Union of Concerned Scientists

California Water Commission
P.O. Box 942836
Sacramento, California 94236

June 17, 2019

Re: Public Comment on Agenda Item 12 of the June 19th, 2019 Meeting of the California Water Commission

Dear Chair Quintero,

On behalf of the Union of Concerned Scientists and our 75,000 supporters across California, thank you for this opportunity to provide public comment on the Commission's Listening Session 1 on Governor Newsom's Water Resilience Portfolio Initiative.

Climate change's transformative impacts on California's water resources will require a revolution in how the state manages its water. The Union of Concerned Scientists (UCS) is committed to enhancing the resiliency and transparency of water management in California by ensuring that public policy, planning processes, and public investments in water appropriately integrate climate science and by empowering scientists and stakeholders to meaningfully engage in these processes through increased access to data and more transparent and equitable water governance.

As state agencies take up the charge of Executive Order N-10-19, UCS wishes to highlight these important considerations for achieving a climate-resilient water system for the state of California:

- **Climate planning in water management must include <u>all</u> climate change impacts on California water supply, demand, and quality.** Climate change is already transforming multiple aspects of how California receives and uses water, beyond changes in the state's total yearly supply. This includes changes in the timing and frequency of wet and dry extremes, changes in heat extremes and temperature ranges that will impact water demand and use patterns, and changes in the duration and intensity of drought. Making our water system resilient to these changes will require that planning processes quantitatively account for <u>all</u> climate change impacts that are likely to affect the way that California's people, plants, and animals get and use water.
- **Greater water variability due to climate change will require greater statewide coordination and flexibility.** Dealing with the more variable water conditions that climate change will bring to the state will require strong coordination statewide, so that the state can manage and store excess water during increasingly extreme and concentrated wet periods and sustain California through increasingly frequent and intense dry periods. Enabling this coordination will require a more flexible and integrated water management approach, and we are pleased that the Executive Order contains a strong mandate for inter-agency coordination and improved integration.
- **Sustainable conjunctive use of surface and groundwater will be a core requirement of dealing with California's climate-changed water future.** As snowpack becomes less reliable and California's water becomes increasingly variable due to climate change,

groundwater is becoming an increasingly necessary buffer for the state's water system. The coming year will be a crucial period for implementation of the Sustainable Groundwater Management Act (SGMA), as critically overdrafted groundwater basins submit their first Groundwater Sustainability Plans. Strong implementation of SGMA will be vital to ensuring that our groundwater resource can be a sustainable solution under a changing climate. Quantitative climate change planning—not only in the setting of sustainable groundwater budgets, but also in the design of the individual actions that communities take to achieve sustainable groundwater—will be crucial to this process.

- **Efforts to establish climate resilience goals must include strong stakeholder engagement and transparent decision-making processes.** As climate change further stresses the state's water management and demands new approaches, all stakeholders must be brought to the table in a decision-making process that is equitable and transparent.
- **The state's climate resilience actions must contain strategies for continuous updating to incorporate the best available science.** The science and data available to understand the impacts of climate change on California are constantly increasing in volume and improving in quality. As the state works to create a water system that will be resilient over decades and centuries, planning and implementation protocols must incorporate systems for regularly updating the science and data used, so that they reflect the latest understanding of climate risks.
- **Implementation of new water management actions will benefit from climate and water education.** While household water use represents only a small percentage of California water demands, individual action and awareness can boost water conservation, reduce waterway contamination, and increase household resilience. Further, improved public water and climate education can increase participation and equity in water decision-making and increase the effectiveness and uptake of new water strategies statewide.

Thank you again for this opportunity to comment on this important effort to ensure the long-term climate resiliency of our state's water resources.

