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Comments on the 2nd Revised Draft EIR

for the Cachuma Water Rights Hearing

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Introduction

In 2003, the Pacific Institute provided an assessment of the potential for increased water-use efficiency among the five major water districts that withdraw water from the Santa Ynez River (the Cachuma contractors): Carpinteria Valley Water District, Goleta Water District, Montecito Water District, City of Santa Barbara, and the Santa Ynez River Water Conservation District, Improvement District #1.[1] This analysis focused on the potential for technology-based water-use efficiency measures to reduce water demand. Measures considered in the analysis included installing high-efficiency clothes washers and low water-use landscapes in homes, and installing ultra-low-flow toilets in homes and businesses. The report found cost-effective water savings of between 5,000 and 7,000 acre-feet per year, which would allow the Cachuma contractors to, "reduce their take of water from Santa Ynez River without a loss of service or quality of life."

Misty Gonzales provided rebuttal testimony which questioned the validity of the 2003 Pacific Institute analysis. In September of 2007, the Pacific Institute provided a response to her testimony and an analysis of the Revised Draft Environmental Impact Report that was released in

[1] Haasz, D. and P.H. Gleick. 2003. Comments on the Draft EIR for the Cachuma Water Rights Hearing.

July of 2007 (2007 RDEIR). The 2007 Pacific Institute analysis concluded that the original 2003 Pacific Institute testimony that 5,000 to 7,000 acre-feet of water could be cost-effectively conserved by Cachuma contractors remained valid, and that the rebuttal testimony from Ms. Gonzales contained factual errors and omissions. This finding was further supported by the observation that all five contractors were failing to meet the requirements of the California Urban Water Conservation Council's Memorandum of Understanding (MOU) and could expand their water conservation efforts through implementation of a series of Best Management Practices and improved rate structures. Furthermore, the 2007 Pacific Institute analysis found that the 2007 RDEIR failed to use the most recent water demand projections, therefore likely overestimating 2020 demand. In April 2011, a 2nd Revised Draft Environmental Impact Report (2011 RDEIR) was released. This assessment reviews the 2011 RDEIR, particularly certain assumptions about water demand and supply options. We conclude the following:

- Water demand projections used in the 2011 RDEIR are based on outdated estimates and ignore more recent water demand projections from the contractors themselves.

- Demand projections in the 2011 RDEIR fail to integrate mandated water conservation and efficiency improvements, particularly a requirement to reduce per capita demand by 20% by 2020.

- The 2011 RDEIR overestimates future demand and potential shortages under the proposed alternatives.

- The conclusions from the original 2003 Haasz and Gleick testimony – that 5,000 to 7,000 acre-feet of water could be conserved by Cachuma contractors, cost-effectively, remain valid, and they are still pertinent to the 2011 RDEIR.

- Although water rates within the region are high, improving *rate structures* provide an opportunity to capture some of the identified water conservation and efficiency potential.

- The 2011 RDEIR does not account for additional local supplies, including through recycled water, rainwater harvesting, and stormwater capture.

Projections in the 2011 RDEIR Overestimate Future Water Demand

Demand projections in the 2011 REIR fail to include new, statewide water-use efficiency requirements, thus overestimating future water demand. In November of 2009, the California legislature enacted the Water Conservation Act of 2009 (SBx7-7), which requires all water suppliers to reduce per capita water demand by 20% by the end of the year 2020. By July 2011, urban water suppliers are required to have developed interim and final water use targets for compliance with SBx7-7. Additionally, in 2009, SB 407 was passed, which requires that old plumbing fixtures be replaced when alterations or improvements are made to single family homes beginning in 2014. This bill will likely accelerate the natural replacement rate of older plumbing fixtures, thereby increasing water-use efficiency improvements. As described below, these requirements and their impacts on water use are not integrated into the 2011 RDEIR.

Table 1 presents water demands projections included in the 2003, 2007, and 2011 DEIRs, as well as forecasted demand in the utilities' 2005 urban water management plans (UWMP), and, where possible, in reports integrating SBx7-7 requirements. Water demand projections in the 2011 RDEIR for both the Carpinteria Valley Water District and Goleta Water District are taken directly from their 2005 Urban Water Management Plans which were written prior to the efficiency improvements mandated by SBx7-7 and SB 407. Thus, these projections likely overestimate 2020 demand. Similarly, demand projections for the Santa Ynez River Water Conservation District are higher in the 2011 RDEIR than in the 2005 Urban Water Management Plan or in the previous 2007 RDEIR. The source of the new estimate and the reason for the increase in demand are not clear, although it strongly suggests that mandatory reductions in per capita demand are not captured in these estimates.

