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California Water Governance for the 21st Century

Deborah A. Sivas
Luke W. Cole Professor of Environmental Law
Stanford Law School

Molly Loughney Melius
Fellow, Environmental and Natural Resources Law & Policy Program Stanford Law School

Linda Sheehan
Earth Law Center

John Ugai
J.D. Candidate, Stanford Law School

Heather Kryczka
J.D., Stanford Law School

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TABLE OF CONTENTS

ABSTRACT

Californians must . . . change their relationship toward the environment and water.[1]

The declining health of California's water systems, combined with the growing challenge of climate change, calls on us to rethink how we use and manage water. Water is a public and environmental good, of a critical, life-sustaining nature. As such, the basic water needs of both humans and natural systems must be prioritized over other water uses. However, not only are we failing to meet basic needs, but we are also inefficiently and inequitably allocating water more generally around the state. As a result, both California's people and environment struggle with current and future threats to water reliability.

Water markets have been offered as a key solution, but the concept of markets is inherently at odds with the nature of water as public and life-sustaining. Our fixation on water as a substance to be cordoned off and profited from is growing increasingly problematic, with water becoming ever more privatized.

This paper recommends that we instead step back and do two things: first, better implement all the laws we have, and second, develop a water vision and strategy that meets 21st century challenges. Both efforts call on us to take a broader view of our water governance system in light of the evolving understanding of water as a public and environmental good, and to incorporate the ethics of that understanding into our decisionmaking. Ethics is a topic rarely addressed but critical to the wise use of water. The moral test of government, and the measure of its strength, is how it treats its most vulnerable members – particularly with respect to meeting their most basic needs.

EXECUTIVE SUMMARY

Built for an earlier era, California's water allocation system is near the breaking point. Vast amounts of increasingly precious freshwater move through a network of storage and conveyance facilities for delivery to distant farms and cities that hold a hodge-podge of historic water use "rights." The result of this ad hoc system is both rampant inefficiency and growing inequality.

To date, state officials have assiduously avoided the kind of comprehensive management of water resources that is necessary to prioritize basic human needs and safeguard natural systems for future generations of Californians. But as the Sierra snowpack predictably diminishes and periodic droughts worsen in both magnitude and duration with the changing climate, California stands at a crossroad. We can either continue business as usual, leading inexorably to ever-greater user inequities and the almost-certain collapse of our remaining aquatic ecosystems. Or we can chart a different course for the twenty-first century, one that arises from the values embedded in contemporary notions of the public trust and our responsibilities as stewards of water. This paper argues for the latter path.

In this paper, we outline the state's current water management and allocation strategies and display how these fail to meet current needs. In particular, we analyze in detail why water markets – the state's current idealized solution to our water woes – will further entrench our dysfunctional water uses, directing water toward the most profitable use, rather than toward the most socially and ecologically beneficial use. We then argue that in order to holistically transform our water governance to meet social and ecological demands, we need to embrace a new water ethic in which the special nature of water as life-giving and undeniably public, rather than private and for-profit, is recognized.

Consistent with this water ethic, we present alternative water strategies and next steps, including broadening the suite of voices and disciplines active in setting the water vision and strategies for the state. We recommend applying vastly under-utilized legal tools, such as the waste and unreasonable use and public trust doctrines; developing and prioritizing instream water rights, to ensure that waterways' needs are addressed; gathering data on surface flows, groundwater levels, and water withdrawals and uses; enforcing water use rights violations, including direct penalties for violating water right permits and streamlined action on violations of the waste and unreasonable use doctrine; and increasing agricultural and urban water efficiency while reducing demand, so that efficiency savings are not simply translated into more use. These reforms, implemented from the ground up with broad public participation, will help the state more effectively manage scarce water resources for the benefit of humans and ecosystems alike.

INTRODUCTION

California's current water governance structure, largely dependent on the enforcement of individual "rights," is wholly unsustainable. Disputes between and among historic water right holders are ultimately resolved by the courts in a way that does not account for the larger public interest at stake in virtually every water allocation decision. The result is a world in which some stakeholders continue to lavishly sprinkler-irrigate alfalfa crops for export to foreign countries or golf courses for affluent patrons while others, quite literally, do not have water to drink, cook, or bathe. And the minimum water needs of California's natural aquatic systems, even if ostensibly protected on paper, inevitably fall by the wayside as water becomes increasingly scarce and more species hover at the edge of extinction. With the state's population growing toward 50 million by mid-century and climate impacts accelerating, the present structure puts us on a course to natural and human catastrophe.

Better water market mechanisms, often advocated by those looking to reform the current system, will not save our ecosystems from collapse or end inefficient water use. Why? One key reason is that markets move water toward the most profitable use and further away from public and environmental uses. Thus, they can actually exacerbate, rather than solve, the challenges we face. In particular, poor communities and natural ecosystems cannot compete in a market where the potential sellers are the beneficiaries of historic giveaways of the state's public trust waters. Large urban water districts may be able to afford to buy expensive water from agricultural interests, who stand to make a significant profit from their subsidized (*i.e.*, non-market) water allocations. But the low-income community of Porterville and the fishes of the San Francisco Bay Delta have no ability to participate in such transactions. The fact that NGOs may occasionally buy an environmental water right in an attempt to preserve instream flows in the stretch of some river should not delude us: such marginal efforts, while commendable, will not avert the widespread ecological disaster facing our waterways and aquatic species.

Water markets are the wrong lens through which to view the problem. Water is not real or personal property. It is essential to life itself, and for that reason the state holds it in trust for California's people and environment and for future generations. The state has given private interests the right to use water, but any such "usufructuary" rights are subject to the state's ongoing fiduciary supervision, constitutional restrictions on waste and unreasonable use, and other constraints. California courts have repeatedly affirmed the state's ability to reduce or extinguish water allocations to satisfy these constraints, whether obtained through riparian or appropriative use.

This paper offers instead that we must address today's water allocation inefficiencies and inequities based on the underlying essence of water as life-giving and undeniably public, rather than private and for-profit.

Some of the state's most influential water policy experts have begun calling on the state to "transform our relationship with water"[2] and "change entrenched [water governance] systems."[3] These appeals for sweeping action reflect the scope of the problems before us. By contrast, our water management strategies in practice have taken an ad hoc, reactionary approach that lacks an affirmative, thoughtful vision or awareness of water facts.

As a state, we tend to jump to answers without first carefully considering the questions we are asking and the data we require. This paper begins to fill that gap by:

- Outlining the state's current water strategies and continued challenges;
- Challenging the assumptions behind the theory of water markets as a strategy for water management;
- Revisiting our relationship with water and presenting alternative water strategies consistent with the understanding of water as life-giving and public; and
- Recommending next steps for moving forward, including broadening the suite of voices and disciplines active in setting the water vision and strategies for the state.

CURRENT CALIFORNIA WATER MANAGEMENT: INEFFECTIVE, INEFFICIENT, AND INJURIOUS

California's Water Management System Is Failing to Meet 21st Century Needs and Challenges

The "water use rights"[4] permitting system set up roughly a century ago to carefully manage allocation has failed. Born out of the Gold Rush and its attendant values of profit and exclusion,[5] our current water management system[6] marginalizes the needs of the environment and those who cannot afford to pay high prices for available clean water. Today, we have allocated water rights to "[m]ost of California's major river basins" in amounts that "exceed their natural, unimpaired annual supply."[7] For example, the State Water Resources Control Board ("State Water Board") to date has issued appropriative water use rights statewide in an amount roughly five times the actual supply.[8] The overall amount of water use rights held on paper is likely even more than that differential, given that this figure does not include riparian and pre-1914 water use rights. These figures also fail to fully account for inaccurate or unavailable water data, a widespread and critical problem.[9]

Box 1: California Water Use Rights Overview

The right to use surface water in California derives primarily from riparian, prior appropriation, and adjudicated water use rights. Prior to 1914, the state broadly recognized water use rights – without permits – for riparian users (those whose land connected to the water's edge) and appropriators (for instance, those who imported water for mining). Since 1914, the state's Water Commission Act has required the State Water Resources Control Board to issue appropriative water use rights only via permits and licenses. In light of the scope of past water use rights allocations, however, the Board now regulates through permitting less than half of the water used by agricultural and urban interests. (Hanak et al., 2011.)

Under California water law – and consistent with the waste and unreasonable use doctrine, the public trust doctrine, and other conditions – riparian users are afforded first priority to fill water use rights, followed by senior appropriators and then junior appropriators, based on the doctrine of "first in time, first in right." (Cal. Water Code § 1241.) Entities also can acquire water use rights by contracting with a local water district or mutual water company that holds the rights to the diversion of water. These districts and companies have broad discretion to authorize use and approve transfers between users in voluntary water exchanges. (Hanak & Stryjewski, 2012.)

In fact, the water use rights system *itself* "has been identified by water managers as one of the state's most important long-term water problems."[10] Over-allocation of existing water use rights, combined with climate change and other stressors, pressure the state to examine its current water allocation more seriously. Calls for a "complete overhaul of water use rights" have been on the rise, with some observers asserting that "the seniority-based system is outdated and not up to the task of meeting California's needs."[11] To date, though, decision makers cling to the existing system regardless, arguing that it has "served as the foundation for billions of dollars' worth of investment."[12] This argument, of course, ignores the fact that such investments depend entirely on the health of the water systems underlying them, systems that are rapidly degrading under existing governance.

Other water management challenges include the fact that illegal diversions abound, and the state has been unable to reliably enforce its water use laws to prevent and address such violations. For example, the State Water Board's Executive Director testified that available data indicate the number of illegal diversions may be over 40% of the number of active permits and licenses.[13] Even where diverters hold permits, they do not always meet permit terms and conditions. Further, fundamental limitations on water use rights, such as the waste and unreasonable use doctrine and the public trust doctrine, have been largely ignored.

Enforcement authority and resources are limited compared with the need, and violations of these laws rarely receive a meaningful state response. Examples are detailed in Appendix 1; they include data from the Water Boards' Annual Performance Reports showing that ***all*** penalties assessed for water use rights violations from 2009 to 2015 (including the height of the drought) totaled only just under $760,000.[14] The state's inattention to enforcement violates its fiduciary duty to protect water, a public and environmental good.

Effective water management has been further hampered by, among other challenges: a lack of meaningful groundwater oversight (even given the Sustainable Groundwater Management Act),[15] a paucity of data (real-time or otherwise) on water diversions and use, and a lack of instream water rights and protective flow standards.

Instead of implementing wide-scale reforms, the state has focused to date on a number of ad hoc measures that attempt to address water challenges. In addition to demand reduction and reuse strategies, these measures include but are not limited to:

- Water markets;
- Section 1707 Transfers (referring to the option water use rights holders have under Section 1707 of the California Water Code to dedicate water rights back to waterways for the benefit of the environment);

- Curtailments (a tool the State Water Board can use to command particular users, in order of priority, to stop diverting surface water when there is insufficient water available for all users in a watershed);
- Temporary Urgency Change Petitions (TUCPs) (referring to the State Water Board's contested waivers of environmental flow and quality standards during times of drought);
- Infrastructure aimed at further water redistribution across the state, such as the proposed Delta tunnels project; and
- Desalination.

Appendix 1 discusses how these piecemeal, largely reactionary measures have failed to fundamentally address issues of water equity and efficiency. By implementing myriad individual strategies rather than broad, meaningful reform, the state is effectively choosing a policy of water as property to be cordoned off and profited from, rather than an essential element of life to be shared to achieve social and ecological well-being.

To shift this path, the state must update its antiquated water management strategies, particularly its water allocation laws, which are failing to reflect modern needs and challenges. Other governments have faced this challenge and risen to the occasion. For example, an unprecedented 13-year dry period led the Australian government to undertake major water reforms in the 1990s, which included restructuring the national water use rights system. Under the new policy, water use rights were separated from land title, quantified, and restricted to "environmentally sustainable levels of extraction." A similar overhaul of the water allocation system occurred in South Africa in the 1990s.[16] California can learn from such efforts.

Current Water Governance Prioritizes Privatization and Profit over Needs

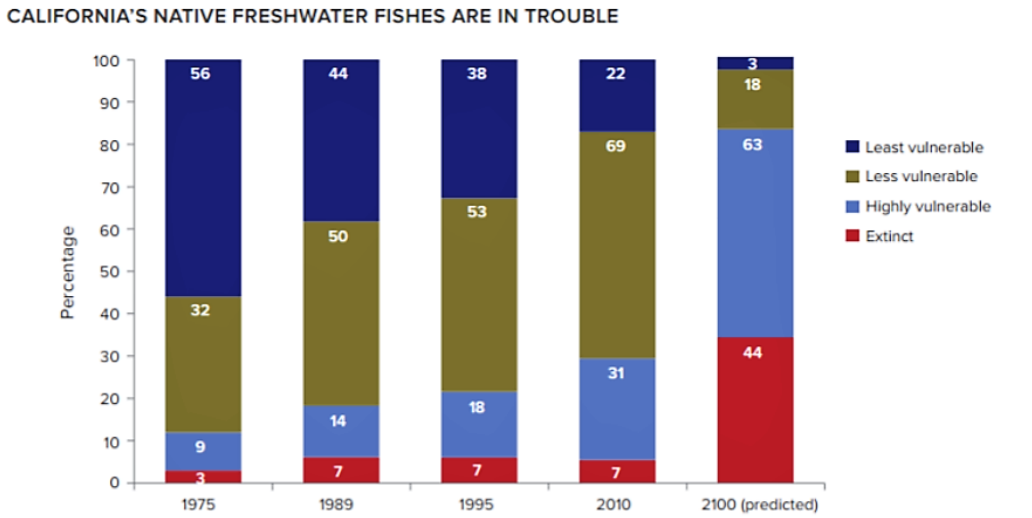
The current drought has received the bulk of the blame for our current water challenges. Yet drought, even severe, should not be a surprise in drought-prone California.[17] Moreover, California's 2015 and 2014 water years were the warmest on record,[18] and this trend seems to be in place for the long-term as climate change increasingly takes hold. California's climate is becoming warmer and more variable, causing wetter wet periods, drier dry periods, and reduced snowpack.[19]

And while the most recent drought has indeed been severe, it cannot be blamed for our failure to provide sufficient water to meet even the most basic needs of all of California's human and aquatic populations. Rather, what the current drought has done is bring to light the fundamental inadequacy of California's water governance system, which fails to recognize and respect the essence of water as life-giving and ultimately public. As the Public Policy Institute of California observed, "[d]uring the latest drought, the state did not have clear

priorities [for public health and aquatic ecosystems]," and so made "decisions in haste and without clear policy guidance." These hasty decisions injured the environment and disadvantaged communities first, even though the law designates public health and safety and the environment "as priorities that may take precedence over senior water rights."[20]

Indeed, the effects of water mismanagement are becoming more evident by the year, with freshwater streams and wetlands being hit particularly hard.[21] Eighteen fish species are now at risk of near-term extinction,[22] and 34 species of freshwater fish are currently on the state or federal endangered species lists.[23] Without change, we are trending toward more and more extinctions of fish and waterfowl over time.[24]

Figure 1: Extinction Trends[25]



SOURCES: R. M. Quiñones and P. B. Moyle, "California's Freshwater Fishes: Status and Management," *FiSHMED Fishes in Mediterranean Environments* (2015). P. B. Moyle, J. D. Kiernan, P. K. Crain, and R. M. Quiñones, "Climate Change Vulnerability of Native and Alien Freshwater Fishes of California: A Systematic Assessment Approach," *PLoS One* 8 (5), doi:10.1371/journal.pone.0063883.

NOTES: The figure shows freshwater native fish status based on field surveys. Bars display the number of fish species for which adequate information for evaluation was available in the specified time period. Predicted status in 2100 assumes continuation of current trends, with added stress from climate change. Extinct means no longer found in California; highly vulnerable means highly vulnerable to extinction by 2100; less vulnerable means less vulnerable to extinction than the previous group; least vulnerable means very low vulnerability to extinction.

Many farms and cities have compensated for drought-reduced flows by pumping additional groundwater, which creates another set of problems. In a typical year, groundwater supplies approximately one-third of total farm and urban water use, but since 2014, groundwater supplies have made up over half of their water use.[26] While a number of urban areas have developed groundwater programs aimed at preventing groundwater basins from falling into long-term declines, many agricultural areas have not,[27] allowing some users to overdraft aquifers at the expense of others. Such activities only exacerbate the inequities of our already unjust water allocation scheme. For example, of the reported thousands of dry wells, more than half occur in Tulare County where low income communities found themselves entirely without water,[28] although this may be because they are one of the few counties that collect information on dry wells.[29] The number of dry wells throughout California may actually be much larger than current, limited data suggests.

