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THE STATE OF CALIFORNIA

BEFORE THE STATE WATER RESOURCES CONTROL BOARD

ADMINISTRATIVE HEARINGS OFFICE

IN THE MATTER OF: CALIFORNIA DEPARTMENT OF WATER RESOURCES' PETITIONS FOR CHANGE OF WATER RIGHTS PERMITS 16478, 16479, 16481, AND 16482	**Expert Testimony of Heather Cooley** Date: July 11, 2025

INTRODUCTION

1. My name is Heather Cooley. I am the Chief Research and Program Officer at Pacific Institute. My Statement of Qualifications is submitted concurrently with my written testimony as FOR-005. I have been employed at the Pacific Institute since 2004. My

professional responsibilities during my tenure at Pacific Institute include evaluating the potential, costs, and benefits of alternative water supply and demand management options in California and other geographies. I served as a Board member of the California Urban Water Conservation Council, a 501(c)(3) nonprofit organization focused on advancing water conservation and efficiency in California, from 2008-2016. I also served on numerous state task forces and committees, including the Commercial, Industrial, and Institutional Taskforce and the Urban Stakeholder Committee. I am a recipient of the Outstanding Achievement Award from the U.S. Environmental Protection Agency, as well as the Environmental Achievement Award from Global Water Intelligence. I have a master's degree from the Energy and Resources Group at the University of California at Berkeley. Based on my education, experience, and professional position, I have sufficient knowledge to testify about the matters included in this written testimony, and I am prepared to testify on these matters if called.

TESTIMONY

2. My testimony will focus on the technical potential of reducing water demand and expanding local water supplies across California and in regions reliant on water exported from the Bay-Delta region. An understanding of the opportunities for alternative water supplies and demand reductions (including water generated by water-use efficiency, stormwater capture, and water recycling projects) is relevant to the State Water Resources Contral Board's consideration of the need for the Delta Conveyance Project (hereafter DCP), and in the Board's balancing of protecting beneficial uses.

3. **There are Significant Opportunities to Reduce Reliance on Water Exports from the Bay-Delta by Reducing Inefficient Water Use and Increasing Local and Regional Water Supplies.** Communities across California have made real and tangible progress in reducing water use through water conservation and efficiency and augmenting local supplies. As

shown in Figure 1, water use across the Metropolitan Water District of Southern California's (MWD) service area was nearly the same as it was in the mid-1970s despite significant population and economic growth. Additionally, the region has increased its use of recycled water and other local water sources. Together, these strategies have reduced reliance on imported water. Even with this progress, there remain significant opportunities to further reduce demand and develop new water supplies through local and regional water projects within the service areas of State Water Project (SWP) contractors.