Table 1. Cachuma Contractors' 2020 Water Demands (Acre-Feet per Year)

	2003 DEIR[1]	2007 RDEIR[2]	2005 UWMP	2011 RDEIR[7]	Studies Integrating SBx7-7[8]
Carpinteria Valley Water District	5,423	5,833	4,600[3]	4,600	-
Montecito Water District	6,835	6,835	7,305[4]	6,500	-
City of Santa Barbara	17,760	18,200	14,000 - 15,000[5]	14,500	13,400[9]
Goleta Water District	16,000	17,300	15,890[6]	15,890	14,900[10]
Santa Ynez River Water Conservation District, ID#1	9,050	8,119	8,119	8,273	-
Total	55,068	56,287	50,220 - 51,220	49,763	-

Notes: Because Santa Ynez has not completed a 2005 UWMP, we used the estimate from the 2007 RDEIR in the "2005 UWMP" column.
2011 RDEIR estimate for Montecito Water District is for 2030, not 2020.
Sources:
(1) Table 4-19 of the 2003 DEIR; page 4-36.
(2) Table 4-19 of 2007 DEIR; page 4-24.
(3) Kennedy/Jenks Consultants. July 2007. Carpinteria Valley Water District Urban Water Management Plan 2005 Update. Ventura, California.
(4) Mosby, T. 2005. Final Urban Water Management Plan – Update 2005. Montecito Water District. Montecito, California.
(5) City of Santa Barbara Public Works Department. 2005. Urban Water Management Plan. Santa Barbara, California.
(6) Goleta Water District. 2005. Final Urban Water Management Plan.
(7) Table 4-19 of the 2011 DEIR; page 4.3-17.
(8). Updated estimates were not readily available for Carpinteria Valley Water District, Montecito Water District and Santa Ynez River Water Conservation District.
(9) Interpreted from graph, "System Demand Projections (AFY)" in City of Santa Barbara Water Resources Division, Public Works Department. (2011). DRAFT City of Santa Barbara Long-Term Water Supply Plan. http://www.santabarbaraca.gov/NR/rdonlyres/D9F28872-C779-4947-8428-56D9A678C8E6/0/LTWSP2011Draft472011.pdf .
(10) Bachman, S. (2011). Goleta Water District Water Supply Management Plan. http://www.goletawater.com/assets/documents/water_supply/Water_Supply_Management_Plan_Final_3-31-11.pdf, page 61.

Projections for Santa Barbara are based on a more recent (2010) document, "Plan Santa Barbara."[2] The projections, however, are based on *current* per capita demand factors applied to the projected mix of future residential and nonresidential users, and therefore clearly do not

[2] City of Santa Barbara. (2010). Plan Santa Barbara Program EIR Section 15 – Public Utilities. Accessed on May 3, 2011 at http://www.youplansb.org/docManager/1000000691/15.0_Public_Utilities.pdf.

integrate the 20% reduction required under SBx7-7. The 2011 Santa Barbara Long-Term Water Supply Plan explicitly states that projections included in Plan Santa Barbara:

> "can be expected to overestimate demand for new development. This is because new development will be subject to new codes and standards, while aggregate demand includes a significant portion of the building stock constructed under older standards."

Yet, these inflated demand estimates are integrated into the 2011 RDEIR. Only demand projections for Montecito Water District integrate " increased rates and water conservation,"[3] although the original documentation for these numbers is not available and thus it is not clear to what degree water conservation and efficiency are included.

Our independent research identified that the City of Santa Barbara and the Goleta Water District have developed new demand projections based on SBx7-7 requirements, although these estimates were not integrated into the 2011 RDEIR. The City of Santa Barbara and the Goleta Water District updated estimates are collectively 2,100 acre-feet less than the estimates included in the 2011 RDEIR. Thus, we conclude that water demand projections used in the 2011 RDEIR are based on outdated estimates and ignore more recent water demand projections from the contractors themselves.

The 2011 RDEIR Fails to Include the Urban Conservation Potential of 5,000 – 7,000 Acre-Feet Per Year Identified in Previous Pacific Institute Analysis

In a 2003 analysis, the Pacific Institute estimated that between 5,000 and 7,000 acre-feet per year (AFY) could be conserved cost-effectively, allowing the Cachuma contractors to "reduce their take of water from Santa Ynez River without a loss of service or quality of life." Measures considered in the analysis included installing high-efficiency clothes washers and low water-use landscapes in homes, and installing ultra-low-flow toilets in homes and businesses. The 2011 RDEIR dismisses the Pacific Institute's 2003 analyses, stating that

[3] 2011 RDEIR, Table 4-19, footnote 4.