Unlike energy blackouts, which are temporary, "water blackouts" require impacted communities to increasingly depend on a patchwork of longer-term, unsustainable "solutions" such as trucking in bottled water or delivering water to temporary holding tanks.[30] Continued pressures on groundwater will result in more drinking water wells and systems running dry at an increasing pace, further jeopardizing the livelihood of some of California's most at-risk residents.[31] The state's relative inaction to prevent this basic health and safety problem from a governance (rather than reactionary) perspective demonstrates that regulators are prioritizing profit over need, in violation of its fiduciary duty to the people of California.

In short, California's current water allocation system is inefficient, inequitable and injurious. It prioritizes current uses[32] based on seniority, with little regard for the impacts of those uses. It places the most vulnerable populations and ecosystems at the back of the line when droughts occur, as they regularly do now and will do with more frequency.[33] The impacts of these decisions on the health and well-being of Californians and California species and ecosystems are widespread and growing. Action is needed now to evolve our water governance system in a way that reflects the life-giving and public nature of water and our utter dependence on water for basic needs.

As reflected by numerous world leaders over the centuries, the moral test of government, and the measure of its strength, is how it treats its most vulnerable members. To ensure that California's most at-risk ecological and human populations receive the water they need to survive now and in the future, we must reform California's water allocation system to prioritize the protection of life over privatization and profit.

WATER MARKETS ALLOCATE WATER TO PRIVATE INTERESTS, NOT ENVIRONMENT AND LOCAL NEEDS

Water can be allocated in several different ways, which are not necessarily mutually exclusive. These include:[34]

- "First-come, first-served" allocation, or the prior appropriation doctrine.
- Allocation based on proximity to the waterway, or the riparian doctrine.
- Allocation based on deserving uses or users (and conversely, away from "undeserving" uses or users, such as for growing ingredients necessary for illegal drugs, or for certain water-intensive growing practices). A "deserving" use of water could be water for basic human needs, as articulated in California's AB 685 (2012),[35] and/or basic environmental needs, as articulated in numerous state and federal environmental laws. This approach allows water to go to the most important societal and biological uses – *e.g.*, needs for healthy life – first.
- Market-based allocation, or water to the highest bidder.

Over the last several decades, California has seen a marked increase in interest in the last approach – privatized water and water markets – ostensibly to solve the state's severe and growing water scarcity and distribution problems. However, water markets and increasing privatization are not the answer to California's water challenges. Water markets seek to allocate privatized commodities efficiently in a capitalized marketplace.[36] California should not be asking, as markets inquire, "how do we better shift water to the highest bidder?" This simply moves water, a life-sustaining and inherently public good, *away* from critical environmental and community needs.

Rather, the question California must ask is: "how should our state share something that is fundamentally essential to the life and vitality of all Californians and California's ecosystems and species?" Water is not a "thing" to be bought, sold, and profited from. Water is first and foremost a public good to be allocated for human and environmental needs – which is why the state holds it in trust for all. At most, the water use rights system is a mechanism for managing discrete water allocations – but only *after* needs are met.

In the following subsections, we discuss first the practical and theoretical limitations of water markets. Second, we argue that markets do not work for a public good and life necessity like water because those who cannot pay (e.g., poor communities and wildlife) cannot participate meaningfully in the market. As a result, markets will increase hardened demand for water by those who can afford to pay. Finally, we posit that the state cannot craft a functioning market system onto the haphazard water allocations we have today. This is in

part because: 1) the starting allocations were granted in a time of water abundance and do not make sense in today's world of increasing scarcity, and 2) the resulting entrenched private interests have every incentive to game whatever new market system we can design on the old water "rights" platform. Thus, even if markets could theoretically work for a public necessity like water (a foundational premise with which we disagree), the state likely could not develop a functioning market system given the reality of today's water rights system, as illustrated by the examples below and in Appendix 2. As such, water exchanges should generally be limited to intra-basin transfers, should compensate for externalities, and should only be allowed after sufficient water is reserved for the environment and for basic human needs.

Markets Cannot Address California's Water Challenges

The practical limitations of markets in allocating California's water are well-known. These include infrastructure challenges, a lack of data (real-time or otherwise) on available water flows and uses, the relatively small pool of buyers and sellers, the difficulties under California water law of perfecting water rights sufficiently to allow for exchanges, a non-existent regulatory structure for water movement that would be required to provide the public with necessary transparency and accountability, and other challenges. These limitations and realities have been examined in depth elsewhere. Here, we examine more fundamental questions with regard to the limitations of water markets to address California's needs and goals.

The threshold question is: Even if we could establish reasonably functional water markets in California, what is their purpose? If we want to move water profitably regardless of the associated impacts to waterways and communities, then markets are one consideration. But if we want to address our water challenges – that is, to improve the health of waterways and the resilience of California communities that currently lack access to clean water for basic needs – markets are the wrong tool to achieve that goal. Successful markets depend on a system of private property rights, including rights to commodify and consume nature for the property holder's exclusive benefit. More markets will only exacerbate this problem. Appendix 2 details several examples of this phenomenon, including the Monterey Amendment's[37] privatization of $74 million in taxpayer-funded water infrastructure, now known as the Kern Water Bank,[38] a decision that enabled the later raid of tens of millions of taxpayer dollars from the state's Environmental Water Account.

Another concern is that markets start from current ownership of goods and services and then prioritize efficient trades from that starting point.[39] This underlying foundational premise raises significant equity concerns in light of California's historic development, including subsidies and giveaways of the public's water to create the current water wealth inequality we have today. This issue must be addressed head-on if California were to genuinely pursue the path of creating functioning water markets – something that does not exist today. For example, billionaire couple Stewart and Lynda Resnick use more water than

every home in Los Angeles combined.[40] Under a market system, "[s]ince the rich are willing to pay more than the poor, the rich will probably own more water."[41] Such a basis for water policy is fundamentally unjust and fails to ensure that water flows to communities and ecosystems where it is most needed.

While California does have laws that could protect against inequitable or unwise water use, including the waste and reasonable use doctrine, the public trust doctrine, and various environmental protection laws. These protections – already under-enforced – would further wither under an increasingly market-based water management regime because they clash with capitalism-based market theory. Accordingly, governments and politicians will continue to marginalize ecological and social protections where they interfere with the application of market theory or the assertion of private property rights. As just one example, in 2014 and 2015, the State Water Board regularly "approved requests to reduce environmental flows and relax salinity standards in the Delta so that water exports for farms and cities could be increased."[42]

Markets Harm, Rather than Help, the Environment and Disadvantaged Communities

Market theory also assumes that goods are substitutable and that the most efficient uses are identified by those who are willing to pay the most.[43] Water, however, is essential to all life, and is non-substitutable for basic needs. A higher willingness to pay does not indicate a more efficient use of water. For example, a wealthy homeowner may be willing to pay a higher price for water to maintain a pristine lawn than an impoverished family is able to pay for drinking water. In a private market, the water would go on the lawn, and the poor family would go thirsty. Although California is the United States' largest exporter of food and the world's fifth-largest food producer, the San Joaquin Valley, which grows this food, is tragically the hungriest place in the U.S.[44] Water markets will not provide water to the many poor residents whose wells have run dry.

This result is even more evident in the case of environmental needs.[45] A river cannot pay for its survival, and measures to use taxpayer funds to support water for waterways generally fail to achieve their laudable goals. Rather than solve our water challenges, markets "have seldom been used to accomplish significant changes in the ways water is used."[46]

Box 2: Aftermath of the Kern Water Bank and Environmental Water Account

The goal of the Kern Water Bank was to protect fish by storing water that could be used to supplement Delta deliveries, allowing biologists to slow pumping during critical times for fish. The reality was just the opposite. In the early 2000s, Delta water pumping increased rapidly, and exports hit record highs of over 6 million acre-feet. The Delta estuary plunged to the "brink of collapse," with Delta smelt falling to near extinction levels. Fall-run Chinook salmon also plummeted to record low returns just three years after the record Delta exports, causing the fishery to be closed for the first time in history in 2008.

Adding insult to injury, private interests manipulated the taxpayer-funded Environmental Water Account, a taxpayer-funded water storage program intended to mitigate the harm caused by pumping from the Bay-Delta. Water was purchased for the Account from a number of sources, including water stored in the Kern Water Bank. Resnick's water and farm companies sold subsidized water at an inflated profit to the Account, taking roughly 20 cents of every dollar spent by taxpayers. The resulting paper shuffle of water enriched Resnick and other individuals, and failed to enhance environmental flows, with threatened and endangered species barely affected. See Appendix 2 for more on the Kern Water Bank and Environmental Water Account.

Indeed, markets may actually make our environmental water challenges worse by increasing use and demand by current water users and re-entrenching current unsustainable water use patterns in the state. Many economists would argue that markets create incentives for "efficient" uses of water – meaning conservation of water that can then be sold to others – and that this behavior "creates" new water. However, these efficiency gains rarely go to disadvantaged communities or the environment since they are not meaningful players in the market. Instead, private markets allow those who can pay, like urban water districts, to expand water use, thereby creating more structural demand over the long-term. Thus, the more we push for efficient water markets, the more we may increase waterway consumption, rather than waterway restoration. Also, markets tend to adapt in directions that we cannot always predict in their search for efficient exchanges and profit maximization.[47] For example, a market could move water from prime farmland and valued open spaces into suburban sprawl, which cements in water needs and potentially increases them over time.

Appendix 2 outlines a number of examples of markets driving more, rather than less, use of water. For instance, through its control of (taxpayer-funded) water facilities, the Kern Water Bank allows agribusiness to sell water from a severely over-drafted groundwater basin to create water-unstable developments, such as Centennial City, proposed to include twenty-three thousand homes. Communities such as Mountain House similarly built on water

promises have seen their water supplies curtailed in drought, leaving residents scrambling for substitutes and developers pushing for new dams to solve a problem they helped create. Together development and agricultural corporations have been trading "paper water" contracts "to keep the severely over-stretched public water projects pumping water to the highest bidder."[48] These corporations are playing an Enron-like game with water and shorting the market with self-created, un-quenchable demands, to the detriment of people and the environment that need real water to live.[49] We can expect more of the same if we implement a market system on top of our dysfunctional and unsustainable water management system.

Proponents argue that water markets "avoid the economic inefficiencies generate[d] by the political system of allocation dominated by a few powerful interests."[50] However, the opposite is true – stakeholders regularly propose predetermined directional flows of water and erroneously call those preferences a "market."[51] In this way, the presumed objective efficiency of markets has become another exercise in political allocation of water. Indeed, prices are often heavily subsidized for at least one partner in the exchange, information is often incorrect or unavailable (making what is bought unclear), players are few, and bargaining power is generally unbalanced. Finally, the distribution system itself is heavily subsidized by the public, leading some to describe these "market" transactions as no more than "another subsidy dressed in green."[52]

California's nascent water market system is already quickly becoming dominated by a few powerful interests, in violation of the state's fiduciary responsibility over water.[53] California's alleged "free market" in water already has arguably become "an intensely negotiated (and corrupted) system set up jointly by the state, the U.S. government, and the San Joaquin Valley agribusiness."[54] Throughout the state, corporate interests pervade water districts and sway water policy. They have worked to set up insider water trading systems by privatizing water infrastructure, abusing subsidies, exploiting water contract entitlements, and creating demand through unwise private development.[55] Under a system where water is considered private property and profit is prioritized over need, the environment, low-income communities, and the vision of a sustainable California suffer.

Even water market proponents acknowledge that water markets "could have unintended adverse impacts on the environment, rural economies, and marginalized stakeholders."[56] We searched for and were unable to find a single example of an effective market transaction of water in California that resulted in permanent, substantial return of water return to a waterway or community in need.

While some argue that water banks like the Kern Water Bank provide a way to recharge groundwater and alleviate impacts to local communities that same water is pumped out when the market desires – during drought – at the worst time for the environment and local communities who depend on groundwater.[57] Local groundwater users alleged in one

suit that while the Kern Water bank investors were pumping away, local wells dried up, forcing residents to scramble for loans to pay for deeper wells or even lose their home.[58] One resident noted that during the 2007 drought, the water table dropped 115 feet in only three years.[59] In general, surface water transfers are likely to increase groundwater pumping while simultaneously decreasing recharge, both of which will lower the water table over time,[60] increasing pumping costs and risking the continued viability of the aquifer.[61]

Finally, the market-based reallocation of water from individual farms to cities cannot be viewed as simply a win-win for the individual farmer and the city. The exchange can create externalities that can devastate local communities. These include loss of farming jobs, loss of non-farming jobs associated with farming communities, reduction in the number of farmers paying to keep up a shared irrigation system (which requires a certain number of users for viability), unemployment related burdens on governance, and a drawdown of shared groundwater if the seller switches to groundwater use.[62]

In sum, the unexamined but significant externalities inherent a water market belie assertions of their benefits in addressing the needs of the environment and disadvantaged communities. In particular, who gets water use rights first, and how much, has a "major effect" on position and bargaining power of different parties.[63] A system that allocates ever-more water to the water wealthy will perpetuate and inflate these inequalities. The better political exercise is a broad conversation about water management among all Californians, one that includes strong voices for the waterways themselves.

If Used, Water Exchanges Must Be Restricted to Fixed Water Supplies and Clear Social Goals

As illustrated by the above examples, even if markets could work in theory for a public necessity like water, it will not work in practice in California. A statewide water market layered onto our current allocation system is destined to continue the dysfunctional status quo. However, re-allocations or exchanges within a basin could be used to more efficiently allocate water, so long as threshold environmental and basic human needs are safeguarded.[64] For example, minimum instream flows or maximum overall diversion amounts could be set with specific social and ecological goals in mind; *e.g.*, to improve waterway flows, build in precaution in light of climate change predictions, or prioritize water for a local community's basic needs. Other users of the water could, in theory, trade the allocation remaining after these needs are first met, *as long as* the original social and ecological goals were achieved, the amount of diversion did not increase, and externalities were addressed.[65] This, however, is not the "market" process in place or being considered today.

Ultimately, California's water goal should not be to "have a water market." And, if water exchanges are to be used as one tool to achieve sustainable ecological and social water use

goals, then exchanges must be used only in limited circumstances and cannot continue to be used to prioritize water for profit. We must constantly steward water toward larger societal and ecological goals, or we violate the trust that underlies the state's responsibility as trustees of California's water. This responsibility requires us to revisit our existing relationship with water, which is the overarching question before us and the issue we take up next.

REVISITING OUR RELATIONSHIP WITH WATER

"The present and future well-being and prosperity of the state depend upon the conservation of its life-giving waters . . . the very life blood of its existence." – Calif. Supreme Court[66]

Transforming Our Values and Water Governance to Meet 21st-Century Challenges

In the face of growing water challenges and increasingly antiquated water management systems,[67] we need to begin to "transform our relationship with water"[68] and "change entrenched [water governance] systems."[69] Such appeals for sweeping action reflect the broad scope of the problems before us. We cannot simply tinker at the edges of the system. Instead, we need to dig inside, starting with the water frame from which we view our challenges and develop our solutions. Ethics, an under-utilized but essential tool, helps us reframe our current, destructive paradigms around water and guide us to a successful path forward.[70]

Ethics addresses the "why" in the water decisionmaking process. Just as we need reliable quantitative data to make solid decisions, we similarly need qualitative information about the motivations, habits, traditions, and ethics that drive our decisions, consciously or unconsciously. The ethics of our decisions are more than rhetorical. They have real impacts. For example, Jevons Paradox[71] posits that while technological progress increases the efficiency with which a resource is used by reducing the amount necessary for any one use, it increases the rate of consumption of that resource by increasing supply and reducing price. The efficiency-driven increase in demand may still be less than the amount of efficiency savings. But it can negate the much larger savings we might have had if we had adopted a different water ethic, one that guided us to exercise more restraint.[72]

We constantly make choices grounded in our values, whether we realize it or not. With respect to water, California has largely accepted the ethics of the capital market, of water rights driven by "market forces that reflect a narrow set of economic values and political pressures."[73] Such an ethical choice fails to consider the interests of all Californians and California's ecosystems and species. By contrast, for example, native Californians accept ethical precepts that respect water as a gift, belonging to no one and shared equally by all.[74]

California's current water ethic, prioritizing water investments over societal and ecological health,[75] is reinforced by the court-driven nature of much of the state's water policy. The court system, though, "very often reflects the objectives and priorities of those with access to the courts to the exclusion of those stakeholders who do not" (including the environment and disadvantaged communities).[76] If California continues to act within its

current ethical framework, we can expect only more of the same – more prioritization of existing, profit-driven uses over ecological needs and basic human rights, more pressure to avoid data collection and public transparency, and more focus on immediate water gratification at the expense of future generations.

