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BEFORE THE

STATE WATER RESOURCES CONTROL BOARD

ADMINISTRATIVE HEARINGS OFFICE

Hearing in the Matter of California Department of Water Resources' Petitions for Change of Water Right Permits 16478, 16479, 16481, and 16482 (Applications 5630, 14443, 14445A, and 17512, respectively)	**TESTIMONY OF MARK BUCKLEY, Ph.D.** **Submitted 11 July 2025** [**CWIN-004**]

TESTIMONY OF MARK BUCKLEY, Ph.D

Testimony Begins with Table of Contents on the Next Page

Table of Contents

INTRODUCTION

A. Qualifications

1. My name is Mark Buckley. I hold a B.A. in economics from Davidson College and a Ph.D. in environmental studies from the University of California, Santa Cruz, with a focus in economics. I am currently a partner, project director, and senior economist at ECONorthwest, a West coast-based economic consulting firm. In these roles I have played a leadership role in the firm's natural resource and environment practice area, designing and managing economic analyses typically involving water resources and land management. Most of my work involves designing and leading benefit-cost analyses for federal, state, and local government agencies managing public natural resources. In these contexts, my role is to provide economic analysis and information necessary to make decisions regarding resource management and the expenditure of funds. I focus on decision-making and context-specific scarcities. I have served as an adjunct economics professor at Portland State University for undergraduate and graduate level environmental economics and published research involving economic analysis of natural resources issues in peer- reviewed journals and edited volumes.

2. In addition to my public policy research, I have also served as an expert economist in litigation and administrative proceedings involving natural resources, the calculation of the value of damages, and the calculation of economic benefits gained by defendants as a result of noncompliance with law. A key topic has been deterrence. This includes the preparation of expert reports and testimony applying economics and finance to Clean Water Act penalty determinations for the U.S. Department of Justice ("USDOJ") and the U.S. Environmental Protection Agency ("USEPA"). I joined ECONorthwest in February 2008.

3. I do considerable work on the benefits and costs as well as financing and funding strategies for water resource investments including municipal and agricultural water supply, municipal wastewater and stormwater, watershed management, and groundwater. This work often

involves consideration of affordability to households as well as other users and customers. I have worked directly for USEPA on application and development of water affordability metrics and calculators, including state and municipal level analyses. I also provide economic analysis support on water resource management for large municipalities including conducting affordability analyses to ratepayers. I have done this work for San Diego County, the city of San Diego, Orange County, King County (WA), and elsewhere.

4. In my professional work applying economic methods to litigation and non-litigation policy and decision analysis, I focus on analyzing specific tradeoffs and providing a comprehensive consideration of benefits and costs facing decision-makers, including both market and non-market effects. This generally involves applying the best available data, including engineering, biophysical, and financial, and accounting for differences in timing, risk and uncertainty, and distribution of outcomes. I have been chosen to lead many benefit-cost, economic impact and financial analyses informing decisions involving public investment of hundreds of millions to billions of dollars for water and land-related proposals. Clients include USEPA, USDOJ, the U.S. Forest Service ("USFS"), the Bureau of Land Management ("BLM"), the Bureau of Reclamation, the National Oceanic and Atmospheric Administration ("NOAA"), the U.S. Department of the Interior ("DOI") headquarters, the U.S. Department of Agriculture ("USDA") headquarters, and numerous state and local resource management agencies.

5. I also provide economic analysis support and expert witness support for tribes on water supply, water quality, and land management issues. This includes tribes in California, Washington, and Oregon.

6. My professional and academic qualifications are described in my curriculum vitae, which is submitted as CWIN-2.

B. Background

6. This testimony regards economic considerations associated with the Delta Conveyance Project (DCP) under administrative review. It involves review of materials associated with the DCP as presented by the California Department of Water Resources (DWR) of economic relevance. My team reviewed documents DWR has produced as part of the DCP planning process (the DCP Record). ECO's review focuses on three key documents: the Petition for Change in Point of Diversion, the Benefit-Cost Analysis of the Delta Conveyance Project (BCA) prepared by the Berkeley Research Group, and the Final Environmental Impact Report for the Delta Conveyance Project (FEIR) developed pursuant to the California Environmental Quality Act (CEQA). Together, these documents establish the chief analytical and policy foundation upon which DWR is advancing the DCP. Other documents reviewed are noted below and in ECOnorthwest's detailed accompanying technical report, *Review and Assessment of Economic Issues Related to the Delta Conveyance Project* (CWIN-018)("Technical Report"). Review of these documents focuses on DWR's assumptions, methodologies, and conclusions that influence the economic benefits, costs, impacts, and distribution of effects of the DCP. It also considers how DWR's framing of the DCP in the FEIR, including a purpose and need that narrowly defines the problem and potential solutions, lead to gaps in understanding and critical omissions in economic outcomes relevant to California's water users and populations.