> "During the 2003 evidentiary hearing before the SWRCB, expert witnesses for CalTrout testified that the Member Units could conserve an additional 5,000 to 7,000 af by replacing inefficient toilets and washing machines and improving landscape irrigation efficiency. The Member Units presented rebuttal testimony, however, that disputed the testimony of CalTrout's witnesses."

While Misty Gonzales provided rebuttal testimony that questioned the validity of the 2003 Pacific Institute analysis, the Pacific Institute submitted a detailed response that identified a number of errors and omissions in Ms. Gonzales' testimony. See the Pacific Institute's 2007 comments for this response.[4] The conclusions from the 2003 Pacific Institute testimony – that 5,000 to 7,000 acre-feet of water could be conserved by Cachuma contractors, cost-effectively – remain valid and are still pertinent to the 2011 RDEIR.

In fact, technological improvements since 2003 suggest that the conservation potential may be even larger. The 2003 analysis, for example, evaluated the savings if everyone were using a 1.6 gallon per flush (gpf) toilets. Today, high-efficiency toilets (HET) using 1.28 gpf or less are widely available, and in 2014, will be required in all new or remodeled developments. Additionally, in 2003, a typical high-efficiency clothes washer used 25 gallons per load. Today, high-efficiency models use 15 gallons per load or less. Thus, technological improvements suggest that the water conservation potential likely exceeds 5,000-7,000 acre-feet per year.

Furthermore, additional measures could be taken to reduce demand during a critical drought period. During droughts, it is not uncommon for communities to cut water use by 10-20% through behavioral measures, such as reducing or even eliminating outdoor irrigation and taking shorter showers. Such measures are not included in the 5,000 – 7,000 AF savings identified in the 2003 Pacific Institute analysis but could help reduce the likelihood and/or severity of future water shortages.

[4] Cooley, H. and P.H. Gleick. 2007. Comments on the Revised Draft EIR for the Cachuma Water Rights Hearing.

The 2011 RDEIR Fails to Consider the Potential for Reducing Agricultural Water Use

While urban use makes up the majority of total water demand from the Cachuma contractors, agricultural use also compromises a significant portion. Among the five contractors in 2005, approximately 5,300 acre-feet,[5] or around 10% of total demand, was delivered to agricultural users. In the Carpinteria Valley Water District and the Santa Ynez River Water Conservation District, ID#1, agriculture accounts for around 50% or more of total water demand.

Like within the urban sector, water use in the agricultural sector can often be reduced through increased efficiency while maintaining the same level of service, i.e. without reducing crop yields or area irrigated. In a 2009 report on the potential for increased water use efficiency in California agriculture, the Pacific Institute estimated that agricultural demand could be reduced by 17% by adopting efficient irrigation technologies, improved irrigation scheduling, and regulated deficit irrigation.[6]

Additionally, recycled water can be used to meet many agricultural water demands. At Sea Mist Farms in Salinas Valley, California, for example, recycled water makes up approximately two-thirds of total farm water use; groundwater is only used when irrigation demands exceed recycled water supply.[7] Using recycled water to meet irrigation requirements in the Cachuma contractors' service areas would reduce the need to secure additional potable supplies. The potential to decrease agricultural demand for potable water supplies in the Cachuma Contractors' service areas, both through increased water-use efficiency and the use of recycled water, should be assessed as a potential mitigation strategy.

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[5] Estimate based on agricultural use reported in 2005 Urban Water Management Plans for Carpinteria Valley Water District, Montecito Water District, and Goleta Water District, and the 2000 Urban Water Management Plan (because a 2005 Urban Water Management Plan is not available). Agricultural use in the City of Santa Barbara is minimal, and not included here.

[6] Cooley, H., J. Christian-Smith, and P.H. Gleick. 2009. Sustaining California Agriculture in an Uncertain Future. Pacific Institute. http://www.pacinst.org/reports/california_agriculture/final.pdf.

