sub-Region	Project Proponent*	Voluntary/Mandatory	Target Reduction	Date Adopted
East	Alameda County Water District	Mandatory	20%	March 13, 2014
	CCWD	Voluntary	15%	March 19, 2014
	DSRSD	Mandatory	25%	May 5, 2014
	EBMUD	Voluntary	10%	February 11, 2014
	Zone 7 Water Agency	Mandatory	25%	January 29, 2014
South	SCVWD	Mandatory	20%	February 25, 2015
	City of Sunnyvale	Mandatory	20% ¹	February 25, 2015
West	SFPUC	Voluntary	10%	January 31, 2014
	San Mateo County RCD	Voluntary	20% ²	March 7, 2014
North	City of Calistoga	Mandatory	20%	February 4, 2014
	City of Napa	Voluntary	20%	May 20, 2014
	MMWD	Voluntary	25%	January 21, 2014
	Sonoma County Water Agency	Voluntary	20%	February 3, 2014
	Stinson Beach County Water District	Mandatory	20% ³	April 1, 2014
	Solano County Water Agency	N/A	N/A ⁴	N/A
Number of Agencies Implementing 20% (or More) Reduction Conservation Measures:			11/15 (73%)	
<p>*Some agencies are participants in multiple projects. ¹ Sunnyvale is following its wholesaler's (SCVWD's) directive. ² In San Mateo County, the local water provider (Cuesta La Honda Guild) targeted a 20% reduction, but conservation efforts have</p>				

achieved a 30% reduction in water use in 2014.

³ The District's April 1, 2014 Water Rationing Ordinance required mandatory water use restrictions for domestic and commercial users equivalent to 27% and 20% mandatory restrictions, respectively.

⁴ A 20% reduction applies to the City of Benicia only – Solano County Water Agency has not issued a conservation directive for its service area.

As shown in Table 2-1, 73% of water supply project proponents are implementing mandatory or voluntary conservation measures of at least 20%. This proportion of proponents is within the 60-79% bracket described in the PSP, which equates to a score of 4 points out of 5.

The percentage of project proponents implementing 2014 conservation measures of 20% or more should be considered in light of existing and ongoing conservation efforts. Past conservation efforts, and efforts already in place, have enabled some water agencies to avoid making deeper cuts in water use (i.e., 20% or more) during the 2014 drought. EBMUD and SFPUC are two of the largest water suppliers in the Region and both have successful long-term, ongoing conservation programs/measures. EBMUD and SFPUC are both currently asking customers for less than a 20% reduction in water use based on the effectiveness of past and ongoing programs. EBMUD customers have already reduced water use by 17% since 2007 (EBMUD, 2014a). In EBMUD's service area, the average per capita water use (indoor and outdoor) for a single-family residential customer was 100 gallons per day in 2009 (EBMUD, 2011b: p. 1-3).. Average water use in California as a whole is 198 gallons per capita per day (gpcd) (DWR, 2013: p. 6). SFPUC retail customers also have low existing per-capita water use. In 2010, per-capita water use in SFPUC's retail water service area was approximately 85 gpcd, while residential per-capita use was 50 gpcd (SFPUC, 2011: p. 33-34). San Francisco and cities in EBMUD's service area (e.g., Berkeley, Oakland) also have higher population densities and less outdoor landscaping than in other parts of the Bay Area Region and state. These factors have allowed EBMUD and SFPUC to avoid implementing stricter water rationing despite the severity of the 2014 drought.

In addition to the numerical conservation targets listed in Table 2-1, project proponents have implemented more specific conservation measures and water use restrictions. For the water providers and partners hardest hit by the 2014 drought, such as Zone 7, DSRSD, San Mateo County RCD, City of Calistoga, SBCWD, and SWP/CVP contractors, conservation efforts have intensified, resulting in immediate actions to address drought impacts. Conservation measures have included water shortage pricing, restrictions on timing and frequency of water use, prohibitions on excessive water use (e.g., refilling pools, hosing off sidewalks), reduced deliveries, conservation incentives (rebates), and penalties for non-compliance.