For example, recent expert water management reports suggest that California avoid mandatory conservation to minimize negative repercussions on business development,[77] conduct "endangered species triage" as a management strategy,[78] and create "fish zoos" rather than battle species extinction.[79] These recommendations are grounded in an ethic of water as capital, not water as life. Such an ethic will drain our waterways, lead to extinctions, and prevent water from meeting basic human needs.

Amending the water allocation system is never considered seriously under this ethic, even though it is widely acknowledged to be inequitable and inefficient, because the ethic of water as capital seeks to preserve existing allocations for future profits and trades. Even the middle ground of effectively amending some water use rights through regular application of the waste and unreasonable use doctrine, the public trust doctrine, and other protective laws[80] has been relatively ignored.[81]

Alternatively, California can change its ethical course to reflect the underlying essence of water as life-giving and undeniably public, rather than private and for-profit. California can do so by explicitly incorporating values into its water governance and evaluating various water management alternatives against the chosen ethical framework.[82]

One approach for developing a new water ethic is to begin with the premise that "all people and all living things should be given access to enough water to secure their survival before some get more than enough."[83] Governance based on such an ethic would work to ensure that water is allocated first for basic human and ecological needs.[84]

The Human Right to Water Act (AB 685, 2012),[85] for instance, states that "every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes." This ethic and right should be prioritized in agency planning, action, and accountability,[86] but it is not. For example, the State Water Board did not incorporate water as a human basic right in their drought curtailments, and have yet to adopt clear policy on ensuring water as a basic human right. Implementation and enforcement techniques could include a policy statement on reasonable use (*e.g.,* deep drilling that causes neighboring home supply wells to go dry is "unreasonable"), or funded adjudications.

Similar ethics can be found in environmental protection laws. The ethic of the capital market has overridden those values, however. The environment has been the "big loser" during the drought "as a result of the existing water rights system. The environment has been

hammered, already listed threatened and endangered species are in worse shape," and the water allocation system has not responded to these needs.[87] To overcome this barrier to protecting the lifeblood of the state, California should consider expanding its ethical framework to include not just the human right to basic water needs, but also the ethic that waterways "have intrinsic rights to exist and we have an intrinsic responsibility to respect those rights."[88] As water grows scarcer, we must prioritize an ethic of sharing.[89]

Taking Back Californians' Power of Affirmative Choice

Today, state decisionmakers generally allow the existing water rights priority system to direct water management choices, to the point where they have regularly waived environmental criteria and ignored needed waterway flows to prop up priorities. This need not be our path. We can make affirmative choices that incorporate the ethics of allocating a life-sustaining substance like water. We are only starting to question whether all diversions of water are morally the same, forgetting that we already make that choice by allowing currently inequitable, inefficient, and injurious diversions to continue. Water for the needs of the poor is disappearing as those with money dig deeper wells for profit. That is a moral choice, whether we own it as such or not.

For example, since June 2015, growers have planted 77,000 new acres of almonds and 27,000 acres of re-plants.[90] This translates to over 300,000 acre-feet of water per year of water demand, every year, for decades. Growers made that choice for Californians in 2015, in the fifth year of a severe drought, because to the growers, almonds are profitable. Whether they are the best use of California's rapidly contested and depleted waterways and aquifers remains unasked and unanswered.

We can publicly, explicitly choose social and ecological values to live by when we make allocation and use decisions. We do this already in land use law. Land use was first focused on who held title; then nuisance law and zoning were adopted. Today, we do not turn to land use titles every time we institute a land use regulation. Water, however, appears still mired in the title phase, with the focus on who has the more senior right rather than the best societal use of water. As with land use, regulating water diversions is a social and ecological issue, not simply a market transaction. We can and should move more confidently in that direction.

Water allocation has collective importance in California. Rather than continue to *de facto* choose existing water allocations that hurt Californians and the environment and destabilize our water supply, we can affirmatively create new opportunities for collective choice and moral accountability for results. Indeed, the courts have been supportive in this area, "propelling California into a new era of judicially and administratively supervised reallocations of its water resources, on the premise that water use is more a governmentally granted privilege than a privately held property right."[91] As reflected by the California Supreme Court, assessment of whether a water use is reasonable "cannot be resolved *in vacuo*

isolated from statewide considerations of transcendent importance," including the "paramount" consideration of the "ever increasing need for the conservation of water."[92]

We are not prisoners to our existing water allocation structure. We can take back our power of thoughtful, informed choice based on social and ecological criteria. We can choose to do this carefully, based on our values, or we can let climate change and commodification do it for us, in ways we may not like. We can choose to protect small towns and fish populations over further expansion of massive corporate farms. We can choose to prioritize growing healthy food for local (low greenhouse gas) consumption, over exporting luxury foods or heavily subsidized animal feed. We could support land retirement for positive social uses, such as wildlife habitat. We can do all this under existing law, including through the waste and unreasonable use doctrine, the public trust doctrine, and other protective measures that ensure that California's waters are respected for their life-sustaining essence.[93]

RECOMMENDATIONS TO MOVE TOWARD HOLISTIC THINKING AND DECISIVE ACTION

Our preferred water "solutions" today reinforce century-old water decisions that may make little sense under current conditions. Climate change, population growth, changes in patterns of water use, rapid species declines, and other pressures challenge us to create new, holistic water governance models that include the needs of all users, including the natural world. These models may acknowledge the water allocations that decisionmakers prioritize now. However, responsibility to present and future generations demands that we cannot continue to blindly defer to the governance status quo.

From California's beginning as a state, "water system development did not adequately provide for the consideration of instream and environmental values . . . Instead, the emphasis was on private property rights over public rights, reflecting the prevalent thinking of the time."[94] Because the water agencies were formed when California was rapidly developing, their design was based upon facilitating water consumption. One commentator has noted:

> The water agencies began as captured agencies and, even with the beginning stirrings of reform, they remained captured agencies. Their principal business remains the protection and advocacy of rights granted. . . The basic problem . . . is the insular nature of the water allocation decisionmaking process. Decisions are made by those who want to capture water, without any comprehensive analysis of the external impacts. This one-dimensional approach to water resource management causes unsound decisionmaking when viewed in the broader context of sustainable watershed management.[95]

Over the last century, the water governance system continued functioning in large part because new and additional water supplies eased potential shortages and conflicts among users.[96] However, future supplies will dwindle from over-extraction, aging infrastructure, and climate change, making this governance approach an anachronism.[97]

Decisions will need to be made that affect existing water rights, and those decisions must begin now in order to stave off permanent injury, most notably extinctions. Though it is transparently logical that fish need flows for survival, pushback on flows for fish continues, even in the face of increasing threats of extinction. Strategies for getting water to fish often seek to reduce conflict with existing water use rights. The voices of those most impacted the water rights system – fish and waterways, as well as disadvantaged communities – are mute by comparison. Ad hoc solutions, such as isolated water purchases, occasional fish rescues, and periodic monitoring cannot substitute for meaningful planning for waterway needs in the short- and long-term as an integral part of the state's water governance.

The focus on prioritizing senior (and where possible in the ongoing drought, junior) water allocation priorities regardless of the use of the water, to the detriment of environmental and human needs, reflects a lack of equity and justice that is becoming more visible each drought year. Some water use rights holders stridently uphold this inequity, asserting, for example, that "[t]here is no health and safety exception to the water rights system," and "[t]here is no way senior water rights holders are going to share the pain."[98]

Our current water governance system is reactionary rather than proactive;[99] is implemented without verifiable, real-time data; prioritizes increasing water supply and water consumption while ignoring ecological thresholds;[100] and treats water as a private commodity rather than the public, life-supporting good that it is. Reforms are needed, but they cannot continue to be made on an ad hoc basis. We need to take a thoughtful, broad, holistic view of our water governance system in light of the evolving understanding of water as life, as public, as environmental good – and incorporate the ethics of that understanding into our decisionmaking.

The state can begin to take these next steps by:

- Applying readily available but vastly under-utilized protective legal doctrines, such as the waste and unreasonable use and public trust doctrines;
- Developing and prioritizing instream water rights, to ensure that waterways' needs are highlighted in decisionmaking;
- Funding comprehensive data-gathering efforts on surface flows, groundwater levels, and water withdrawals and uses;
- Enforcing water use rights violations, including allowing for direct penalties for violating water right permits, and creating a streamlined process to act on violations of the waste and unreasonable use doctrine; and
- Simultaneously increasing agricultural and urban water efficiency and reducing demand, so that efficiency savings are not simply translated into more use.

These tools can be used to build ecological water governance from the ground up, with the state sponsoring local water policy discussions that involve broad citizen representation, rather than just professional water experts and large water stakeholders. This will be critical to transform state policy from one in which water is treated as a private good and allocated to entrenched interests, to one where water is treated as a public and environmental good essential to the health of all life in California.

Waste and Unreasonable Use Doctrine

By law, "no water rights are inviolable; all water rights are subject to governmental regulation."[101] Yet decisionmakers currently pay relatively little attention to some of the most powerful of these regulations, the waste and unreasonable use doctrine.

The waste and unreasonable use doctrine is a "fundamental limitation on the exercise of water rights."[102] Water Code Section 275 requires the State Water Board to "prevent waste, unreasonable use, unreasonable method of use, or unreasonable method of diversion of water in this state."[103] The California Constitution similarly provides that "the right to water or to the use or flow of water in or from any natural stream or water course in this State is and shall be limited to such water as shall be reasonably required for the beneficial use to be served, and *such right does not and shall not extend to the waste or unreasonable use* or unreasonable method of use or unreasonable method *of diversion of water*."[104] Even if there are vested water use rights, courts have refused to recognize a property right in the wasteful or unreasonable use, method of use, or method of diversion of water.[105]

The definition of an "unreasonable" use of water is not static; it "changes with circumstances, including the passage of time."[106] A water use that is reasonable in times of high precipitation, for example, may be unreasonable in times of drought.[107] The state Legislative Analyst's Office (LAO) recommended that the state implement its reasonable use requirements to "better reflect scarcity of resources," in part through reconsideration of state water allocation policy. The LAO adds that current water allocation strategies are "based on outdated policy that is in need of reform."[108]

The state is not unequivocally bound by prior water allocation decisions. We have the power to reconsider those allocations in light of new circumstances.[109] California has changed significantly in the last 100 years, with 36 million more people, entirely different systems of agriculture and industry, climate change, and escalating environmental degradation. What is considered wasteful and unreasonable use accordingly needs to evolve to meet societal and ecological goals. For example, new permanent crops in basins with declining groundwater could be considered unreasonable based on the doctrine. It is not reasonable to plant permanent crops that will need water for three decades over – at best – an uncertain water supply.

Redirection of wasteful and unreasonable uses of water towards basic human and environmental needs should be a priority in developing and implementing the state's water vision and policy. Craig M. Wilson, long-time Chief Counsel of the State Water Board and later the state's Delta Watermaster, declared that "the inefficient use of water is an unreasonable use of water," and that the waste and unreasonable use doctrine "can comprehensively address the inefficient use of water in California."[110]

Mr. Wilson recommended that the state employ the reasonable use doctrine *proactively* (rather than solely in enforcement actions) to promote more efficient water use or methods of use.[111] He recommended more specifically that the doctrine be used to:[112]

- Create a Reasonable Water Use Unit within the State Water Board's Division of Water Rights, which would enforce the prohibition against the waste or unreasonable use of water, with a focus on using doctrine to promote more efficient use of water in a wide variety of settings;
- Streamline the procedures for enforcement actions against waste and unreasonable use, starting with the issuance of a Cease and Desist Order;
- Conduct one or more adjudicatory proceeding(s) regarding inefficient agricultural water use;
- Employ the reasonable use doctrine to promote more efficient agricultural water use or methods of use, including water delivery system/irrigation scheduling improvements and improved conservation practices; and
- Revise state water plans to specifically incorporate the efficient use of water, pursuant to the doctrine.

The waste and unreasonable use provisions can provide important guidance in allocating water first toward need, and then towards efficient and equitable allocation priorities (*i.e.*, that maximize social and environmental well-being) after basic needs are met. As recommended by the state Legislative Analyst's Office, the "enactment of legislation to provide an updated, comprehensive definition of the reasonable use of water to be used in the water rights permitting process would be a beneficial first step" in the process to "realign the water rights system to better reflect modern needs and circumstances."[113]

Public Trust Doctrine

The public trust doctrine similarly provides a powerful yet under-utilized tool to allocate the public's water in the public interest.[114] As with the waste and unreasonable use doctrine, "no party can acquire a vested right to appropriate water in a manner harmful to public trust interests."[115] Additionally, "the state has 'an affirmative duty' to take the public trust into account in regulating water use by protecting public trust uses whenever feasible," including when making planning decisions and water allocations.[116] Some have argued that the "recognition of the public trust doctrine in water law is the single strongest statement that historic uses must accommodate modern needs."[117]

Like the waste and unreasonable use doctrine, the public trust doctrine evolves over time according to changing social values. The California Supreme Court has ruled that "[t]he doctrine is 'sufficiently flexible to encompass changing public needs,'" and accordingly California need not be limited to "apply[ing] the doctrine according to an outmoded classification."[118] While the doctrine was initially applied only to protect navigable waters,

the courts have repeatedly extended it to protect wildlife,[119] recreational and ecological values,[120] and species and tidelands.[121] When making allocation decisions, the state has an *affirmative obligation* to protect these public trust systems.

Despite the importance of the public trust doctrine in protecting the public's water, the number of public trust doctrine actions to protect waterways has been relatively low. The groundbreaking *Audubon* public trust case, addressing Mono Lake,[122] has proven to be the exception rather than the model. Critical waterways such as the Bay-Delta Estuary continue to suffer in the face of under-utilization of the doctrine, despite decades of discussions. The decline in populations of Delta Smelt, Chinook salmon, Central Valley steelhead, tule perch, and other native species over the last several decades has been well documented and widely recognized.[123] The Brown Administration has acknowledged that "the status quo in the Delta is unacceptable."[124] And the State Water Board has recognized that "[t]he best available science suggests that current flows are insufficient to protect public trust resources."[125] However, meaningful action under the public trust doctrine still remains to be taken in the Delta.

Facilitation of water transfers and markets, which is gaining increasing traction as a water management strategy, focuses the state "myopically on the areas of export and import," rather than its "constitutional public trust responsibilities and its regulatory obligations."[126] While transfers may be a useful tool in limited circumstances involving planned, fixed water quantities, they must implement an overarching water vision and plan, *not* substitute for it.

Stronger enforcement of the state's public trust responsibilities is critical to planning and acting for the future health of our waterways. This has included targeted litigation as needed, but some scholars also believe that "an administrative forum can be a promising focus for [public trust] reform," through "more effective integration into the larger system of administrative environmental law."[127] Recommendations for more streamlined and effective administrative application of the public trust doctrine include such strategies as:

- Instituting a default schedule at the State Water Board for periodically reviewing the public trust impacts of existing water use rights;[128]
- Establishing a policy at the State Water Board of reconsidering public trust obligations any time a federal decisionmaking process involves an assessment of the public trust impacts of existing water rights;[129]
- Obligating water users to participate in or provide financial support for an ongoing monitoring program that assists the State Water Board in fulfilling its obligation to continuously reevaluate water uses;[130]
- Enabling the State Water Board to demand information from water users whose activities may create significant public trust impacts;[131] and

- Requiring the State Water Board to better apply information – such as from ESA Section 7 consultations – about the public trust impacts of water use under pre-established rights.[132]

Instream Water Rights

Despite the fragility of California's water-dependent ecosystems, its long dry spells, and its escalating number of threatened and endangered aquatic species, water governance over the last century and a half continues to be driven largely by a "first in time, first in right" race that rarely accounts in practice for environmental needs. People may hold rights to divert water from waterways for human uses, but waterways have no equivalent rights to retain clean water sufficient to maintain their health, or the health of their dependent ecosystems and species.

Waterways' needs are addressed only indirectly, through such methods as conditions in permits, requirements to prevent waste and unreasonable use, Section 5937 water releases,[133] and the public trust doctrine. None of these otherwise important tools have been enforced in any meaningful way, in part because they are not on par with actual water use rights. The result has been a dangerously well-trod path of use, overuse, environmental decline, and hasty, ineffective reaction.