[7] Christian-Smith, J., L. Allen, M.J. Cohen, P. Schulte, C. Smith and P.H. Gleick. 2010. California Farm Water Success Stories. http://www.pacinst.org/reports/success_stories/success_stories.pdf

Improving Water Rates Structure Can Help Capture Water Conservation and Efficiency Potential

The 2011 RDEIR states that "water rates are some of the highest in the state and constitute a strong incentive to conserve water." Water rates among the Cachuma contractors are generally high as a result of recent investment in capital-intensive water supply projects, such as the desalination plant in Santa Barbara and the Coastal Branch of the State Water Project, but these rates do not consistently include designs that encourage efficiency improvements (Table 2). Of all of the Cachuma contractors, the City of Santa Barbara has a rate design that encourages conservation with a steep increase of $2.63 per thousand gallons between the first and second tiers at a relatively low water use rate of about 3,000 gallons per month. This design places an early premium on water uses and sends a strong price signal to customers to reduce their water use. The remaining Cachuma contractors, however, have rate designs that send a weak price signal to their customers. For example, the Santa Ynez River Water Conservation District remains on a uniform rate structure with high fixed costs. The Montecito Water District recently adopted inclining block rates; however, households only move into the second tier after using 18,700 gallons, equivalent to more than 620 gallons per day, and the rate increase between tiers is small. Likewise, the Goleta Water District has only a very small increase of $0.21 between tiers. These agencies could improve their rate structures by instituting inclining block rates with high price differentials between blocks. Additionally, the size of the block should be such that first and second tiers should cover essential uses of water.

Table 2. Residential Water Rates, May 2011.

Municipality [Water Provider]	Rate Structure Type	Fixed Monthly Service Charge	Unit Rate per 1,000 Gallons of Water Consumed
Carpinteria Valley Water District[(1)]	Increasing Block Rate (three blocks)	$18.15	$4.01 - avg. winter use (base) $5.15 - base to 2xbase $6.48 - over 2xbase
Montecito Water District[(2)]	Increasing Block Rate (four blocks)	$30.95	$5.21 – up to 18,700 gal $5.55 – 19,448 to 44,800 $6.55 – 45,628 to 89,760 $7.89 – over 90,508
Goleta Water District[(3)]	Increasing Block Rate (two blocks)	$9.21 - $27.63	$4.75 – up to 2,992 gal $4.96 – over 2,992 gal
City of Santa Barbara[(4)]	Increasing Block Rate (three blocks)	$12.31	$3.92 - up to 2,992 gal $6.55 - 2,993 to 11,968 gal $6.90 - over 11,968 gal
Santa Ynez River Water Conservation District[(5)]	Uniform	$31.00	$3.62

Note: gal=gallons
Source:
(1): Carpinteria Valley Water District Website: http://www.cvwd.net/water_rates.htm
(2): Montecito Water District Website: http://www.montecitowater.com/fees_charges.htm
(3): Goleta Water District Website: http://www.goletawater.com/rates/index.htm
(4): City of Santa Barbara Website: http://www.santabarbaraca.gov/Government/Departments/PW/Rates.htm
(5): Santa Ynez River Water Conservation District Website: http://www.syrwd.org/view/53

2011 RDEIR Underestimates Availability of Recycled Water and Other Alternative Supplies

In addition to water conservation and efficiency, a wide range of alternative water supplies are available that can reduce or eliminate the need for additional Cachuma project supplies. Recycled water is an additional source of supply that may have significant potential in some of the Cachuma Contractor's service areas. Recycled water can be used directly for landscape and agricultural irrigation and industrial processes. It can also be used to recharge surface and/or groundwater sources, thereby supplementing potable water supplies with a drought-resistant source. Capture and use of rainwater is another potential alternative supply option. The 2011 RDEIR, however, fails to consider the potential to develop these alternative supply options.

Water reuse is becoming an increasingly important component of the water-supply portfolios of water districts throughout California. For example:

- The Irvine Ranch Water District, in Southern California, met 22% of its total demand with recycled water in 2010.[8]
- In West Basin, recycled water accounted for about 7% of its water supply portfolio in 2008, but is expected to account for 15% of the water supply portfolio by 2020.[9]
- In the 2009/2010 fiscal year, recycled water for direct use and recharge purposes accounted for 33% of the total available supply of the Inland Empire Utilities Agency.[10]
- Additionally, the Orange County Sanitation District practices large-scale indirect potable reuse, with approximately 35 million gallons per day pumped into percolation basins where the water naturally filters through the earth and into the groundwater supply.[11]

The Cachuma contractors, by contrast, meet very little of their demand with recycled water. Currently, the Cachuma Contractors collectively produce and use 1,800 acre-feet of recycled water per year in a normal year, or about 3% of their total supply, and 1,860 acre-feet, or 4.5% of supply, in a critical drought year. Of the five Cachuma contractors, only Goleta Water District and the City of Santa Barbara use recycled water. In the City of Santa Barbara, recycled water meets 5% of demand in a normal year and 8% in a dry year. In the Goleta Water District, recycled water meets 6% of demand in a normal year and 11% in a dry year (Table 2).

