Sacramento Regional Water Utility Collaboration Study

Activity 2 Report

Benchmarking

January 2021 - FINAL

RAFTELIS

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Summary

The Sacramento Regional Water Utility Collaboration Study (Study) is a collaboration among Carmichael Water District (CWD), Citrus Heights Water District (CHWD), the City of Folsom Environmental & Water Resources Department (Folsom), Del Paso Manor Water District (DPMWD), Rio Linda/Elverta Community Water District (RLECWD), Sacramento Suburban Water District (SSWD), and San Juan Water District (SJWD) (together the "participating agencies") to identify opportunities for increased collaboration with the goal of creating additional operational and financial efficiency, and improving service provision to customers.

This document is the second of three project deliverables. It encompasses the activities for Study Activity 2 – Benchmarking. It provides an overview of organizational and opportunity specific data and benchmarks relative to each participating agency, and nationally where available. Raftelis gathered information, including virtual interviews with senior representatives of each participating agency, about the opportunities and how they hope to benefit from each. Data about the opportunities are summarized and compared in this document.

Overall, data analysis shows there is an array of approaches and different levels of services being provided by the participating agencies in the studied services. These different approaches and service levels mean resource requirements for the services vary widely among the participating agencies. This translates into a range of costs and staffing requirements normalized on a per account (customer) basis. For example, some of the agencies allocate very little time toward water conservation and human resources activities, while others have extensive water conservation programs and full-time HR resources. Some follow American Water Works Association (AWWA) best practices in terms of preventative maintenance and leak detection, while others employ their own customized approaches based on their governing board's priorities. There is some alignment between the size of the utility and the level of services provided, but a bigger determinant appears to be what the utility prioritizes and historical practices.

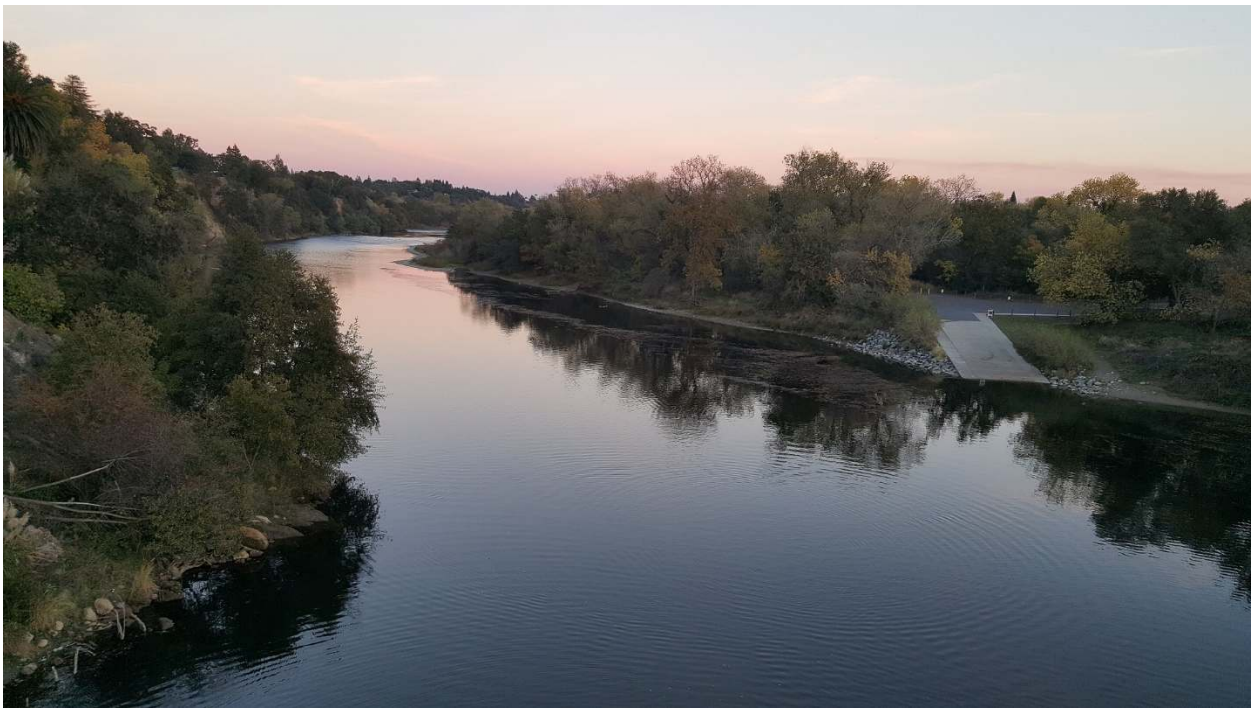
Even with the differing approaches and levels of services being provided by the participating agencies, there are commonalities. These commonalities are opportunities for collaboration. They will be explored in Study Activity 3 – Business Case Evaluations.

Introduction

The Sacramento Regional Water Utility Collaboration Study (Study) is a collaboration among CWD, CHWD, Folsom, DPMWD, RLECWD, SSWD, and SJWD (together the "participating agencies") to identify opportunities for increased collaboration. The goals of this Study are to identify opportunities for additional efficiency and to improve service provision to customers. Increasing costs of living, evolving regulations, and additional competition for scarce water resources across California mean that agencies must work together, more seamlessly and regionally, to provide reliable and affordable services.

This document is the second of three project deliverables and encompasses the activities for Study Activity 2 – Benchmarking. It provides an overview of organizational and opportunity specific data and benchmarks relative to each participating agency, and nationally where available. Raftelis gathered information, including virtual interviews with senior representatives of each participating agency, about the opportunities and how they hope to benefit from each. Data about the opportunities are summarized and compared in this document.

Studying every aspect of each participating agency's operation is infeasible, so Raftelis worked with the participating agencies to focus on a list of common areas that presented viable opportunities for potential collaboration. The group reviewed and narrowed a list of over 80 potential opportunities for further study. The participating agencies prioritized seven of those opportunities for investigation during a workshop on September 24, 2020. Note that while the full list of opportunities may be explored at any time by any collection of agencies, the seven priority opportunities are the focus of Study efforts for Activity 2 – Benchmarking and subsequently Activity 3 – Business Case Evaluations.



Prioritized Opportunities

Prioritization Process

After gathering the initial list of over 80 opportunities through interviews and document reviews during Activity 1, each participating agency was asked to submit their top five priority opportunities for assessment. Raftelis gathered the top five selections to identify overlaps and isolate the full unique set of opportunities. Ultimately, through combinations of directly and partially overlapping opportunity scopes, nine unique priority opportunities were isolated. These nine opportunities were discussed in a workshop with the participating agencies on September 24, 2020. The goal of the workshop was to narrow down the list of opportunities from nine to 5-7 to ensure sufficient effort could be allocated to the evaluation of each opportunity in subsequent Study phases. The result of that workshop was the identification of seven priority areas for further evaluation:

1. Distribution System Preventative Maintenance
2. Human Resources
3. Leak Detection
4. Paving
5. Stand-by / Emergency Operations
6. Water Conservation Programs
7. Water Supply

Description of Opportunities

Distribution System Preventative Maintenance

Distribution system preventative maintenance (PM) is the collection of activities employed to maintain a water system's distribution network with the goal of increasing its longevity, lowering lifecycle operating costs, and providing better service to customers. Activities such as proactive valve exercising, hydrant maintenance, and water main flushing are considered typical distribution system PM activities. Robust programs have dedicated staff employing industry best practices to achieve outcomes measured by metrics and aligned with service level targets. Representatives from some of the participating agencies would like to explore if and how joint efforts could improve PM activities.

Differing resource levels, priorities, and attitudes are the primary drivers of varying distribution system PM activity levels among the participating agencies. Practices often correlate with the number of assets and their location, age, condition, and criticality. Historical practices also strongly influence activities. PM data availability varied by participating agency with Raftelis focusing on flushing, valve exercising, and hydrant activities. Note that capital replacement and repair, as well as customer leak response and other reactive field efforts were not the focus of this review, because they are not considered PM activities.

Human Resources

Human resources (HR) functions were prioritized because many participating agencies noted gaps in their respective HR capacity to cover the full range of activities demanded. Larger agencies with dedicated staff find that their greater headcounts demand one or more dedicated HR positions. Smaller agencies do not have dedicated HR staff, thereby requiring agency general managers or other staff to include this effort in their responsibilities. Given the broad array of activities that HR covers, the participating agencies identified joint HR resources and contract resources to consider.

Leak Detection

Leak detection, whether conducted on an ad-hoc, systematic, or reactive basis in response to leaks presents an efficiency and service-level enhancing opportunity. Whether through joint contracting or sharing equipment and staff there is a sense that this area may be rife for increased collaboration. While the age, size, water pressure, and even geology of a given service area can change the perspective of a utility with respect to the need for preventative system-wide leak detection, when engaged in this more proactive manner it can lead to water loss reductions. This can be critical in periods of drought. Examples of financial incentives to explore collaboration in this area include sharing the mobilization charges that contractors often include among participants. Joint contracts could present savings on leak detection, as well as offer technology advances such as the use of Light Detection and Ranging (LiDAR), which is a remote sensing method that uses light in the form of a pulsed laser to take measurements from a plane, for which regional flyovers could be contracted. They present opportunities for reducing labor hours, mobilization, and fuel costs, while producing scale efficiencies that also reduce non-revenue water losses. Finally, it is acknowledged that there may be some overlap in ad-hoc leak detection activities with the stand-by / emergency operations opportunity area as some emergency ad-hoc leak detection activity may occur during stand-by periods, though the activities are thought to be broadly distinct enough to justify separate reviews for the purposes of this Study.

Paving

All the participating agencies outsource their paving activities that follow in-street and facility repairs, replacement, new asset construction, and other pavement disturbances. Several contractors compete for this paving work. Raftelis observed variable per area costs and contract structures across the participating agencies. Opportunities such as joint bidding may therefore be worth exploring.

If scale capacities, contracting limitations, or desires to support local firms are not prohibitive, cost savings could be obtained, particularly where larger minimum area or multiple year contract commitments are deemed acceptable. While paving requirements (thickness, material, etc.) may vary by participating agency, and overlaying City / County jurisdictions, there is a feeling that this would not be prohibitive to contractors since most roads share similar paving requirements. Some participants have cited the success of chemical consortia programs in achieving savings, despite varied requirements, as a template or reason for optimism in exploration of a successful paving collaboration.

Stand-by / Emergency Operations

Stand-by / emergency operations occur after normal business hours to address a concern or a system issue such as a leak or service failure. Discussions pertaining to the stand-by / emergency operations opportunities focused on after-hours on-call staffing costs and resource availability. Future collaboration in this area would be understood to go above and beyond any aspect of existing Mutual Aid Agreements for support during significant emergencies, and would therefore require either modifications to those agreements or wholly separate agreements. Most participating agencies provide rotating staff with stipends or additional pay for weekly on-call duty with overtime pay for callouts. Other costs include dedicated vehicles, as well as answering service and other supporting technology costs (e.g. dedicated iPads, SCADA alarm systems).

Some larger agencies in the region may have sufficiently infrequent rotation intervals that there is the possibility that staff would have an appetite for more overtime opportunities in support of select tasks for smaller agencies where staff may be overburdened.

Water Conservation Programs

Water conservation programs promote the efficient use of water resources by customers through education and awareness. The water conservation programs opportunity was framed as an area where collaboration could occur to augment existing efforts by each participating agency to provide customer service programming and materials coordination. The goal is to foster joint efforts to enhance the communications channels that agencies utilize to increase awareness and participation in conservation activities.

The Regional Water Association (RWA) offers programming to support regional collaborative success in the area, yet the participating agencies identified an appetite for more offerings during the opportunity prioritization process. This suggests that RWA and other activities could be expanded. Another element within this area of opportunity is a concept of involving Non-Government Organizations (NGOs) such as community non-profit groups to provide installation or cost assistance to low income households to improve their indoor or outdoor water efficiency.

Water Supply

Regional groundwater and surface water sources extend across and outside the service area boundaries of the participating agencies. The agencies are also impacted collectively by changes in legislation and policy that apply broadly to regional or state-wide water management. The Water Supply opportunity considers areas to collaborate on preservation, distribution, and use of water assets.

During the prioritization process, opportunities for collaborative successes around water supply touched upon reliability enhancement and optimization of water banking, transfers, and/or wheeling potential. This opportunity presents a chance to improve water security in the region, particularly during periods of drought, and to increase monetization of assets.

Organizational Benchmarking

Organizational and Opportunity Benchmarks

The sections that follow detail high-level organizational metrics and associated national benchmarks (where available), as well as comparative metrics among the participating agencies that focus on the seven priority opportunities. Following Activity 2 – Benchmarking, Activity 3 – Business Case Evaluations will advance these data analytics and interpret them within the context of potential collaborative models to better understand the savings and service level enhancements that working together may offer.

This section provides a comparison of organizational benchmarking data collected for each of the participating agencies and national metrics contained in the publication *AWWA Utility Benchmarking (2019): Performance Management for Water and Wastewater.*[1] High-level organizational information about the participating agencies is shown in Table 1.

Table 1: Participating Agencies Information

	CWD	CHWD	Folsom	DPMWD	RLECWD	SSWD	SJWD
Type of Agency	Irrigation District	Irrigation District	Municipal Department	County Water District	County Water District	County Water District	Community Services District
Total Customer Accounts (Retail and Wholesale)	11,522	19,944	21,654	1,797	4,628	46,268	10,704
Wholesale Accounts	1[2]	0	0	0	0	0	4
Total Employees (FTEs)	32	36	34	4	10	70	48
MGD Produced (Avg per Day)	12.31	14.57	17.1	1.08	1.9	27.3	40
Miles of Pipe	160	249.6	367	21	62.66	698	222

[1] This is a high-level comparison to national benchmarks and the middle 50% of the national range. Raftelis recognizes that many factors impact spending levels for a given utility.