This pattern can only begin to be broken by recognizing waterways' right to be at the planning table from the beginning, rather than at the end after the die is cast and the damage is done. If water rights are the legal system by which water is allocated to humans, then the law should also recognize the inherent rights of rivers to flow, and the rights of fish to swim. Such laws would level the playing field for waterways and better guide us to modify our behavior to reflect their needs.

The relative lack of attention in water law to instream needs only reinforces California's antiquated prioritization of existing water rights based on seniority. Change can occur now in California to recognize instream water rights through existing regulatory mandates.[134] In addition, other jurisdictions specifically recognize the inherent rights of waterways to flow in law. Examples, such as Santa Monica's aquifer rights ordinance, Oregon's instream water rights program, and Ecuador's constitutional amendment for nature's rights, are discussed further in Appendix 3.

Data Collection and Transparency

Whatever legal tools we use, we must as a state focus far more attention on the development and distribution of water data. Information, including real-time information, is critical to effective decisionmaking, but has been relegated to low-priority status in California. As reported by the state's Little Hoover Commission, the state "lacks the comprehensive view

of water use and demand needed for meaningful management and long-term planning."[135] Missing information includes:

- Minimum flow needs of surface waters (including species) and aquifers statewide, and at specific times of significance. These flow needs must be incorporated into water allocation decisions. Key priorities for immediate action (such as completely dry waterways and/or critical habitat for threatened fish) should be identified and addressed swiftly, such as through interim flow proxies as flow needs are being developed.[136]
- How much water is withdrawn and how much is put back, and where and for what purposes.
- Who holds what kind of proven water use rights and for what activities.
- How much water is withdrawn illegally (and where and how much), and which enforcement efforts are needed and ongoing.
- Which communities require additional clean water consistent with AB 685's human right to water, and what is the schedule for and status of action on these priorities.
- Best estimates of the impacts of climate change and droughts on water supplies and sources, and needed precautionary cushions (such as on water allocations) to prevent and minimize such impacts. This should be regularly course-corrected based on updated data.

Importantly, all water accounting information should be made publicly available, in the interests of transparency and efficient management of the public's water.[137] Studies have shown that the public strongly considers water information and applies that information in its policies preferences. For example, Stanford University's Hoover Institution found in a recent study that:

> . . . with no information, only 29 percent favor and 39 percent oppose reallocating agricultural water. When told that agriculture currently uses 40 percent of California's water, 38 percent favored and 36 percent opposed. When a third group was told that agriculture uses 80 percent of the water put to human use in California, the numbers shifted to 47 percent in favor and 30 percent opposed.[138]

Moreover, real-time data helps people feel more connected to the waters of the state, further increasing the likelihood of their active engagement on an issue of such importance. One suggestion that has been made is to approach interested utilities to include river flows and species with customer water information, to tie the consumer with the range of interests and values associated with water. The public can and should be an integral partner in state planning and action around water. Information is critical to their meaningful engagement, and should be a top priority for the state.

Enforcement

The state must prioritize enforcement and make it more streamlined and equitable. The state's ability to enforce against water quality violations far exceeds its authority to enforce against water use rights violations – yet both are integral to the health of waterways. As the U.S. Supreme Court has concluded, the distinction between water quality and quantity is "artificial" because (logically) "a sufficient lowering of the water quantity in a body of water could destroy all of its designated uses, be it for drinking water, recreation, navigation or . . . a fishery."[139]

Despite the critical importance of meaningful enforcement, funding remains inadequate and reforms have been few, particularly as compared with more developed enforcement structures such as in Australia.[140] Among other reforms, California must enhance enforcement in the water use rights arena by:[141]

- Allowing for direct penalties for violation of the terms and conditions of a water right permit or license; and
- Creating a streamlined process to act on violations of the constitutional prohibition against the waste or unreasonable use of water.

Even where the state does take enforcement action, there is often a long time lag before the water violation ceases and water can be returned to waterways. Adjusting existing water use rights on behalf of waterways after a successful legal action can take years under existing regulations. This is the reason the State Water Board adopted, under the Administration's emergency drought authority, injunctions on water withdrawals pursuant to curtailment proceedings (that is, to prevent delays in implementation due to the lengthy appeals processes allowed under current regulations.) Significant attention needs to be paid to this obstacle to water reform to ensure streamlined implementation of legal mandates to put needed water back into streams.

Conserving Water and Reducing Demand on Waterways

The state can and must invest now in aggressive, diversified strategies to reduce demand and increase supply in cost-effective, efficient ways. First, both urban efficiency and agricultural efficiency should be mandated. Given that agriculture consumes up to 80% of California's developed water supply,[142] any meaningful efforts to reduce water use across the state, increase the amount of water in waterways, and address the needs of water-poor communities must include stricter controls on agricultural water use. For example, improved irrigation efficiency is both essential and possible.[143] Conservation also needs to be applied broadly, as Australia discovered in reacting to its Millennium Drought.[144] All Californians need to take part in the conservation and stewardship of their waters.

Water use efficiency improvements need also to be tied to specific policies that ensure that increases in availability do not translate to increases in demand. For example, the state could tie water allocations to water conservation technology, much as the Clean Water Act technology-based standards force dischargers into ever-better wastewater controls. The waste and unreasonable use doctrine could help achieve this shift. The Legislative Analyst's Office opined on this topic, recommending that the state:

> . . . undertake a concerted effort to realign the water rights system to better reflect modern needs and circumstances. For example, . . . *where water is required for agricultural purposes, the water right should mirror only the amount of water needed to grow a crop using available water efficiency technology. Similarly, urban water rights should reflect the use of cost-effective water conservation and efficiency measures*. By realigning water conservation and efficiency efforts with water rights, overuse of water simply to maintain a water right could be reduced and that water would be available for other purposes . . . This modernization of the water rights system could start [with] the enactment of legislation to provide an updated, comprehensive definition of the 'reasonable use' of water to be used in the water rights permitting process.[145]

Improvements in conservation, such as seen during the recent, State Water Board-mandated urban conservation directive, should be tied to new water allocation structures that prevent the backsliding California witnessed after the mandatory conservation restrictions were lifted.[146]

Water efficiency and conservation improvements can be combined with recycling and reuse measures to see even more savings, with studies finding up to 14 million acre-feet of water per year available through recycling, efficiency measures,[147] and stormwater reuse.[148] The Los Angeles Economic Development Corporation ranked conservation and "local stormwater capture" as the most cost-effective, energy efficient, relatively immediate water sources available to Southern California.[149] A publicly transparent focus on using such strategies first will avoid the experiences of Australia, where

> . . . careful planning . . . was set aside by political decisions . . . result[ing] in over-investment in large-scale infrastructure that is expensive, energy-intensive, subject to unfavorable contractual terms, and in many cases not actually used, resulting in costly stranded assets that will need to be paid for by the community for decades, well ahead of when they may be needed.[150]

Rather than over-investment in energy intensive and large-scale infrastructure, which also takes significant time to ensure water rewards to waterways and communities, the state Legislative Analyst's Office recommends using a "least cost, highest gain" approach, in which the state places urban and agricultural efficiency at the top of the strategy list.[151]

Figure 2: Assessing Southern California Water Strategies[152]

Assessing Southern California Water Strategies

Strategy	2025 Regional Potential (TAF*)	Typical Project Characteristics							
		Timeframe (years)	Drought-Proof (Reliability)	Risk (Project Aborted)	Enviro Opinion	GHG	Initial Cap. Cost ($millions)	Annual Oper. Cost ($millions)	30-yr cost Treated ($/AF)
Strategies to Replace or Augment Imported Water									
Urban Water Conservation	1,100+	0-2	Favorable	Favorable	Favorable	Favorable	$0	$0.5	$210
Local Stormwater Capture	150+	3-5	Unfavorable	Favorable	Favorable	Favorable	$40-$63	$1-$3.5	$350+
Recycling	450+	6-10	Favorable	Neutral	Favorable	Neutral	$480	$30	$1,000
Ocean Desalination	150+	6-10	Favorable	Neutral	Unfavorable	Unfavorable	$300	$37	$1,000+
Groundwater Desalination	TBD	6-10	Favorable	Neutral	Neutral	Neutral	$24	$0.7	$750-$1,200
Strategies to Increase Imported Water									
Transfers-Ag to Urban	200+	1-5	Neutral	Unfavorable	Neutral	Favorable	n/a	n/a	$700+
Strategies to Increase Reliability									
Inter-agency Cooperation	**	0-5	Favorable	Neutral	Favorable	Favorable	low	low	n/a
Groundwater Storage	1,500+	3-5	Neutral	Neutral	Favorable	Neutral	$68-$135	$13	$580
Surface Storage	0	10+	Unfavorable	Unfavorable	Unfavorable	Neutral	$2,500+	$7.5-$15.5	$760-$1,400

*TAF-Thousand Acre-Feet
** Improves reliability and efficiency of existing supplies
Source: LAEDC

Favorable | Neutral | Unfavorable

Despite their proven, substantial benefits, measures to cost-effectively decrease demand and consumption of water have not been prioritized to the extent necessary to solve California's water crisis, and certainly have not been implemented across all users. In 2015, NRDC issued a report grading California with a B in urban water conservation and efficiency, B- in recycling and reuse, D in stormwater capture and reuse, and D in agricultural water conservation and efficiency.[153] By contrast, Australia spent billions on successful urban retrofits and efficiency that created permanent, meaningful changes, not temporary changes that vary with the issuance of state mandatory conservation decrees.

Further, California has paid relatively little attention to how water is being used. The recent planting of tens of thousands of new acres of water-intensive crops – during a drought and over uncertain groundwater supplies – would have received more scrutiny if the state were serious about effectively attending to its water challenges. Australia's water management policies effectively fallowed a significant part of their irrigated land, a strategy that has yet to be considered in California at even close to the level in Australia.[154]

Finally, the state has yet to seriously consider measures to redirect conserved water – particularly water conserved with public funds – back to environmental uses.[155] For example, at least some significant portion of water conserved with public funds (such as Proposition 1 bond funds) should be permanently dedicated to instream use with the original priority date. Requiring that some or all conserved water remains instream will help ensure that publicly-

funded flow restoration projects are not negated by new, off-stream consumption. Oregon has successfully implemented this type of model through its Allocation of Conserved Water Program, which allocates back instream at least 25 percent (after mitigating effects on other legal water users) of water conserved through certain activities.[156] California should implement similar approaches as appropriate.

CONCLUSION: WATER GOVERNANCE FOR THE 21ST CENTURY

The state's water management structure is woefully inadequate and will fail to support the needs of the environment and communities in the face of coming challenges. While we must significantly enhance implementation of important tools such as the waste and unreasonable use and public trust doctrines, improve data collection and distribution, increase enforcement, and implement sound conservation strategies, these steps will not be enough to ensure sustainable water management and healthy waterways. More holistic, thoughtful, and values-driven planning for California's water future – by Californians – is needed.

This is a challenge to which Californians must now rise. A 21st century solution to modern problems requires asking both the "why" and the "how" of managing water. Water management in the hands of the water experts is about the "how" of managing water. The "why" questions – those that address values and vision – "need to be asked, debated, and resolved by civil society, all of us together."[157] To reflect the needs of society as a whole, including future generations, we need the ordinary people of California to have their voices heard in the decisionmaking, rather than leave it to the "powerful elite"[158] or to those seeking ever-broader privatized control of water. Democratic accountability for the protection of the state's water future is key, and the public must not only be part of that discussion, but active participants in ensuring that agreements are implemented.

Moreover, we need to ensure input from a diversity of people and disciplines.[159] For example, sociologists were crucial to transforming the conversation about climate change worldwide. They similarly can help create new, ethical, factual frames around water for the modern era. Further, because values do not make themselves readily visible in traditional water policymaking forums, efforts for water reform should reach out for broad input, rather than convene primarily around water experts.[160]

Finally, the waterways themselves should be represented in such discussions. For example, the state could appoint independent "guardians"[161] – such as water masters with scientific expertise – to speak for the waterways' interests (as opposed to defining waterway requirements based on desired human demands).

How do we begin this discussion? The state currently does not have a structure to encourage it, but movement forward can nonetheless start now. For example, statewide polling efforts can be conducted both to inform water managers as to public perceptions about water, and to educate the public on water issues. The results can help create and bolster necessary political will. Local pilot programs, such as town hall discussions on how to move toward water sustainability and improve self-sufficiency, can provide other first steps.

Appendix 4 also illuminates lessons from past water commission reports, California's energy crisis and subsequent reforms, and redistricting in California to help us transform water governance.

Will we as Californians choose to define "highest need" through a values-blind economic system? Or will we recognize the public nature of water, to be allocated first to sustain the waterways that sustain us, and ensure that we care for all Californians? This paper has argued for the latter path. We must forge a new California water ethic, one that charts a successful path for the future by embracing the values of stewardship and care.

Appendix 1: Current Water Management Strategies and Gaps

Strategy: Markets

Water markets ostensibly "enable [] the temporary, long-term, or permanent transfer of the rights to use water in exchange for compensation."[162] They have been presented as a silver bullet to California's pressing water challenges. But the implication that water markets will help bring stability and efficiency to California's water system is based on a suite of unquestioned assumptions. In fact, water markets in practice simply reallocate water uses and, in doing so, can actually increase consumptive demand.

For example, if an urban developer purchases water from an agricultural user who switches crops or fallows land, this market transaction brings new, relatively inelastic residential demand online, rather than conserved supply that could have been used to satisfy the unmet needs of natural systems or existing, under-served human communities. This pattern reinforces the inequities and inefficiencies of the existing water allocation system, which itself ignores water's nature as a life-giving substance that the state holds in trust for all. Markets as a system are inherently antithetical to the state's mandatory fiduciary responsibility. Specific examples of the inherent incongruity between a public and environmental good like water, and the workings of the market system as defined by economists, are provided in Appendix 2.

Strategy: 1707 Transfers

Water Code Section 1707 transfers allow any water use rights holder to petition for a change in use for purposes of "preserving or enhancing wetlands habitat, fish and wildlife resources, or recreation in, or on, the water."[163] Such a transfer will be approved as long as it does not increase the amount of water the person is entitled to use and it does not unreasonably affect any legal user of water.[164]

However, the provision has not had the desired effect in improving instream flows. Over the past two decades, just 37 petitions for 1707 instream water transfers have been sought from the State Water Board.[165] Of these, 35 have been approved, with 16 of the 35 for long-term or permanent dedication.[166] Moreover, most of the approved environmental water transfers have involved relatively small volumes of water, raising the question of how effective this tool has been at actually increasing instream flows in a way that meaningfully impacts the environment.[167]

There are several potential reasons that the 1707 transfers have not been widely used, including a relatively lengthy approval process,[168] funding issues, and uncertain

environmental results. First, on average the state approval process is 16 months for permanent and long-term transfers and over four months for short-term transfers, which is especially problematic since short-term dedications are only valid for a year or less.[169] Approval processes take even longer for smaller dedications by NGOs and individuals,[170] as opposed to larger transferring entities such as the Bureau of Reclamation, federal agencies, and water districts. Second, a lack of funding and tax incentives for instream dedications has deterred instream dedications (unlike similar land conservation easement dedications, instream flow dedications are not tax deductible).[171]

Finally, specific instream dedications and transfers are unlikely to have a large impact on species and ecosystem protection without broader water governance changes. Because there are no set guidelines on monitoring of instream dedication projects, there are relatively little data on their efficacy. Where there are data, however, the efficacy in improving conditions with environmental transfers so far has been low.[172]

For example, the Environmental Water Account (EWA),[173] a large, taxpayer-funded program created in 1999 to provide environmental managers with supplemental flows to support the Delta's threatened and endangered native fish species, failed to thwart the collapse of these fish populations[174] despite over $158 million spent in the first five years.[175] Based on available data, the program likely increased the survival of winter-run Chinook salmon by only 0 to 6 percent, adult delta smelt by 0 to 1 percent, and juvenile Delta smelt by only 2 to 4 percent.[176] As discussed in Appendix 2, this result occurred in part because of misuse of EWA funds that allowed at least tens of millions in funds to be siphoned away for paper water with no environmental benefit. In spite of this questionable efficacy, and the lack of guidelines to measure the cost-effectiveness of 1707 transfers or other environmental water transactions,[177] Proposition 1 provides nearly $200 million for stream flow enhancements that include environmental water transactions.[178] More attention needs to be paid to the expenditure of such limited public funds to ensure they result in permanent, long-term instream flows.

