BAY AREA COUNCIL ECONOMIC INSTITUTE

SECONDARY ECONOMIC IMPACTS OF REDUCED BAY AREA WATER SUPPLY

An Analysis of the Draft Substitute Environmental Document of the Bay-Delta Water Quality Control Plan Update

Key Findings:

- **Large water supply shortfalls during dry years**
- **Severe dry-year water rationing in the RWS service area**
- **Building moratoria in affected cities**
- **Higher Bay Area housing costs**
- **Increased price of water within the RWS**

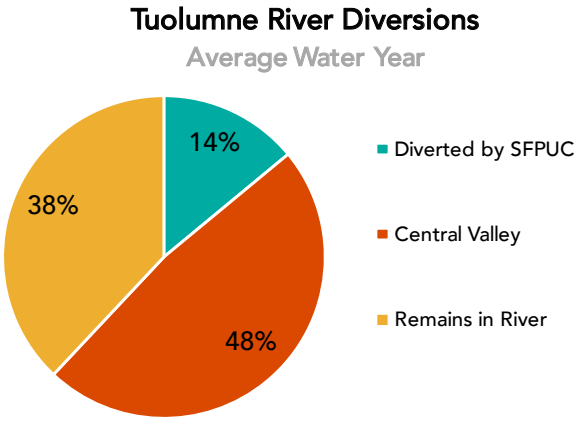
The State Water Resources Control Board is responsible for setting flow objectives on rivers flowing into the Sacramento-San Joaquin Delta to protect beneficial uses of water. The Board is considering new regulations aimed at improving fisheries on the San Joaquin River. The regulations, as detailed in the draft Substitute Environmental Document (SED) for the Bay-Delta Water Quality Control Plan update would require an average 40 percent of the river's natural unimpaired flow to be allowed to flow from La Grange into the Sacramento-San Joaquin Delta between February and June, with adaptive implementation ranging between 30 and 50 percent unimpaired flow depending on conditions. Flow objectives would be achieved by curtailing water diversions on the San Joaquin River's three major tributaries: The Merced, Stanislaus, and Tuolumne Rivers. The Tuolumne River is the primary water supply for the Hetch Hetchy Regional Water System (RWS), which is owned and managed by the San Francisco Public Utilities Commission (SFPUC).

In an average year, about 48 percent of the Tuolumne's water is diverted for Central Valley agriculture, 38 percent remains in the river, and 14 percent is diverted by the SFPUC (Figure 1). Water from the Tuolumne River

is the primary (85%) supply for SFPUC's RWS that serves 2.6 million people in San Francisco, Silicon Valley, and the East Bay. During dry years, as little as 10 percent of the Tuolumne's water remains in the river. According to this analysis, meeting the SED's increased flow requirements in dry years would require major cuts to water supplies for the Bay Area, the Central Valley, or some combination of both.

The draft SED does not explain how the cuts would be allocated across users; SFPUC estimates it could be responsible for providing as much as 51 percent of any new flows required. Under that scenario, SFPUC analyzed flow data on the Tuolumne River going back to 1920, and estimated how much water would be available for its Bay Area retail and wholesale customers in each year through 2010 according to five different variables: 20, 30, 40, and 50 percent unimpaired flow, as well as a "base case" without an unimpaired flow standard. SFPUC repeated the analyses under three different demand scenarios: A system wide demand of 265 million gallons per day (MGD) to represent future conditions; demand of 223 MGD to represent current system demand without rationing and equivalent to deliveries made in FY 2012-2013; and lastly, demand of 175 MGD to represent current system demand including drought rationing equivalent to deliveries made in FY 2015-2016.[1]

Figure 1



Source: San Francisco Public Utilities Commission, Jan 2017.
Analysis: Bay Area Council

The Bay Area Council Economic Institute looked at the impacts a 30, 40, and 50 percent unimpaired flow requirement on the Tuolumne River would have on Bay Area water users under the 175 MGD scenario. The 175 MGD scenario was chosen because it accurately reflects recent (2015-2016) dry year demand, and therefore represents the worst-case scenario current residents could be expected to face, and city planners would be forced to consider when evaluating available water supplies available for new development.

The key takeaways from this analysis are as follows:

The draft SED could lead to large water supply shortfalls during dry years

According to the SFPUC, RWS supplies would be reduced to as low as 67 MGD from 175 MGD during dry years such as 1990, 1991, 1992, resulting in a maximum annual shortfall of 120,976 acre-feet. The shortfall would have to be addressed either through conservation, the creation of new water supplies, or a combination of both.