The 2011 RDEIR assumes no expansion in recycled water supplies in the future. Yet, Goleta and Santa Barbara currently have significant unused recycled water capacity. Santa Barbara has an

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[8] Irvine Ranch Water District. "Your Water: Supply." Accessed on May 3, 2011 at http://www.irwd.com/your-water/water-supply.html.

[9] West Basin Municipal Water District. 2011. Water Reliability 2020. Accessed on April 28, 2011 at http://www.westbasin.org/water-reliability-2020/planning/water-reliability.

[10] Inland Empire Utilities Agency. (2010). Accessed on May 3, 2011 at http://www.ieua.org/recycled/docs/FY09-10AnnualReport/index.html.

[11] Groundwater Replenishment System. (undated). Accessed on May 3, 2011 at http://www.gwrsystem.com/images/stories/pdfs/GWRS.E-PressKit.FactsFiguresSection.11.17.10.pdf.

additional treatment and distribution capacity of 300 acre-feet per year, [12] and the Goleta Water District has an additional treatment and distribution capacity of 2,000 acre-feet per year, [13] Note that the 2011 RDEIR incorrectly states that Goleta Water District has a recycled water capacity of 1,500 acre-feet per year – the 2011 Goleta Water District Water Supply Management Plan reports a total treatment and distribution capacity of 3,000 acre-feet per year. Thus, these agencies are currently using less than 50% of the *existing* capacity, an indication that there is potential to expand the use of recycled water. At a minimum, this existing capacity should be identified in the RDEIR as existing supply available to the Contractors.

Additionally, the relatively low rate of recycled water use among the Cachuma contractors suggests there is potential to expand capacity and use above existing capacity in order to mitigate any identified potential water supply impacts. We recommend that a comprehensive recycled water feasibility study be conducted to support such mitigation; this feasibility study should explicitly evaluate ways to expand the use of recycled water, including through the development of a regional project and a groundwater recharge project.

Table 2. Recycled Water Use Among Cachuma Contractors

	Recycled Water-Normal Year	**Total Supply - Normal Year**	**% supply from Recycled Water**	**Recycled water-Critical Drought**	**Total Supply – Critical Drought**	**% supply from Recycled Water**
Carpinteria Valley Water District	0	5,699	0%	0	5,077	0%
Montecito Water District	0	7,305	0%	0	2,920	0%
City of Santa Barbara	800	17,493	5%	800	9,945	8%
Goleta Water District	1,000	16,471	6%	1,060	9,922	11%

[12] City of Santa Barbara Water Resources Division, Public Works Department. (2011). DRAFT City of Santa Barbara Long-Term Water Supply Plan. http://www.santabarbaraca.gov/NR/rdonlyres/D9F28872-C779-4947-8428-56D9A678C8E6/0/LTWSP2011Draft472011.pdf .

[13] Bachman, S. (2011). Goleta Water District Water Supply Management Plan. http://www.goletawater.com/assets/documents/water_supply/Water_Supply_Management_Plan_Final_3-31-11.pdf.

Santa Ynez River Water Conservation District, ID#1	0	7,241	0%	0	6,279	0%

Source: Tables 4-10, 4-11, 4-12, 4-13, and 4-14 in the 2nd RDEIR.

Similarly, rainwater is another alternative supply option that can be used for landscaping, flushing water closets and urinals, and cooling towers. Rainwater collection systems range in size from small 55-gallon barrels that rely on the force of gravity to complex multi-million gallon reservoirs equipped with pumps and sensors. Rainwater harvesting can be employed in residential settings and by businesses, industry, and public institutions. In Ingleside, Texas, for example, Reynolds Metals uses rainwater as process water in its metal-processing plant.[14] A 1992 survey of American State Health Departments revealed that there were more than 250,000 rainwater cisterns in use across the United States.[15] This number has certainly grown in recent years as water managers are increasingly encouraging these systems.

The 2011 RDEIR does not consider the potential for rainwater reuse to augment supplies or mitigate potential water supply impacts. Water suppliers in other parts of the country, however, have taken steps to promote and expand the use of rainwater. For example, in the City of Hopkinsville, Kentucky, city officials hold rain barrel workshops to teach residents how to construct their own systems. Cities across the country are also providing rebates to customers for installing rainwater harvesting systems. In San Francisco, for example, the local water utility provided rebates to customers ranging in value from $80 to $480, depending on the volume of the container. The City of Tucson has moved beyond education and financial incentives, requiring commercial developers to install rainwater harvesting systems to meet 50% of landscaping water requirements. The City of Los Angeles, working with the group TreePeople has installed large-scale cisterns in schools to meet landscape water needs. The potential for the Cachuma contractors to use rainwater as an alternative supply should be assessed.