[2] Golden State Water Company / Aerojet Rocketdyne Agreement

Operations and Maintenance Budget	$7,101,576	$13,071,059	$14,234,824	$1,106,450	$1,803,560	$23,241,000	$20,020,600
Capital Budget	$4,942,816	$4,378,110	$3,881,601	$473,483	$2,887,500	$19,565,000	$10,900,200

Overall Staffing Levels

The participating agencies have between 4 and 70 employees, serve between 1,797 and 46,268 customer accounts (including wholesale), and produce between 1.08 and 40 million gallons per day (MGD) of water. With such a range in scale, comparing the number of accounts served per employee and the MGD produced per employee provides a reasonable comparison of the agencies through normalization of the data to like units.

The number of customer accounts per employee are compared between the participating agencies in Figure 1. Also included in this comparison are the AWWA utility benchmarking median, 25th percentile, and 75th percentile. As seen in the figure, Folsom and SSWD serve the most retail customer accounts per employee and are both above the 75th AWWA percentile. Being above the 75th percentile means that the utility serves more accounts per FTE than 75% of the utilities in the AWWA survey. The operations of SJWD including wholesale and CWD serve fewer customers per FTE than the AWWA Median. While the ratio of customer accounts per employee when including retail and wholesale operations is lower for SJWD, staffing is reflective of the need to meet wholesale customers requirements. Wholesale entities are counted as just four customer accounts but serve a population that is larger than the SJWD retail service area. By reviewing the population served per employee (including wholesale population served) as shown in Figure 2, it becomes clear that SJWD is serving a larger population per FTE than suggested in the customer accounts per employee figure, because of the wholesale customers. Note that customer accounts per employee can be an indicator of efficiency, but it is heavily influenced by the scale of the operation, and more importantly, the service levels provided. Higher service levels often require more staff.

The MGD of water produced per employee is compared between the participating agencies in Figure 3. The AWWA benchmarking data is shown on the figure as well. Most of the participating agencies produce more water per employee than the AWWA 75th percentile of 0.27 MGD per employee. RLECWD produces 0.19 MGD per employee, which is slightly less than the national median of 0.20 MGD per employee. SJWD produces 0.83 MGD per employee which is significantly higher than the other participating agencies and the national data. The four wholesale customers SJWD serves are likely impacting this statistic. Note that the demographics of the customer base significantly impact these metrics. Systems with large and/or high numbers of large commercial, wholesale or industrial customers will have a much higher ratio.

Figure 1: Customer Accounts per Employee

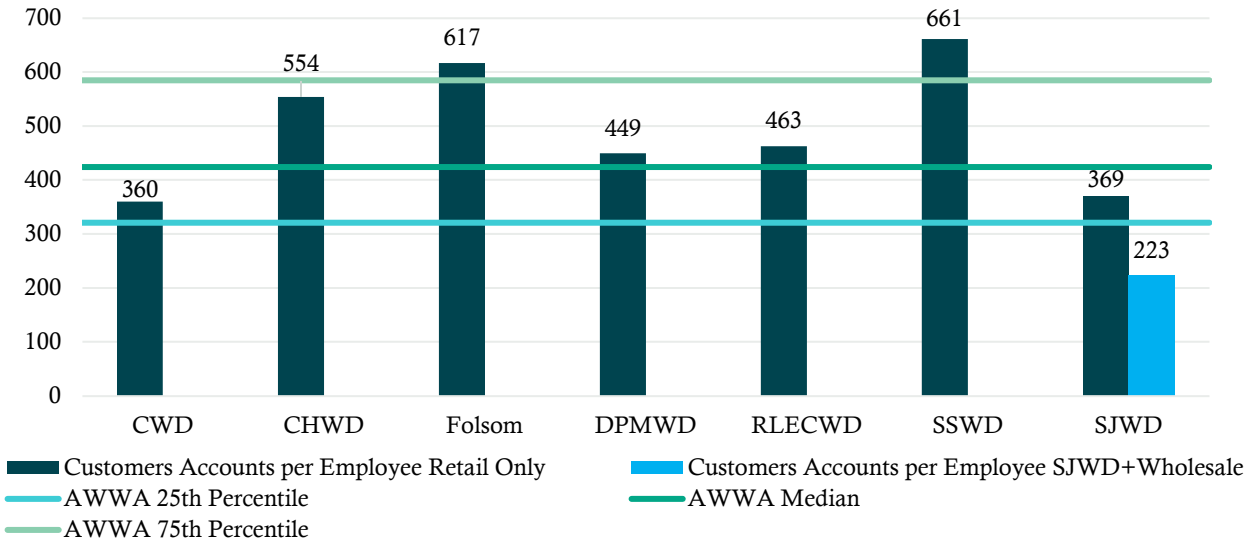


Figure 2: Population Served per Employee

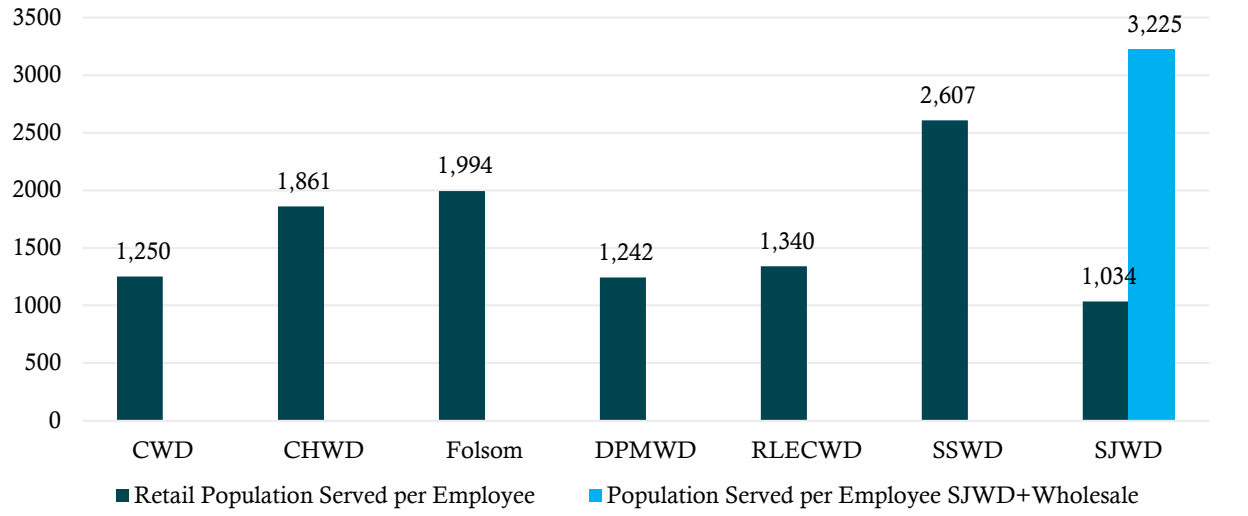
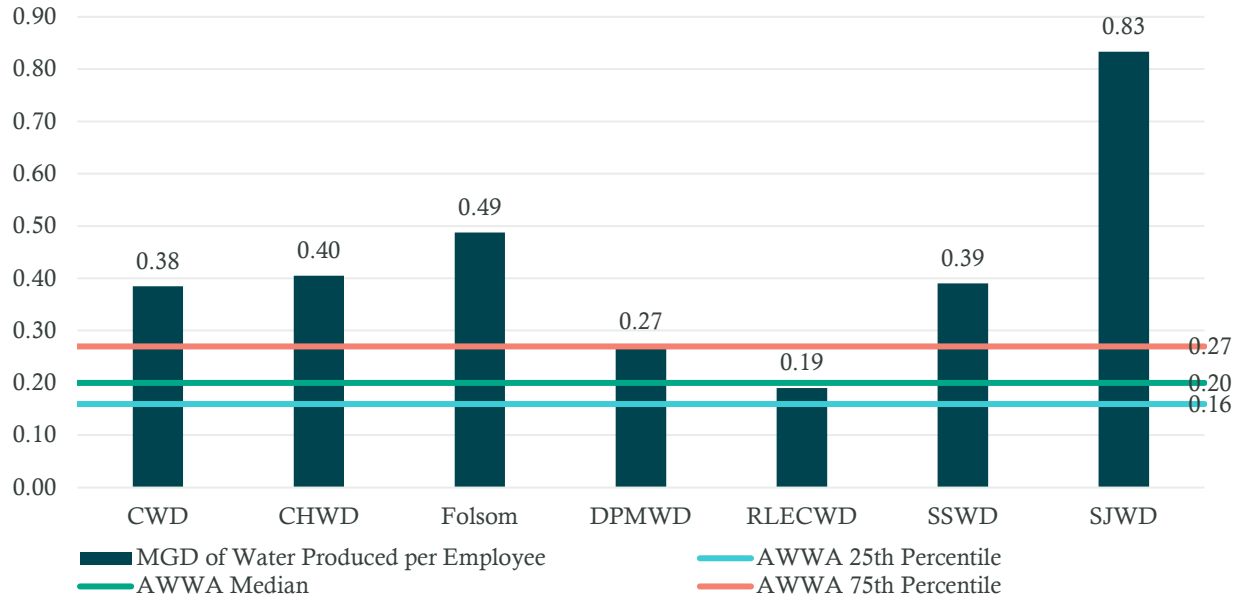


Figure 3: MGD of Water Produced per Employee

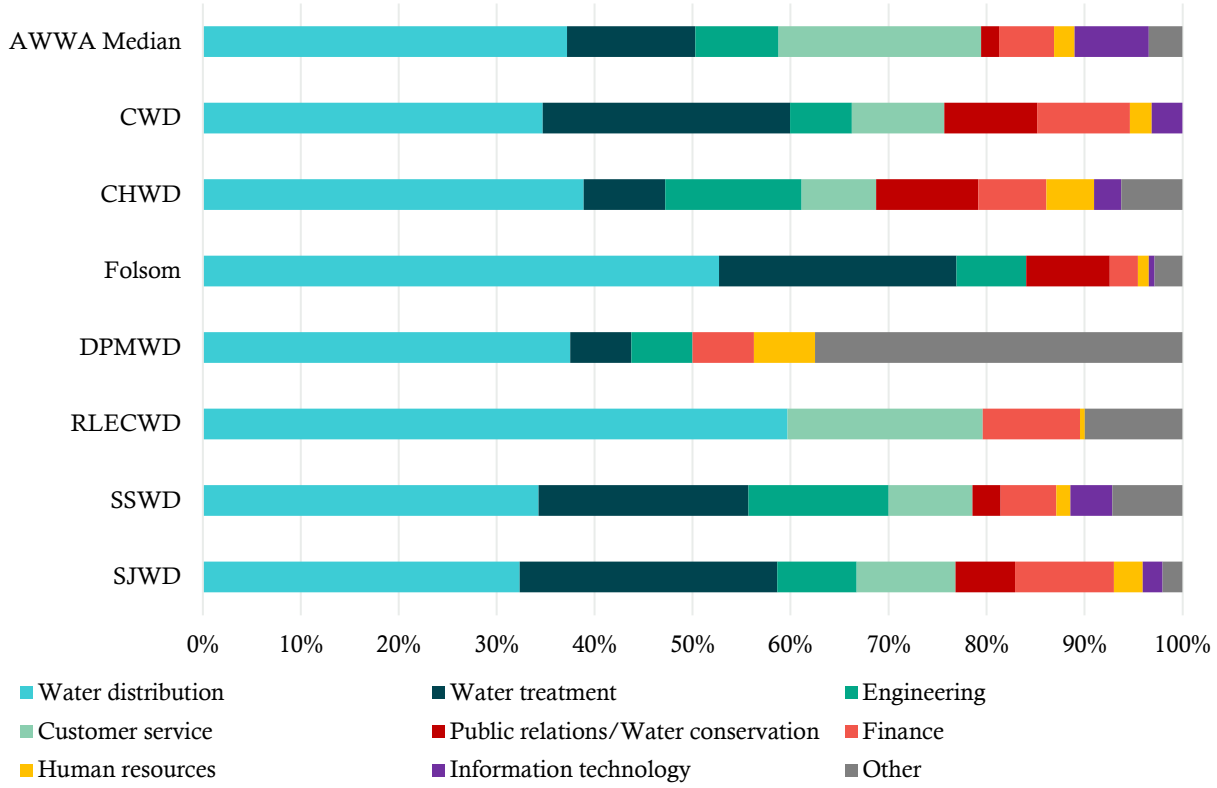


The number of budgeted staff within each of the participating agencies is aggregated in Appendix A, showing the breakdown by functional area. The areas shown are:

- Water distribution
- Water treatment
- Engineering
- Customer service
- Public relations/Water conservation
- Finance
- Human resources (HR)
- Information technology (IT)
- Other

To normalize the comparison of staffing levels, an employee by function ratio was calculated as a percentage of the overall number of employees budgeted to the utility. Additionally, some administrative and management functions have been rolled into the "Other" category. These comparisons are shown in Figure 4. The AWWA 2019 median for these functional areas is included in the figure.