C. Assignment

7. California Water Impact Network ("CWIN") has asked me to evaluate key economic considerations associated with the DCP. This includes the costs of the DCP, the efficiency of the DCP in terms of water supply benefits relative to the costs of the DCP, and the affordability of water supply associated with the DCP to households, businesses and institutions. We have produced a technical report summarizing our findings from this review

and evaluation of relevant materials associated with the DCP and economic dimensions. I provide a summary of my opinions in this report. CWIN is concurrently submitting the full Technical Report as CWIN-018.

8. Under my direction, staff at ECONorthwest assisted with the preparation of this report.

ANALYSIS

9. I have organized my evaluation in eight primary critiques that DWR must address to answer critical questions about whether the DCP provides the most economically efficient and equitable pathway to water resiliency for California's populations and ecosystems, and whether the State of California is adequately acting in the public interest and protecting the public trust if it builds and operates the DCP. When considered together, the critiques reveal a cumulative pattern of overly optimistic assumptions and omitted costs that significantly distort the DCP's economic feasibility and public benefit. While each assumption individually may appear plausible under certain conditions, the combined effect is to systematically inflate benefits, underestimate actual costs, discount the importance of opportunity costs and non-market costs, and ignore distributional impacts to vulnerable Californians. This creates an inaccurately favorable picture of the DCP's value to Californians and is not a defensible or credible basis for decision-making on economic grounds.

10. **Critique 1: DWR underestimates probable construction costs of the DCP, providing inadequate support to justify the DCP on economic and public interest grounds.** In 2024, Delta Conveyance Design and Construction Authority ("DCA") estimated that the DCP would cost approximately $20 billion (undiscounted 2023 dollars) to construct and $53 million (undiscounted 2023 dollars) annually to operate and maintain over its lifetime DWR's current estimate of $20 billion almost certainly underestimates how much the DCP will ultimately cost the state and ratepayers. Taking into consideration the long history of significant cost overruns for public works megaprojects of this kind as well as financing costs

and inflation the total project cost that ratepayers would be responsible for is likely in the range of at least 3-5 times higher than DWR currently estimates (approximately $60 to $100 billion or more). While DWR's estimate of $20 billion includes contingency, DWR itself acknowledges that as a class 4 estimate, it carries considerable uncertainty with more risk that the estimate is an underestimate than an overestimate. Critically, DWR's estimate does not account for capitalized interest, bond issuance costs, inflation, legal and land acquisition risks, and soft costs such as administrative overhead and project management inefficiencies. Tunneling projects and linear projects of similar scope and complexity have historically carried some of the highest risk for significant delays and cost overruns arising from geotechnical issues and legal hurdles.

11. DWR's estimate suffers from optimism bias and strategic misrepresentation—well-documented phenomena in public investment analysis—raising serious concerns about allocative efficiency, equity, and the fiscal sustainability of the project. While $20 billion may be a sufficient placeholder for costs in a planning exercise, it is not an adequate estimate for decision makers to transparently evaluate downside risk and potential opportunity costs of the DCP, especially compared to other strategies available to address water supply reliability. It is entirely insufficient for understanding cost liabilities for ratepayers, including equity and distributional issues for communities in Southern California already facing unaffordable costs for utilities (See Critiques 2, 3, and 4).

12. **Critique 2: DWR does not credibly assess opportunity costs of the DCP and it has ignored other costs salient to operating the DCP.** The DCP Record overlooks a broad range of potentially more cost-effective and resilient water supply alternatives. By failing to rigorously assess non-conveyance solutions and localized investments as an alternative strategy to the DCP, DWR has effectively excluded serious evaluation of the opportunity costs associated with pursuing the DCP. This omission undermines the ability to compare the DCP

against alternatives such as conservation, reuse, and stormwater capture—all of which may deliver more flexible, scalable, and affordable benefits on a shorter timeline. In particular, the DCP Record fails to account for critical localized storage capacity infrastructure needs that would be essential for effective use of DCP water, especially during dry years—it claims benefits for water that would need to be captured in dry years and stored, while omitting the cost of additional storage capacity to ratepayers and the external costs to society of such investments.