Sincerely,

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SIERRA CLUB
CALIFORNIA

June 17, 2019

California Water Commission
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RE: June 19, 2019 Meeting Agenda Item #12 - Governor Newsom's Water Resilience Portfolio Initiative Listening Session

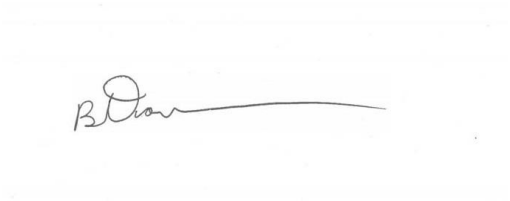
Dear Commissioners,

Sierra Club California appreciates the opportunity to provide comments on Agenda Item #12: Governor Newsom's Water Resilience Portfolio Initiative Listening Session. We are a grassroots environmental organization with more than 400,000 members and supporters in the state that are deeply invested in California's water infrastructure, supply, and management. As such, please find attached our white paper, "The Smart Alternative to Tunnel(s): A Sensible Water Management Portfolio" that we offer as comments on the changing landscape of California water.

The paper calls for a sustainable portfolio approach as a solution to the many water challenges that California faces such as climate change, over-allocation, and over-pumping of critical groundwater basins. In response to these challenges, we offer practical solutions that affect different sectors and can be employed across the state. Moreover, these solutions and practices will limit dependency on the Delta and act as an alternative to the single tunnel project proposed by Governor Newsom.

We hope you take these recommendations into account as the State pursues crafting an action plan to solve California's water crisis.

Sincerely,



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The Smart Alternative to Tunnel(s): A Sensible Water Management Portfolio

Chiara Scaramuzzino, Eric Parfrey, Charles A. Malotte,
Charming Evelyn, Katie Bailey, Charlotte Allen

Sierra Club California Water Committee Volunteers

May 2019

Photo by Bob Wick, Bureau of Land Management

The Smart Alternative to Tunnel(s): A Sensible Water Management Portfolio

Since passage of legislation in 2009, California's water policy debate has been dominated by the controversy over Governor Brown's proposal to build two 40-foot diameter, 30-mile long tunnels that would divert water from the Sacramento River around the San Francisco Bay Delta for export to the south.[1] More recently, Governor Newsom has rejected the two tunnels plan and suggested they be replaced by a single tunnel.

What California needs is not two tunnels, or one tunnel. What it needs is a diverse water portfolio, including firm commitments of water for the environment. California can meet its water needs and provide the flows needed to restore the Delta with a combination of increased agricultural and urban conservation, groundwater storage and management, increased water reuse, and stormwater capture. A smart and sustainable water portfolio will enable us to meet the challenges of climate change and provide the water our families, farms, and ecosystems require to flourish.

The amount of water we could save in California with this combination of conservation measures is enough to stop the overdraft of California's groundwater basins and replace much if not most of the water we now take from the Delta, thus restoring the ecological health of the Delta and making even one tunnel unnecessary.

Potential Water Savings/Supplies from a Portfolio of Resilient Strategies

Resource Strategy	Water Savings/Supplies (million acre-feet/year)
Agricultural Water Use Efficiency	5.6 - 6.6 MAF
Urban Water Use Efficiency	2.9 - 5.2 MAF[2]
Recycled Municipal Water	1.2 - 1.8 MAF[3]
Stormwater Capture	0.4 - 0.6 MAF
Groundwater Storage and Conjunctive Use	0.5 - 2.0 MAF
TOTAL	10.6 - 16.2 MAF

This table has been compiled from 2014 analysis by the Pacific Institute and Natural Resources Defense Council,[4] and 2016 analysis by the Department of Water Resources.[5] The Sierra Club opposes the more aggressive operation of reservoirs and the Delta pumping plants DWR proposes in order to achieve maximum gains from conjunctive groundwater storage as we believe these gains can be achieved using more sustainable and environmentally-friendly techniques.

A History of the Delta Tunnels

The California tunnels project, now referred to by its proponents as the "WaterFix", was previously called the Bay Delta Conservation Plan (BDCP). The Department of Water Resources held the first meeting to discuss the BDCP in May of 2006,[6] two months after the Emergency Petition to declare the Delta Smelt an endangered species was filed.[7] The BDCP was proposed as a comprehensive Habitat Conservation Plan for the Delta which would address the collapse of endangered fish populations.