In sum, while some transfers have been successful at protecting certain localized stream reaches or parts of fish runs, these efforts by themselves have not been as impactful as policymakers had hoped. Broader water governance reforms are needed, with transfers as one tool, not the main strategy, for improving waterway and aquatic species health.[179]

Strategy: Curtailments

The State Water Board has the authority to issue curtailments that command particular users to stop diverting surface water, authority it has used almost exclusively to protect senior water rights holders. When there is insufficient water available to meet the demand of all users in a watershed, as was the case in the recent drought, water use rights are curtailed in order of seniority – the most junior water use rights holders are the first to be told to stop

diverting water in order to protect the rights of more senior right holders. The State Water Board curtailed water use rights throughout California during the 1976-77 drought, as well during the 1987-88 drought.[180] The State Water Board then curtailed junior water use rights in 2014,[181] and both junior and some senior water use rights in 2015.[182]

The State Water Board has curtailed diversions to protect uses other than those associated with senior water use rights only once: in 2014, the State Water Board adopted drought emergency regulations[183] to protect threatened species of anadromous fish on three creeks (Mill, Deer, and Antelope) by stipulating minimum instream flow requirements.[184]

The high bar for curtailments to protect environmental uses (or junior water rights holders, or the public) contrasts sharply with the policy of protecting senior water use rights under essentially all circumstances, simply because of asserted seniority and regardless of the fairness or societal impacts of such decisions. The flawed ethics of this approach has made water curtailment actions "highly controversial":

> Many water users questioned the fairness of curtailments, which . . . failed to consider the efficiency of use and other factors. Critics also argued that the board did not identify amounts required to meet urgent public health and safety needs or the needs of the environment. By law, these factors must be considered along with seniority, and in some circumstances they may take precedence over water rights.[185]

The Water Board has significant authority to subordinate senior water use rights to other environmental and social needs based on the "reasonable use" requirement of the California Constitution (Article X, Section 2), the Public Trust Doctrine, Fish and Game Code Section 5937, the federal and state Endangered Species Acts, and other laws.[186] As observed by decisionmakers,

> The recent experience with curtailments has highlighted important gaps in both common understanding and practice regarding protections for public health and safety and the environment in the surface water allocation process. Although these public interests can take precedence over water rights seniority, the water board has lacked a systematic policy on how to factor them into the curtailment process.[187]

Development of this "systemic policy" to account for public and environmental interests in water is essential if California is to be prepared to weather the water challenges to come, particularly in the face of climate change.

Strategy: Temporary Urgency Change Petitions

The State Water Board's demonstrated preference for implementation strategies that prioritize senior water use rights holders over the environment and disadvantaged communities also extends to waiving environmental flow and water quality standards. The state has waived such standards dozens of times during the drought through approval of "Temporary Urgency Change Petitions" (TUCPs) by water rights holders, who filed to ensure they would keep receiving expected water.[188] TUCPs attempt to waive Clean Water Act and other requirements under the assertion of a drought "emergency,"[189] despite the fact that droughts regularly occur in California.[190] TUCPs allow increased withdrawals from waterways than would otherwise be prohibited under water quality and flow standards, even where species extinctions are imminent.

From early 2014 to July 2015, a total of 38 TUCPs were filed. Out of these 38, only three were denied.[191] Most approved TUCPs were for changes in flow requirements to allow continued diversions from already-stressed waterways. Some TUCP orders also included waivers of water quality standards, including temperature and dissolved oxygen standards. According to Water Board staff, these changes shifted more than one million acre-feet of water from habitat support to agricultural and urban use.[192] Lawsuits asserting the illegality of these actions are pending, arguing that the waivers attempt to effectively change water quality standards in violation of law.[193]

Strategy: Desalination

California has also been looking to desalination as a potential answer to water challenges. However, as described further in Appendix 2, this solution involves high infrastructure costs,[194] intensive energy use, high energy input costs, high greenhouse gas emissions, detrimental marine impacts, and potential privatization of the urban water supply system.[195] Experts estimate that desalination uses 15,000 kWh per million gallons of water produced, making it is one of the most energy intensive and expensive ways of procuring fresh water.[196] To the extent electricity is fossil fuel-based, desalination increases greenhouse gas emissions and exposes consumers to energy price volatility.

The desalination process is also detrimental to marine ecosystems. All of the operating and proposed plants in California discharge highly concentrated saline brine, which also contains toxic chemical additives and heavy metals.[197] When brine is disposed into the ocean, it is typically twice the salinity of ocean water, and so it sinks to the ocean floor, depleting dissolved oxygen levels and affecting fragile marine ecosystems.[198] When desalination plants use open ocean intake systems, as proposed for all significant regional facilities now under consideration, marine organisms are killed or injured by impingement (becoming trapped by the intake screen) and entrainment (where small organisms pass through the intake screen and are killed during processing).[199]

Finally, Australia's costly lessons desalination plants mothballed in light of successful conservation and efficiency programs[200] should sound a cautionary note about investing in desalination before fully implementing lower-cost and more effective water strategies.

Gap: Effective Groundwater Oversight

Governor Brown concluded that "it is imperative that California now take steps to initiate more effective management of groundwater resources" – *in 1978*.[201] Almost 40 years later, the Department of Water Resources estimates that "groundwater extractions exceed natural recharge at a rate of approximately two million acre feet per year,"[202] and that "groundwater levels have dropped 50 feet below historical lows, with levels in many areas in the San Joaquin Valley more than 100 feet below previous historic lows."[203] Excess groundwater pumping, especially during the drought, has led to land subsidence of more than a foot a year in parts of the southern Central Valley, plunging water tables and drying up drinking wells in rural communities.[204] By July 2015, California residents had reported more than 2,000 dry domestic wells.[205] Without reliable access to drinking water, these communities are typically dependent on temporary and unsustainable solutions like trucking in bottled water or delivering water to temporary holding tanks.[206]

The remaining groundwater is often contaminated. Approximately 3.7 million people (many within rural and low income communities) who are 100 percent reliant on groundwater as their source for drinking water are withdrawing contaminated water.[207] An estimated 680 community water systems in California are contaminated,[208] and increased groundwater pumping such as seen during the current drought will worsen contamination problems.[209]

In 2014, Governor Brown signed into law the Sustainable Groundwater Management Act (SGMA). Chapter 4 of the SGMA creates guidelines for establishing local groundwater sustainability agencies to manage each basin.[210] The effectiveness of resulting plans is limited, however. For example, any reduction in groundwater pumping determined by a management plan must respect existing water use rights or property rights.[211] Additionally, formation of management agencies is not required until 2017,[212] management plans do not need to be developed until 2020 or 2022,[213] and management plans need only be written to achieve sustainable management within 20 years of implementation.[214] Thus, even if the statutory timeline is rigorously followed, sustainable groundwater use will not be achieved until at least 26 or 28 years after passage of the Act, likely too late for some communities.

For example, In the Monterey County portion of the Salinas Valley, agriculture uses 92% of the water. Agriculture had record pumping and record productions values during the drought, while municipal wells and small system wells went dry in 2015 and will likely go dry again this summer. SGMA offers no relief for this system for decades, and agricultural water

users are maneuvering to control the SGMA planning process, potentially in a way that preferences irrigation over other uses. As one local advocate offered, "It's a race to the bottom. Small communities seek state loans to drill deep wells and large farms will drill even deeper wells. Small systems will be supplied with bottled water – which brings new meaning to the Governor's call for shorter showers."[215]

Finally, even where management plans are properly and timely prepared, SGMA sets a protective standard so low that meaningful reform may still remain a distant hope. The statute defines "sustainable groundwater management" as "management and use of groundwater in a manner that can be maintained … *without causing undesirable results*."[216] The statute then defines "undesirable results" as including "one or more of the following effects":

> (1) Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued…
> (2) Significant and unreasonable reduction of groundwater storage.
> (3) Significant and unreasonable seawater intrusion.
> (4) Significant and unreasonable degraded water quality…
> (5) Significant and unreasonable land subsidence that substantially interferes with surface land uses.
> (6) Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.[217]

In other words, SGMA plans will not ensure the long-term health of groundwater basins. Rather, they are only required to prevent them from being significantly and unreasonably drawn down and polluted – essentially the status that they exist at today. Stronger intervention is needed, now, including immediate moratoria on new, permanent crops in water-stressed basins.

Gap: Data on Water Diversions and Use

As discussed above, it is widely accepted that "California's water monitoring systems are primitive, with significant gaps in critical information. The resulting uncertainty creates inefficiencies, reduces transparency, and fosters conflict."[218] Every element of the state's water management system depends on readily available, up-to-date (preferably real-time), publicly accessible, sufficiently comprehensive data in order to work effectively.

The water use rights system in particular requires "improved quantification . . . of water rights," including "accurate knowledge of how much water is being used."[219] This recommendation was first made over a century ago, when the 1912 Water Commission found that it is "impossible" for the state to protect and regulate the waters of the people "unless it

knows what valid appropriations and other rights are in existence" and how much water is available to be granted.[220] Over a century later, the state has still failed to achieve this basic but essential task.

For example, the State Water Board issued an informational order in conjunction with emergency curtailments in the Russian River Valley that itself revealed at least 130 previously unreported and unknown surface water diversions in just that area.[221] Yet even with this newly acquired information, the State Water Board admits that it still cannot accurately estimate the number of water wells, the location of the wells, or the current demand for water in the Russian River basin.[222] It is disappointing – if not surprising – that so much is unknown about the water availability and use on tributaries so critical to the survival of threatened and endangered species in the area. Accurate data on both surface water and groundwater use will be critical to effectively managing our water use statewide going forward.

Gap: Instream Water Rights and Protective Flow Standards

As described above and in Appendix 3, the governance imbalance between waterways and humans must be corrected before California can achieve sustainable waterway health. Water law in California assigns water use rights only to humans, for diversions out of the waterway to serve human uses. Yet how can we assert rights to something that does not itself have a parallel right to exist? Like other state and national governments, California must consider development of a system of prioritized instream water rights for waterways to address this imbalance.

California's lack of attention to waterway health extends to its dearth of protective instream flow standards. Standards that exist are far out of date, not protective, and have been repeatedly waived through TUCPs. By contrast, at least ten states and several tribal governments have adopted instream flow standards that are consistent with the Clean Water Act – reinforcing the states' and tribes' commitment to flows by linking standards with strong enforcement tools.[223] One state regulation asserts, for example, that "Stream or other waterbody flows *shall* support the fish and aquatic life criteria."[224]

Unfortunately for California's waterways, however, little has changed since the 1978 Water Commission recommended that the state develop comprehensive instream flow standards.[225] Various strategies have been suggested for setting and enforcing instream flow standards broadly, but the slow movement forward has been limited only to a small handful of waterways.[226] We must specifically commit to protecting waterways' rights to flow, with metrics, deadlines, and enforcement measures, for that result to occur.

Gap: Enforcement

As addressed above, responsible regulation of water use rights necessarily includes enforcement. But the State Water Board estimates based on available data that illegal diversions may be over 40 percent of the number of active permits and licenses (the terms of which are also violated).[227] While more attention has been paid to enforcement in recent years, action is still sparse in the face of the mounting problems. The Water Board has triaged this effort with a focus on enforcement where the basis of water use rights is unknown.[228] Even then, formal actions are rare. More frequent informal actions to remedy permit violations and illegal diversions have proven vastly insufficient, in light of the challenge before us.[229]

For example, the State Water Board Executive Director Reports indicated that from January 2012 through January 2016, the state issued 110 Administrative Civil Liability (ACL) complaints but only 32 ACL orders, for a total over the four years of only $164,800 in ACL fines.[230] In another example, the Water Boards' Annual Performance Report show that revocation of water use rights (permits, licenses, etc.) peaked in fiscal year 2009-2010 at 395; only 26 were revoked in the 2014-2015 fiscal year, in the height of the drought.[231] Finally, the same Performance Reports show that ***all*** penalties, in total, assessed over the six-year period from 2009 to 2015 for water use rights violations totaled only just under $760,000.[232] Given the enormous private profits that can and do arise from the use of water in the state, the state's inattention to enforcement deprioritizes, and in many cases violates, the state's fiduciary duty to protect water, a public and environmental good.

The state can and must take action to make enforcement more streamlined, equitable, and funded. Compared to its water quality authority, the State Water Board's water rights monitoring and enforcement authority is relatively weak. Deficiencies include but are not limited to the fact that:[233]

- There are no direct penalties for violation of the terms and conditions of a water right permit or license. The State Water Board may only impose penalties where the violation amounts to an unauthorized diversion or use of water, or where the State Water Board has already issued a Cease and Desist Order for the violation and that violation continues.
- For violation of the constitutional prohibition against the waste or unreasonable use of water, a convoluted process of issuing an order finding a violation, issuing a Cease and Desist Order of continuing violation, and then conducting a third proceeding to impose ACL must currently be followed, delaying important corrective action.

The state water management report raising these issues concludes that "the enforcement program in the water right arena should be enhanced to approach that of water quality

enforcement authorities," such as the Clean Water Act. This recommendation should be prioritized for follow-up and action.

Appendix 2: Privatization of Water and Abuses of Public Trust

Wealthy business interests, often working in tandem with state government, have repeatedly abused and contorted water law through the water rights system, pushing for preferential treatment for some to the detriment of the public and the environment. To address this problem, the state needs to regroup around the letter and purpose of the Water Code, which is to manage the waters of the state in trust for people and the environment.[234]

Example: The Monterey Amendment – Giving Away Water Entitlements and Infrastructure

In a closed door negotiation, the California State Water Project's (SWP) largest contractors and the Department of Water Resources (DWR) rewrote central principles of California water policy and priorities in the Monterey Amendment of 1994.[235] This agreement arose from threats of litigation over SWP entitlements, which had been severely restricted by drought in the early 1990s and by federal court decisions recognizing threatened fish species in the area.[236] The SWP originally mandated that in the event of a temporary shortage, agricultural contractors would have their supplies reduced first before reducing water supplies for all users; if a permanent shortage existed, the SWP would reduce all entitlements.[237] In reality, a long-term shortage does exist because the state never completed the SWP. While the original plan promised 4.23 million acre-feet of water a year – an amount on which DWR's long-term entitlements were based – the actual supply is closer to 2 to 2.5 million acre-feet of water annually.[238]

Because of the SWP's continued shortages, made worse by drought and the need to protect endangered species, contractors threatened to sue. To resolve this policy-created dispute over water that does not exist, agricultural contractors relinquished an annual entitlement of 130,000 acre-feet of water in exchange for an end to the "urban preference" during droughts.[239] The Monterey Amendment then abolished the provision that would have reduced long-term entitlements in the event of long-term shortages, such as the SWP's core inability to deliver the planned 4 million-plus acre-feet per year.[240] The Agreement further privatized taxpayer-funded water infrastructure, by giving the $74 million Kern Water Bank to the Kern County Water Agency, who immediately transferred it to the Kern Water Bank Authority.[241]

The Kern Water Bank Authority – quasi-public, joint powers authority comprised of a private company and a mix of water districts with close ties to corporations – is essentially a corporate conglomerate controlled by agricultural and development companies.[242] The Kern Water Bank concentrated the number of people holding control of local water use rights,

contrary to the public nature of water. For example, one family, the Boswells, owns 15 percent of the Kings River, which is enough water for a city of three million people and is worth $1 billion.[243]

The problems arising from such potential water monopolies are exacerbated by joint powers agreements that allow private companies and water monopolists to control water though a hidden government.[244] Such seemingly government water agencies are actually "private agencies masquerading as public ones" who "enjoy government powers and immunities but carry water for the private landed establishment."[245] Making matters worse for the public at large, many of these private districts elect leaders via a "land-based franchise: one-dollar one-vote."[246] Thus, joint powers agreements effectively allow a few water monopolists to expand their power beyond their own water company into the state government, giving them more voice and more power into the management of the people's and environment's water.