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[14] Texas Water Development Board. 2005. The Texas Manual on Rainwater Harvesting. Third Edition. Austin, Texas.

[15] Lye, D.J. 1992. Microbiology of Rainwater Cistern Systems: A Review. J. Environ. Sci. Health. A27(8): 2123-2166.

Conclusions

The potential water supply impacts of the range of alternatives for modifying the U.S. Bureau of Reclamation's water right permits for the Cachuma Project depend in part on the water that might be made available by increasing the efficiency of water use, expanding alternative supplies, and reducing waste. The water demand projections in the 2011 RDEIR are a critical piece in determining the ultimate impacts of the various alternatives and efforts to mitigate those impacts. Thus it is important to get these numbers correct.

Like the previous RDEIRs, however, the 2011 RDEIR continues to overestimate future demand. Specifically, demand projections included in the 2011 RDEIR fail to include efficiency improvements mandated in 2009 by SBx7-7 and SB 407. The Pacific Institute estimated in 2003 that 5,000 to 7,000 acre-feet of water could be conserved through technology-based measures; subsequent technology improvements suggest that current potential could be even greater.

Additionally, the 2011 RDEIR does not adequately consider alternative supply options. Recycled water use and rainwater harvesting are alternative supplies that have been developed by water suppliers in other parts of the country. Current recycled water use by the Cachuma contractors is very limited compared with that of other communities in California. The 2011 RDEIR fails to fully identify existing capacity for the limited recycled water facilities that are available. In addition, the 2011 RDEIR fails to consider this as mitigation for potential water supply impacts. However, rainwater harvesting and use for landscaping, toilet flushing, and industrial uses has been promoted successfully by other water agencies. The potential to expand the use of recycled water, both for nonpotable and indirect potable reuse, and the capture and use of rainwater, should be thoroughly assessed as a potential mitigation strategy.

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SELECT RESEARCH PAPERS AND PUBLICATIONS

- Cooley, H., Christian-Smith, J., Cohen, M., Gleick, P.H., and Heberger, M. *California's Next Million Acre-Feet: Saving Water, Energy, and Money*. Pacific Institute: Oakland, CA. August 2010.
- Cooley, H., J. Christian-Smith, P.H. Gleick, L. Allen, and M. Cohen. 2009. Understanding and Reducing the Risks of Climate Change for Transboundary Waters. United Nations Environment Programme.
- Cooley, H. 2008. Adapting Water Resource Management to a Changing Climate. In Gleick, P.H. et al. The World's Water 2008-2009: The Biennial Report on Freshwater Resources.
- Cooley, H. 2006. Floods and Droughts. In Gleick, P.H., H. Cooley, D. Katz, E. Lee, J. Morrison, M. Palaniappan, A. Samulon, and G.H. Wolff. The World's Water 2006-2007: The Biennial Report on Freshwater Resources.
- Cooley, H., P.H. Gleick, G. Wolff. 2006. Desalination, With a Grain of Salt: A California Perspective. Pacific Institute for Studies in Development, Environment, and Security. Oakland, California.
- Palaniappan, M., H. Cooley, P. Gleick, and G. Wolff. 2006. Assessing the long-term outlook for current business models in the construction and provision of water infrastructure and services. Organization for Economic Co-operation and Development.
- Cooley, H. and P.H. Gleick. 2006. "Water efficiency is key in California." World Water and Environmental Engineering. Vol. 29(1): 27-28.
- Gleick, P.H., H. Cooley, and D. Groves. 2005. California Water 2030: An Efficient Future. Pacific Institute for Studies in Development, Environment, and Security. Oakland, California.
- Cooley et al. 2005. "Impact of agricultural practice on regional climate in a coupled land surface mesoscale model." *Journal of Geophysical Research-Atmospheres*. Vol. 110.

- Cooley, H.S., W.J. Riley, and M.S. Torn. 2003. "Interactions between land cover change and regional climate in a coupled regional climate model." Poster. Annual meeting of the Ecological Society of America, Savannah, Georgia.
- Cooley, H.S., W.J. Riley, and M.S. Torn. 2003. "Agricultural practice and regional climate interactions in a coupled land surface mesoscale model." Poster. American Geophysical Union Fall Meeting, San Francisco, CA.
- Cooley, H.S., W.J. Riley, and M.S. Torn. 2003. "Effect of harvest on regional climate and soil moisture and temperature." Poster. American Geophysical Union conference on ecosystem interactions with land use change. Santa Fe, New Mexico.