1. Special thanks to California Water Research for contributing to this report.

2. About 2.1 MAF of Pacific Institute's projections of potential urban water conservation savings were realized in 2015. *The Untapped Potential of California's Water Supply* used the average of urban uses between 2001 and 2010 as a baseline, which was 9.1 MAF a year. According to the 2018 California Water Plan Update, in 2015, urban uses consumed an average of 7.0 MAF a year (p. 1-5.) Available at https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/California-Water-Plan/Docs/Update2018/PRD/California-Water-Plan-Update-2018-Public-Review-Draft.pdf.

3. Even greater supplies could be realized if SB 332 is enacted -- estimates are 2.5 MAF.

4. Peter Gleick et. al. *The Untapped Potential of California's Water Supply: Efficiency, Reuse, and Stormwater*. Pacific Institute and Natural Resources Defense Council, June 2014. Available at https://pacinst.org/wp-content/uploads/2014/06/ca-water-capstone.pdf.

5. California Department of Water Resources, *Conjunctive Management and Groundwater, A Resource Management Strategy of the California Water Plan*, July 2016. Available at http://www.water.ca.gov/waterplan/docs/rms/2016/08_ConjMgt_GW_Storage_July2016.pdf.

6. Bay Delta Conservation Plan Steering Committee. Agenda, May 19, 2016. Available at http://baydeltaconservationplan.com/Libraries/Dynamic_Document_Library_-_Archived/5_19_06_agenda.sflb.ashx.

7. Center for Biological Diversity, The Bay Institute, and Natural Resources Defense Council. "Emergency Petition to List the Delta Smelt (Hypomesus transpacificus) as an Endangered Species Under the Endangered Species Act," March 8, 2006. Available at https://baydeltalive.com/assets/eec462358f80c-c8d9910bfda974fa6f4/application/pdf/ds-endangered-petition-3-8-06.pdf.

By November 2007, the steering committee, which included DWR, the Federal Bureau of Reclamation, water agencies, fishery agencies, the California Farm Bureau, and some environmental groups, had agreed on "a dual conveyance system, the ultimate acceptability of which will turn on important design, operational and institutional arrangements that the Steering Committee will develop and evaluate through the planning process."[8]

In 2009, the Delta Reform Act, which enacted the BDCP planning process into law, came before the legislature. Sierra Club and other environmental organizations, as well as Delta stakeholders, strongly opposed the legislation. The legislation passed, and the environmentalists' worst fears were soon realized. By 2010, the BDCP steering committee had proposed an enormous new conveyance, with five 3,000 cubic feet per second intakes in the North Delta, which would feed two 33-foot diameter pressurized tunnels. A draft Environmental Impact Report / Environmental Impact Statement was circulated in 2013. Environmental organizations that had initially supported the project protested the new two tunnels design.[9] In 2015, the project was changed to two 40-foot gravity flow tunnels, the number of intakes was reduced to three, and the tunnel alignment was moved to the east. The extensive federal Habitat Conservation Plan component of the project was dropped, and the remaining habitat restoration program[10] was rebranded as EcoRestore.[11]

The following sections present our portfolio alternative to the tunnels—increased agricultural and urban conservation, groundwater storage and management, increased water reuse, and stormwater capture.

Agricultural Water Conservation

Water conservation in agriculture is crucial to reducing water consumption in California since agricultural water use represents about 80% of total annual human water use.[12] To avoid further diversions of water from the Bay Delta and its watersheds, new management systems and investment are required. Thanks to improved irrigation techniques, agricultural water use efficiency increased for most crops in California between 2001 and 2010, according to estimates by the UC Davis Water Management Research Laboratory.[13] Even though water efficiency has increased, water savings are still being directed towards agricultural production and more needs to be done to return them to the environment instead.

8. Bay Delta Conservation Plan Steering Committee. "The Bay Delta Conservation Plan: Points of Agreement for Continuing into the Planning Process," Draft, November 16, 2017. Available at http://baydeltaconservationplan.com/Libraries/Dynamic_Document_Library_-_Archived/11_16_07_HO_BDCP-Points_of_Agreement.sflb.ashx.