Example: The Environmental Water Account – Using Subsidies and Public Funds to Enrich Private Entities at the Expense of Californians and the Environment

Large agriculture corporations have long benefited from two main forms of subsidies: subsidized infrastructure and subsidized rates. For example, although those benefiting from the SWP were supposed to pay for 100 percent of the SWP's construction costs, "due to pressure to keep water rates low because of low crop prices farmers went tens of millions of dollars into arrears on the state debt."[247] The Monterey Amendment canceled the remaining 30 percent that farmers owed on the project, leaving taxpayers to cover the difference.[248]

The second form of subsidy applies to the actual price agricultural users pay for water. By that measure, the price of water for farmers in the San Joaquin Valley is about a tenth of the price someone in Los Angeles pays.[249] This is problematic because a "[s]ubsidy generates waste almost by definition, in the amount of the subsidy."[250]

The agriculture empire amassed by billionaire couple Stewart and Lynda Resnick uses more water than every home in Los Angeles combined.[251] This empire was built in significant part on the infrastructure and bond measures funded by California taxpayers. Like many large agricultural water users, billionaire Stewart Resnick's Paramount Farms benefits from historical and current subsidies, allowing them to leverage their control of water supplies in the Kern Water Bank for an enormous windfall at the taxpayers' expense. Kern Water Bank members paid an average of $86 and as little as $28 an acre-foot under a discounted program for water from the state. They then sold the same water back to state's Environmental Water Account for an average price $196 per acre-foot.[252] Resnick's water and farm companies sold $30.6 million of water to the state program, participated as a partner in an additional $16

million in sales, and received an additional $3.8 million in checks and credits for sales through public water agencies.[253] All in all, Resnick's water and farm companies grabbed about 20 cents of every dollar spent by taxpayers through the Environmental Water Account.[254] "For a program that was supposed to benefit the environment, it apparently did two things — it didn't benefit the environment and it appears to have enriched private individuals using public money."[255]

Not only do such subsidies and public funds lead to windfalls for already wealthy water monopolists at the expense of taxpayers, but they also further illustrate the fundamental incongruity between the nature of water and the concept of markets. For example, normally a market transaction includes the cost of supplying and transporting the good. However, because of the pervasive subsidies in the California's water market, for-profit users displace these costs onto the public.[256] Such externalities, among others, cost the taxpayers even more money by increasing the need for state funds and programs to offset the externalities of the alleged market. The truth is that "no one . . . grabs part of the public domain without hurting everyone else. Those who seize public property in the name of the free market are not promoting the market, but exploiting its good name for private monopoly."[257]

Example: Private Developments – Creating New Water Demand through Financial Speculation Based on Paper Water

Urban sprawl is an ideal outlet for water monopolists looking to flip subsidized water. In the tradition of Mulholland, developers are looking to acquire water supplies for new subdivisions.[258] Together development and agricultural corporations have been trading "paper water" contracts "to keep the severely over-stretched public water projects pumping water to the highest bidder."[259] These corporations are playing an Enron-like game with water and shorting the market with self-created, un-quenchable demands, to the detriment of people and the environment that need real water to live.[260]

One example is Mountain House, a planned community outside of Tracy. The community had its only water source completely curtailed during the 2015 drought, leaving it to scramble for water.[261] This creates a situation where paper water predictably falls short and developers "push for new dams and more pumping of water from the north."[262] Once again "[t]he losers will be the same: the rural communities in the north and throughout the valley, the tax and ratepayers who ultimately have to pay for it all, and the environment upon which all Californians depend."[263]

The Kern Water Bank once again provides another example. Through its control of water facilities, the Kern Water Bank allows "the largest agribusiness companies like Paramount [to] hold on to enough water to do the impossible in a severely over-drafted

groundwater basin: increase their production *and* sell to developers."[264] One owner in the Kern Water Bank, Tejon Ranch Company, wants to use the water to construct multiple communities: Tejon Mountain Village and Centennial City. [265] The former development acquired 30,000 acre-feet of water from the Kern County Water Bank for its base supply,[266] and the latter was proposed to include twenty-three thousand homes, three fire stations, and eight schools.[267] Other water bankers, such as the Semitropic Water Storage District, proposed to provide water for private developments like Newhall Ranch.[268] One of Resnick's companies already sold 5,099 acre-feet of its SWP annual water entitlement to Newhall Land and Farming Company, which has proposed to construct a new city in northwestern Los Angeles County.[269] Resnick also has indicated plans to sell water to a private town near Fresno called Gateway Village.[270] Finally, Boswell has described plans to create a 30,000-person city in Yokohl Valley.[271] Urban sprawl development is quickly becoming the water monopolists' newest source of profits with the state's water.

Instead of deterring this type of water speculation, our current water governance system encourages it. First, the water use rights holders "with surplus waters are like hoarders during an energy crisis except that the condition is perpetual," so they hold out as demand continues to grow to maximize their payday.[272] With water use rights expected to yield higher rents in the future, corporations and organizations are engaging in classic rent-seeking behavior – "distorting present investment to secure future rents."[273] Water monopolists turned speculators "visualize commercializing the water for distant growing cities or industries, using their political influence to secure needed rights-of-way, and litigation/legislation [or closed-door agreements] to modify the water permits to make them more tradable."[274] This behavior reinforces flawed water governance patterns, to the detriment of human and environmental needs (particularly in the long term).

Example: Kern Water Bank – Impacting Instream Flows Further through Markets

The Kern Water Bank also demonstrated that water markets typically do not increase meaningful conservation. Instead, they simply reallocate and sometimes increase consumptive use. The goal of the Kern Water Bank was to protect fish by storing water that could be used to supplement Delta deliveries, which would allow biologists to slow pumping from the Delta during critical times to protect fish.[275] The reality was just the opposite. In the early 2000s, Delta water pumping increased rapidly, and Delta exports hit record highs of over 6 million acre-feet.[276] Consequently, the Delta estuary "plunged to the brink of collapse," with the Delta smelt in particular falling to near extinction levels.[277] Fall-run Chinook salmon plummeted to record low returns just three years after the record Delta exports, causing the fishery to be closed for the first time in history in 2008.[278]

Part of the problem can be traced to the over-allocation of the SWP, which has resulted in paper water use rights that fictionally inflate the water supply.[279] But the result of the Kern Water Bank should come as no surprise, since it only reflect what California's water system has been built to do – deliver water to agriculture and cities at enormous cost to the environment and increasing cost to Californians at large.[280]

Example: Large-Scale Desalination Projects – Avoiding Meaningful Reform through More Privatization

Desalination is another example of our increasing commodification of water.[281] Private companies that stand to gain significant wealth from commoditizing seawater and marketing the desalinated water to the highest bidders often promote desalination. However, as we learned from Australia's example, expensive desalination plants have been proven unnecessary given successful conservation and efficiency programs.[282]

Moreover, privately owned desalination plants provide little guarantee of long-term stability and efficient, accountable management. For example, Tampa Bay's regional water authority had to sell public bonds to take over a private desalination project after multiple private companies involved in building and financing the project went bankrupt.[283] The plant was ultimately delivered five months behind schedule and at higher operating costs, causing the public to bear higher water costs.[284]

In California, Poseidon Resources – the same private company involved in the Tampa Bay desalination debacle – has recently begun operating a large coastal power plant in Carlsbad and is seeking permits to open yet another one in Huntington Beach. California decisionmakers should question whether our public water supply should become increasingly reliant on private actors like Poseidon, who are "strictly focused on the dollars and cents" of a project.[285] Indeed, given that major water sources such as the SWP and the Central Valley Project are so over-allocated, any "new water" produced would likely be allocated to the next rights holder in line, rather than being left in or sent to streams. This is particularly true given that there are no mandates currently in place to ensure waterways' inherent rights to water are protected.

Appendix 3: Instream Water Rights

California's ongoing focus on preserving the water rights status quo ignores a critical gap – that waterways themselves currently lack parallel rights to the water they need to survive. As a state, we cannot continue to blindly assert rights to water, when the source of the water itself has no right to exist. We think we have a right to push the system because we think we have a right to water. We seek only the minimal requirements for species to survive, or rivers to flow, constraining the systems as much as we can to squeeze out the last drops.

We are seeing the impacts of that worldview now, in drying rivers, collapsing aquifers, and disappearing species. We cannot simply wish these impacts away with feverish prayers for rain. We must address the problem staring us in the face – that we must take care of the waterways that take care of us. Our water governance system focuses on the minimal flow requirements for waterways to exist and species to survive; it constraining ecosystems to their limits, and then goes beyond them. We must instead focus on what needs to be done: ensure waterways are healthy, for their own sake as well as ours.

Recognizing waterways' inherent rights to the flows that they need to survive as waterways is an essential step in reversing this trend. Water rights for waterways benefits waterways and California a whole, by:

- Reducing uncertainty (thereby reducing conflict) around allocations and enforcement;
- Creating a backstop to any attempts to create markets around water (i.e., by ensuring the markets exist around only the fixed amount of water that exists *after* waterways' needs are addressed); and
- Creating public support for monitoring and transparency (on the assumption water users will want to assert the full extent of their rights, and so will insist on monitoring waterway flows if the waterways have clear rights to them).

There are at least two categories of strategies that the state can use to take up waterway rights, one relying on existing regulatory mandates, and one taking a broader, rights-based approach that is being used in other jurisdictions. Each is addressed briefly below.

Implementing Waterway Rights through Existing Regulatory Mandates

One approach suggested by the PPIC for recognizing waterway rights to flow is adoption of watershed-based environmental flows based on the requirements of applicable environmental laws (public trust, Clean Water Act, Fish and Game Code Section 5937, state and federal endangered species acts, SGMA, etc.).[286]

Administration of these environmental flows could occur in two ways.[287] First, the required flows could be defined as a regulatory baseline that would subtracted from the water available for diversions by water right-holders. Second (the preferred option), the required flows could be defined as a water right that would function as the most senior water right within the waterway system.[288] These environmental water rights would be assigned to independent guardians to manage. Although definition of the instream flows as a water right is "more complicated" than the first option, it is consistent with protective standards under governing state and federal statutes.[289] The state would require significantly improved water rights and water use accounting for this to work effectively, though this is broadly true.

Enacting a Rights-Based Approach to Waterway Health

Recognition of waterways' inherent rights to flow, and aquatic species' inherent rights to habitat, can go one step further by incorporating a goal of achieving a *healthy* ecosystem, rather than simply one that is minimally protected. A growing number of jurisdictions, from local to national, have done this by recognizing to varying degrees the inherent rights of rivers, streams, and the environment. Some jurisdictions have enacted instream water rights that are one step removed from full recognition of waterway rights; others more comprehensively recognize nature's fundamental rights to exist, thrive, and evolve, and have taken legal action accordingly.

Instream Water Rights

Oregon attempts to meet the environmental needs of waterways under the Instream Water Right Act of 1987, which recognizes that waterways have the right to a minimum flow "sufficient to support aquatic life and minimize pollution."[290] Through implementation of the Act, Oregon has restored instream flow to nearly double that of Washington, Idaho, and Montana combined, restoring about 900 cubic feet per second (cfs) of flow instream, compared to Washington (400 cfs), Idaho (100 cfs), and Montana (14 cfs).[291] California could shift to this new governance paradigm to better recognize the flow needs of waterways. If so, California should also learn from the challenges in Oregon that have prevented full protection of instream flows. In particular, senior water right claims take precedence over more junior instream water use rights,[292] which blunts their utility. Further, Oregon's Water Resources Commission holds discretionary power to allow exemptions from instream water use rights.[293]

Colorado has also created an Instream Flow Program, one which not only monitors instream flow but also natural lake levels. However, instream flow permits are limited because only the Colorado Water Conservation Board (CWCB) can appropriate water for instream uses, and (as in Oregon) senior water use rights have priority over junior instream rights. Despite these limitations, a significant amount of water has been retained instream. Water is appropriated for instream uses in over 1,600 stream segments and 480 natural

lakes,[294] representing 30% of the perennial stream miles in Colorado.[295] Key to this success is the fact that the program allows other agencies, conservation groups, and the public to submit recommendations to the CWCB, which holds a yearly workshop to discuss these requests.

California can also learn from other countries that are enacting rights-based approaches to instream flow protection. South Africa's Bill of Rights guarantees everyone the right of access to sufficient water,[296] as well as the right to a healthy environment for the benefit of present and future generations.[297] The Constitution directs the government to take reasonable legislative and other measures to ensure these rights.[298] As a result, South Africa passed the National Water Act, which characterizes water use rights as public in nature. According to the Guide to the National Water Act,

> . . . the only *right* to water is water for basic human needs (such as water for drinking, for food preparation and for personal hygiene) and water for the environment. The Act ensures that water for basic human needs and the environment is "reserved" (set aside) before water is allocated for other uses.[299]

The nation's "ecological reserve" accounts for water needed to protect both the quantity and quality of water needed by ecosystems.[300] South Africa's water management trajectory shows that it is possible for California to replace "an outdated, inequitable, and inefficient water management regime with an entirely new one"[301] – if the political will is there.

Australia has developed an "Environmental Watering Plan," which requires diversions from the Murray-Darling Basin to be environmentally sustainable.[302] E nvironmental water is defined as the amount of water needed to rebuild the four main components of the Basin's water-dependent ecosystems: river flows and connectivity, native vegetation, waterbirds, and native fish.[303] The Environmental Watering Plan "ensures that the size, timing and nature of river flows will maximise benefits to the environment."[304] The environment itself is considered a "user" of water.[305] As a result, the Australian Government capped surface water purchases at 1,500 GL (gigaliters), and 71 percent of the water recovery target of 2,750 GL was recovered[306] through infrastructure improvements and investments. However, the market-based approach seems to be preventing the full amount of determined environmental water from being set aside. For example, the most recent annual report indicated that only 2,000 GL had been left for environmental needs, even though the water recovery target for a sustainable environment was 2,750 GL.[307]

Inherent Rights of Waterways and Nature

Instream water rights programs such as those outlined above are important steps forward in reversing the current, rapid trend of environmental and aquatic species degradation. The next step is to recognize the inherent rights of nature, including waterways and species, to exist, thrive, and evolve, and to adjust our actions and governance systems accordingly. Just as we humans claim inherent rights arising out of our existence, so too must

we recognize parallel inherent rights on the part of the natural world, with which we co-evolved.

In 2008 Ecuador became the first nation to amend its Constitution to recognize the rights of nature, providing citizen enforcement authority to implement the new provisions. The key provision is Article 71, which states that: "Nature or Pachamama, where life is reproduced and exists, has the right to exist, persist, maintain itself and regenerate its own vital cycles, structure, functions and its evolutionary processes." Numerous court decisions and administrative actions have already occurred specifically implementing these constitutional provisions.[308] In one flow-related example, Ecuador's Vilcabamba River was damaged by construction debris deposited by adjacent road builders. The debris channelized stream flow and created flooding downstream, and local landowners sued under the constitutional provisions. The Court agreed that the river's constitutional right to flow had been violated, and it ordered those responsible to restore the river fully.[309]

Nature's rights laws have been spreading throughout the world, and include federal law in Bolivia,[310] treaty agreements in New Zealand,[311] and at least three dozen municipal ordinances around the United States,[312] including in Pittsburgh, Pennsylvania[313] and Santa Monica, California.[314] Santa Monica's Sustainability Bill of Rights, passed in 2013, states that "[n]atural communities and ecosystems possess fundamental and inalienable rights to exist and flourish in the City of Santa Monica." It specifically includes the City's groundwater aquifers as holding these fundamental rights. The Ordinance includes a citizen suit provision as well, stating that to "effectuate those rights on behalf of the environment, residents of the City may bring actions to protect these natural communities and ecosystems." In October 2016, the City's Task Force on the Environment recommended strongly to the City Council against the permitting of new private wells in the City in order to protect the aquifer's rights to flourish pursuant to the Ordinance – a far higher standard than provided in SGMA.[315]

Appendix 4: Lessons from California's Past

Lessons Learned from Past Two Water Commissions

Two Governor-driven Water Commissions over the past century – in 1912 and 1978 – have delved into California water management. Both arose out of water crises, though only one resulted in meaningful change in water management. Lessons learned from the genesis and results of these efforts can inform the critical review of water governance needed today.

Governor Hiram Johnson addressed water in his 1911 inaugural address, stating that:

> [t]he great natural wealth of water in this state has been permitted, under our existing laws and lack of a system, to be misappropriated . . . A rational and equitable code and method of procedure for water conservation and development should be adopted.[316]

A 1911 law created a three-person 1912 Conservation Commission, appointed by the Governor, to investigate the use of water and other natural systems and make appropriate legislative recommendations.[317] The Commission was chaired by former Governor George Pardee, who brought progressive[318] ideas regarding conservation and distrust of corporate monopolies.

The 1912 Commission criticized court-driven water policy, opining that water allocations involved public policy, not just application of the law.[319] It "call[ed] for a wholesale determination of water rights," strongly criticized the existence of any riparian rights in a semiarid state, and recommended a permit system for appropriation of *both* surface and underground waters.[320] The Commission further recommended establishment of a state agency "through which the titles to water rights may be at least equally well-defined and settled" as real estate titles."[321] After revisions in the Legislature, these recommendations resulted in the Water Commission Act[322] adopted by the Legislature to oversee the public's interest in water, create a permit system for the appropriations, limit riparian rights to beneficial use, among other actions.[323] Immediately following the Governor's approval, power and irrigation companies launched a referendum campaign to nullify it. The voters reaffirmed the Water Commission Act in November 1914, however, and the statute became effective the next month.