SELECT PRESENTATIONS

- Asia Society. "Water Issues in California and China." January 14, 2010. San Francisco, California.
- United State Committee on Irrigation and Drainage. "The Future of Water and Agriculture in California." March 25, 2010. Sacramento, California
- City of Oakland. Sea-Level Rise and the San Francisco Bay. March 30, 2010. Oakland, California.
- State of the Estuary Annual Conference. The Impacts of Sea Level Rise on the San Francisco Bay. September 29, 2009. Oakland, California.
- House Subcommittee on Water and Power. "Extinction is not a Sustainable Water Policy: The Bay-Delta Crisis and the Implications for California Water Management." July 2, 2007. Vallejo, California.
- Multi-State Salinity Coalition. The Environmental Impacts of Seawater Desalination. January 12, 2007.
- Water Education Foundation Board of Directors. California and Floods. December 5, 2006.

PUBLIC AND PROFESSIONAL SERVICE

- California Urban Water Conservation Council, Vice-President of the Board of Directors
- Urban Stakeholder Committee, convened by the California Department of Water Resources
- Water Education Foundation, Water Leaders.
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Research and Teaching Associate

HONORS, AWARDS AND FELLOWSHIPS

- Recipient of 2009 Region 9 Award for Environmental Excellence from the U.S. Environmental Protection Agency.
- The 2009 American Water Resources Association's "Csallany Award" for exemplary contributions to water resources.
- Named "one of 15 People the Next President Should Listen To" by Wired Magazine, September 2008.
- Awarded 2007 Top Environmental Achievement Awards for Freshwater Protection and Restoration, Environment Now Foundation.
- Elected to United States National Academy of Sciences: April 2006.
- Elected AAAS Fellow (Atmospheric and Hydrospheric Sciences): October 2005 (American Association for the Advancement of Science)
- Elected member of AAAS Atmospheric and Hydrospheric Sciences Section: February 2007-2011.
- Awarded 2005 Excellence Award for Statewide/Institutional Innovations, California Urban Water Conservation Council.
- Elected IWRA Fellow: October 2005 (International Water Resources Association)
- Named MacArthur Foundation Fellow. October 2003
- Elected to Phi Beta Delta: Honor Society for scholarly achievement in international education. April 2003
- Named by the BBC as a "Visionary on the Environment" in its Essential Guide to the 21st Century. 2001.
- Elected Academician of the International Water Academy, Oslo, Norway. October 1999
- Awarded MacArthur Foundation Research and Writing Fellowship. International Peace and Security Studies, 1988-1990
- Awarded Social Science Research Council-MacArthur Foundation Post-Doctoral Fellow in International Security. 1986-1988.
- Named San Francisco Chronicle, one of "90 People to Watch in the '90s." 1990.