9. John Cain et. al., "NGO letter to Messr.s Laird, Hayes, Meral and Connor," September 30, 2011. Available at http://deltacouncil.ca.gov/docs/dsc-miscellaneous-correspondence/john-laird-and-dr-jerry-meral-ca-resources-agency-david-hayes.

10. CALFED Bay Delta Program, *Programmatic Record of Decision*, August 28, 2000. Available at http://www.calwater.ca.gov/content/Documents/ROD8-28-00.pdf.

11. Acreage cited in comments by Local Agencies of the North Delta on the 2018 Draft California Water Action Plan Update. Available at https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/California-Water-Plan/Docs/PublicComments/Update2018/PRD/Update-2018-PRD-Public-Comment-48.pdf.
In contrast to the 100,000 acres proposed to be restored by BDCP, EcoRestore is currently implementing only the minimum habitat restoration projects required as mitigation for the impacts of the Central Valley Project and State Water Project under the federal Endangered Species Act Section 7 permits. The 2008 and 2009 Biological Opinions required up to 28,000 acres of tidal and floodplain habitat restoration Biologists overseeing the habitat restoration projects say the benefits are uncertain.

12. Jeff Mount and Ellen Hanak. "Just the Facts: Water Use in California," Public Policy Institute of California, July 2016. Available at https://www.ppic.org/content/pubs/jtf/JTF_WaterUseJTF.pdf.

13. Samuel Sandoval-Solis, Ph.D., et. al. *Spatial Analysis of Application Efficiencies in Irrigation for the State of California* Water Management Research Laboratory, UC Davis, June 2013. Available at https://www.dropbox.com/s/jqbc1j92c4ckuln/Application%20Efficiencies%20-%20UCDavis%20-%20Sandoval%20Solis%20et%20al%202013%20-%20Report.pdf.

Increase irrigation efficiency. Flood and furrow remain the predominant irrigation methods, accounting for 43% of all irrigated acres.[14] However, adoption of drip and micro-irrigation systems has been spreading rapidly, accounting for 39% of irrigated acres. This shift can be attributed partly to federal assistance mechanisms – farmers can benefit from a 50% discount on drip irrigation systems – and partly to the higher efficiency of new irrigation systems. Using these systems can result in increases in efficiency of applied water, from 10% to 20% or more.[15,16] But the impacts on local groundwater basins must be carefully evaluated before implementing high-efficiency irrigation systems, as they can have detrimental impacts on groundwater recharge and result in greater overall water use.[17]

Employ soil management and crop selection. The Pacific Institute identifies irrigation technology, irrigation scheduling and regulated deficit irrigation for specific crops as the main water-saving practices in agriculture.[18] However, soil management techniques such as mulching, rotational grazing, cover crops integration, and conservation tillage[19,20] not only provide significant water savings due to reduced evaporation, they also sequester and store carbon in the soil. Selecting water-efficient crops in arid regions over water-intensive ones is also important as evapotranspiration rates increase due to climate change.

Upgrade agricultural water district infrastructure. To boost water savings, capital investments need to be directed towards upgrading the infrastructure of agricultural water districts. In a district like the Oakdale Irrigation District, in which annual water losses amount to 100,000 acre-feet per year (afy), with 45-55% of these coming from on-farm losses, reducing water spills by 75% could save 15,000 afy of water.[21]

Shift land uses. Another way to increase water efficiency in agriculture would be reclaiming and retiring degraded lands on the western side of the San Joaquin Valley to repurpose them for more sustainable uses. Partial or complete fallowing of degraded fields holds a high potential for water conservation. A comprehensive study in 1990 projected a total of 1,000,000 drainage impaired acres of land on the western side of the San Joaquin Valley by 2000.[22] Drainage impaired land has been going out of production. Westlands Water District reported 89,000 acres of retired land in 2006.[23] The Department of Land Conservation's most recent report found a further net reduction of 276,000 irrigated acres of land in the San Joaquin Valley between 2006 and 2012.[24] A consortium of entities could consider buying more drainage-impaired acres of land – and associated water rights. Given its location, adjacent to major interties to the state electrical grid, the land could be used for the development of solar farms.