The draft SED could result in severe dry-year water rationing in the RWS service area

Using conservation only, RWS users could be forced to reduce water use 55 percent to 30 gallons per residential user per day (R-GPCD) during dry years (Table 1). Many cities would face R-GPCD requirements that were much lower, such as Menlo Park at just 8.57 gallons. RWS customers currently use 54 R-GPCD, the lowest in California. The California statewide average is 82 R-GPCD.

The draft SED could result in building moratoria in affected cities

Residents in Melbourne Australia, widely regarded as one of, if not the, most water efficient cities in the developed world have achieved 40 R-GPCD. We assume that any Bay Area city which would be forced to plan around dry-year R-GPCD levels below 35 gallons would be compelled to adopt interim controls over

1. Deliveries by demand and unimpaired flow as provided by the SFPUC upon request.

new permitting and implement a moratorium on new construction (Figures 2, 3, and 4).

The draft SED could result in higher housing costs in the Bay Area

The California Legislative Analyst's office has found that building less housing than people demand inflates housing prices.[2] Had the draft SED been put in place in 1990, the earliest available housing data provided by the California Department of Finance, we estimate the multiple building moratoria could have resulted in 91,098 fewer housing units over the period ending 2015. Over the same time period, the RWS service area attracted 302,435 new residents. Additionally, SFPUC estimates RWS demand will increase to 265 MGD in the future, meaning the gulf between the Bay Area's supply and demand will grow over time, further negatively impacting affordability.

The draft SED could undermine Bay Area economic growth

The region served by the RWS supports 3.3 million jobs and generated $667 billion in GDP in 2015.[3] Moratoria on new development will directly undermine the ability of Bay Area employers to grow and create jobs in the region. Indirectly, Bay Area employers increasingly cite the lack of housing as a powerful deterrent to locating new growth within the Bay Area, and report outsourcing new jobs to regions with more affordable housing supplies. By making it harder and more expensive to build, the SED will reinforce this trend.

The draft SED could increase the price of water within the RWS

The above impacts could be avoided, or partially reduced, through securing new water supplies. Due to chronic water supply deficits throughout California, we assume SFPUC will be unable to secure long-term contracts for imported water, and would instead have to create new water either through desalination or water recycling. During dry years at 175 MGD demand, SFPUC estimates the RWS supply will be reduced to 67 MGD, a supply gap of approximately 121,000 acre-feet per year. Producing such quantities of water through desalination would cost an estimated $258 million - $286 million annually, a net cost increase of between approximately $38 million and $66 million to ratepayers. Water recycling wasn't considered due to the lack of projects at comparable scale.

METHODOLOGY

The Bay Area Council Economic Institute used various sources to compile data by water source, distribution by city, and use by sector.

Supply and Demand Figures

The primary source for determining available supply during wet and dry years and under the various release schedules required to meet unimpaired flow thresholds were simulations developed by the San Francisco Public Utilities Commission (SFPUC). These models present three levels of water demand evaluated for the SFPUC retail and wholesale service areas. A system demand of 265 million gallons per-day (MGD) to represent future conditions, a system demand of 223 MGD to represent current system demand without rationing equivalent to deliveries made in FY 2012-2013, and lastly a system demand of 175 MGD to represent current system demand including drought rationing equivalent to deliveries made in FY 2015-2016.

Additionally, the SFPUC model evaluated the contribution to in-stream flows on the Tuolumne River at 20%, 30%, 40%, and 50% of the total unimpaired flow at La Grange from February through June of each year. A "base case" was evaluated without unimpaired flow standard.

Distributions by City and Source

The primary source used to allocate supply by city was the BAWSCA Annual survey for the 2014-2015 fiscal year which includes current water supply by source, current and projected water purchases from the San Francisco

2. State of California, Legislative Analyst Office. California's High Housing Costs: Causes and Consequences. March 17, 2015.

3. California Employment Development Department and Bureau of Economic Analysis, the region consists of the San Francisco-Oakland-Hayward, CA and San Jose-Sunnyvale-Santa Clara, CA Metropolitan Statistical Areas.

Regional Water System (SF RWS), and BAWSCA member agency profiles. The annual survey has been conducted since 1996 to update key BAWSCA service area information including projections of water demands and population.

Additionally, the Socioeconomic Impacts of Water within the Hetch Hetchy Regional Water Systems Service Area conducted by the Brattle Group for the SFPUC was used for its analyses the potential impacts of water shortages to water users of different sectors, as well as impacts on welfare, business sales, and employment for the City and County of San Francisco and wholesale customer service areas.