The 1978 Water Commission arose out of drought challenges that led the Department of Water Resources (DWR) to criticize state water law as "not only an obstacle to optimal water management practices," but an actual contributor to "the waste of the state's scarce water resources."[324] Governor Brown created the Commission to Review California Water Rights Law pursuant to Executive Order[325] in 1977. His ten-member Commission was charged with both examining current water use rights laws and recommending legislative

changes. While their final Report acknowledged that "many of the criticisms of riparian and appropriative rights may be valid,"[326] the Commission refused to act to address those criticisms, stating that the existing structure supported too many investments to change (though they failed to examine what those changes might be, or how vulnerable those investments might be to more droughts).

The 1978 Commission did, however, address instream flows, an area little-examined by the 1912 Commission. The 1978 Commission recommended, among other things, that the state:

- Begin to develop comprehensive instream flow standards,[327] "expressed in terms of certain quantities or flows of water which are required to be present at certain points along the same in certain times of the year to protect fishery, wildlife, recreational, aesthetic, and scenic and other beneficial instream uses";[328]
- Establish "compliance programs" to "secure the beneficial instream uses of water envisioned by the [instream flow] standards";[329] and
- Implement an interim protection program for streams that allows for instream appropriative rights while instream flow standards are being developed.[330]

The Legislature, however failed to act on these recommendations to protect instream flows. Finally, neither Commission specifically addressed a process for ensuring flows for the basic needs of individuals.

Moving forward, it is noteworthy that the voices of those who had water were well-represented in both Commissions, but water-poor communities and waterways were not. While the 1978 Commission prepared background reports for public consumption and held hearings around the state, the makeup of the Commission itself drew from a relatively small pool of water stakeholders and experts.

State decisionmakers contemplating a future water Commission or other, similar review body should consider the role of process – particularly the Commission makeup – on outcome. Given water's nature as a public and environmental good, one that is necessary for life itself, the voices of all Californians and the natural world should be central to the next water governance review process.

Lessons from the California Energy Crisis and Reforms

Water managers can also draw on lessons from the California energy crisis and subsequent reforms. In the wake of the energy blackouts and general crisis that followed California's brief experiment in electricity sector deregulation, California instituted numerous reforms that have led to significant gains in energy efficiency and reductions in energy use.

While these reforms are not perfect, many could be adapted and applied in the water sector to improve our water management.

For example, "energy loading orders" dictate that energy needs must first be met by increasing energy efficiency and improving demand response *before* turning to new energy generation. Similarly, institution of a "water loading order" system would prioritize funding for efficiency and conservation efforts first, along with stormwater capture and potable water recycling, before turning to consideration of infrastructure projects, such as large conveyance infrastructure that does not support the former strategies, dams, or desalination.[331] Not only would a water loading order help facilitate more effective water management decisions, but it could also help California achieve its AB 32 goals by prioritizing local water supplies with little to no embedded energy, before more energy intensive options could be developed.[332]

A state-level oversight organization, accountable to the public, to help the state efficiently meet necessary water demand while also ensuring needed water is allocated to the environment should also be considered. The California Independent System Operator (CAISO)[333] is the "nerve center" of the state's power grid, responding to deficiencies in capacity, trying to match generation with energy demand, and maintaining the electric frequency of the grid no matter what extreme weather or natural disaster is imposed on the infrastructure and facilities supporting the grid.[334] An oversight entity in the water arena would be challenging to establish today, because it would require near real-time data on instream flows and water demand around the state. However, comprehensive, real-time data information is a goal the state must reach if it is to be successful in protecting and improving water flows and supplies. Lessons from CAISO successes in the energy arena may help build the political will needed to gather and provide this necessary information.

Lessons Learned from the California Redistricting Commission

The California Redistricting Commission is a citizen-driven assessment that could provide useful lessons for either a future water commission, or another structure that allows for meaningful citizen input on an issue of statewide importance such as water. Proposition 11 (2008) provided for an independent Commission to draw Assembly, Senate and Board of Equalization districts through an "open and transparent process enabling full public consideration of and comment on the drawing of district lines." In 2010, Proposition 20 added Congressional redistricting as a purpose of the Citizens Redistricting Commission. Districts were to be drawn based on strict, nonpartisan rules designed to ensure fair representation, and Commissioners were charged with applying the law in an impartial manner. A detailed selection process was followed to choose the 14 Commissioners,[335] who had to meet specific conflict of interest requirements.

The Redistricting Commissioners conducted significant outreach to get the public's input in drawing new lines. This included speaking to the media, holding public meetings, streaming meetings online, and providing a website that included Commission records and documents. For the first map drawing, they held 34 public meetings in 32 locations around the state. More than 2,700 people participated in person and over 20,000 submitted comments. After the draft set of maps was released, the Commission held 11 more public meetings to collect reactions and comments. Majority votes were needed by the Commission to submit the final maps. Though the final redistricting maps were challenged in courts, they were upheld unanimously in the California Supreme Court and in the U.S. District Court.

The structure of a new, statewide water discussion similarly must actively "empower the community as a whole."[336] Polling and focus groups may be able to help pull out community values and visions more effectively than public workshops, which may stifle the give-and-take discussion.[337] The questions developed should be objective, leaving room for thoughtful input, and should be broad enough to allow participants to successfully express their vision for, and feelings about, water.

ENDNOTES

[1] Delta Vision Blue Ribbon Task Force, *Our Vision for the California Delta* (March 19, 2008), *available at* http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/strategic_plan/comments/080

[2] Water Funder Initiative, *Toward Water Sustainability: A Blueprint for Philanthropy*, 3, 7 (March 2016), *available at* http://waterfunder.org/wp-content/uploads/2016/03/Water-Funder-Initiative-Blueprint-March-15-2016.pdf.
[3] *Id*. at 5, 27.
[4] To clarify that people do not have the rights to water itself, we use the term "water use rights" rather than "water rights."
[5] The Gold Rush brought the first large wave of water seekers to California and with them, their values of individual rights and minimal government intrusion. Norris Hundley, Jr., *The Great Thirst* 67 (2001). These miners dramatically shaped the development of water law in California. The riparian doctrine's rigid tie to land hindered miners' pursuit of wealth, so miners chose to disregard it. They developed instead a custom that mirrored the process they used to establish mining claims – first in time, first in right. Roderick E. Walston, *California Water Law: Historical Origins to the Present,* 29 Whittier L. Rev. 765, 768 (2008). The prior appropriation system "ratified the survival instincts of a profit-driven people" with limited access to water by supporting the "swift commandeering of water resources and rapid economic development." Hundley, *The Great Thirst,* at 75. This view of water as tool for economic gain was at the core of the early prior appropriation doctrine's requirement that one must continue to use the water to maintain her water right. *Id.* at 71. Water's role in mining also meant that it became "recognized at once as a necessity and a readily acquirable source of power and wealth," which "encouraged individual and corporate tendencies to monopolize as much of it as possible." *Id.* at 75.
[6] *See, e.g*., Ellen Hanak *et al*., PPIC, *Managing California's Water: From Conflict to Reconciliation* (PPIC 2011), *available at* http://www.ppic.org/content/pubs/report/R_211EHR.pdf; *see also* Ellen Hanak & Elizabeth Stryjewski, *California's Water Market, By the Numbers: Update 2012* (PPIC 2012).
[7] PPIC, *Allocating California's Water: Directions for Reform*, 5 (2015), *available at* http://www.ppic.org/content/pubs/report/R_1115BGR.pdf (Allocating California's Water).
[8] Theodore E. Grantham & Joshua H. Viers, *100 Years of California's Water Rights System: patterns, trends and uncertainty*, 9 Environ. Res. Lett. 2 (June 19, 2014), *available at* http://iopscience.iop.org/article/10.1088/1748-9326/9/8/084012/pdf.
[9] *See, e.g*., PPIC Water Policy Center, *California's Water*, 16 (Oct. 2016) *available at* http://www.ppic.org/content/pubs/report/R_1016WPCBKR.pdf.
[10] Grantham & Viers, *supra* note 8, at 2.
[11] PPIC, *Allocating California's Water*, *supra* note 7, at 5.
[12] Governor's Commission to Review California Water Rights Law, *Governor's Commission to Review California Water Rights Law: Final Report*, 12-13 (Dec. 1978) *available at* http://digitalcommons.law.ggu.edu/cgi/viewcontent.cgi?article=1425&context=caldocs_agencies (hereinafter 1978 Water Commission Report).
[13] Testimony of Thomas Howard, Executive Director, State Water Res. Control Bd., Senate Natural Resources and Water Committee Hearing, *Overview of California Water Rights Laws* (Mar. 10, 2009).
[14] Cal. Water Boards' Annual Performance Reports - Fiscal Years 2009-15, *available at* http://www.waterboards.ca.gov/about_us/performance_report_1415/.
[15] On September 16, 2014, Governor Jerry Brown signed into law a three-bill legislative package collectively known as the "Sustainable Groundwater Management Act." The Governor's signing message states that "a central feature of these bills is the recognition that groundwater management in California is best accomplished locally." For more information, *see* the state's Sustainable Groundwater Management website at http://www.water.ca.gov/groundwater/sgm/index.cfm.
[16] Grantham & Viers, *supra* n. 8 at 8.
[17] PPIC, *California's Water*, *supra* note 9, at 14 ("droughts are a regular feature of California's variable, semiarid climate").
[18] NOAA, Nat'l Centers for Environmental Information (retrieved April 10, 2016) http://1.usa.gov/1VQgbip.

[19] PPIC, *Policy Priorities for Managing Drought* (March 2015) *available at* http://www.ppic.org/main/publication_quick.asp?i=1141. *See also* Grantham & Viers, *supra* note 8, at 1.
[20] PPIC, *Allocating California's Water*, *supra* note 7, at 4.
[21] Ellen Hanak et al., PPIC, *What if California's Drought Continues?* (Aug. 2015), *available at* http://www.ppic.org/main/publication_quick.asp?i=1160.
[22] PPIC, *California's Water*, *supra* note 9, at 42.
[23] Cal. Dep't of Fish and Wildlife, State & Federally Listed Endangered & Threatened Animals of California, 4-6 (April 2016), *available at* file:///C:/Users/lsheehan/Downloads/CNDDB_Endangered_and_Threatened_Animals_List.pdf.
[24] Hanak, *What if California's Drought Continues*, *supra* note 21, at 1, 12-13; *see also* Peter B. Moyle *et al*., *Rapid Decline of California's Native Inland Fishes: A Status Assessment*, 144 Biological Conservation 2414, 2419 (2011) (noting that before the drought began, 107 native species already were "prone to extinction,"); The Bay Institute, *Delta Smelt*, *available at* http://thebayinstitute.org/programs/rivers-delta/saving-endangered-species/delta-smelt; California Trout, *California's Coast Chinook Salmon, SOS: California's Native Fish Crisis*, 30-31 (2008) *available at* http://caltrout.org/pdf/SoS-Californias-Native-Fish-Crisis.pdf (estimating that if present trends continue, 65% of native salmon, steelhead, and trout species will be extinct this century); The Bay Institute, *The Shrinking Bay*, 12, *available at* http://thebayinstitute.org/about-the-bay/the-shrinking-bay (noting that California is an essential stop on the Pacific Flyway, and northeastern California and the Central Valley have wetlands that provide winter habitat for over five million water birds); *compare* US Dep't of Agric., *Pac. Region Results of Mid-Year Surveys* (2015), *with* US Dep't of Agric., *Results of Cal.'s Mid-Year Surveys* (2012) (noting that water deliveries to refuges have decreased by over 30 percent during the drought, putting further pressure on the birds' few remaining habitats).
[25] PPIC, *California's Water, supra* note 9, at 42.
[26] Hanak, *What if California's Drought Continues*, *supra* note 21, at 5.
[27] *Id.*
[28] *Id.*
[29] *Id.*
[30] Zoe Myers, *Residential Wells Run Completely Dry in the Central Valley*, High Country News (July 13, 2015), http://www.hcn.org/articles/residential-wells-dry-drought-porterville-water.
[31] Hanak, *What if California's Drought Continues*, *supra* note 21, at 11.
[32] *Id*. ("The state has not followed these [reasonable use and public trust] doctrines sufficiently when allocating water, relying principally on the priority of water rights").
[33] PPIC, *Policy Priorities for Managing Drought*, *supra* note 19.
[34] Brent M. Haddad, *Rivers of Gold: Designing Markets to Allocate Water In California*, 20-21 (2000).
[35] Stating that "every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes." Cal. Water Code § 201.3.
[36] The term "water market" has been used loosely among proponents, who have yet to develop and apply a consistent definition of the term. Markets have been a part of human exchange for millennia. However, "markets" in today's neoclassical economic system are grounded in capitalism, dominated by private ownership, which in turn is protected by government regulation. The goal is efficient exchanges of goods and services through prices. A true "water market" would require waterways to be capitalized and traded towards the goals of profit maximization, exchange efficiency, and provision of ever-more goods and services. This runs counter to water's essence as a fundamental element of life, owned by all the people for the good of the state as a whole.
[37] Water Education Foundation, *Monterey Amendment*, *available at* http://www.watereducation.org/aquapedia/monterey-amendment.
[38] John Gibler, Public Citizen, *Water Heist: How Corporations Are Cashing in on California's Water*, 2 (Dec. 2003), *available at* https://www.citizen.org/documents/Water_Heist_lo-res.pdf (Water Heist).
[39] *See, e.g.*, Haddad, *Rivers of Gold, supra* note 34, at 25.
[40] Josh Harkinson, *Meet the California Couple Who Uses More Water than Every Home in Los Angeles Combined: How megafarmers Lynda and Stewart Resnick built their billion-dollar empire*, Mother Jones (Aug. 9, 2016), *available at* http://www.motherjones.com/environment/2016/04/lynda-stewart-resnick-california-water.
[41] Haddad, *supra* note 34, at 34.
[42] PPIC, *California's Water*, *supra* note 9, at 43.
[43] *See, e.g.*, Joshua Farley, *Ecosystem Services: The Economics Debate*, 1 Ecosystem Services 40–49 (2012), *available at* http://www.sciencedirect.com/science/article/pii/S2212041612000071 ("Market demand is

determined by preferences weighted by purchasing power. The preferences of the wealthy are weighted heavily and the preferences of the destitute are virtually ignored.").

[44] Karen Piper, *The Price of Thirst*, 70-71 (2014).

[45] *See, e.g.*, Larry R. Brown *et al*., *Managing Water to Protect Fish: A Review of California's Environmental Water Account, 2001–2005*, 14 Environmental Management 237-261, Table 3 (2009) (illuminating the failure of the EWA to thwart the collapse of delta fisheries), *available at* http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/deltaflow/docs/exhibits/swrcb/swrcb_brown2008.pdf.

[46] Joseph W. Dellapenna, *Markets for Water: Time to Put the Myth to Rest?,* 131 J. Contemp. Water Res. and Educ. 33 (2005).

[47] *See, e.g.,* Haddad*, supra* note 34, at 47.

[48] *Id.* at 12.

[49] Piper, *supra* note 44, at 65; *see also* Gibler, *Water Heist*, *supra* note 38, at 12-13.

[50] Santos Gomez & Penn Loh, *Communities and Water Markets: A Review of the Model Water Transfer Act*, 14 Hastings W.-N.W. J. Envtl. L. & Pol'y 689, 693 (2008).

[51] *See, e.g., Rivers of Gold, supra*, at p. 35.

[52] John Gibler, Public Citizen, *Water for People and Place: Moving Beyond Markets in California Water Policy* (2005), *available at* https://www.citizen.org/documents/Water-for-People_web.pdf.

[53] *Id.*

[54] Piper, *supra* note 44, at 62.

[55] Gibler, *Water Heist*, *supra* note 38, at 1.

[56] Water Funder Initiative, *Toward Water Sustainability: A Blueprint for Philanthropy*, 14 (2016), *available at* http://waterfunder.org/wp-content/uploads/2016/03/Water-Funder-Initiative-Blueprint-March-15-2016.pdf. *See also* Mary Manning Cleveland, Adjunct Prof. of Environmental Economics, Columbia University and Mason Gaffney, Prof. of Economics, U.C. Riverside, "Whose Water? Ours! How to End California's Water Crisis," *HuffPost Green* (March 17, 2014), *available at* http://www.huffingtonpost.com/mary-manning-cleveland/whose-water-ours-how-to-e_b_4967944.html (transforming the water allocation system into a market-based system could cause "speculators to grab up water licenses and hold them . . . creating an astronomical 'spot market' for emergency water" and "lock in a system under which every subsidy and giveaway engineered by pork-barrel politics becomes sacrosanct, perpetual property, and taxpayers forever incur ongoing costs" of subsidizing water monopolists).