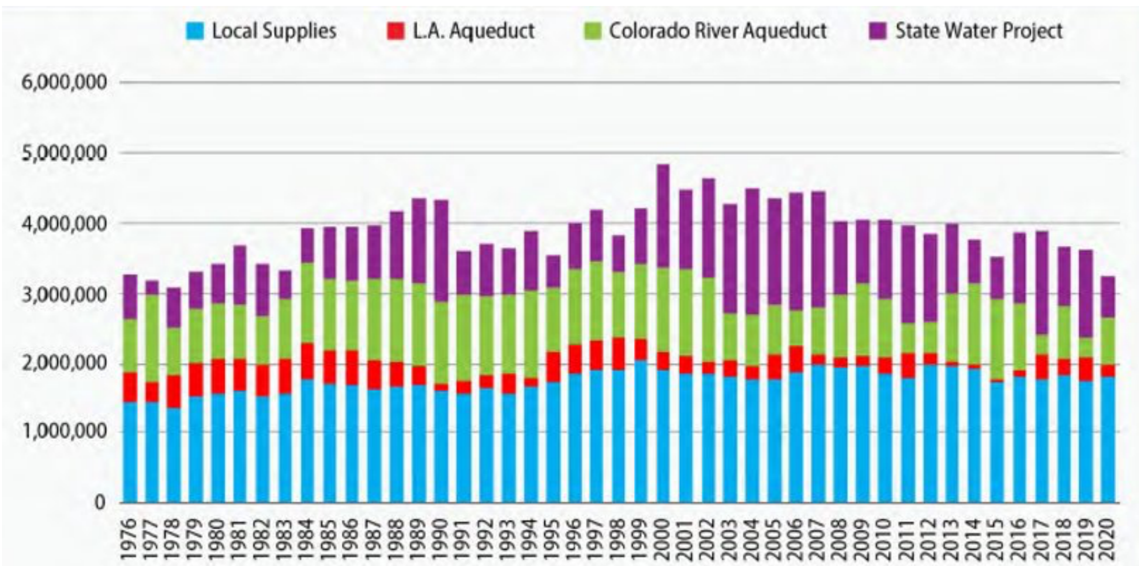

FIGURE 1. Water Supply Trends for the Metropolitan Water District of Southern California's Service Area from 1976-2020, reproduced from Figure A.2-1 in MWD (2021).[1]

[1] Metropolitan Water District of Southern California (MWD). 2021. "2020 Urban Water Management Plan." Los Angeles, California. Available at https://d1q0afiq12ywwq.cloudfront.net/media/21641/2020-urban-water-management-plan-june-2021.pdf. (FOR-128)

4. In 2022, the Pacific Institute authored a report entitled *The Untapped Potential of California's Urban Water Supply: Water Efficiency, Water Reuse, and Stormwater Capture*[2] ("*Untapped Potential (2022)*"), which provided an evaluation of the statewide technical potential of three water strategies: improved urban water-use efficiency, water reuse, and stormwater capture in urban areas. This study updated Pacific Institute's earlier research published in 2014 under a similar name. *Untapped Potential (2022)* used various datasets that represented the best data available at the time of publication and generally covered the period from 2017 through 2020. The findings represent a "snapshot" of the technical potential based on population and development patterns during this period, as well as widespread adoption of available technologies and practices. The study does not include any additional savings or water supply potential from new developments or new technologies and practices. *Untapped Potential (2022)* did not evaluate other water supply options, such as desalination or agricultural water efficiency, although these options also offer opportunities to reduce reliance on traditional water sources like the Bay-Delta. The report was reviewed by experts from California water agencies, non-governmental organizations, and academia. The major findings of that report are summarized in Table 1, and a copy of that report is included as FOR-123. *Untapped Potential (2022)* did not evaluate other water supply options, such as desalination or agricultural water efficiency, although these options also offer opportunities to reduce reliance on traditional water sources like the Bay-Delta.

Table 1. Potential Water Impacts of Improved Urban Water-Use Efficiency, Water Reuse, And Stormwater Capture, Based on Estimates from *Untapped Potential (2022)*

[2] Cooley, Heather, Anne Thebo, Sonali Abraham, Morgan Shimabuku, Peter Gleick, and Sarah Diringer. 2022. The Untapped Potential of California's Urban Water Supply: Water Efficiency, Water Reuse, and Stormwater Capture. Available at: https://pacinst.org/wp-content/uploads/2022/04/PI_California_Untapped_Urban_Water_Potential_2022-1.pdf. (FOR-124)

Strategy	Volume of Water (acre-feet per year)		
	Statewide	South Coast Hydrologic Region	San Francisco Bay Hydrologic Region
Urban Water-Use Efficiency	2.0 million – 3.1 million	1.1 million –1.7 million	230,000 – 390,000
Municipal Wastewater Reuse	1.8 million – 2.1 million	1.1 million	500,000
Urban Stormwater Runoff over Public Supply Aquifers	580,000 in a dry year; 3.0 million in a wet year	260,000 in a dry year; 1.4 million in a wet year	85,000 in a dry year; 460,000 in a wet year

Note: These values are not additive across strategies.