MODEL

Distributions by City and Source

The estimated residential gallons per-capita per day (R-GPCD) for each of the cities in the study was modeled by distributing the system-wide demand of 175 MGD at 30%, 40%, and 50% of total unimpaired flow levels between the SFPUC retail (37.5% of the estimated MGD) and wholesale costumers (62.5% of the estimated MGD) for 1990 through 2010 as set forth by the SFPUC SED alternative model. A system-wide demand of 175 MGD was chosen to depict similar conditions to the most recent water-year. However, in addition to assuming residents can maintain the level of conservation achieved during drought years, this level of demand does not allow room for population growth. The water share for wholesale costumers was then distributed across the wholesale customers according to their water usage in the 2014-2015 fiscal year as reported in the BAWSCA Annual Survey. The estimated MGD from other local sources was accounted for as reported by the Brattle study for normal and dry years.

Cities' total estimated water supply in MGD was distributed across four sectors: dedicated irrigation (5.84%), commercial and industrial (26.31%), residential (58.39%), and other (4.79%) water use. These water use ratios were determined from the SFPUC wholesale service area's aggregate demand by sector as stated in the BAWSCA Annual Survey for the 2014-2015 fiscal year. This analysis makes the assumption that the sector demand is the same for all the years analyzed.

For the SFPUC wholesale area, the analysis uses aggregate figures for water demand by sector, and assumes that water demand by sector is the same for all the years analyzed.

Finally, the estimated R-GPCD for each city per year from 1990 through 2010 was calculated by allotting the total estimated MGD in the residential sector to the total population in each year, as described by the California Department of Water Resources.

Population and housing figures were attained from the California Department of Finance's historical population and housing estimates. Population and housing statistics were only estimated for 70 percent of cities in the RWS as data is unavailable for unincorporated municipalities.

Increased Price of Water

During dry years, estimated supply in the RWS will be reduced to 67 MGD, a supply gap of approximately 121,000 acre-feet per year when system demand is at 175 MGD. To determine the cost of replacing that water, we assume SFPUC will be unable to locate reliable existing supplies from elsewhere in California for import, and would instead have to create new water locally.

For new water, we looked at desalinated water. For desalination, we used the current price per-acre-foot range at the Carlsbad Desalination Plant, the largest such facility in California, which can produce 48,000 acre-feet per year.

Appendix

Table 1. Unimpaired Flow Impacts

	30%		40%		50%	
JURISDICTION	**R-GPCD**	**GPCD**	**R-GPCD**	**GPCD**	**R-GPCD**	**GPCD**
Alameda County Water District	-	-	-	-	-	-
City of Brisbane/GVMID	43.41	74.34	32.44	55.52	18.4	31.52
City of Burlingame*	32.35	47.53	25.33	35.5	16.37	20.16
CWS Bear Gulch	-	-	-	-	-	-
CWS Mid Peninsula	-	-	-	-	-	-
CWS South San Francisco	-	-	-	-	-	-
Coastside County Water District	-	-	-	-	-	-
City of Daly City	13.92	53.14	27.5	17.81	23	10.11
City of East Palo Alto	39.15	67.04	35.49	60.77	30.82	52.78
Estero Municipal Improvement District	-	-	-	-	-	-
City of Hayward	11.77	17.95	10.56	17.95	11.04	18.71
Town of Hillsborough	51.74	88.6	38.64	66.17	21.94	37.57
City of Menlo Park	20.22	34.63	15.1	25.86	8.57	14.68
Mid-Peninsula Water District	-	-	-	-	-	-
City of Millbrae	22.36	38.29	16.75	28.69	9.6	16.43
City of Milpitas	44.44	76.12	34.63	59.31	22.12	37.88
City of Mountain View	41.76	71.52	34.39	58.89	24.99	42.8
North Coast County Water District	-	-	-	-	-	-
City of Palo Alto	46.44	70.48	30.73	52.64	22.74	29.88
Purissima Hills Water District	-	-	-	-	-	-
City of Redwood City	30.3	51.9	23.31	39.93	14.4	24.66
City of San Bruno	39.39	67.45	34.9	59.77	29.18	49.98
City of San Jose	-	-	-	-	-	-
City of Santa Clara	152.32	260.86	140.44	240.52	125.3	214.6
Stanford University	-	-	-	-	-	-
City of Sunnyvale*	73.23	125.41	64.16	109.88	53.03	90.82
Westborough County Water District	-	-	-	-	-	-
San Francisco	53.62	81.77	35.92	61.07	21.35	34.67
REGIONAL AVERAGE	**52.90**	**86.08**	**40.89**	**68.37**	**29.36**	**47.53**

R-GPCD = Gallons per Capita per Day for residential users only.