For example, Zone 7 Water Agency has enacted a number of measures, as dictated by Stage 2 of its Water Shortage Action Plan, including the following prohibitions: no watering during or less than three days after a rain event; no irrigation that results in ponding, flooding, excessive runoff, or marshy conditions; no watering during daylight hours; no refilling swimming pools; no use of non-recycling decorative fountains. DSRSD, which purchases water from Zone 7, has implemented water shortage rates (e.g., 2.8 times baseline for Tier 3 residential customers and all potable irrigation customers), as well as restricting commercial and residential irrigation and other water uses (e.g., watering only allowed two days per week from June to September, no hosing off sidewalks) (DSRSD, 2014). To ensure compliance, DSRSD has established the following enforcement and penalty provisions (DSRSD, 2014):

- | | |
|----------------------------|--|
| 1 st Violation: | District issues warning orally (telephone call, site visit) or in writing (door hanger, letter) specifying the violation and what the customer must do to correct it |
| 2 nd Violation: | \$250 penalty |
| 3 rd Violation: | Additional \$500 penalty |
| 4 th Violation: | Additional \$1,000 penalty |
| 5 th Violation: | Reduction in water delivered to that customer via a flow restrictor or disconnection of water service |

EBMUD is offering a discount landscaping mulch coupon program, in partnership with CCWD, as well as a free WaterSmart Home Survey Kit (EBMUD, 2014b) to help its customers conserve more water.

ACWD has declared a water shortage emergency and adopted water use regulations and restrictions similar to those adopted by DSRSD and Zone 7, including irrigation restrictions (e.g., two days per week during the period June 1

through September 30) and prohibitions on certain water uses (e.g., hosing off sidewalks). To ensure compliance, ACWD has given notice to its customers that it will enforce its water use restrictions as follows: (1) written warning; (2) on-site notification; (3) termination of water service; (4) reconnection charge for restoration of water service.

SCVWD has reduced treated water deliveries to its wholesale customers by 20% and agricultural demands are not being met at all in 2014. SCVWD has also offered landscape conversion rebates, a “Laundry to Landscape” graywater rebate program, and rebates for efficient commercial food steamers and clothes washers (SCVWD 2014f).

In support of its current 10% water use reduction goal, SFPUC has directed its customers to take the following actions:

- Minimize indoor water use: take shorter showers, run only full loads in dishwasher and clothes washer.
- Limit landscape watering to twice per week and adjust irrigation to avoid overspray and runoff.
- Minimize water used to clean sidewalks and outdoor surfaces unless required for public health purposes.
- Provide water only upon request at restaurants.
- Minimize car washing or use a commercial car wash; avoid washing cars at home.
- Repair or replace inefficient or leaking equipment as soon as possible.

SFPUC, as a participant in the Bay Area Regional Conservation Program, also offers rebates to residential customers who replace their toilets and washers with high-efficiency models, as well as rebates and incentives for rainwater harvesting, commercial toilet and urinal replacement, commercial washer and other equipment replacement, and Laundry-to-Landscape gray-water starter kits (SFPUC, 2014).

In coordination with SFPUC, the City of San Francisco has taken action to address the drought. Executive Directive 14-01, issued by the Mayor’s Office on February 10, 2014, called on all city departments to take immediate steps to reduce water consumption with a goal of achieving a 10% reduction (Office of the Mayor, City and County of San Francisco, 2014). The directive requires all departments to (1) develop a Water Conservation Plan that includes an inventory of all departmental plumbing fixtures and their flow rates, a timeline for retrofitting inefficient plumbing fixtures with high-efficiency models, and a list of best management practices for water conservation (e.g., maintenance of medians and other landscapes); (2) educate staff and visitors on water conservation practices; (3) explore the use of non-potable water for street cleaning; and (4) develop alternative sources of water supply (e.g., groundwater, recycled water, foundation drainage) (Office of the Mayor, City and County of San Francisco, 2014).