Improving Urban Water-Use Efficiency

5. Water-efficiency measures include a variety of technologies and practices, such as replacing old, inefficient toilets, showerheads, and clothes washers with high-efficiency models; installing low water-use plants; improving irrigation efficiency; as well as pressure management and leak repair within water-distribution systems. The *Untapped Potential* report (2022) focused on water efficiency opportunities in homes, businesses, institutions, and in the water-distribution system. For each, we estimated both current and efficient water use, with the difference between these values representing the water efficiency potential. Current water use was based on data from California's Electronic Annual Reports (EARs) for the years 2017, 2018, and 2019, the most recent years for which data were available. A

summary of the methods for each urban subsector follows, and additional detail can be found in the report included in FOR-123.

- Efficient indoor residential water use was estimated based on two scenarios: (1) all California homes are equipped with appliances and fixtures that meet current state standards (a moderate estimate), and (2) all homes are equipped with leading-edge technologies currently available on the market but not yet mandated (a high estimate).
- Efficient outdoor water use was based on two scenarios: (1) urban landscapes comply with the Model Water Efficient Landscape Ordinance (a moderate estimate), and (2) urban landscapes are converted to low water-use plants and efficient drip-irrigation systems (a high estimate).
- Commercial, industrial, and institutional (CII) water use was based on estimates in the literature, including policy documents, case studies, and water audits. These literature estimates indicated that CII water use could be reduced by 30% (a moderate estimate) to 50% (a high estimate).
- Water savings from water loss control measures were based on data from 2017-2020 on reported water losses and individual water loss performance standards. These standards were developed pursuant to California Water Code Section 10608.34 and require urban water suppliers to comply with individual volumetric water loss standards by 2028.

6. In total, *Untapped Potential (2022)* found that adopting proven technologies and practices could reduce current urban water use in California by 2.0 million to 3.1 million acre-feet per year (AFY), or by 30% to 48%. Water savings were found across all sectors but were largest for the residential sector (1.2 to 2.1 million AFY), followed by the CII sectors (0.65 to 0.9 million AFY) and reductions in water losses from the water distribution system (0.11 to 0.13 million AFY).

7. These demand reduction opportunities were found across the state. The South Coast Hydrologic Region - which largely overlaps with the service area of the Metropolitan Water District of Southern California, the largest State Water Project contractor - has the greatest potential for water savings across all regions. By implementing water efficiency improvements, *Untapped Potential* (2022) found that the South Coast region could reduce water demand by 1.1 million to 1.7 million AFY. San Francisco Bay Hydrologic Region had the second-highest potential water savings (0.23 million to 0.39 million AFY), followed by the Sacramento River Hydrologic Region (0.20 million to 0.32 million AFY).

Water Reuse

8. *Untapped Potential (2022)* estimated the quantity of municipal wastewater potentially available for reuse in California using data on the volume of effluent produced and the existing allocation of wastewater effluent for instream flow requirements from the State Water Resources Control Board's 2020 Volumetric Annual Reports.

9. According to these data, an estimated 3.1 million AFY of municipal wastewater was produced within the State of California in 2020. About 23% of the municipal wastewater produced, or 728,000 AFY, was directly recycled at wastewater treatment plants or by a dedicated recycled water producer. An additional 286,000 AFY of municipal wastewater effluent supported ecosystems through both instream flow requirements and discharges to wildlife refuges and other natural systems. Of the remaining wastewater produced in 2020, *Untapped Potential (2022)* estimated that approximately 1.8 to 2.1 million AFY is potentially available for reuse. The lower estimate of the reuse potential is conservative and only includes wastewater discharged to land and to marine environments. The higher estimate (2.1 million AFY) includes wastewater discharges to land; marine environments; and inland surface water not currently allocated for instream flows or natural systems.

10. Water reuse potential was highest in the South Coast Hydrologic Region, followed by the San Francisco Bay. The South Coast Hydrologic Region produced 1.6 million AFY of wastewater in 2020. Of this amount, 473,000 AFY of wastewater was reused, representing 29% of the wastewater generated, and 101,000 AFY was reserved for instream flows or natural systems. This leaves up to 1.1 million AFY of wastewater potentially available for reuse in the South Coast Hydrologic Region.