13. Evidence from local agencies like Zone 7 Water District shows that the DCP is not cost-effective or reliable when considered on its own but finds that it only becomes viable when bundled with costly local investments or under extreme future demand scenarios. In contrast, portfolios that exclude the DCP but incorporate reservoir expansion, potable reuse, and water transfers achieve the same reliability targets at lower cost. Likewise, the cost of water conservation, often the most cost-effective water supply option, further highlights the inefficiency of DCP participation.

14. Moreover, scalable alternatives such as the Pure Water Southern California recycling project, stormwater capture and conservation demonstrate that California has multiple paths to resilience that cost far less than the DCP's projected and likely understated, total cost. ***Investing in these alternatives not only improves affordability and climate adaptability but also avoids the lock-in effects of committing to a megaproject with high financial, operational, and ecological risks. For many agencies, the opportunity cost of pursuing the DCP may be the loss of more sustainable, justifiable and affordable local solutions.***

15. **Critique 3: The DCP Record overestimates municipal water demand forecasts, thereby overestimating the stated benefits of the DCP.** DWR's economic analysis of the DCP uses demographic scenarios characterized by high demand, constrained imports, and robust

economic and demographic growth—in selecting this single-point scenario, DWR anchors its analysis to an outlier assumption that is both demographically and economically tenuous. Current state-level projections forecast only modest population increases (6.2% statewide by 2050) and even negative growth in key service areas such as Los Angeles County. These figures are inconsistent with the demographic surge assumed in DWR's selected scenario and undermine the plausibility of projected urban demand growth.

16. Furthermore, the analysis fails to incorporate newer, more stringent conservation regulations under California's AB 1668 and SB 606, which are expected to materially reduce per capita water use through mid-century. A critical review of Urban Water Management Plans reveals that they systematically overestimate both population and per capita demand, largely ignoring forthcoming regulatory constraints. Empirical analysis shows that achieving compliance with the new standards would require significant demand reductions—up to 73% in some cases—relative to current UWMP projections. This suggests that DWR's economic analysis of the DCP substantially overstates the future shortfall in urban water supplies, thus inflating the DCP's purported reliability benefits. A more defensible approach would have incorporated a scenario which aligns more closely with emerging demographic trends and regulatory realities.

17. **Critique 4: The DCP Record fails to analyze the impact of the DCP on ratepayers and water affordability in Southern California.** DWR's failure to evaluate the affordability impacts of the DCP on ratepayers constitutes a significant departure from both regulatory guidance and best practices in public sector economic analysis. California's Water Code §106.3 explicitly recognizes access to affordable water as a human right, while the State Water Resources Control Board (SWRCB) has developed formal affordability thresholds—such as limiting household water expenditures to under 1.5 percent of income—to guide infrastructure decision-making. Similarly, the California Public Utilities Commission (CPUC) and federal

guidance under OMB Circular A-94 underscore the imperative to assess the distribution of costs and benefits across income groups. In this context, DWR's omission of affordability analysis is not merely an analytical gap, but a policy misalignment that undermines statutory and administrative mandates for equitable investment.

18. The evidence strongly reinforces that the DCP carries substantial risk of exacerbating affordability concerns for water users in Southern California. Ratepayer obligations associated with the DCP could reach up to $1.3 billion annually for a single agency such as the Metropolitan Water District (MWD), with no guarantee that the project would deliver water (but payments would be required regardless). These fixed costs would cascade down to end-users—particularly customers of agencies like LADWP and the San Diego County Water Authority—adding to already rising household utility bills. Empirical assessments estimate annual per-customer increases ranging from $30 to $204, even as monthly bills in some areas already exceed affordability benchmarks. For instance, 13.7 percent of low-income San Diego households and 20.4 percent in Los Angeles currently pay well above SWRCB's affordability threshold, even before DCP-related costs are incorporated. These burdens are most acute in census tracts with concentrated poverty, where structural cost-of-living pressures already limit discretionary spending. With no statewide rate assistance program in place and constitutional limits on local redistributive pricing, DCP-related cost escalations threaten to exacerbate affordability crises for the most economically vulnerable.