Figure 4: Employee Distribution by Function



Operations and Maintenance Costs and Capital Budget

The operations and maintenance (O&M) costs for water service can be compared between utilities once normalized. For the participating agencies, these costs have been normalized by water production (Figure 5), by the number of accounts served (Figure 6), per capita of population (Figure 7), and by the miles of distribution pipeline (water mains excluding customer service lines) (Figure 8).

Reviewing these three metrics provides a fuller comparison between the agencies, especially because both CWD and SJWD provide water to wholesale customers as well as retail customers. There is national benchmarking data from AWWA for these three metrics, which are included on the figures. The final operational comparison between these agencies is the capital budget spent per customer account (Figure 9). This provides a comparison of capital improvement spending.

Shown in Figure 5, the O&M cost normalized by water production gives a unit cost ($/MG) for each of the agencies. The AWWA national median is $2,537 per MG and the 75th percentile is $1,803 per MG. Most of the participating agencies are near the median or between the 75th percentile and the median. Both CWD and SJWD (including wholesale) have unit costs of production less than the 75th percentile. SJWD's retail O&M cost per MG produced is higher and falls near the AWWA 25th percentile.

Figure 6 presents the O&M cost normalized by the number of accounts served. It shows that most of the participating agencies spend near or above the national 25th percentile of $526 per account. RLECWD spends near the national median of $383 per account. SJWD, which provides service to its retail area and four wholesale customers, spends close to $1,870 per customer account overall, but a still higher than others $1,102 per account for their retail operations alone. Figure 7 reveals that on a per capita basis (including wholesale populations served), SJWD has among the lowest O&M costs, but the highest for their retail only operations. Again, level of service differences play a big factor in the cost per customer account. In addition, surface water tends to be more expensive to treat than ground water.

The O&M costs normalized by the miles of distribution pipeline are shown in Figure 8. It is calculated per 100 miles of pipe. The national median is $2,988,629 per 100 miles of pipe. Many of the participating agencies have O&M costs per 100 miles of pipe close to the median. CHWD, DPMWD, and SJWD's retail operations are spending close to the national 25th percentile of $4,897,484 and SJWD with wholesale spends $9,018,288 per 100 miles of pipe.

Figure 9 shows the capital budget per customer account for the participating agencies. There is not a national benchmark for this metric. CHWD, Folsom, and DPMWD are on the lower end of the agencies for capital spending per customer account—the average for these three agencies is $221 per account. RLECWD has the highest capital spending per account and per capita as shown in Figure 10.

Figure 5: Operations and Maintenance Cost per MG Produced

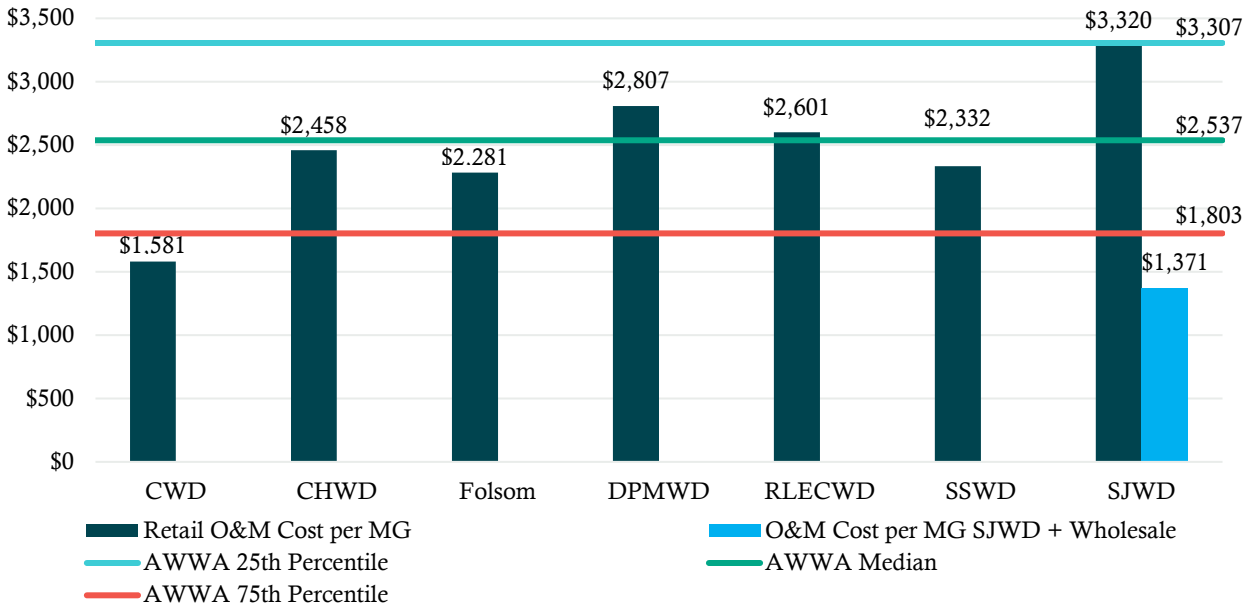


Figure 6: Operations and Maintenance Cost per Customer Account

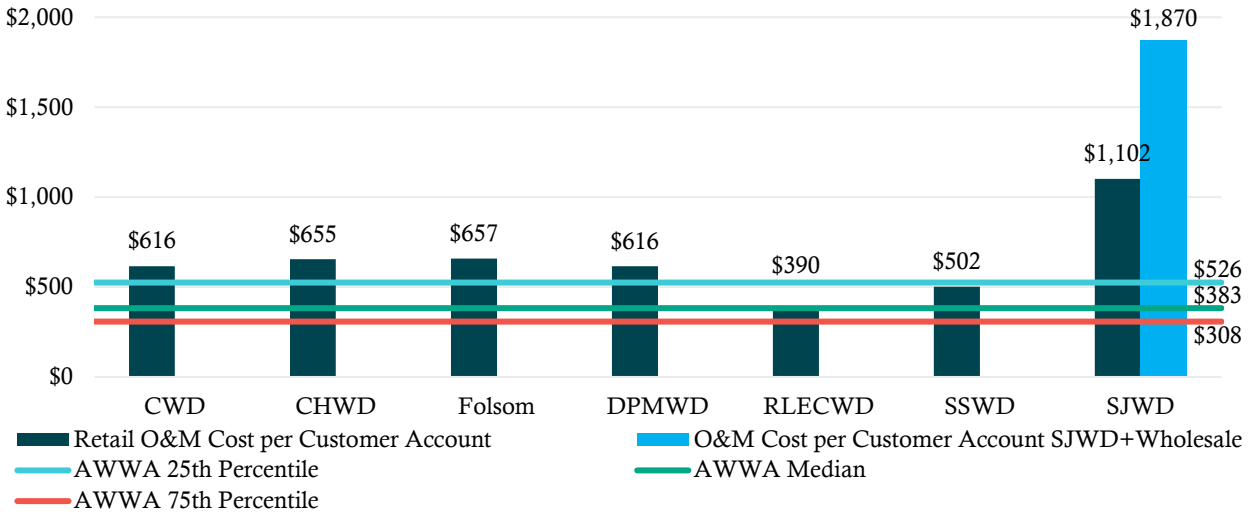


Figure 7:Operations and Maintenance Cost per Capita

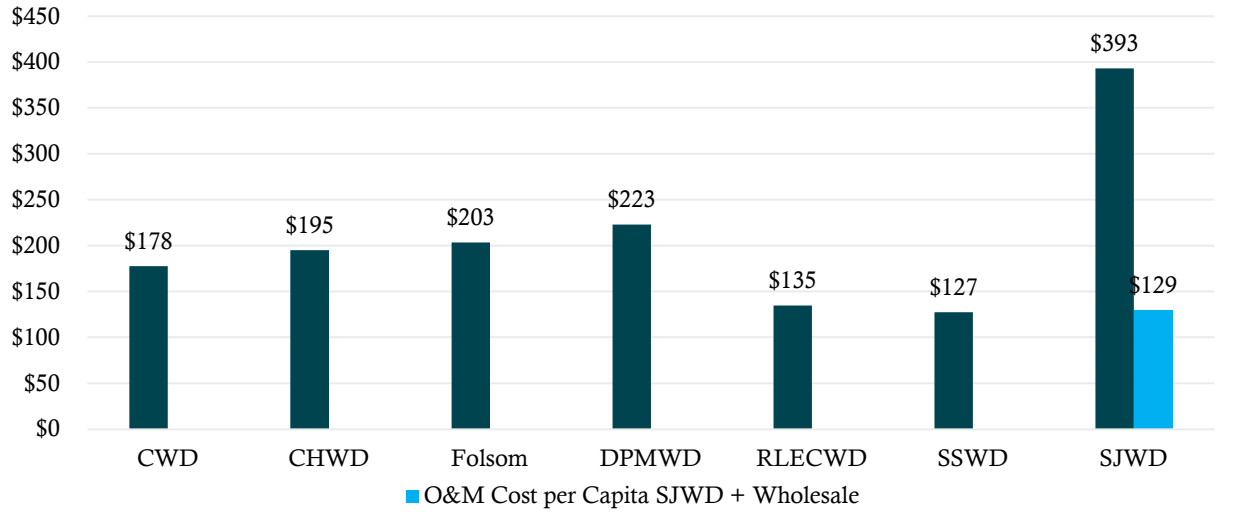


Figure 8: Operations and Maintenance Cost per 100 Miles of Pipe

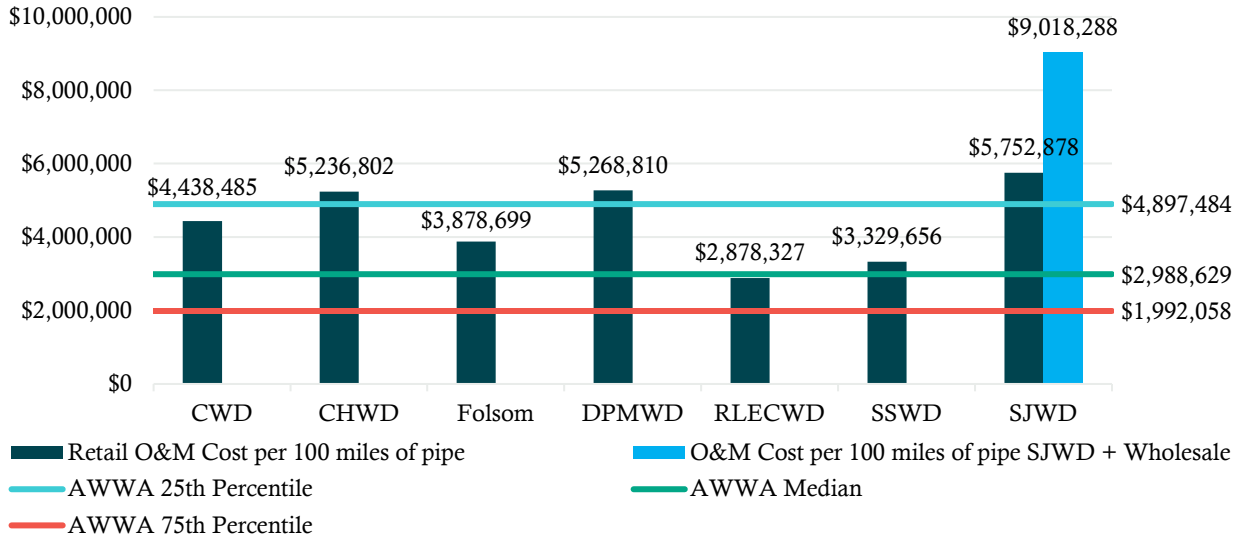


Figure 9: Capital Budget per Customer Account

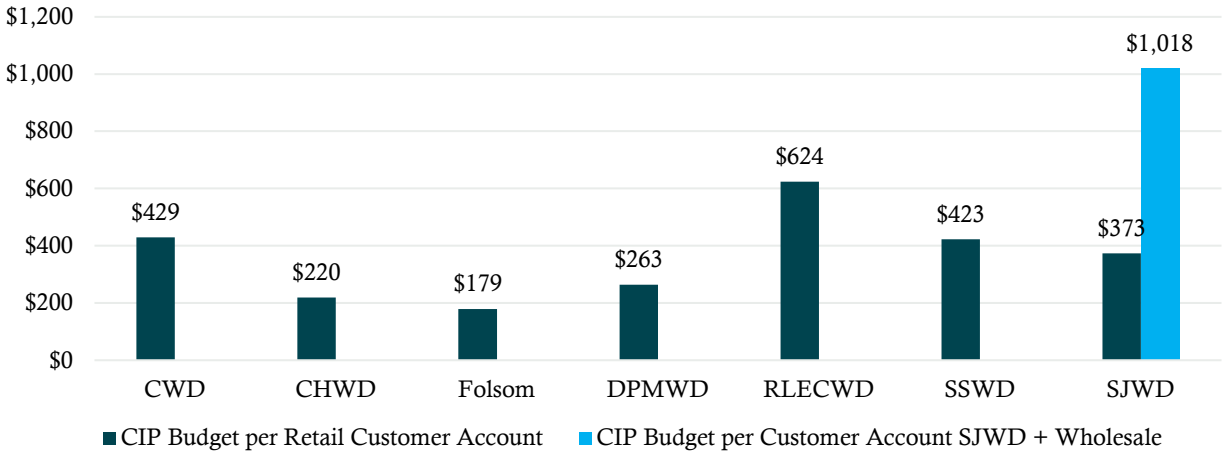
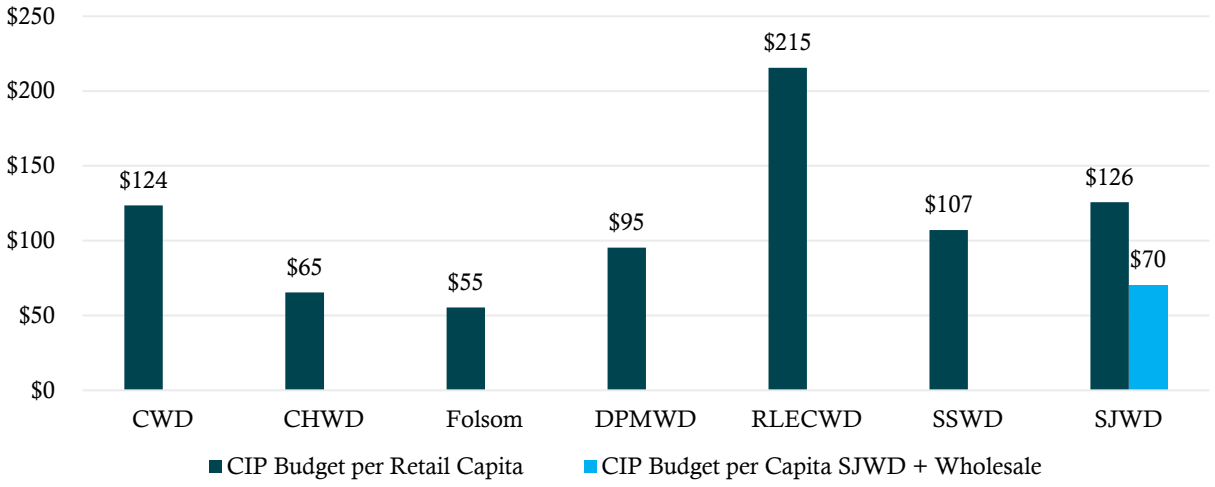