11. By comparison, in 2020, the San Francisco Bay Hydrologic Region generated 549,000 AF of wastewater. Also in 2020, the region reused 49,000 AF of wastewater, just 9% of the total wastewater generated, and dedicated 3,000 AF for instream flows. This leaves up to 497,000 AFY of wastewater potentially available for reuse. In both regions, expanding centralized and distributed reuse could reduce the need for additional exports from the Sacramento-San Joaquin Delta.

Stormwater Capture

12. *Untapped Potential (2022)* utilized a GIS analysis of impervious surface cover in urban areas across California to estimate the amount of stormwater runoff generated in high (i.e., wet), medium, and low (i.e., dry) precipitation years. Runoff volumes were calculated in two ways: (1) as the total from all impervious surfaces in urban areas, and (2) as the total from impervious surfaces in urban areas that lie above groundwater aquifers used for municipal supply. The estimates do not include runoff from open space, nor do they include dry-weather runoff. This assessment is a high-level estimate of California's stormwater runoff potential and additional analysis would be needed to refine these estimates to determine the portion of runoff potential that would be technically and economically feasible to capture for supply augmentation.

13. *Untapped Potential (2022)* found that stormwater runoff from all urban areas in the state was 770,000 AF in a dry year, 2.0 million AF in a medium precipitation year, and 3.9 million AF in a wet year. In all years, the South Coast Hydrologic Region was found to generate the largest volume of stormwater runoff, ranging from 370,000 AF in a dry year to 1.9 million AF in a wet year. Despite relatively low precipitation compared to other parts of the state, the region has large amounts of paved area and high precipitation variability between wet and dry years. Stormwater runoff was also large in the San Francisco Bay Hydrologic (from 120,000 AF in a dry year to 670,000 AF in a wet year), followed by the Sacramento River Hydrologic region (110,000 AF in a dry year to 450,000 AF in a wet year).

14. Aquifers used for public water supply offer the best option for storing stormwater runoff for later use. *Untapped Potential (2022)* found that the amount of stormwater runoff generated from urban areas above public supply aquifers across California was 580,000 AF in a dry year, 1.6 million AF in a medium precipitation year, and 3.0 million AF in a wet year. Here, too, the largest amount of stormwater runoff generated above public supply aquifers was in the South Coast Hydrologic Region (260,000 AF in a dry year to 1.4 million AF in a wet year), followed by the San Francisco Bay (85,000 in a dry year and 460,000 in a wet year) and Sacramento River Hydrologic Regions (84,000 in a dry year and 350,000 in a wet year).

Costs and Benefits of Alternative Water Supplies

15. Cooley, Phurisamban, and Gleick (2019)[3] evaluated the costs of four alternatives for urban supply and demand based on data and analysis in the California context: stormwater capture;

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[3] Cooley, Heather, Phurisamban, and Peter Gleick (Pacific Institute). 2019. The cost of alternative urban water supply and efficiency options in California. Environmental Research Communications. Volume 1, Number 4. Available at https://iopscience.iop.org/article/10.1088/2515-7620/ab22ca (FOR-125)

water recycling and reuse; brackish and seawater desalination; and a range of water conservation and efficiency measures. The authors found that water-efficiency measures were almost always less costly than other water-supply options except for some of the most expensive landscape water reduction options (Figure 2). Some of these measures, especially those that reduce hot water use, had a negative cost – meaning that the financial savings from lower wastewater and/or energy costs over the lifetime of the device exceed the incremental cost of the more efficient device. Urban stormwater capture, brackish recycled water, and desalination projects were more costly per unit of water produced but still less expensive than seawater desalination, the most expensive option evaluated.