In rural San Mateo County, a number of conservation measures have been implemented. The San Gregorio Creek Watermaster issued a notice to second-priority water users to curtail their diversions from San Gregorio Creek to 2 days per week (Fulwiler, 2014). The County of San Mateo Department of Public Works (2014b) requested that customers conserve water, including the following water-saving tips:

- Landscape with plants and flowers that use 50% less water.
- Clean driveways and sidewalks with a broom instead of a hose to save about 150 gallons per month.
- Run full loads in the washing machine and dishwasher to save about 800 gallons per month.
- Take 5-minute showers while using a low-flow showerhead to save about 600 gallons per month.

Signs urging water conservation have also been placed along Highway 84 and at the entrance to the community of La Honda in San Mateo County. These and other voluntary conservation measures have successfully reduced residential water use in La Honda by 30%. In addition, due to low water levels in Pescadero Creek, the San Mateo County Parks Department has closed several campgrounds for the 2014 camping season due to lack of adequate water supply (Murtert, 2014).

MMWD has issued a dry-year water ordinance, which includes prohibitions on washing sidewalks and driveways, restrictions on irrigation (no runoff or overspray allowed), requirements for high-efficiency indoor plumbing fixtures and water-efficient landscaping in new buildings/developments, and other measures (MMWD, 2011: p. 119a-119l). MMWD has also provided rebates for water-efficient appliances (MMWD, 2014a).

The City of Calistoga has declared a Stage II Water Emergency, including restrictions on outdoor irrigation and on water use in restaurants, hotels, and spas. Violation of City-mandated best management practices is subject to issuance of a notice of violation or other citation and also subject to monetary penalties.

In Stinson Beach, SBCWD is using the following enforcement and penalty provisions (in effect April 1, 2014) to achieve its mandatory rationing allocation (125 gallons per residence per day):

1. Notice #1 (a warning notice) will be sent with the May bill to reduce water usage if the customer's monthly usage for April exceeds 125 gallons per residence per day (55 cubic feet per month).
2. If a subsequent over-usage occurs, Notice #2 (a violation notice) will be sent no earlier than June and a fine of \$400 will be charged.
3. If another subsequent over-usage (violation) occurs, Notice #3 will be sent no earlier than July, a cease-and-desist order will be issued, water will be turned off, and water service will be terminated.
4. Excessive water consumption in violation of the ordinance will result in termination of water service. A charge shall be paid prior to reactivating a service that has been terminated.

Anticipated Water Conservation Measures if the Drought Continues

If drought or dry-year conditions continue into 2015, Bay Area water providers will be forced to implement additional mandatory and severe conservation measures, as prescribed in the Water Shortage Contingency Plans in their Urban Water Management Plans, and/or as dictated by their ordinances and decisions made by governing boards. For many project proponents, the next step in their contingency plans is the emergency stage, with mandatory rationing up to 50%. For other proponents, the next step is a shift from voluntary to mandatory rationing. If the drought continues into 2015, treated and untreated water deliveries may be cut back substantially or discontinued altogether, water use prohibitions may be enacted or expanded, and parks and other public facilities may be closed. Examples of possible conservation measures to be implemented by project proponents if the drought continues are provided below.

East Sub-Region: If the drought continues into 2015, DSRSD will likely enact Stage 4 (the final stage) of its Water Shortage Contingency and Drought Plan, required for a 50% or greater water supply shortage (DSRSD, 2011: p. 124). Stage 4 would enact additional measures on top of Stage 3 measures that are currently in place, including (1) shut down or prohibit use of any water at water theme parks; (2) prohibit turf irrigation and allow hand watering of other landscaping only on Saturday or Sunday; (3) prohibit draining and refilling of public swimming pools unless required for health or structural reasons; and (4) prohibit use of non-efficient washing machines at laundromats (DSRSD, 2011: pp. 126-127). Stage 4 of DSRSD's Water Shortage Contingency and Drought Plan also includes increased rates, with water supply shortage rates at 3.8 times the baseline rate for Tier 3 residential customers and all potable irrigation customers (i.e., \$5.53 per cubic foot [cf]), consistent with a 50% water use curtailment (DSRSD, 2014).