Figure 10: Capital Budget per Capita



Each of the participating utilities have O&M and capital costs within a regional range, and certainly in alignment with national peers. Because these graphs don't convey the differences between the costs and complexity of surface water treatment and groundwater treatment or show the different service levels provided, and don't accurately depict wholesale customer service, they must be interpreted carefully. Few conclusions can be drawn from these graphics and underlying data alone.

Opportunity Benchmarking

Opportunity benchmarking data and analysis is presented in this section. The sections covering each opportunity are arranged in alphabetical order as there is no preference given to the opportunity priorities at this stage. Subsequent analysis in Activity 3 may reveal either greater financial savings opportunities, likelihoods of success, or appetites for some opportunities over others.

Distribution System Preventative Maintenance

PM ensures the reliability of a water distribution and transmission system and that levels of services are provided to customers at the least possible long-term cost. PM is often neglected because of competing priorities and because its benefits are often less apparent in the short term. You might say this is where the "rubber *does not* hit the road" for the "out of sight, out of mind" conundrum that is buried infrastructure. The participating agencies have identified the possibility of collaborative action as a way to overcome the varied stresses placed on achieving desired PM service levels. PM activities considered in this assessment are detailed in Appendix C. Note that few agencies provided data on large meter testing, but costs for that work are intended to be captured in this section However, meter repair and replacement work is considered reactive rather than preventative and excluded from the assessment.

Figure 11 charts PM expenditures by year, while Figure 12 charts the same on a per mile of pipe basis for the participating agencies. In the per mile of pipe chart, CWD costs appear to represent outliers suggesting that further cost allocation may be necessary. Otherwise, PM expenditure per mile of pipe falls into a range from $376 (RLECWD) to $2,217 (CHWD). These costs reflect a combination of different PM activity levels, pay and benefits, infrastructure age and quantity. They represent very different PM approaches among the participating utilities. Note that AWWA has manuals of practice with guidance on maintaining all major distribution asset types. Each recommends regular PM activities at various intervals.

Figure 11: Annual Preventative Maintenance Expenditure

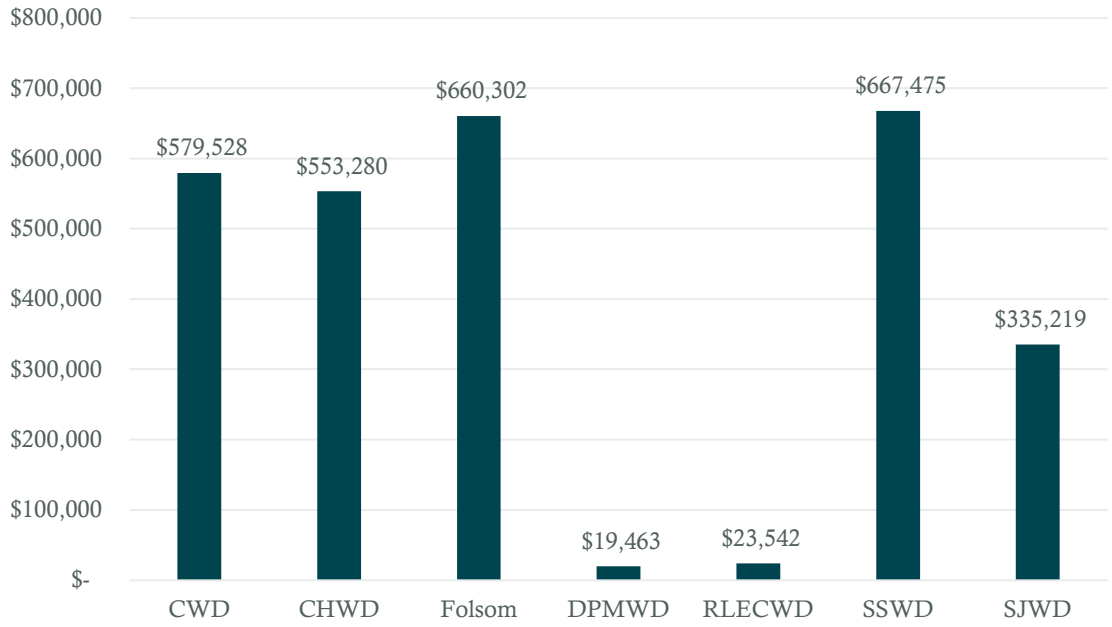


Figure 12: Annual Preventative Maintenance Expenditure per Mile of Pipe

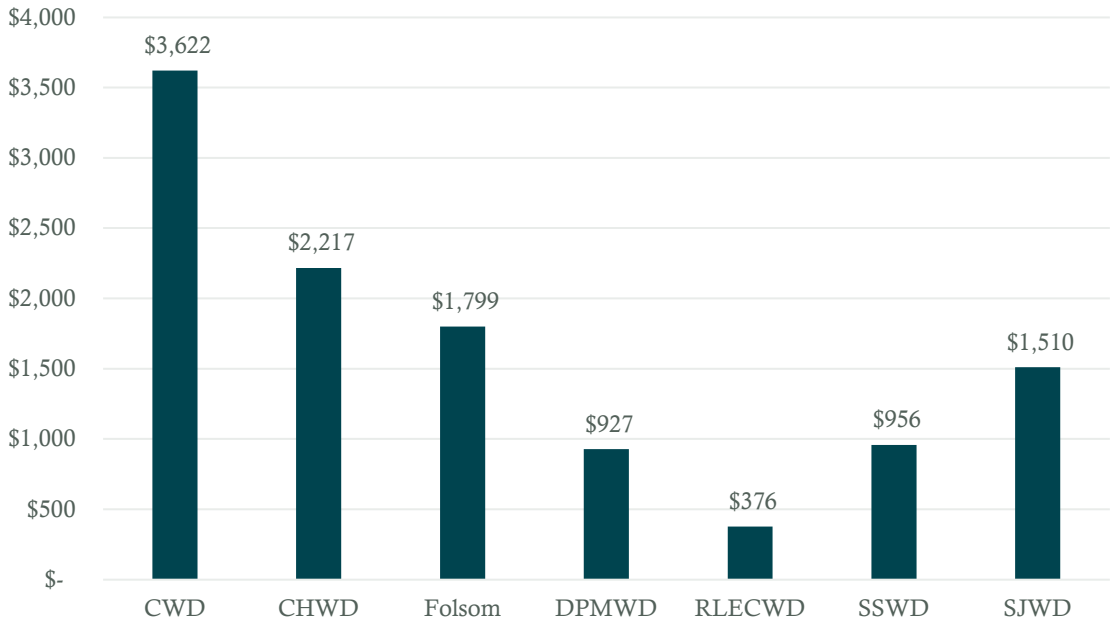


Figure 13 details available data on the frequency of hydrant maintenance. Reported hydrant maintenance activities vary by utility and may include painting, flushing, inspecting, exercising, and servicing of the hydrant. The frequency of engaging with a given hydrant ranges from every year (DPMWD noted annual flushing of their 200 hydrants) to about every 7 years (CHWD noted general maintenance for 300 of 2,156 per annum).

Figure 14 details available data on the frequency of valve exercising. Some utilities noted that their activities in this area cover mainline, blow-off, hydrant, and/or ARV/CARV valves with the largest assets having greater PM frequency than the system-wide intervals. The frequency of valve exercising ranges from unspecified and infrequent due to access issues (DPMWD) to about every 12 years (CHWD noted about 500 of 5,964 are exercised per year). Many entities do not have PM valve exercising and maintenance programs, instead relying on reactive pipeline renewal activities and main breaks for opportunities to exercise valves.

Table 2 describes reported flushing practices, which vary based on groundwater usage and resulting water quality, pipe age, the number of dead-ends, drought conditions or other factors. Reported practices range from as needed flushing and unspecified approaches to annual dead-end or hydrant flushing. None of the agencies reported annual unidirectional flushing. CWD reported that they are in the process of developing a system-wide plan, which may present an opportunity to share notes with others in the region given the wide variation in practices. AWWA recommends utilities employ a regular unidirectional flushing program.

Figure 13: System-wide Hydrant Maintenance Interval (Years)

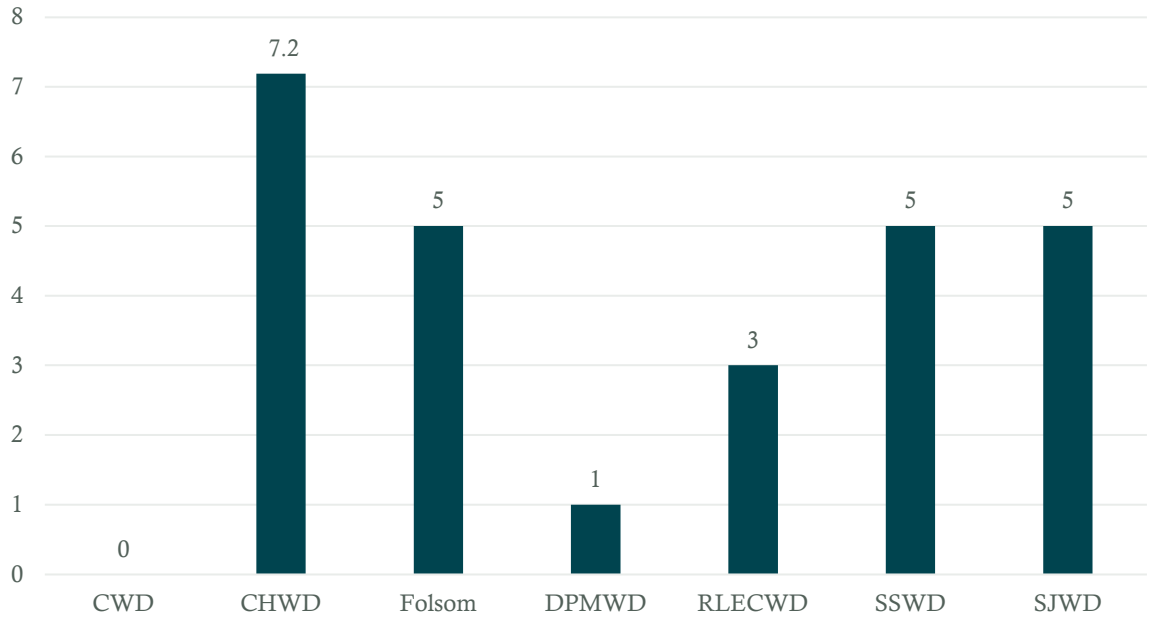


Figure 14: System-wide Valve Exercising Interval (Years)

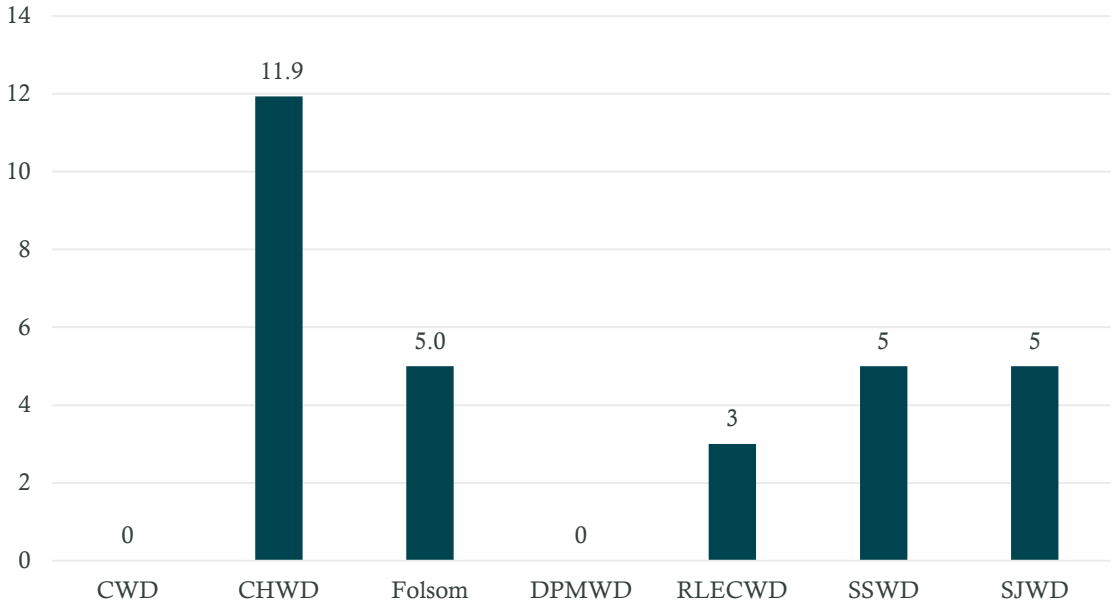


Table 2: Reported Flushing Practice

Participating Agency	Reported Flushing Practice
CWD	As needed currently but system-wide plan in development
CHWD	As needed
Folsom	Dead-ends every year and system-wide every 5 years
DPMWD	Annual hydrant flushing
RLECWD	System-wide every 3 years
SSWD	When necessary, no formal program
SJWD	Dead-ends every year

While the current metric comparisons included in this section do not have national benchmarking equivalents, there is national benchmark data for planned linear maintenance to distribution system length (hours per 100 miles of pipe), which is shown in Table 3. For Task 3, the participating agencies should consider whether the comparison of this metric on a national level would provide further context for the agencies for the identification of collaborative opportunities.