Assess and manage water transfers. Further legislative efforts should be made to establish and enforce rules and regulations aimed at assessing the environmental and economic impacts of water transfers. Transfers of water from one agricultural district to another (for example from Sacramento Valley to San Joaquin Valley) particularly deserve scrutiny during drought periods, while transfers from agricultural districts to urban agencies should be consistent with regional plans.

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14. Renee Johnson and Betsy Cody, *California Agricultural Production and Irrigated Water Use*, Congressional Research Service, June 30, 2015. Available at https://fas.org/sgp/crs/misc/R44093.pdf.

15. Samuel Sandoval-Solis, Ph.D., et. al. Op. cit.

16. United States Environmental Protection Agency, *Water Efficiency Management Guide Landscaping and Irrigation*, November 2017. Available at https://www.epa.gov/sites/production/files/2017-12/documents/ws-commercialbuildings-waterscore-irrigation-landscape-guide.pdf.

17. https://www.greenbuildermedia.com/hubfs/Documents/Irrigation_Study.pdf.

18. Heather Cooley et. al., *Agricultural Water Conservation and Efficiency Potential in California*, Pacific Institute and Natural Resources Defense Council, June 2014. Available at https://www.nrdc.org/sites/default/files/ca-water-supply-solutions-ag-efficiency-IB.pdf.

19. Jeffrey P. Mitchell et. al., "No-tillage and high-residue practices reduce soil water evaporation," *California Agriculture* 66(2):55-61. Available at https://doi.org/10.3733/ca.v066n02p55.

20. D.G. Sullivan et. al., "Potential impact of conservation tillage on conserving water resources in Georgia," *Journal of Soil and Water Conservation*, May/June 2007 vol. 62 no. 3 145-152. Available at http://www.jswconline.org/content/62/3/145.abstract.

21. Deanna Wulff, "California's Choices: Two Big Expensive Tunnels or Just Better Water Management," *Bilingual Weekly*, March 6, 2012. Available at https://bilingualweekly.wordpress.com/2012/03/06/californias-choices-two-big-expensive-tunnels-or-just-better-water-management.

22. *A Management Plan for Agricultural Subsurface Drainage and Related Problems on the Westside San Joaquin Valley : Final Report of the San Joaquin Valley Drainage Program*. U.S. Department of the Interior and California Natural Resources Agency, 1990. Available at https://archive.org/details/managementplanfo-00sac.

23. Tom Birmingham, Testimony before the House Committee on Natural Resources, Subcommittee on Water and Power, September 21, 2006.

24. California Department of Conservation, Division of Land Resource Protection, *California Farmland Conversion Report*, 2015, p. 24. Available at https://www.conservation.ca.gov/dlrp/fmmp/Documents/fmmp/pubs/2010-2012/FCR/FCR%202015_complete.pdf.

Urban Water Conservation

The least expensive, least energy-intensive, and most environmentally prudent way to meet California's future urban water needs is through conservation and public education. With existing technology as well as new landscaping, plumbing, metering, and green building ordinances, the potential for water savings in urban areas has increased over the years. The Pacific Institute states that with current technology only, California has the means to save between 2.9 and 5.2 million afy through urban conservation.[25] And at least 85% of these savings would be cheaper than tapping into new sources of supply.[26]

Limit landscaping water use. On average, outdoor water use accounts for about half of the water consumed in urban areas in the state.[27] In areas such as Los Angeles, that amount increases to around 70%. Since most water use occurs outdoors, the potential for greater water conservation must happen there. Water agencies should promote the use of soil-moisture based irrigation systems as well as regionally appropriate native plants. In July 2015, California's governor signed The Model Efficient Landscape Ordinance (MWELO) into law to reduce water use for new landscaping projects with more than 500 square feet of irrigated area, as well as landscape renovations greater than 2,500 square feet. Implementation of the new laws have been left to county and local government agencies and enforcement varies throughout the state. The legislature should revisit the existing program and determine if changes are required to ensure it applies to all areas of the state and it reaches the maximum water savings.