PUBLIC AND PROFESSIONAL SERVICE

- World Economic Forum's Global Agenda Council on Water Security, 2008-
- National Academy of Sciences Committee on Ecological Impacts of Climate Change, 2008-2009
- U.S. EPA, Human Impacts of Climate Change Advisory Committee, 2007-2009.
- Expert Group on Policy Relevance of the World Water Assessment Program, United Nations, 2008-
- Climate Advisory Group of the California Academy of Sciences, 2007-
- State of California Climate Change Technical Advisory Group, 2007-
- National Academy of Sciences Committee on Advancing Desalination Technology, 2006-2008
- Vice Chair, American Geophysical Union Global Environmental Change Focus Group, 2006-2008
- United Nations-Sigma Xi Scientific Expert Group on Climate Change and Sustainable Development, 2004-2007.
- Water Science and Technology Board, National Academy of Sciences, 2001-2007.
- Public Advisory Committee: California Water Plan. Department of Water Resources, 2001-2006.
- Board of Directors: Pacific Institute, 1988-present.
- Editorial Board: Senior Advisory Council. Environmental Research Letters, 2006-2008.
- Editorial Board, Annual Reviews of Energy and the Environment, 2001-2004
- Editorial Board, Climatic Change, 1990-present.
- Advisory Council, International Water Academy, Oslo, Norway, 2003-2005.
- Scientific Advisor: IMAX Film "The Water Planet," 2003-2006.
- Advisory Board: Documentary film "Thirst," 2002-2004.
- Co-Chair: Water Sector: National Assessment of the Potential Impacts of Climatic Variability and Change on the United States, 1998-2000.
- Board of Directors: International Water Resources Association, 1997-2000.
- Global Environmental Change Committee, American Geophysical Union, 1993-1998.
- Public Advisory Forum: American Water Works Association, 1993-1998.
- 1990 Water Task Group, Second World Climate Conference, Geneva, Switzerland.
- Advisor, Comprehensive Freshwater Assessment, Stockholm Environment Institute, 1996-1997.
- Advisory Board: Documentary film "Cadillac Desert," 1995-1997
- Advisory Committee: Climate Institute's Environmental Refugee Program, 1993-1995.
- Climate and Water Panel, American Association for the Advancement of Science, 1986-1990.
- Co-Chair, Working Group 2, Advisory Group on Greenhouse Gases (AGGG), WMO/UNEP, 1989-91.
- Committee on Science & International Security, American Association for the Advancement of Science, 1993-95.
- Editorial Board, Environment and Security, 1993-2001.
- Editorial Board, Encyclopedia of Life Support Systems, 1997-2002.
- Editorial Board, Encyclopedia of Global Change (Oxford University Press), 1996-2000.
- Editorial Board: Global Change and Human Health, 1999-2003
- Interim Board of Directors: Middle East Water Information Network, 1994-1996
- Project Steering Committee: IUCN (World Conservation Union): Water Demand Management in Southern Africa, 2000-2003.
- Scientific Review Group, President's Council on Sustainable Development, 1994-1996.
- Surface Water Committee, American Geophysical Union, 1992-1993
- Working Group VIII Special Report, United States-Soviet Agreement on Protection of the Environment, 1989-1990.

(A full publications list is available upon request)

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EDUCATION

University of California – Berkeley *May 2008*
B.S., Conservation and Resource Studies (College Honors, High Distinction)

PROFESSIONAL EXPERIENCE

Pacific Institute, Oakland, CA *May 2008 – present*
Research Associate

Torn Laboratory, Lawrence Berkeley National Laboratory, Berkeley, CA *April 2007 – May 2008*
Laboratory Assistant

Bancroft Technical Services, Berkeley, CA *Feb. 2005 – July 2007*
Archivist Assistant

PUBLICATIONS

- L. Allen, "Water Quality." Chapter in: Gleick, P. and J. Christian-Smith (editors). In press. *A 21st Century Water Policy*. New York: Oxford University Press.
- Allen, L., J. Christian-Smith, and M. Palaniappan. 2010. Overview of Greywater Reuse: The Potential of Greywater Systems to Aid Sustainable Water Management. Oakland: Pacific Institute.
- Christian-Smith, J., L. Allen, E. Moore, and P. H. Gleick. 2010. The 2010 California Water Bond: An Independent Analysis of the "Safe, Clean, and Reliable Drinking Water Supply Act of 2010." Oakland: Pacific Institute.
- Schulte, P., J. Morrison, M. Morikawa, E. Moore, M. Heberger, and L. Allen. 2010. The Water Footprints of Steel, Petrochemicals, and Forest Products: An Analysis of Water-Related Business Risks and Impacts in the United States. Written for the U.S. Environmental Protection Agency. Oakland: Pacific Institute.
- Christian-Smith, J., L. Allen, M. Cohen, P. Schulte, C. Smith, and P. Gleick. 2010. California Farm Water Success Stories. Oakland: Pacific Institute.
- Palaniappan, M., P. Gleick, L. Allen, M. Cohen, J. Christian-Smith, and C. Smith. 2010. Clearing the Waters: A Focus on Water Quality Solutions. United Nations Environmental Program Publication. Available online: www.unep.org/PDF/Clearing_the_Waters.pdf.
- Cooley, H., J. Christian-Smith, M. Cohen, P. Gleick, and L. Allen. 2009. "Understanding and Reducing the Risks of Climate Change for Transboundary Waters." Prepared for the United Nations Environmental Program. Oakland: Pacific Institute.

SELECTED PRESENTATIONS

- Panel Participant, Climate Corps Bay Area training. "Water-Energy-Climate: Critical Links." (2010).
- Panel Participant, Bay Area Water Forum. "Overview of the 2010 Water Bond" (2010).
- Invited Speaker, Water Summit. "Pacific Institute Analysis of the 2010 Water Bond" (2010).

SELECTED HONORS AND AWARDS

- Phi Beta Kappa member
- Golden Key International Honour Society Scholar