Table 3: AWWA Benchmark - Planned Linear Maintenance to Distribution System Length

AWWA Benchmark	75th Percentile	Median	25th Percentile
Planned Linear Maintenance Hours per 100 Miles of Distribution Pipe (hr./100 miles of pipe)	1,793	937	642

There are many collaborative opportunities for PM ranging from equipment and staff sharing to communicating lessons learned. For example, DPMWD may gain insights from SSWD's efforts to relocate assets from backyards to streets to improve access. Some participating agencies have recently begun to engage in contracting to meet PM objectives, while others might not yet have seriously considered such an approach. There are opportunities to do more through a collaborative scale contract with attractive rates per mile of pipe compared to what might be offered otherwise.

Appendix C details the reported PM activity areas reported by each agency. The participants should review the tables in Appendix C and consider both where their PM activities could be enhanced relative to peers and how collaborative action might get them closer to a more comprehensive program with less cost.

Human Resources

The participating agencies vary in how Human Resources (HR) services are provided. Each agency identified some areas of gaps and opportunities for shared or expanded HR services. All agencies have some internal capabilities, and a few agencies hire external contractors to fill in the gaps in services provided. This information is shared at a high level in Table 4.

SSWD contracts HR service support as needed to supplement the work of the one HR FTE who supports 70 FTEs in the agency. The supplemental work includes some of the following services:

- Bryce Consulting:
  - Classification analysis and job description development/revision
  - Recruitment support (review of job applications, development of oral interview questions, facilitation of oral interview, reference checks)
  - General HR support (development/revision of personnel policies, audit of personnel practices, advising managers on performance management issues)
- Employee Benefits Insurance Brokerage and Consulting Firm (EPIC)
  - Complete benefit renewal analysis for all district benefits and assist with contract negotiations and renewals.
- Management Partners
  - Developed a training and leadership development plan for the district.

SJWD contracts legal labor assistance with Meyers Fozi, LLP and HR service support with Bryce Consulting. The support provided by Bryce Consulting includes:

- Development of job announcements
- Placement of ads
- Receipt and screening of applicants
- Development of selection materials

- Scheduling and facilitating interviews
- Maintaining contact with candidates
- Making offer to selected candidate
- Conducting reference checks

CHWD also contracts with Bryce Consulting for unspecified services.

To normalize the number of HR related FTEs at each of the agencies, the number of utility FTE served by one HR FTE was calculated and shown in Figure 15. RLECWD stands out among the participating agencies in that the General Manager provides HR services as a portion of their duties. So, while the agency has 10 FTEs, the time spent on HR is representative of one full-time HR employee supporting 200 full-time employees. It is important to also note that Folsom is supported by the shared HR department with the City; this agency would be unable to support the other agencies on HR collaboration.

Another comparison made is the total HR cost per utility employee. Figure 16 shows this comparison which highlights that cost goes down when the scale of the utility increases.

Table 4: HR Services Overview

	CWD	CHWD	Folsom	DPMWD	RLECWD	SSWD	SJWD
Total Employees	32	36	35	4	10	70	48
HR FTE	0.7	1.75	0.4	0.25	0.05	1	1.45
Total HR Cost	$70,000	-	$53,865	$23,228	$7,540	$8,650	$8,785
HR Services Offered	Comprehensive less gaps	Comprehensive	Recruitment, City policy and procedures, worker's compensation, short-term and long-term disability, maintain personnel files	Comprehensive less gaps	Comprehensive less gaps	Comprehensive less gaps Good training facility; ACWA-JPIA is an online resource	Comprehensive less gaps
HR Service Gaps or Opportunities	Staff morale building, training coordination	Training coordination	None	None	GM provides the HR services currently (lack of capability for separation of powers)	Training and recruitment, updating policies and procedures handbooks, restart regional JPIA group	Recruitment and selection, non-technical staff development, training and team building, performance management and employee coaching/discipline, culture building, keeping abreast of labor laws.
Contract Services	None	Bryce Consulting	None	None	None	Bryce Consulting, Employee Benefits Insurance Brokerage and Consulting Firm (EPIC), Management Partners	Bryce Consulting, Meyers Fozi, LLP

Figure 15: Utility FTE Served per HR FTE

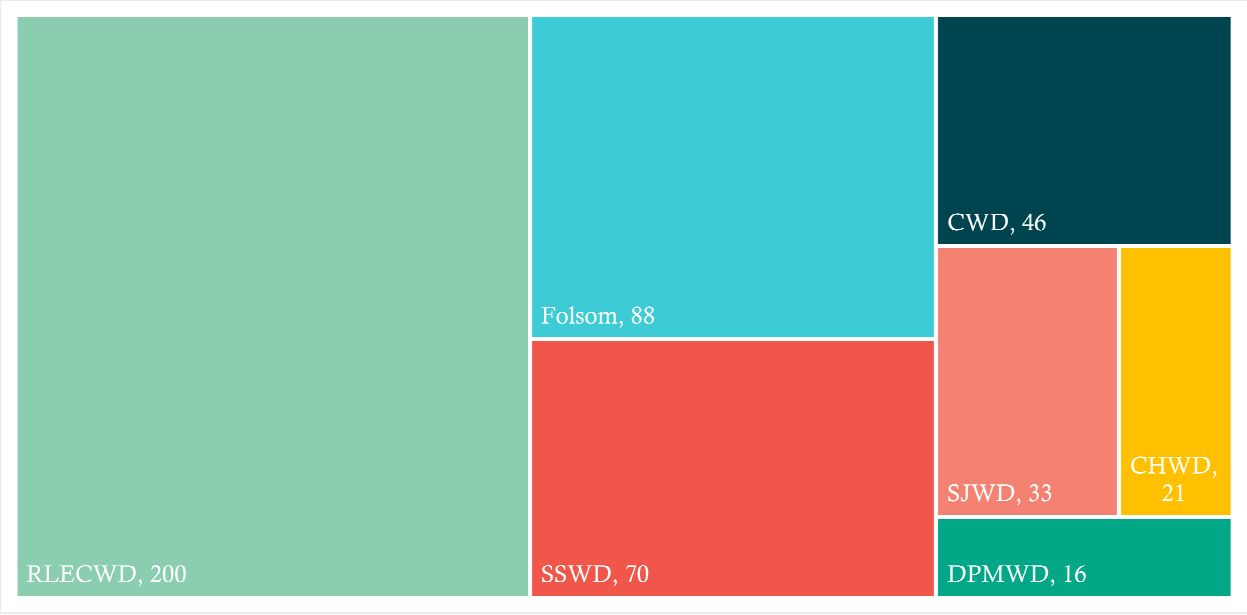
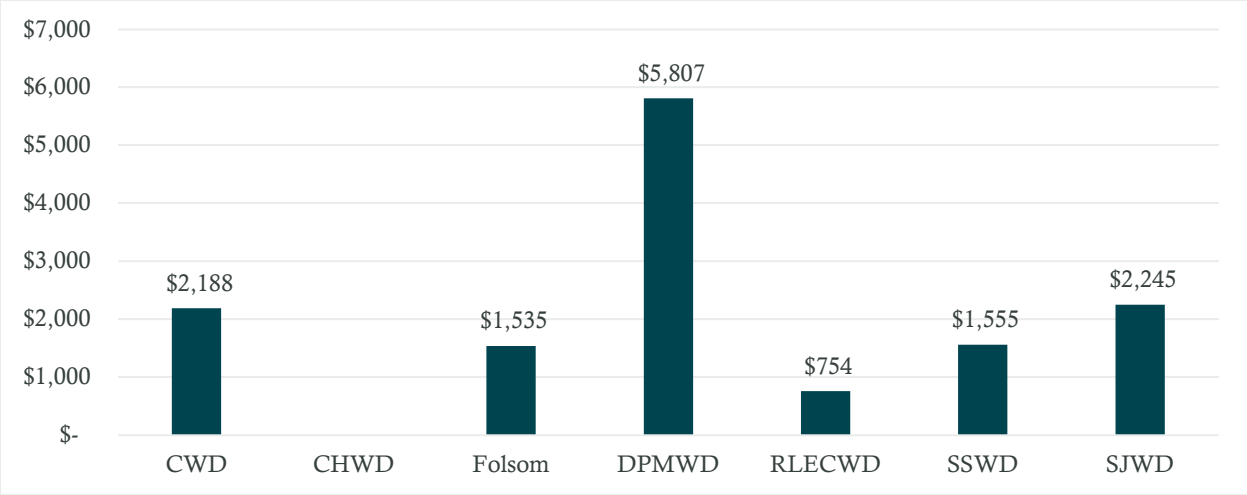


Figure 16: Total HR Cost per Utility FTE Served[3]



[3] CHWD was not able to share this information.

Leak Detection

The participating agencies maintain a total of 1,780 miles of water distribution and transmission pipelines. Table 5 lists the total miles of pipe, leaks and breaks relating to service lines and mains, and the total acceptable number of main breaks per 100 miles if the agency has set an acceptable range. For further comparison, AWWA utility benchmarking provides a median of 9.2 for leaks and breaks per 100 miles of mains per year (services not included in AWWA benchmark).

Table 5: Leaks and Breaks

	CWD	CHWD	Folsom	DPMWD	RLECWD	SSWD	SJWD	AWWA Median
Miles of pipe	160	249.6	367	21	62.66	698	222	-
Leaks and breaks per 100 miles of pipe (service lines)	59.1	35.3	31.4	53.5	121.9	10.9	36.8	-
Leaks and breaks per 100 miles of pipe (mains)	27.9	4.5	0.4	11.1	4.8	7.4	1.9	9.2
Acceptable number of main breaks per 100 miles	0	N/A	0.3	95.2	N/A	N/A	40.5	-

Figure 17 shows the miles of pipe ordered by total miles by agency. In Figure 18, keeping with the same order, the total leaks and breaks per 100 miles of pipe per year are shown for each agency. This is split between the leaks and breaks per 100 miles of main per year and per 100 miles of service lines per year.