Capture rainwater. Rainwater capture reduces the reliance on potable water for landscaping needs and provides a recharge benefit to underlying groundwater aquifers. While legislation has made it easier and more cost effective to increase rainwater capture,[28] more needs to be done to encourage and help homeowners install rainwater capture systems. Collecting the first quarter inch of rain from a 1,000 square foot roof can produce as many as 150 gallons. If all of the approximately 3.5 million housing units in Los Angeles were to install just one single rain barrel, the city could save approximately 590 afy of water.

Reuse greywater. Greywater is primarily the byproduct of household water used for washing. This includes water from sinks, showers, bathtubs, and washing machines. With a greywater system, homeowners could reuse up to 80% of this water to irrigate plants and trees within their property, saving up to 50,000 gallons a year.[29] While the permitting process for greywater has been streamlined, interpretation of the codes is often left to individual inspectors. Continued education and resources could lead to greater implementation and water savings.

Fix aging infrastructure. A 2011 report from the California Public Utilities Commission estimated that 10% of all urban water deliveries are lost to leaks every year.[30] Pipes that deliver drinking water are rusting, clogging, and cracking, and reservoirs are losing storage capacity. Our nation's water systems lose almost 7 million afy of treated water due to problems such as leaking pipes.[31] In Los Angeles alone, water officials estimate that almost 25 thousand afy of water is lost to leaky pipes, firefighting, evaporation, theft and other unaccounted losses.[32] Irrespective of any other plans to gather or deliver water, repairs of our aging water infrastructure will need to be completed if California plans to meet its responsibility to provide safe, clean water to all its citizens, and ensure the human right to water.

25. Matthew Heberger et. al., *Urban Water Conservation and Efficiency Potential in California*, Pacific Institute, June 2014, p. 2. Available at https://pacinst.org/wp-content/uploads/2014/06/ca-water-urban.pdf.

26. Peter Gleick, et. al., *Waste Not Want Not*, Pacific Institute, November 2003. Available at https://pacinst.org/reports/urban_usage/waste_not_want_not_full_report.pdf.

27. Ibid.

28. In 2012, the Rainwater Recapture Act allowed residential users, and other private and public entities, to capture and use rainwater harvested from rooftops. In 2018, California Proposition 72 allowed Rainwater Capture systems to be added to the value of the home yet be excluded from property tax assessments.

29. Lucy Allen, Juliet Christian-Smith, and Meena Palaniappan, *Overview of Greywater Reuse: The Potential of Greywater Systems to Aid Sustainable Water Management*, The Pacific Institute, November 2010. Available at http://www.pacinst.org/wp-content/uploads/sites/21/2013/02/greywater_overview3.pdf.

30. Cited by Paul Rogers in "California drought: Leaky water pipes losing billions of gallons targeted by new state law," *San Jose Mercury News*, October 9, 2015.

31. American Society of Civil Engineers, 2017 *Infrastructure Report Card*. Available at https://www.infrastructurereportcard.org/cat-item/drinking_water.

32. Ben Poston and Matt Steven, "L.A.'s aging water pipes; a $1-billion dilemma," *Los Angeles Times*, February 6, 2015. Available at http://graphics.latimes.com/la-aging-water-infrastructure.

Desalinate brackish groundwater. The opportunities are great for providing water supply from brackish groundwater desalination as well as recovering contaminated groundwater. Brackish water desalination can be used to help relieve drought conditions, replace water lost from other sources, and replace water that can be used for river and stream ecosystem restoration. Although most estimate that brackish groundwater desalination will contribute less than 10% of the total water supply needs in California, this still represents a significant portion of the state's water supply portfolio. Currently, there are 24 inland brackish water desalination plants in California and an additional 17 in the planning stages.[33] Additional focus should be placed on brackish water desalination as it is generally cheaper and much less energy intensive than ocean water desalination.

Water Reuse

Water reclamation and reuse have long been an essential but underutilized part of California's water policy, and the State should continue to expand its efforts to reuse municipal wastewater to meet the demand for water supply.

The 2019 proposed amendment to the State's Recycled Water Policy aims to "increase the use of recycled water...to 1.5 million afy by 2020 and to 2.5 million afy by 2030."[34] In 2015 the amount of recycled water used in the state was 714,000 afy, up from roughly 500,000 afy in 2013. This increase is significant but still well below the reuse potential.