South Sub-Region: If the drought persists into 2015, SCVWD could enter Stage 5 (the final stage) of its contingency plan (already in Stage 4), which requires 50% mandatory water use reduction. Stage 5 of SCVWD's plan is considered an emergency and is triggered when projected groundwater reserves are below 150,000 AF (SCVWD, 2010: p. 6-4). As described in SCVWD's Urban Water Management Plan, in this last stage, water supply would be available only to meet health and safety needs (SCVWD, 2010: p. 6-4). Because SCVWD is a water wholesaler, the cities and water retailers it serves would be responsible for implementing water contingency plan actions identified in their own Urban Water Management Plans to achieve the 50% water use reduction necessary for a Stage 5 emergency (SCVWD, 2010: p. 6-4).

West Sub-Region: If the drought continues into the winter of 2014/15 and beyond, SFPUC will need to maintain or increase rationing and potentially move to mandatory cutbacks. This could result in rationing customers up to 40%. SFPUC is currently in Stage 1 (of 3) of its Water Shortage Allocation Plan. Stage 2 is triggered when overall system shortage exceeds 20% and involves mandatory restrictions for a target water use reduction of 11-20% (SFPUC, 2011: p. 61). Stage 3 is triggered when overall system shortage exceeds 50% and involves mandatory actions/restrictions necessary to achieve a target water use of greater than 20% (SFPUC, 2011: p. 61). Mandatory actions required in Stage 2 and 3 include the following: (1) no water waste, no irrigation runoff into street or gutters; (2) no water for cleaning sidewalks, driveways; (3) restaurants to provide water only upon request; (4) new construction water connections to have mandatory water-saving fixtures; and (5) all cooling water must be recycled (SFPUC, 2011: p. 62).

If the drought continues in San Mateo County, mandatory and severe conservation measures may be implemented and community facilities may be closed. The Board of the Cuesta La Honda Guild is looking into modifying the agency's bylaws so that mandatory 50% allotment reductions can be extended beyond 3 months if needed. Memorial Park campgrounds will likely be closed again in 2015 if the drought persists, as well as other community facilities.

North Sub-Region: MMWD could move to mandatory rationing if the drought continues. MMWD's rationing levels, identified in its Water Shortage Contingency Plan, are dictated by water supply conditions, as shown in Table 2-2.

Table 2-2. MMWD Water Shortage Contingency – Water Supply Conditions and Rationing Levels

Stage	Water Supply Conditions	% Reduction
Alert Stage (Voluntary Rationing)	Total reservoir storage is less than 50,000 AF on April 1	10%
Mandatory Rationing	Total reservoir storage is less than 40,000 AF on April 1	25%
Water Shortage Emergency	Total reservoir storage on December 1 is projected to be in the vicinity of, or less than, 30,000 AF	Up to 50%

Source: MMWD, 2011: p. 5-4

As of June 29, total reservoir storage in MMWD's system was 59,971 AF (75% of total, or 90% of average storage for that date) (MMWD, 2014b). However, as in other coastal areas in the Region (e.g., San Mateo County, Stinson Beach), Marin's water supply is extremely vulnerable because it depends upon immediately local rainfall in Marin watersheds and local storage is limited, so even when maximized, the supply does not provide multi-year coverage. If the drought continues into 2015, MMWD may be forced to consider mandatory rationing of 25-50%.

If the drought continues, mandatory conservation measures already being implemented in Calistoga and Stinson Beach will be continued and expanded. Calistoga may run out of water supply if the drought continues. Outdoor irrigation for landscaping and agriculture would be further restricted and non-essential uses of water (e.g., parks) may be discontinued altogether.

Summary of Water Conservation Measures

In summary, water conservation measures are being implemented by virtually all the water providers in the Bay Area. Of the project proponents included in this Proposal, 73% are implementing mandatory or voluntary measures of 20% or greater and many are implementing measures restricting wasteful or unnecessary uses of water, such as hosing off sidewalks and refilling swimming pools. The projects included in this Proposal would provide immediate drought relief to people, wildlife, and the economy of the San Francisco Bay Region and may avoid the necessity of implementing many of the more extreme, economically damaging conservation measures described above.