Figure 17: Miles of Pipe

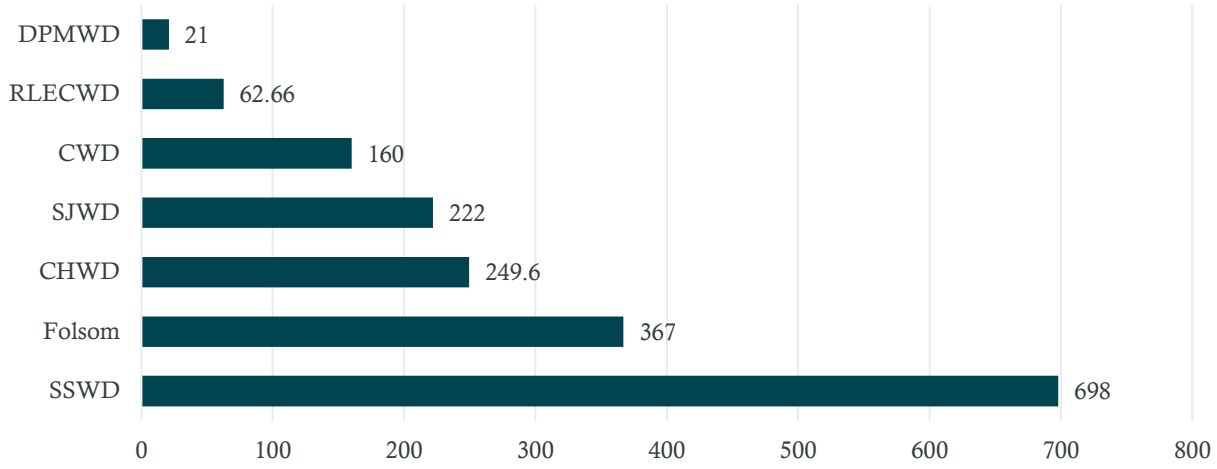
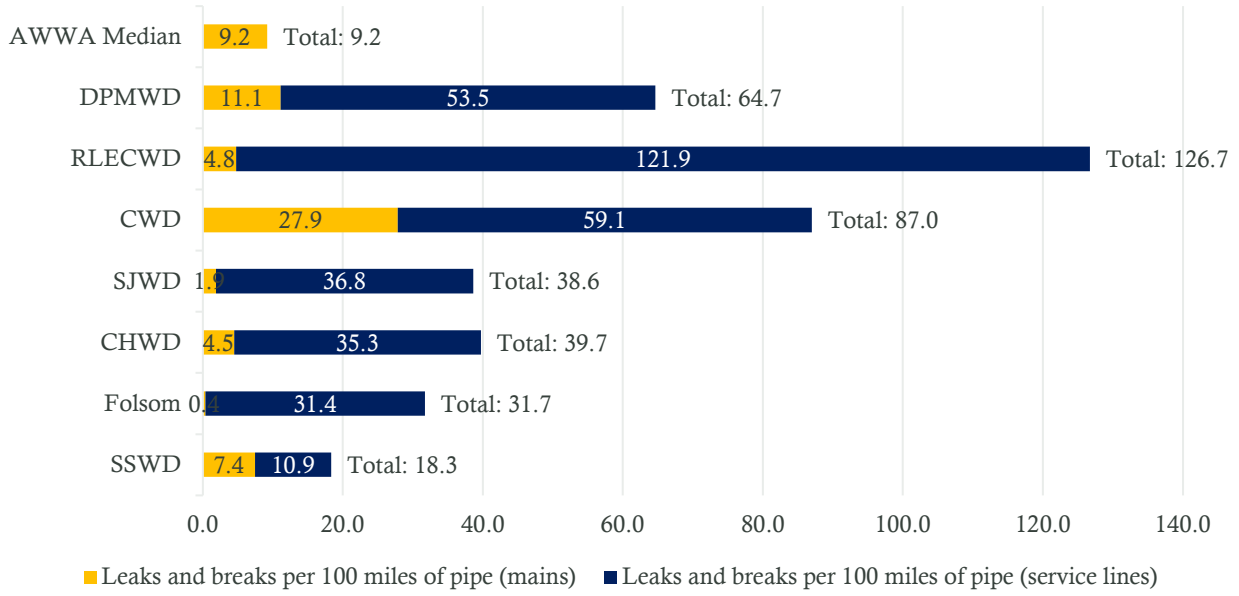


Figure 18: Leaks and Breaks per 100 Miles of Pipe



CHWD, DPMWD, and RLECWD all do not have system-wide leak detection programs, and DPMWD does not perform any systematic leak detection on their 21-mile system because the pipes are in backyards. For the other agencies, the frequency of the single system-wide leak detection cycle ranges from 4 to 6.4, shown in Table 6. The leak detection costs per miles of pipe are shown in Figure 19. CHWD, which does not have a system-wide leak detection program, has an expected lower cost per mile compared to the other agencies as they are only spending time on this task on an ad-hoc basis.

Table 6: Leak Detection Program

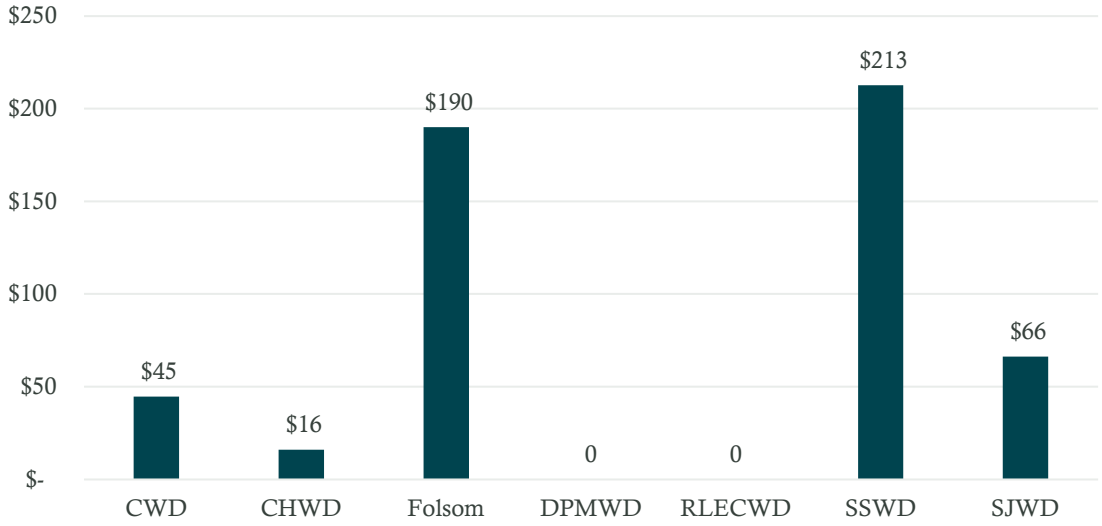
	CWD	CHWD	Folsom	DPMWD	RLECWD	SSWD	SJWD
Miles of pipe	160	249.6	367	21	62.66	698	222
Frequency of a single system-wide leak detection cycle	6.4[4]	N/A	4[5]	N/A	N/A	5	5
Leak detection costs per mile of pipe	$45	$16	$190[6]	N/A		$213	$66

[4] Goal is 3

[5] Goal is 3; reality has been 3-5 based on most recent 3 rounds

[6] Includes leak detection for 21,654 service lines as well

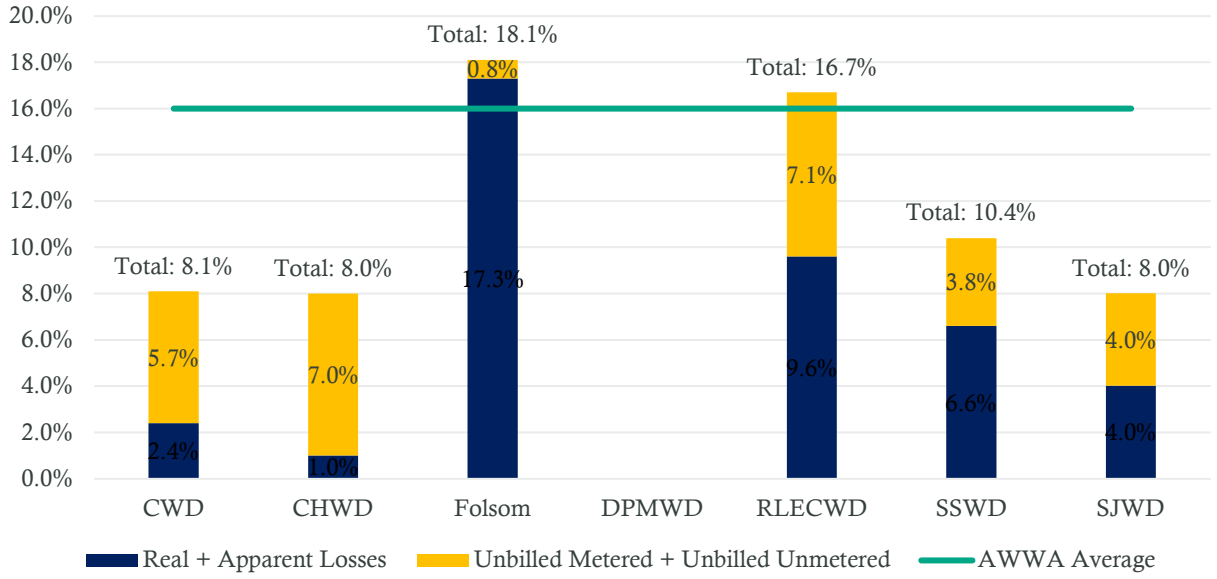
Figure 19: Leak Detection Costs per Mile of Pipe



Utilities incur Real Water Losses from pipeline leakage and Apparent Water Losses when customer water consumption is not properly measured or billed.[7] This is considered a portion of the non-revenue water at the utility. Also subsumed in non-revenue water is unbilled metered usage and unbilled unmetered usage. Except for DPMWD, which solely provides unmetered service to residential accounts, the participating agencies provided data about non-revenue water. This includes the breakdown of real and apparent water losses and unbilled metered and unbilled unmetered water. The percentage of the total water produced is shown in Figure 20 for the agencies.

[7] Real Water Losses and Apparent Water Losses are formally defined by AWWA in its manual M36 Water Audits and Loss Control Programs, Fourth Edition.

Figure 20: Non-Revenue Water



Paving

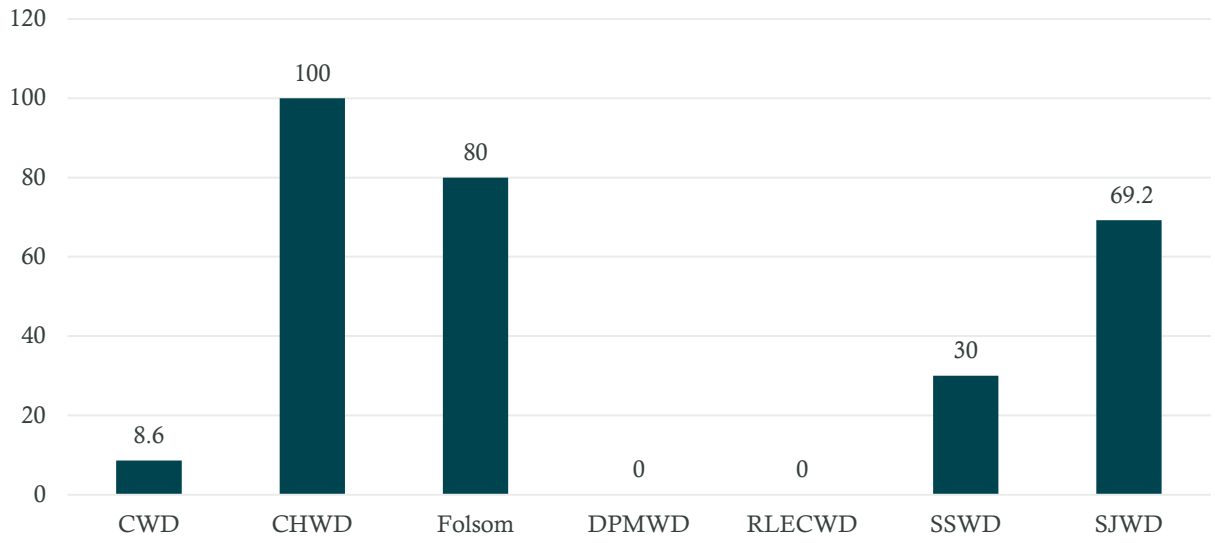
Shown in Table 7 are the annual volumes and costs of patch paving for each of the participating agencies. CIP investment related paving costs are often bundled with project work and were not considered as part of this assessment. DPMWD primarily has pipes located in backyards, so they typically have little to no paving. When possible, both the number of paving work orders and the square feet of paved area were collected to gauge volume and size of projects. Figure 21 shows the number of annual paving work orders. The number of work orders do not always equate to a larger size of square feet paved, as can be seen comparing CHWD and SJWD reported annual square feet paved to the number of work orders. Note that Central Valley Engineering and Asphalt has the CHWD and Folsom contracts and bid on SSWD, suggesting that there are regional contractors with scale and appetite for broader coverage.

Table 7: Annual Paving Volume and Cost

	CWD	CHWD	Folsom	DPMWD	RLECWD	SSWD	SJWD
Number of paving work orders (annual)	8.6	100	80	0	N/A	30	69.2
Square feet paved (annual)	N/A	11,000	N/A	0	N/A	8,319	9,000
Total spend (annual)	$172,747	$109,000	$90,161	$0	$25,000	$283,958	$128,250

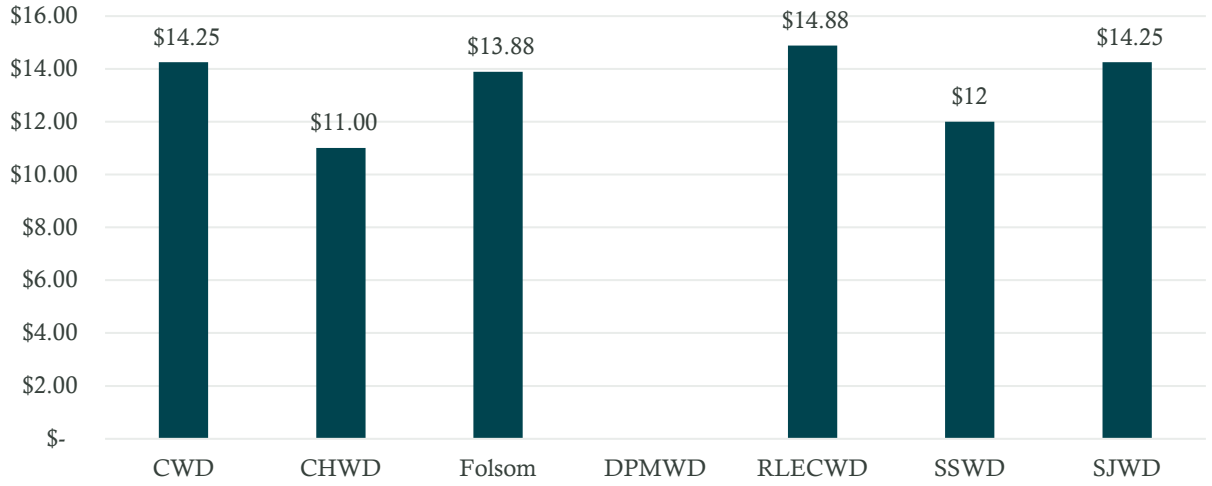
Contractor	Planet Paving and Grading	Central Valley Engineering and Asphalt	Central Valley Engineering and Asphalt	N/A	N/A	Various options including Central Valley Engineering & Asphalt and Flowline Contractors	Sierra National Asphalt

Figure 21: Volume of Annual Paving Work Orders



The annual cost of paving has been normalized per square foot of paved area to better compare the paving costs. Figure 22 shows this comparison of paving cost. All the agencies with paving work are spending an average of $13.65 per square foot paved.