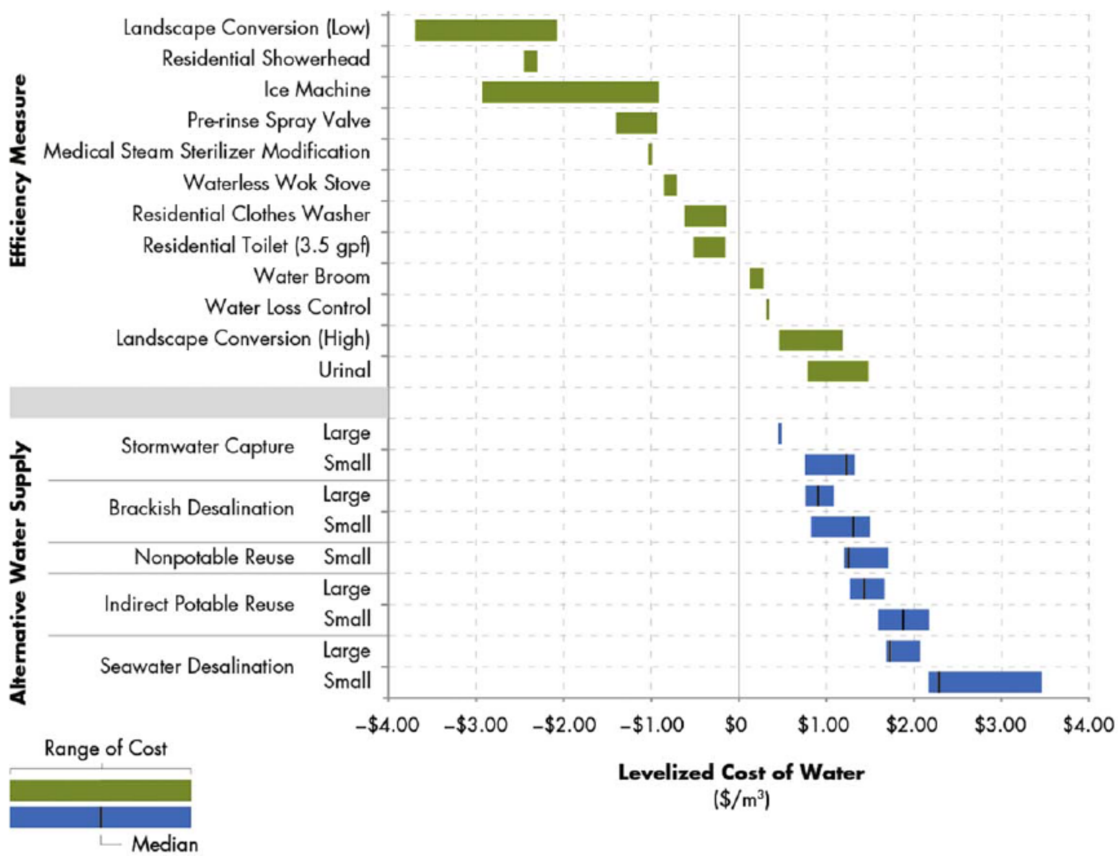

FIGURE 2. Levelized cost of alternative water supplies and water efficiency measures, in 2015 dollars per cubic meter, reproduced from *Cooley, Phurisamban, and Gleick (2019).*

16. Further, some of these alternatives – including efficiency, recycled water, and stormwater capture – also offer important co-benefits such as improved water quality; lower energy use and greenhouse-gas emissions; improved ecosystem health and community livability; and added green space. In its Resilience by Design report, the Los Angeles Mayoral Seismic Safety Task Force recognized that efforts "to improve local water supplies through storm water capture, water conservation, water recycling, and San Fernando Valley Groundwater Basin contamination remediation provide the best possible protection and should be supported as fundamental earthquake resilience measures."[4] These and other co-benefits would enhance their financial, social, and political viability, but are rarely acknowledged or included in comparisons among competing water infrastructure and policy options. Government agencies, businesses, and others are increasingly acknowledging the importance of these co-benefits and their potential to leverage resources and garner public support.[5]

CONCLUSION

17. Figure 3 summarizes the potential for water efficiency, water reuse, and stormwater capture across the ten hydrologic regions in California. All regions have the potential to save water through water-efficiency improvements and to augment local supplies through water reuse and stormwater capture. In terms of the total volume of water, the greatest potential for efficiency, reuse, and stormwater capture is in the South Coast, followed by the San Francisco Bay and the Sacramento River Hydrologic Regions.