19. The affordability issue is made even more concerning when uncertainty about total DCP costs and cost sharing agreements are taken into consideration alongside uncertainty about increasing operating costs to maintain other aging infrastructure and changing demographics that may result in fewer households than expected to share rising costs (see Critique 3).

20. **Critique 5: The DCP Record evaluates the seismic benefits of the DCP based on a single representative seismic scenario thereby potentially overestimating the benefits of the DCP.** The seismic reliability benefits of the DCP, as represented in DWR's benefit cost analysis, are severely undermined by a narrow, underdeveloped analytical framework that falls short of professional standards for infrastructure risk assessment. By modeling only a single 500-year seismic event and relying on a single, cost-optimized recovery strategy, the benefit-cost analysis fails to capture the probabilistic range of seismic risks or alternative emergency responses. DWR's omission of multiple scenarios, localized seismic investments by agencies like MWD, and transparent economic valuation methods significantly weakens the credibility of the reported $969 million in seismic benefits—just 2.5% of total benefits and only 5.6% of project costs. This analytical opacity is particularly problematic given that seismic resilience is presented as a core justification for the DCP. A rigorous economic appraisal would require scenario-based modeling, sensitivity testing, and integration of regional investments to accurately assess marginal benefits. Without these components, the current evaluation likely overstates the DCP's seismic value proposition and does not justify the significant capital costs on resilience grounds alone.

21. **Critique 6: The market price of water used to estimate the value of increased water supply claimed from the DCP is based on prices in drought years and is thus an overestimate of the value of water.** The econonomic analysis underpinning the DCP relies on a flawed valuation of agricultural water benefits by including in its calculation of the value water prices from the Nasdaq-Veles California Water Index (NQH2O) during a period dominated by severe drought—conditions that elevate willingness-to-pay and artificially inflate average market prices. By including this value in the rage of values used to calculate an average per-acre foot value of water, DWR's economic analysis likely overstates marginal benefits of water the DCP would deliver to agricultural users.

22. **Critique 7: The DCP Record focuses on the private cost of farmland conversion and does not include costs incurred by society related to farmland conversion including to agricultural communities thereby underestimating the true cost of the DCP.** The DCP is expected to temporarily or permanently convert over 4,400 acres of farmland, yet the DCP Record values these losses only through market land and rental prices—capturing private landowner impacts while ignoring broader societal costs. This approach underestimates the true value of farmland by excluding the lost economic output from high-value crops like wine grapes and tomatoes, and by failing to account for ripple effects on local agricultural supply chains, jobs, and agricultural community resilience. A more comprehensive valuation that considers lost agricultural productivity and acknowledges secondary economic impacts would reveal significantly greater costs than currently acknowledged in the DCP Record.

23. **Critique 8: The DCP Record fails to incorporate potential adverse impacts to critically endangered salmon runs in the Sacramento River and other potential adverse impacts to ecosystems.** DWR's econonomic evaluation of the DCP understates the costs of the project due to an inadequate treatment of ecological and environmental externalities—particularly the potential catastrophic impacts on Sacramento River Chinook salmon populations. The assumption of "no significant effect" on these populations, despite their precarious status, reflects a deterministic approach that ignores well-established principles of risk and uncertainty in ecological economics. A probabilistic framework incorporating the social cost of species extirpation would yield a more accurate representation of expected losses. These additional losses could amount to $1.1 to $2.6 billion (discounted 2024 dollars). Additionally, DWR's economic analysis fails to monetize other critical non-market values such as cultural, recreational, and aesthetic losses. The reliance on $1.6 billion in mitigation and community benefit programs, without explicit valuation or outcome guarantees, represents a policy gamble rather than a defensible economic strategy. Overall, DWR's approach to externalities

is inconsistent with principles of economic analysis and the state of California's responsibilities to protect public trust resources.

EVIDENCE

24. The evidence and documentation supporting the eight critiques summarized above is thoroughly delineated in the Technical Report. In addition to other authorities cited therein, this report relies upon the following CWIN exhibits:

Number	Title
CWIN-007	Bent Flyvbjerg and Dan Gardner. Why do large projects go over budget?. (June 19, 2023). Accessed June 26, 2025 at https://www.strategy-business.com/article/Why-do-large-projects-go-over-budget
CWIN-008	Bent Flyvbjerg, 2014, "What You Should Know about Megaprojects and Why: An Overview," *Project Management Journal*, vol. 45, no. 2, April-May, pp. 6-19, DOI: 10.1002/pmj.21409
CWIN-009	California Department of Water Resources. *Delta Conveyance Program Revenue Bond: General Bond Resolution (No. DWR-DPRB-1).* Sacramento, CA: California Superior Court, January 6, 2025 (Pending litigation)
CWIN-010	California State Auditor, Department of Water Resources: The Unexpected Complexity of the California WaterFix Project Has Resulted in Significant Cost Increases and Delays, Report 2016-132 (October 2017), accessed on July 9, 2025, https://information.auditor.ca.gov/pdfs/reports/2016-132.pdf
CWIN-011	Hazen and Sawyer. (2023). "Zone 7 2022 Water Supply Evaluation Update," Accessed at https://www.zone7water.com/sites/main/files/file-attachments/draft_zone_7_2022_wse_update_2023.03.pdf?1685462831
CWIN-012	Shimabuku, Morgan, Curtis, Christine, and Heather Cooley. *The Potential for Water Efficiency to Support Affordability in the United States*. Oakland, CA: Pacific Institute, October 2024. Accessed July 10, 2025. https://pacinst.org/the-potential-for-water-efficiency-to-support-affordability-in-the-united-states/.]
CWIN-013	Cooley, Heather and Rapichan Phurisamban. (2016). The Cost of Alternative Water Supply and Efficiency Options in California. Accessed at https://pacinst.org/wp-content/uploads/2016/10/PI_TheCostofAlternativeWaterSupplyEfficiencyOptionsinCA.pdf
CWIN-014	Cooley et al., (2022) The Untapped Potential of California's Urban Water Supply: Water Efficiency, Water Reuse, and Stormwater Capture. Accessed at https://pacinst.org/publication/california-urban-water-supply-potential-2022/
CWIN-015	Aaron Hrozencik and Marcel Aillery. "Trends in U.S. Irrigated Agriculture: Increasing Resilience Under Water Supply Scarcity." December 2021. *United States Department of Agriculture - Economic Research Service.*

CWIN-016	Metropolitan Water District of Southern California, *2020 Integrated Water Resources Plan (IRP) – Regional Needs Assessment*, adopted April 12, 2022, https://www.mwdh2o.com/.
CWIN-017	Abraham, Sonali, Sarah Diringer, and Heather Cooley. *An Assessment of Urban Water Demand Forecasts in California*. Oakland, CA: Pacific Institute, August 2020, Page 8, https://pacinst.org/wp-content/uploads/2020/08/Pacific-Institute-Assessment-Urban-Water-Demand-Forecasts-in-CA-Aug-2020.pdf.
CWIN-020	Metropolitan Water District of Southern California. (2020). *Seismic Resilience Report: 2020 Update*. Available at https://d1q0afiq12ywwq.cloudfront.net/media/20396/seismic-resilience-report-2020-update.pdf.
CWIN-021	Open
CWIN-022	Maven's Notebook. "California Aqueduct Repairs: Billions Needed to Fix Subsidence." *Maven's Notebook*, July 2, 2025. Accessed April 3, 2025. https://mavensnotebook.com/2025/07/02/california-aqueduct-repairs-billions-needed-to-fix-subsidence
CWIN - 023	Metropolitan Water District of Southern California, *Special Subcommittee on Imported Water: Delta Conveyance Project Funding Agreement & Other Updates*, June 23, 2025, accessed Jul 9, 2025, https://mwdh2o.legistar.com/View.ashx?M=F&ID=14313229&GUID=898917A4-72DD-4D30-9811-BEC46775A720
CWIN-024	California Water Impact Network, *The Unaffordable and Destructive Twin Tunnels: Why the Santa Barbara Experience Matters* (November 2017), Page 24
CWIN-100	Testimony of Max Gomberg

CONCLUSION

25. **When considered together, the critiques outlined in this assessment reveal a cumulative pattern of overly optimistic assumptions and omitted costs that significantly distort the DCP's feasibility and economic justification.** While each assumption individually may appear plausible under certain conditions, the combined effect is to systematically inflate benefits, underestimate actual costs, ignore opportunity costs and non-monetary costs, and

ignore distributional impacts to vulnerable Californians. This creates an inaccurately favorable picture of the DCP's value to Californians and is not a defensible or credible basis for decision-making on economic grounds. It provides an inaccurate basis for analyzing the likelihood that the DCP contributes to the public interest and protects the public trust.

Respectfully Submitted,

Mark Buckley, PhD