GPCD = Gallons per Capita per Day across all water users.

Figure 2. Potential Rationing with 30% Unimpaired Flow on the Tuolumne River

Assuming RWS Demand of 175 Million Gallons per Day

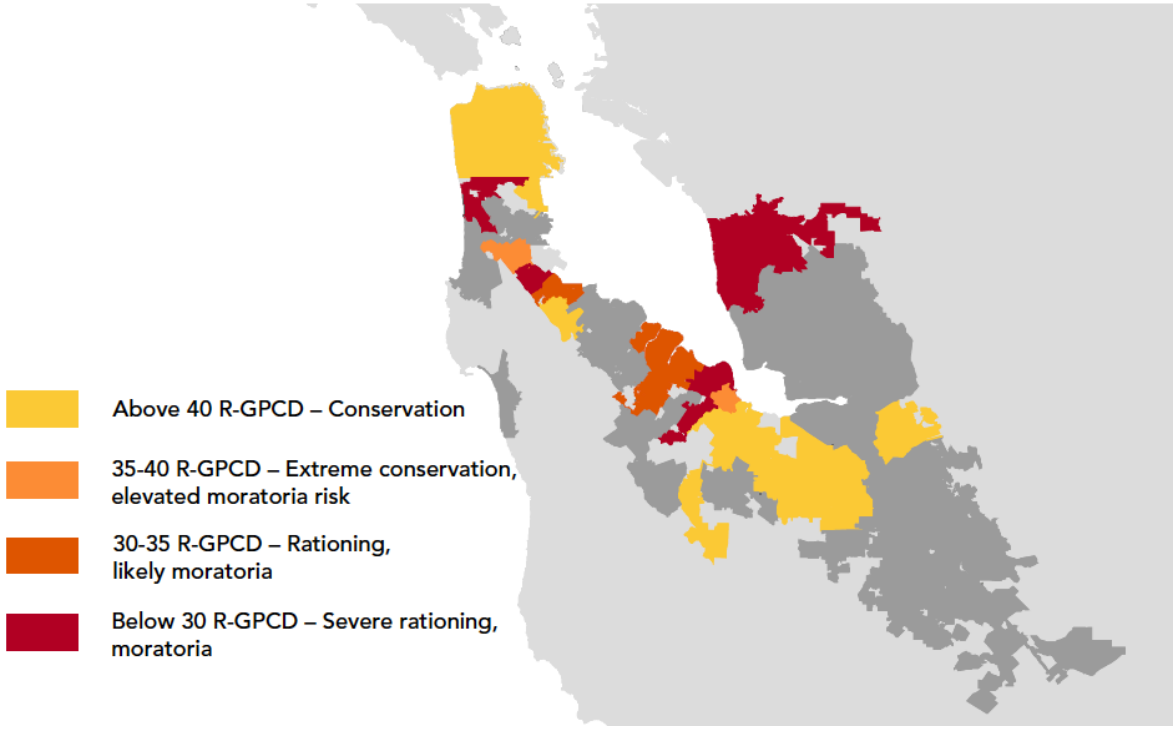
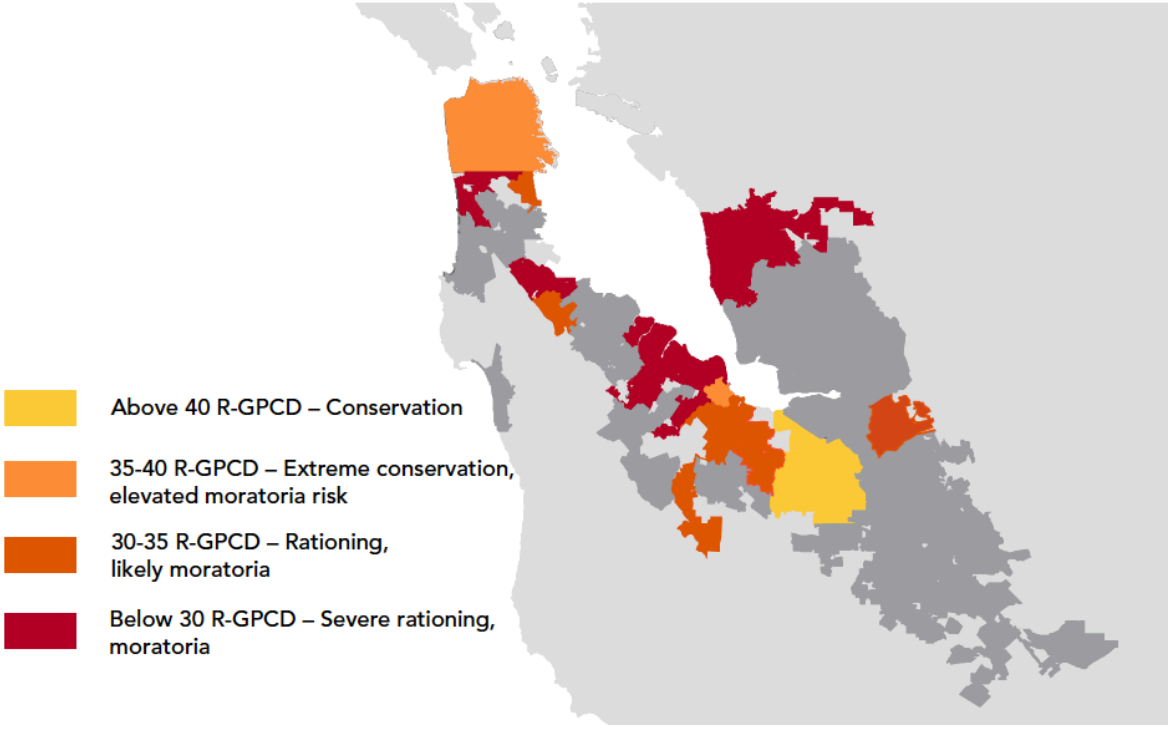