Southern California is home to the state's more prominent reuse initiatives, but there are significant opportunities for advancement in the region. Orange County's Groundwater Replenishment System (OCGRS) is one of the largest purification systems for indirect potable reuse in the world and produced 100,363 afy of indirect potable water in 2017.[35] Sanitation Districts of Los Angeles County (SDLAC) has 11 facilities that recycle water, and during the 2015-2016 fiscal year, SDLAC reused 100,698 afy, or roughly 67.3% of the recycled water they produced.[36] Additionally, the Inland Empire and San Diego County utilize various programs to introduce recycled water into their water supplies. However, these programs often aren't using all of the reclaimed water they produce and are also recycling water at a rate well below their maximum capacity. By investing in the infrastructure to maximize the amount of recycled water generated and reused we can increase the water supply significantly. At SDLAC alone, maximizing recycled and reuse capacities would increase the water supply by close to 130,000 afy[37], based on 2015-2016 fiscal year levels. Furthermore, by directing funding to expand reuse programs across the state, we can ensure that local regions are protecting themselves against changes to our water supply and consumer demand and reduce the need to rely on imported water from the San Francisco Bay Delta without a tunnel system.

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33. Heather Cooley and Rapichan Phurisamban, *The Cost of Alternative Water Supply Efficiency Options*, Pacific Institute, October 13, 2016. Available at https://pacinst.org/publication/cost-alternative-water-supply-efficiency-options-california.

34. State Water Resources Control Board, *Water Quality Control Policy for Recycled Water*, 2018. Available at https://www.waterboards.ca.gov/water_issues/programs/water_recycling_policy/docs/2018/121118_7_final_amendment.pdf.

35. Orange County Water District, *Groundwater Replenishment System, 2017 Annual Report*. Available at https://www.ocwd.com/media/6822/2017-gwrs-annual-report.pdf.

36. Sanitation Districts of Los Angeles County, *27th Annual Status Report on Recycled Water Use*, 2015-16. Available at https://lacsd.org/civicax/filebank/blobdload.aspx?blobid=14586.

37. Calculation: 149,719 afy of recycled water produced by SDLAC in 15-16FY equaled 53.3% of recycled water capacity. 149,719/.533 = 280,898.687 (maximum capacity) difference between the two is 131,179 afy.

Managing Groundwater Sustainably

As noted in the *Delta Plan*, more than 40% of Californians rely on groundwater for part of their water supply, and many small- to moderate-size towns and cities are entirely dependent on groundwater for their drinking water systems. The state's most significant groundwater use occurs in regions that also rely on water from the Delta watershed, including the San Joaquin Valley, Tulare Lake, Sacramento Valley, Central Coast, and South Coast. The Tulare Lake region alone, in the southern San Joaquin Valley, accounts for more than one-third of the state's total groundwater pumping, according to the Department of Water Resources.[38]

Because of historical groundwater overdraft and resulting land subsidence experienced in these regions, water users switched to using surface water when the Central Valley Project and the State Water Project were completed in the late 1960s. However, groundwater pumping and overdraft became more severe as water demands exceeded available supplies. Satellite imaging published by Jay Famiglietti, of the University of California Center for Hydrologic Modeling, and others reveals that the Central Valley lost approximately 25 million acre-feet of stored groundwater during the period of October 2003 to March 2010.[39]

California was one of the last states in the nation to regulate groundwater. Governor Jerry Brown signed major new groundwater management legislation, the Sustainable Groundwater Management Act (SGMA) in September 2014. For the first time in its history, California has a framework for sustainable, groundwater management - "management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results." SGMA empowers local agencies to form Groundwater Sustainability Agencies (GSAs) to manage basins sustainably and requires those GSAs to adopt Groundwater Sustainability Plans for crucial groundwater basins in California.