Figure 22: Cost per Square Foot Paved



Stand-by / Emergency Operations

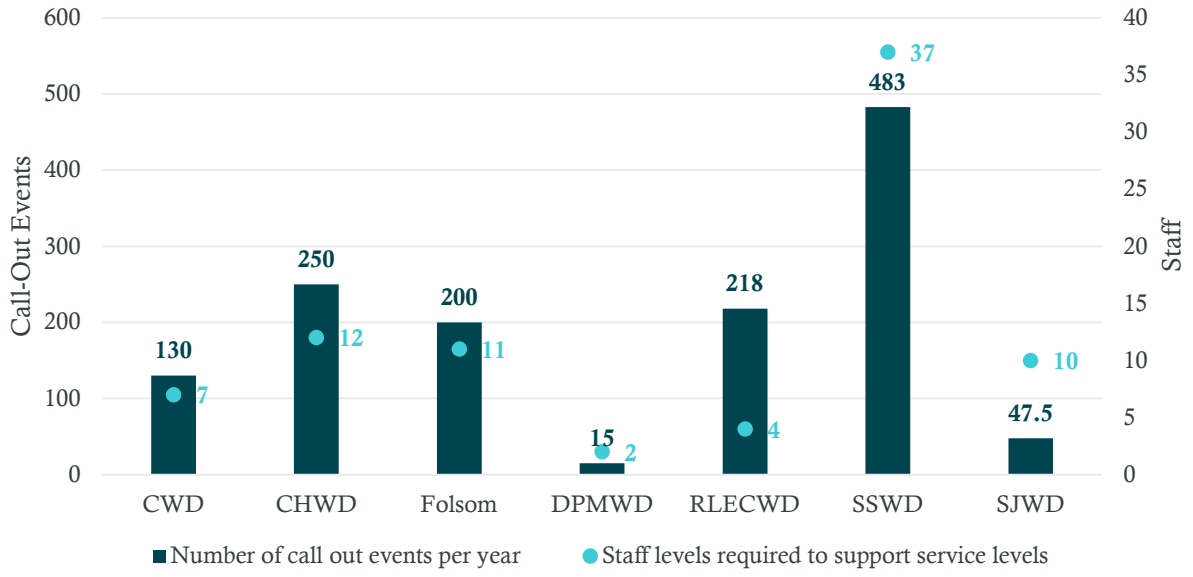
The number of emergency call out events each agency responds to annually is shown in Table 8. This table also shows the costs per year, the calculated costs per event, and the staff levels that are required to support the service levels currently provided.

Table 8: Annual Call Out Events

	CWD	CHWD	Folsom	DPMWD	RLECWD	SSWD	SJWD
Number of call out events per year	130	250	200	15	218	483	47.5
Contract / in-house costs per year	$86,190	$87,565	$127,990	$14,758	$43,184	$379,382	$26,281
Costs per event	$663	$350	$640	$984	$198	$785	$553
Staff levels required to support service levels	7	12	11	2	4	37	10

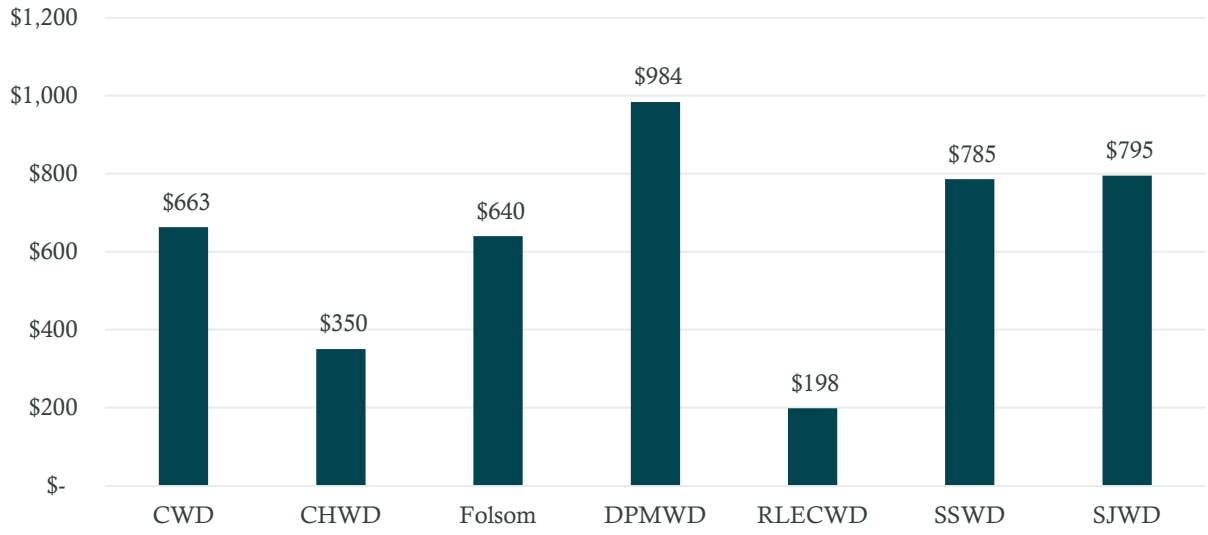
Comparing the number of call out events per year across the agencies as well as the staff levels required (Figure 23) shows that some agencies are staffed at a similar level to each other while the call out event volume is significantly different. In other cases, such as when comparing Folsom to RLECWD, the call out event volume is similar, but the staff level is very different. The numbers gathered reflect all after hours calls that resulted in an individual being dispatched regardless of whether it was a full crew or just the on-call individual.

Figure 23: Call Out Events per Year and Staff Levels Required



The annual costs of call out events have been normalized per call out event for comparison between agencies, as seen in Figure 24. CWD, Folsom, SSWD, and SJWD are spending near the same amount per event, whereas DPMWD is on the higher end and CHWD and RLECWD are both on the lower end of the group.

Figure 24: Costs Per Call Out Event



Water Conservation Programs

The participating agencies operate in a Mediterranean, but drought susceptible climate in the northern half of California's Central Valley. They share variable surface and groundwater supplies, which are coveted by other area users and those in the southern parts of the state. The water conservation program opportunity represents a chance to collectively and individually manage water usage by further encouraging efficient water use among customers. While reduced water usage can initially seem counter intuitive to a water utility because it presents the risk of revenue reductions (reduced volume consumed), well-designed practices can help to ensure water rates fully recover revenue requirements even on reduced consumption units.

A component of a water conservation program is education detailing water usage trends and resulting impacts on rates. As such, and as reflected in the collective appetites for pursuing this opportunity, the participating agencies should consider enhanced water conservation through collaborative action to be both financially viable and practically important to pursue. Indeed, it is both the last drought, and the next, that should motivate such action.

Figure 25 shows the annual costs of water conservation programs at each participating agency including salaried positions dedicated to water conservation as well as related programming and contract costs. The larger agencies (CHWD, Folsom, SSWD, and SJWD) have the highest total spend. However, as shown in Figure 26, CHWD, CWD and Folsom are higher in terms of conservation program spending per capita relative to SSWD and SJWD. A table detailing the many varied channels, enforcement mechanisms, events, incentives, management tools, and other programming and messaging activities that each participating agency engages in is detailed in Appendix B.

As the participating agencies consider their relative spending overall and per capita costs relative to peers, as well as the programmatic detail in Appendix B covering normal operations and drought only initiatives, each may find opportunities for enhancement through the various collaborative models to be explored in Activity 3. Those showing relatively higher spend per capita may achieve the same service levels with less expenditures through collaboration, and those showing less spend may find that enhanced service levels are not as unobtainable as they might have been alone. While the modes of collaborative action will be explored further in Activity 3, consider a scenario where staff time at each agency is being spent to develop different versions of the same water efficiency messages seven times, whereas a collaborative approach might allow for simply stamping each agencies logo on a menu of aligned regional messaging (as is done currently through RWA with 19 agencies participating including most but not all of the participants in this Study). This has the potential to free up often multi-tasking staff for other functional needs, thereby potentially either reducing contractor support needs or enhancing service levels.

Figure 25: Costs of Water Conservation Programs

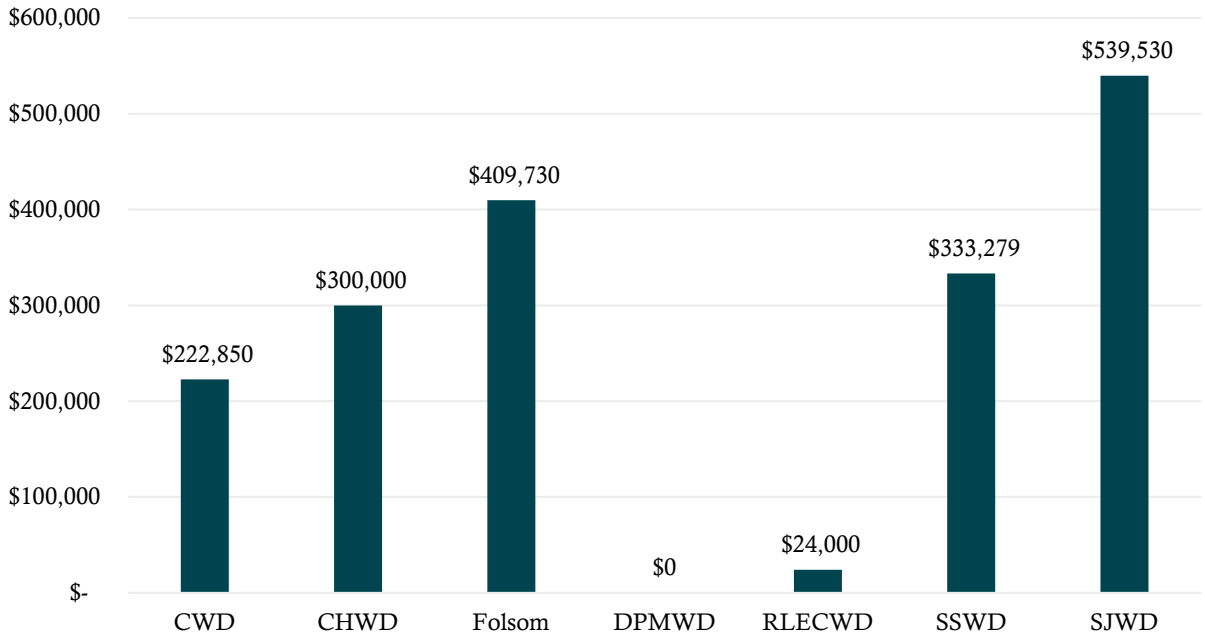
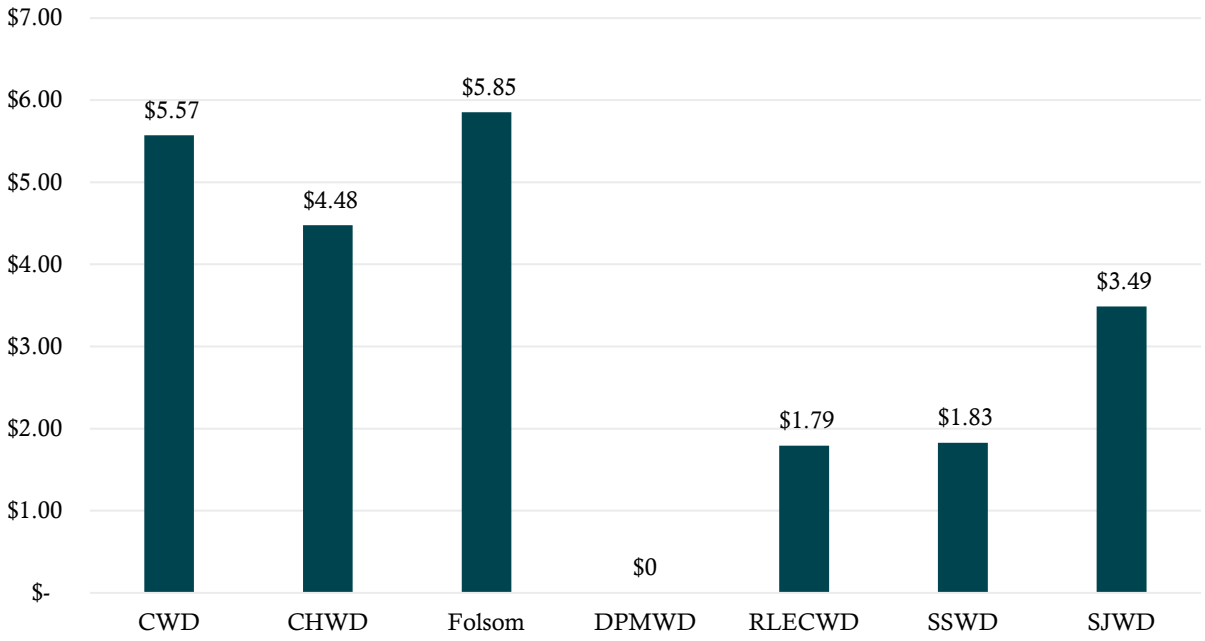


Figure 26: Costs of Water Conservation Programming Per Capita



Water Supply

The Sacramento Region's water suppliers have many opportunities to collaborate on preservation, distribution, and use of their water assets since the regional groundwater and surface water sources they depend on extend across and outside the service area boundaries of the various entities. They are also impacted collectively by changes in legislation and policy that apply broadly to regional or State-wide water management. This Study by the participating agencies should be a catalyst for further assessing regional water asset opportunities.