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[4] Mayoral Seismic Safety Task Force. 2017. Resilience by Design. Available at https://cawaterlibrary.net/wp-content/uploads/2017/12/Resilience-by-Design-1.pdf. (FOR-126)

[5] Diringer, Sarah, Anne Thebo, Heather Cooley, Robert Wilkinson, Morgan Shimabuku and McKenzie Bradford (Pacific Institute). 2019. Moving toward a Multi-Benefit Approach for Water Management. Available at: https://pacinst.org/wp-content/uploads/2019/04/moving-toward-multi-benefit-approach.pdf (FOR-127)

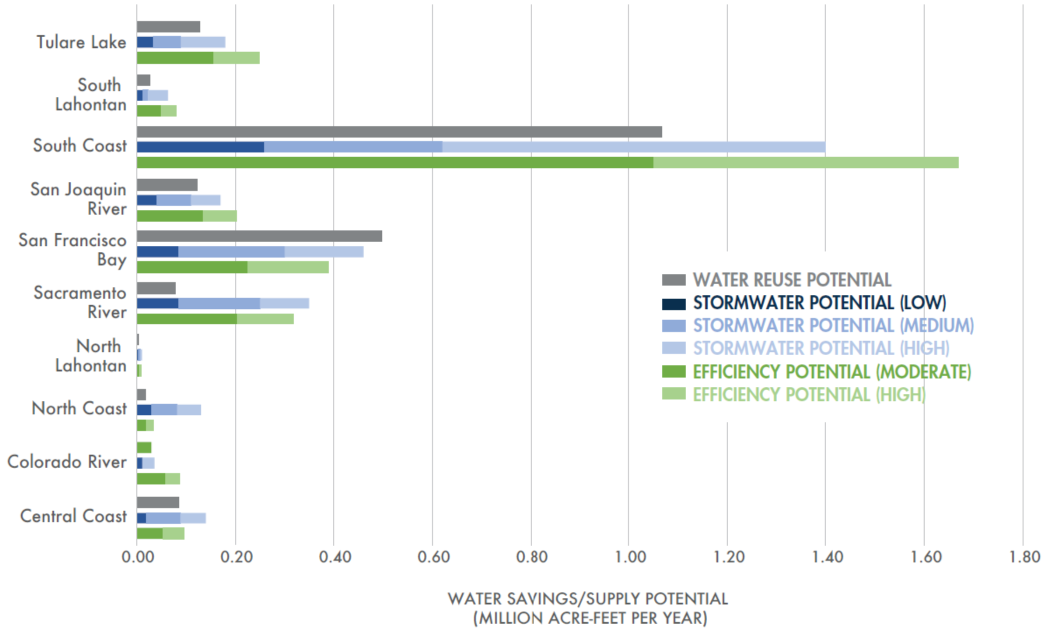

FIGURE 3. Water Efficiency, Water Reuse, and Stormwater Capture Potential by Hydrologic Region, reproduced from *Untapped Potential (2022)*.

18. These estimates demonstrate there is tremendous potential in urban areas across the state, and particularly in the regions served by the SWP, to reduce water demand and increase local water supplies through investments in water use efficiency, water reuse, and stormwater capture. These investments offer an immediate pathway to reduce diversions from the Bay-Delta estuary, thereby helping to protect this critical and fragile ecosystem. Although not discussed in *Untapped Potential (2022)*, other water sources, such as desalination and agricultural water efficiency, offer additional opportunities for reduced reliance on the Bay-Delta.

DATED: July 11, 2025

Heather Cooley