SGMA requires governments and water agencies of high and medium priority basins to halt overdraft and bring groundwater basins into balanced levels of pumping and recharge. However, the timelines for reaching this new sustainability stretch very far into the future. Under SGMA, the most overdrafted basins should reach sustainability within 20 years of implementing their sustainability plans. For critically overdrafted basins, that will be 2040. For the remaining high and medium priority basins, 2042 is the deadline. The amount of groundwater that is at risk, and could be used more efficiently, is huge. Although the Bay Delta is a major source of water supply for California (approximately five million afy), the Bay Delta supply is less than the amount of groundwater that is pumped by farmers (approximately eight million afy). The State Water Board estimates that more than 30% of California's water for agriculture and urban use is pulled from the ground and reliance on groundwater increases to 40% during dry years when surface water supplies shrink.

We have a crisis building in the state. Groundwater reserves that could be a critically needed resource in times of drought for both farms and urban customers are shrinking. DWR reports that groundwater is being depleted at a rate of 2 million afy,[40] though some estimates taking a shorter time period (October 2003 through March 2009) into account put the depletion rate much higher, as high as 4.4 million afy.[41] The problem is especially critical in the San Joaquin Valley. It is estimated that groundwater reserves are shrinking by 2.5 million afy in the Central Valley. "That is enough water to supply the needs of nearly 22 million people each year," Famiglietti told the Modesto Bee in November 2013.[42] "People need to truly understand groundwater is disappearing…Without intervening, that water is not coming back."

38. Delta Stewardship Council, *Delta Plan*, adopted May, 2013. Available at http://deltacouncil.ca.gov/delta-plan-0.

39. J.S. Famiglietti et al, "Satellites Measure Recent Rates of Groundwater Depletion in California's Central Valley", Geophysical Research Letters, February 2011. Available at https://www.researchgate.net/publication/237998500_Satellites_Measure_Recent_Rates_of_Groundwater_Depletion_in_California%27s_Central_Valley.

40. California Department of Water Resources, *California Water Plan Update 2013*, available at https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/California-Water-Plan/Water-Plan-Updates/Files/Update-2013/Water-Plan-Update-2013-Volume-1.pdf.

41. Peter Gleick, *Stealing Water from the Future – California's Massive Groundwater Overdraft Newly Revealed*, Circle of Blue Water News, December 16, 2009, available at https://www.circleofblue.org/2009/world/peter-gleick-stealing-water-from-the-future-californias-massive-groundwater-overdraft-newly-revealed.

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One of the predictions about climate change is that California will get more rain overall, but this rain will be less evenly distributed over time.[43] More intense storms and big rainfall years, and longer and more severe droughts. We're already beginning to see this change - one of the worst California droughts and its four biggest rainfall years post-1900 have all occurred since 1980.[44] Our water management and water use will have to change in response. A key change will be the restoration of our groundwater reserves, which are the largest reservoirs by far in California, provide crucial supplies in drought, and are a day-to-day water source for many, especially in disadvantaged Central Valley communities. To do this, we must accelerate the implementation of SGMA and aim for an increase in the current levels of groundwater, not just the avoidance of undesirable results compared against a degraded baseline. Once our groundwater basins are managed so that no single individual or corporation is able to exploit them, we can ramp up efforts to restore our groundwater with the water from big rainfall years that climate change will bring.

Conclusion

The cost-benefit analysis for the Delta tunnel project assumes continued high levels of exports, for either one and two tunnels.[45,46] The fact is that the enormous WaterFix project doesn't "pencil out" unless water contractors can use it to take more water. But the Delta desperately needs more fresh water flows, not continuing or even increased diversions of water to feed unsustainable uses in the San Joaquin Valley and Southern California. The Delta ecosystem is already collapsing, as demonstrated by the failure of the California Department of Fish and Wildlife's Fall 2018 Fish Survey to find even one Delta Smelt, once the most abundant fish species in the Delta and considered an indicator species of the Delta's ecological health.[47]

The Delta, which is the largest estuary on North America's west coast, is recognized as a wetland of international importance, vital to the survival of migratory shorebirds and waterfowl.[48] We should not continue to pursue outdated water policies that will reduce the Delta to an industrial water conveyance system supporting no fish or bird life when we have the option of implementing 21st century water solutions that will provide California with the water it needs while protecting one of the world's most vital and beautiful estuaries.

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