In the past four decades collectively the water agencies in the greater Sacramento Region have made great strides in diversification of water supplies and capital facilities associated with addressing drought, climate change, redundancy, reliability, groundwater overdraft (including creation of the Sacramento Groundwater Authority), emergency response and other factors. Within the agencies participating in this Study, examples of those facilities include improvements to SJWD's Sydney Peterson WTP, CWD's Bajamont WTP, the Cooperative Transmission Pipeline, the Antelope Transmission Pipeline, the Antelope Booster Pump Station and additional groundwater wells in CHWD. These facilities reflect millions of dollars of ratepayer dollars and State Grant funds coordinated through RWA to enable the agencies to conjunctively use the region's surface and groundwater assets as needed.

The total annual volume of the participating agencies' surface water and groundwater assets far exceeds the current and projected needs of their customers. However, the stagnant nature of the surplus water assets may have unanticipated long-term consequences. A fundamental tenet of California's surface water prior appropriation law is "use it or lose it" and the regional surface water supplies have not been fully utilized. This inability to put all surface water assets to beneficial use may jeopardize the future ability to retain those water assets or derive the maximum benefit available under the provisions of each water asset. Similarly, the continued water conservation regulatory actions further reduce the purveyor's actual water use that may limit long-term asset preservation despite purported legislative protections.

For those participating agencies that rely on groundwater exclusively or predominantly there may not be an obvious association with surface water supplies and the requirements associated with their use. Several suppliers indicated to Raftelis that they have adequate supplies now and into the foreseeable future, especially since per capita usage has trended downward and there is little significant growth in their service areas. This view may be shortsighted as groundwater withdrawal requirements can change and there could be unanticipated problems and/or limitations with groundwater resources for a variety of reasons. Furthermore, coordination between groundwater and surface water resources not only provides insurance against resource and policy changes but can also provide a revenue source. None of the participating agencies indicated that they are overfunded, and several noted the opposite, which should make revenue enhancement opportunities attractive.

As noted in the Task 1 Report, the participating agencies water assets total valuation approaches $1 billion, without incorporating the economic activity spawned by reliable water supplies or the value of the infrastructure used to divert, treat, and deliver the supplies. The combined current water assets available to the participating agencies exceeds 300,000 acre-feet per year while the current water demands for the participating agencies totals approximately 100,000 acre-feet per year. The future

projected total demand for the participating agencies is approximately 137,000 acre-feet per year. As such, the agencies have more than 170,000 acre-feet of apparent surplus water that is not, and may not in the future, be put to beneficial use (and this figure excludes banked water assets). Table 9 shows the total water supplies and demands for the participating agencies and the banked groundwater supplies attributable to each participating agency. Of course, changes in policies or new studies on the resources could impact these supplies at any time.

Table 9: Participating Agencies Water Demands and Supplies[8]

Agency*	Current Demand (Annual)	Future Demand	Own Surface Supply	Contract Supply	Reasonable GW Capacity**	Future Surplus w/out GW	Future Surplus w/ GW
SJWD	12,000	13,000	57,200	25,000			
CHWD	12,400	13,100			5,000		
FOWD	8,800	9,600			8,343		
OVWC	3,500	3,900			500		
Ashland	1,100	1,100					
San Juan Family Totals	**37,800**	**40,700**	**57,200**	**25,000**	**13,843**	**41,500**	**30,343**
DPMWD	1,700	1,700			2,460		760
CWD	10,000	10,000	32,627		2,200	22,627	24,827
SSWD	29,000	39,567		55,064	135,493	15,497	150,990
Folsom	19,000	28,200	34,000			5,800	5,800
RLECWD	2,500	17,000			15,767		0
Other Agency Totals	**62,200**	**96,467**	**66,627**	**55,064**	**155,920**	**43,924**	**182,377**
All Agency Totals	**100,000**	**137,167**	**123,827**	**80,064**	**169,763**	**85,424**	**212,720**

*Data derived from recent planning documents
**Reasonable Groundwater Capacity is a yield less than maximum groundwater pumping capacity

Collaborative management of the regional water asset portfolio may provide additional dry year reliability protections, improved emergency response management, and potential revenue streams for participating agencies. For instance, the value of the underutilized water assets likely exceeds $30 million in a conservatively priced short-term (annual) water transfer market if all of the supplies could be fully used and transferred. The long-term water asset value approximates $250 million based upon

[8] All units are in acre-feet (AF)

a permanent transaction water asset valuation of $2,000 per acre-foot. Leveraging the financial value of even a portion of these water assets would provide alternative revenue streams that could be used for system improvements.

Many of the participating agencies also have additional water assets, like contracts with neighboring purveyors and banked groundwater assets that may be called upon to further support the water supply portfolio. For example, SSWD has contract supplies with the City of Sacramento and Placer County Water Agency that may also be considered in this collaborative effort. In addition, SSWD, CWD, DPMWD, and RLEWD have banked groundwater supplies that may provide utility in collaborative activities and these values have been excluded from Table 9. In short, Table 9 presents a conservative estimate of the total supplies available to the participating agencies.

Collaborative management and use of regional water supplies, through contracts or other mutually beneficial agreements for use and storage, will protect the water assets for each purveyor's benefit, improve dry year reliability, and potentially improve short-term and long-term revenue opportunities for all participating agencies. Differences in costs of production per unit of water produced as identified in Figure 5 also may suggest regional opportunity. Activity 3 will provide potential options to improve the collaborative efforts among the purveyors in water management and use.

APPENDIX A:

Number of Staff by Function

Appendix A 1: Number of Staff by Function

Function	CWD	CHWD	Folsom	DPMWD	RLECWD	SSWD	SJWD
Water distribution	11	14	18.5	1.5	6	24	16
Water treatment	8	3	8.5	0.25	0	15	13
Engineering	2	5	2.5	0.25	0	10	4
Customer service / billing	3	2.75	2	0	2	6	5
Public relations/Water conservation	3	3.75	3	0	0	2	3
Finance	3	2.5	1	0.25	1	4	5
Human resources (HR)	1	1.75	0.4	0.25	0.05	1	1.45
Information technology (IT)	1	1	.2	0	0	3	1
Other	0	2.25	1	1.5	1	5	1
Total	32	36	35	4	10	70	48

Note: For the purposes of this table the minimum reported or estimated staffing level is 0.25 FTE for most reporting, however, agencies are welcome to refine this further in subsequent drafts.

APPENDIX B:

Conservation Programming

Appendix B 1: Water Conservation Communication Channels

Channels	CWD	CHWD	Folsom	DPMWD	RLECWD	SSWD	SJWD
Website / scrolling banner	X	X	X			X	X
Social media	X	X	X				X
Online advertising		X	X			X	
Emails							X
Digital video	X					X	X
Messages for on-hold customers (phone system?)						X	
Print newsletter / mailers / bill inserts or on bill	X	X	X		X	X	X
Lobby brochures / water wise gardening literature	X	X				X	X
Local newspaper articles /ads	X	X	X			X	
Children's workbooks						X	
Welcome packets with efficiency messaging for new customers							X
Drought: Door-to-door messaging in high use neighborhoods		X				X	
Drought: Increase frequency of public outreach campaign interventions through usual media content	X	X	X			X	
Drought: Push info to media outlets (radio, print, web, TV)	X		X			X	
Drought: Develop and distribute drought information to customers	X	X	X			X	
Drought: Display signs alerting public of reduction drought stage in community or at district offices	X					X	

Channels (continued)	CWD	CHWD	Folsom	DPMWD	RLECWD	SSWD	SJWD
Drought: Update website with current demand reduction information	X		X			X	
Drought: Work with outside groups to post District literature or links on respective websites, email lists, or meetings	X					X	
Drought: Special mailing to customers notifying drought stage requirements	X	X	X			X	
Drought: Restaurant water efficiency window stickers						X	
Drought: Manage to state imposed 32% reductions target						X	
Drought: Adding requirements of the water shortage contingency plan	X	X	X			X	

Appendix B 2: Water Conservation Enforcement Mechanisms

Enforcement Mechanisms	CWD	CHWD	Folsom	DPMWD	RLECWD	SSWD	SJWD
Water waste patrol		X	X			X	X
Restricted watering times during midday hours			X			X	
Water use prohibitions (SSWD Regulation No. 15)						X	
Drought: State imposed 32% reductions target		X				X	
Drought: Adding requirements of the water shortage contingency plan	X	X	X			X	
Drought: Late night / early morning water waste patrol		X	X			X	
Drought: Restricted watering days		X	X			X	

Enforcement Mechanisms (continued)	CWD	CHWD	Folsom	DPMWD	RLECWD	SSWD	SJWD
Drought: Change regulations to increased Water Conservation Stage in Regulation No. 15 based on severity of drought conditions or state mandates						X	
Drought: Develop/revise message and content to reflect reduction requirements.	X		X				

Appendix B 3: Water Conservation Events

Events	CWD	CHWD	Folsom	DPMWD	RLECWD	SSWD	SJWD
Community outreach events and workshops / HOH/neighborhood association presentations	X	X	X		X	X	X
Irrigation efficiency education communications			X			X	X
Community outreach event, water efficiency workshop sponsorships (Rotary, Chamber of Commerce, Kiwanis)	X		X			X	
School water efficiency calendar art contest	X	X					X
School presentations	X	X				X	
Facility tours	X		X			X	
WaterSmart Classes / conservation related classes or trainings		X				X	
Water efficient garden tours						X	X
Drought: Increase in presentations to neighborhood associations, community groups, and schools.	X		X			X	
Drought: Increase school presence by offering presentations and materials	X					X	
Drought: Offer presentations to all local civic groups, HOAs, and neighborhood associations.	X					X	

Appendix B 4: Water Conservation Incentives

Incentives	CWD	CHWD	Folsom	DPMWD	RLECWD	SSWD	SJWD
Free low flow outdoor components (hose end nozzles, hose timers)	X	X				X	
Free or promote low flow indoor appliance kits (low-flow bathroom or kitchen faucet aerators)	X	X			X	X	
Rebate programs (toilet=$75-175, pressure reducing valve=$150, clothes washers ($50-100), pool covers, on demand hot water $100)		X	X			X	X
RWA irrigation controller rebates (reduced to $75)	X	X	X			X	X
Irrigation equipment rebates up to $500, $1500 commercial (heads or weather based timers, rain sensors)			X			X	X
Mulch program / giveaway						X	X
Rate structure that promotes efficient use per SB-606 and AB-1668			X		X	X	
Drought: Consider plumbing retrofit programs and increased advertising through public outreach efforts	X		X			X	
Drought: District will determine cost effectiveness and whether or not to offer additional rebates. i.e. smart -controllers, high efficiency washer, etc.	X		X			X	
Drought: High user surge to focus on contacting customers with higher use patterns in order to encourage participation in water efficiency programs and incentives (Top 20 percent of water users in each parcel acreage category)	X		X			X	

Appendix B 5: Water Conservation Management Tools

Management Tools	CWD	CHWD	Folsom	DPMWD	RLECWD	SSWD	SJWD
Tracking usage at public facilities	X		X				
Tracking irrigation rebate program customer usage impacts			X			X	
Customer water usage is monitored each meter reading cycle to identify abnormal water use patterns and those customers are contacted.	X		X		X	X	X
Annual water loss submission and monthly reporting		X	X			X	
Customer portal for usage			X		X (pilot)	X	
AMI system that flags continuous use			X		X	X	
UWMP Public Notification		X	X			X	
Drought: High user surge to focus on contacting customers with higher use patterns in order to encourage participation in water efficiency programs and incentives (Top 20 percent of water users in each parcel acreage category)	X		X			X	
Drought: Utilize regional partnerships for messaging and implementation depending on purpose of water shortage stage declaration.	X		X			X	

Appendix B 6: Other Water Conservation Programming and Messaging

Other Programming and Messaging	CWD	CHWD	Folsom	DPMWD	RLECWD	SSWD	SJWD
Messaging on efficiency stage						X	X
Messaging on indoor outdoor efficiency tips			X			X	X
Messaging on leak detection information						X	X
Encouraging reporting water waste						X	X
Messaging on native planting to attract wildlife						X	X
Residential water efficiency evaluations (WaterWise housecalls)	X	X	X			X	
CII water efficiency evals	X	X	X			X	
Private leak detection service / notifications / investigations	X	X	X			X	X
Water budget development			X			X	X
Drought: Additional staff and resources may be allocated to conduct an expected increase in requests for water audits, water efficiency device distribution, landscape budgets, and other programs offered as part of the Districts water efficiency program	X					X	

APPENDIX C:

Preventative Maintenance Activities

Appendix C 1: Preventative Maintenance Activities

Activities	CWD	CHWD	Folsom	DPMWD	RLECWD	SSWD	SJWD
Infrastructure maintenance	X	X	X	X	X	X	X
Dead-end or groundwater area flushing when quality issue	X	X	X			X	X
Hydrant maintenance / paint / flushing / greasing / inspecting	X	X	X	X	X	X	X
System-wide flushing			X		X		X
Valve exercising (mainline, blow off, hydrant valve, ARV/CARV)	X	X	X		X	X	X
Tank / storage reservoir inspections			X			X	
Large meter testing			X			X	X
Cathodic protection program						X	X