Figure 3. Potential Rationing with 40% Unimpaired Flow on the Tuolumne River

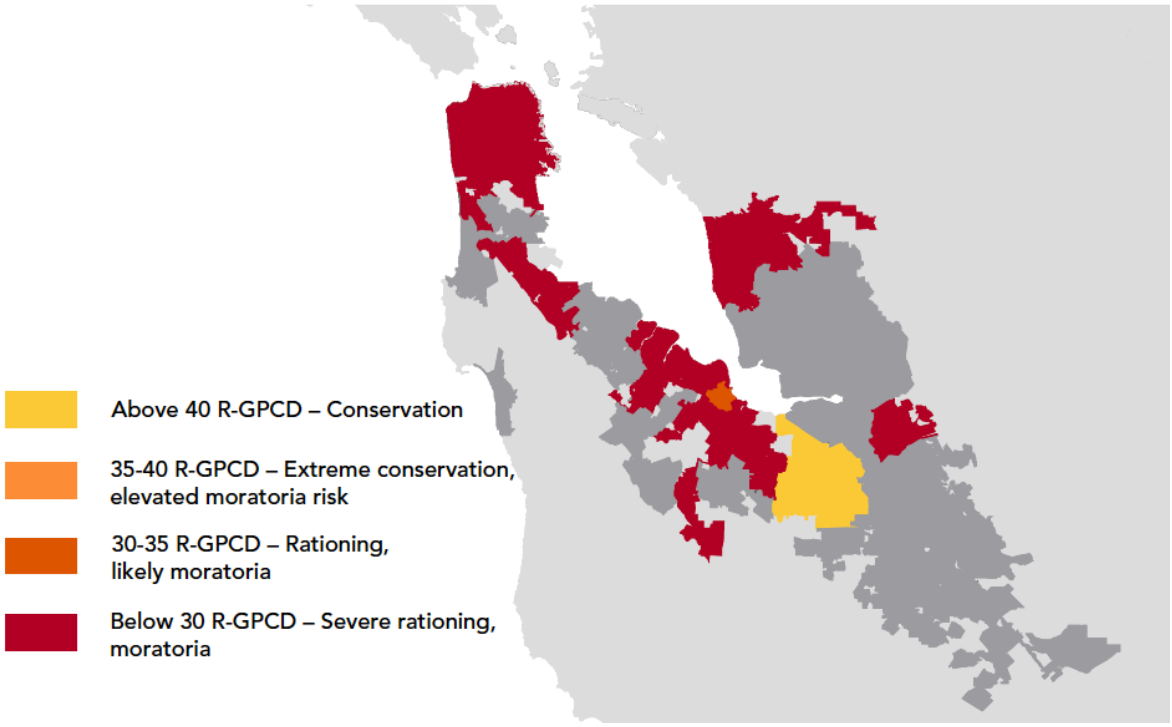
Assuming RWS Demand of 175 Million Gallons per Day



R-GPCD = Gallons per Capita per Day for residential users only.

Figure 4. Potential Rationing with 50% Unimpaired Flow on the Tuolumne River

Assuming RWS Demand of 175 Million Gallons per Day



R-GPCD = Gallons per Capita per Day for residential users only.