[57] *Id.* at 60.

[58] Mark Grossi, "*Chinatown II" Water Bank Sued as Wells Go Dry*, Fresno Bee (Sep. 5, 2010).

[59] Piper, *supra* note 44, at 60.

[60] Keith C. Knapp et al., *Water Transfers, Agriculture, and Groundwater Management: A Dynamic Economic Analysis* 67 *J. Envtl. Mgmt.* 291, 292 (2003).

[61] *Id.*

[62] Haddad, *supra* note 34, at 34, 37.

[63] Mason Gaffney, *What Price Water Marketing? California's New Frontier*, 56 *Am. J. Econ. & Soc*. 475, 491 (1997).

[64] A somewhat analogous process is the setting of Total Maximum Daily Loads (TMDLs) of pollution under Clean Water Act Section 303(d). TMDLs are established to ensure that only fixed, agreed-upon levels of contaminants can enter impaired waterways, in amounts that will restore the affected water body over time. The pollutant loads can be allocated through permits, or, as some have argued, traded among dischargers. The goal, however, is never to exceed the allotted amount of contamination, in light of the overarching social and ecological goal of restoring the waterway.

[65] *See, e.g*., Haddad*, supra* note 34, at 36. Any water exchanges should include a requirement to eliminate or compensate for externalities. The goal for compensating externalities should be to achieve a standard of Kaldor-Hicks efficiency, where the "winners" compensate those who suffer externalities fully for their losses. *Id.* at 25. By contrast, economics today favors Pareto efficiency, which articulates that efficiency is achieved when there are no more trades that would make one person better off without making another person worse off. Compensation of those who lose – *i.e.*, suffer externalities – is not a consideration for Pareto-efficient markets.

[66] *Gin S. Chow v. City of Santa Barbara*, 217 Cal. 673, 701-702 (1933).

[67] *See, e.g.,* PPIC, *California's Water*, *supra* note 9, at 2 (Oct. 2016) ("California's water management systems were designed for the conditions of the past century. . . Meeting this challenge will require a concerted public- and private-sector effort that involves all levels of government").

[68] Water Funder Initiative, *supra* note 56, at 3, 7.
[69] *Id*. at 5, 27.
[70] For a comprehensive examination of the role of ethics in water decisionmaking, *see* David Groenfeldt, *Water Ethics: A Values Approach to Solving the Water Crisis* (Routledge, NY 2013). *See also* Center for Humans and Nature, *Fostering a Water Ethic*, http://www.humansandnature.org/water-ethics-climate-change (last visited Jan. 12, 2017); Christiana Peppard, *Just Water: Theology, Ethics, and the Global Water Crisis* (2014).
[71] *See, e.g*., Blake Alcott, *Jevon's Paradox*, 1 *Ecological Econ.* 54 (July 2005).
[72] For example, "demand is rising fastest in those sectors that have had the biggest efficiency gains – transport and residential energy use." Juliet Schor, *Plenitude: The New Economics of True Wealth*, 91 (2010).
[73] *See id*. at 18, 47.
[74] Hundley, *supra* note 5, at 2, 25 (noting that the indigenous peoples of California viewed nature as "neither the enemy nor simply a means to an end or a commodity to be exploited for wealth or power"); *see also* Groenfeldt, *Water Ethics*, *supra* note 70, at 109, 137; *Departures: Gabrieleno Tongva Mission Indians*, KCET Radio Broadcast (Jan. 24, 2011) *available at* http://www.kcet.org/socal/departures/lariver/yangna/gabrieleno-tongva-mission-indians.html (indigenous cultures, like Tongva Mission Indians, "always relied on some waterway or source because [water] is life"). Unfortunately, this indigenous worldview is marginalized at best today. From an ethics perspective, "[m]embers of the dominant culture tend to overlook the values dimension of their own worldview. . . The dominant society has usurped not only the land and water, but the very code by which indigenous committees conceptualize their natural resources." Groenfeldt, *supra* note 70, at 142. From a legal perspective, these ethics could be incorporated through a pluralistic approach that embraces this cultural diversity. *Id.* at 148. Indeed, we arguably must move in this direction in order to fulfill the letter and intent of our responsibilities with regard to indigenous water rights. *See, e.g*., *Winters v. U.S.*, 207 U.S. 564 (1908); Cynthia Brougher, Cong. Research Serv., *Indian Reserved Water Rights Under the Winters Doctrine: An Overview* (June 8, 2011) *available at* http://nationalaglawcenter.org/wp-content/uploads/assets/crs/RL32198.pdf.
[75] For example, an oft-quoted statistic is that agriculture uses roughly 80% of the water diverted for human use in the state. A less-quoted statistic is that agriculture represents only about 2% at most of the state's economy. *See, e.g.,* Mechel Paggi, *California Agriculture's Role in the Economy and Water Use Characteristics*, in *Appendix 1, Agricultural Water Use in California: A 2011 Update*, Center for Irrigation Technology 5 (Nov. 2011) *available at* https://www.fresnostate.edu/jcast/cab/documents/pdf/Appendix-1-Economics-12-7-2.pdf. This does not mean that growing food for human needs should be driven by neoliberal economic constructs. It does mean that we must closely examine who is benefitting economically from the current water law and infrastructure system, and reprioritize those benefits as needed for the good of society and ecosystems. It means we get to ask, "What kind of agriculture do we, as a society, want to support with precious allocations of water?" Groenfeldt, *supra* note 70, at 52. For example, Australia's water use rights system changes resulted in dry-area dairies being replaced by more water-appropriate growing practices.
[76] Little Hoover Commission, *Managing for Change: Modernizing California's Water Governance*, iii (Aug. 2010) *available at* http://www.lhc.ca.gov/studies/201/Report201.pdf.
[77] Hanak et al., *What if California's Drought Continues*, *supra* note 21 (noting that mandatory conservation can "convey an overly negative impression about urban water conditions in the state—potentially dampening future business investments"); *see also,* Charles F. Wilkinson, *Aldo Leopold and Western Water Law: Thinking Perpendicular to the Prior Appropriation Doctrine*, 24 Land & Water L. Rev. 1, 29-30 (1989) ("First, there must be conservation of resources, so that resources will be used as efficiently as practicable. Efforts to conserve the water resource should include regulation to reduce consumption and diversion of water by all users so that there will be a reduced reliance on structural alternatives such as dams and interbasin transfers in the future . . . . Second, no proposed new uses should be allowed, even if efficient, unless the use can be accommodated within the context of a sustainable resource base.").
[78] Hanak et al., *Managing California's Water*, *supra* note 6, at 241-47.
[79] Hanak et al., *What if California's Drought Continues*, *supra* note 21(noting that "Continued drought will likely lead to multiple extinctions of native fish species in the wild, and California lacks a plan to address this . . . [P]urchasing water to boost flows could reduce conflicts," and "[i]t may also be prudent to make immediate investments in conservation hatcheries.").
[80] Other water management legal tools include but are not limited to: endangered species acts, the human right to drinking water, Fish and Game Code Section 5937 releases, and relevant Clean Water Act provisions. *See, e.g*., Hanak et al., *Managing California's Water*, *supra* note 6.

[81] Richard Frank, Professor and Director of the Environmental Law and Policy Center, U.C. Davis School of Law, Panel Discussion: "Fixing" California's Water Rights System at California Water Policy Conference 25 (Apr. 20, 2016) (noting, for example, that the State Water Board "had the ability to be far more equitable in imposing . . . curtailments" through these under-utilized doctrines, rather than simply relying on the existing water use rights priority system), *available at* https://mavensnotebook.com/2016/05/25/if-pigs-wont-fly-fixing-californias-water-rights-system/.
[82] *See, e.g.,* David Groenfeldt & Jeremy J. Schmidt, *Ethics and Water Governance*, 18 *Ecology and Society* 14 (2013).
[83] Sandra Postel, *The Missing Piece: A Water Ethic*, *The American Prospect* (May 23, 2008), *available at* http://www.prospect.org/cs/articles?article=the_missing_piece_a_water_ethic.
[84] Other scholars have called for a similar overhaul in values. *See, e.g., id.* ("Instead of asking how we can further control and manipulate rivers, lakes, and streams to meet our ever-growing demands, we would ask instead how we can best satisfy human needs while accommodating the ecological requirements of freshwater ecosystems."); Groenfeldt, *Water Ethics, supra* note 70, at 158 (setting forth four principles for a new water vision: "1) nature needs to be kept alive (ecological function); 2) everyone has a right to water and sanitation (social justice); 3) water should be used responsibly in agriculture and industry (responsible use); 4) stakeholders should be involved in decision-making (participation)"); *id.* at 41 (the ethics of diverting water "concerns the fair allocation of water across competing demands, and the responsible use of that water" and ethics of river protection "is concerned with how much water to leave in the river, and how much effort to invest in ensuring the water is clean" as well as recognizing the interconnections of environmental flow and water quality and the reality of climate change).
[85] Cal. Water Code § 106.3.
[86] *See generally* International Human Rights Clinic, University of California, Berkeley, *The Human Right to Water Bill in California: An Implementation Framework for State Agencies* (May 2013), *available at* https://www.law.berkeley.edu/files/Water_Report_2013_Interactive_FINAL.pdf.
[87] Frank, *supra* note 81.
[88] *Id.*
[89] *See, e.g*., Comment Letter from Linda Sheehan, California Coastkeeper Alliance, to Chair Fran Pavley and Members, Senate Natural Resources and Water Committee, Comments on March 10, 2009 Hearing: Overview of California Water Rights Laws (Mar. 18, 2009) *available at* http://cacoastkeeper.org/document/water-rights-hearing-comments.pdf.
[90] Cal. Dep't of Food and Agric., 2016 California Almond Nursery Sales Report (Oct. 27, 2016) *available at* https://www.nass.usda.gov/Statistics_by_State/California/Publications/Fruits_and_Nuts/2016/20161027ALMsalessurv.pdf.
[91] Haddad*, supra* note 34, at 39.
[92] *Joslin v. Marin Mun. Water Dist.*, 67 Cal. 2d 132 (1967).
[93] *See, e.g.,* Haddad*, supra* note 34, at 39-43.
[94] Arthur Littleworth & Eric Garner, *California Water II* 33-34 (2nd ed., 2007).
[95] Charles F. Wilkinson, *Aldo Leopold and Western Water Law: Thinking Perpendicular to the Prior Appropriation Doctrine*, 24 *Land & Water L. Rev*. 12 (1989).
[96] Littleworth & Garner, *supra* note 94, at 33.
[97] *Id*.
[98] These assertions were made by the attorney for Placer County Water Agency and the attorney for Oakdale Irrigation District, respectively. Matt Weiser, *California orders thousands of Sacramento Valley water users to stop pumping from streams*, Sacramento Bee (May 30, 2014), *available at* http://www.sacbee.com/news/local/article2600034.html.
[99] *See, e.g.,* Wilkinson, *supra* note 95, at 21. *See also* Hanak et al., *What if California's Drought Continues*, *supra* note 21 ("California was unprepared for this drought emergency and is now struggling to implement stopgap measures").
[100] *See, e.g.,* Postel, *supra* note 83 ("Overall, we have been quick to assume rights to use water but slow to recognize obligations to preserve and protect it.").
[101] *U.S. v. State Water Res. Control Bd.*, 182 Cal. App. 3d 82, 106 (1986).
[102] Hanak et al., *Managing California's Water*, *supra* note 6, at 38.
[103] Cal. Water Code § 275; *see also California Trout v. State Water Res. Control Bd.*, 207 Cal. App.3d 585, 624-25 (1989) (finding that the legislature has broad authority for conservation and regulation of scarce water resources).

[104] Cal. Const. Art. X, § 2 (emphasis added).
[105] *See, e.g*., *Light v. State Water Res. Control Bd.*, 226 Cal. App. 4th 1463 (Cal. Ct. App. 2014) (*Light v. SWRCB*) ("since enactment of Article X, Section 2, there can no longer be any property right in the unreasonable use of water"). *See also* Craig M. Wilson, Delta Watermaster, *The Reasonable Use Doctrine & Agricultural Water Use Efficiency: A Report to the State Water Resources Control Board and the Delta Stewardship Council*, 3 (Jan. 2011) (Wilson Report) (noting that "All water use must be reasonable and beneficial regardless of the type of underlying water right. No one has an enforceable property interest in the unreasonable use of water.") *available at* http://deltacouncil.ca.gov/sites/default/files/documents/files/Item_9.pdf.
[106] *See, e.g*., *Light v. SWRCB*, 226 Cal. App. 4th at 1479 (quoting *Tulare Dist. v. Lindsay-Strathmore Dist.*, 3 Cal. 2d 489, 567 (1935)) ("What may be a reasonable beneficial use, where water is present in excess of all needs, would not be a reasonable beneficial use in an area of great scarcity and great need. What is a beneficial use at one time may, because of changed conditions, become a waste of water at a later time."); *see also Tulare Dist.*, 3 Cal. 2d at 567 (finding use of water to flood land to kill gophers unreasonable); *Joslin v. Marin Mun. Water Dist.*, 67 Cal. 2d 132, 141 (1967) (use of flooding to deposit sand and gravel unreasonable); *Peabody v. City of Vallejo*, 2 Cal. 2d 351, 368 (1935).
[107] *Light v. SWRCB,* 226 Cal. App. 4th at 1478 ("water rights are limited and uncertain. The available supply of water is largely determined by natural forces").
[108] Legislative Analyst's Office, *Water Rights: Issues and Perspectives*, 10 (Mar. 10, 2009), *available at* http://www.lao.ca.gov/handouts/resources/2009/water_rights_issues_perspectives_031009.pdf.
[109] *Nat'l Audubon Soc'y v. Super. Ct. of Alpine County*, 33 Cal. 3d 419, 443 (1983) (in "exercising its sovereign power to allocate water resources in the public interest, the state is not confined by past allocation decisions which may be incorrect in light of current knowledge or inconsistent with current needs. The state accordingly has the power to reconsider allocation decisions even though those decisions were made after due consideration of their effect on the public trust.").
[110] Wilson Report, *supra* note 105, at 3; *see also Light v. SWRCB,* 226 Cal. App. 4th 1463.
[111] *Id.* at 10, 16.
[112] *Id.* at 14-15.
[113] Legislative Analyst's Office, *California's Water: An LAO Primer*, 68 (Oct. 2008), *available at* http://www.lao.ca.gov/2008/rsrc/water_primer/water_primer_102208.pdf.
[114] *See, e.g*., Joseph L. Sax, *The Public Trust Doctrine in Natural Resource Law: Effective Judicial Intervention*, 68 *Mich. L. Rev.* 471 (Jan. 1970). *See also* Jan S. Stevens, *Applying the Public Trust Doctrine to River Protection*, *California Water Plan Update 2005*, Vol. 4, *available at* http://www.water.ca.gov/pubs/planning/california_water_plan_2005_update__bulletin_160-05_/vol4-environment-applyingpublictrustdoctrine.pdf.
[115] *Light*, 226 Cal. App. 4th at 1489 (citing *Nat'l Audubon Soc'y*, 33 Cal. 3d at 446-47); *see also* Cal. Const. Art. X, § 2 (which states, in relevant part, "the conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare.").
[116] *Id.*
[117] Charlton H. Bonham, *Perspectives from the Field: A Review of Western Instream Flow Issues and Recommendations for a New Water Future*, 36 Envtl. L. 1205, 1221 (2006) (quoting Charles F. Wilkinson, *Western Water Law in Transition*, 56 U. Colo. L. Rev. 317, 336 (1985)).
[118] *Id*. at 380.
[119] *Ctr. for Biological Diversity v. FPL Group*, 166 Cal. App. 4th 1349, 1363-64 (2008).
[120] *Nat'l Audubon Soc'y*, 33 Cal. 3d at 434.
[121] *See Marks v. Whitney*, 6 Cal. 3d 251, 259-60 (1971).
[122] *Nat'l Audubon Soc'y*, 33 Cal. 3d at 419.
[123] *See, e.g., id.* at 5 (Central Valley salmon and steelhead runs have decreased 90% since State Water Projects began); Bettina Boxall, *The drought's hidden victim: California's native fish*, L.A. Times (Aug. 24, 2015), http://www.latimes.com/local/california/la-me-drought-fish-20150824-story.html (detailing the mass extinction of Chinook salmon in the Sacramento River); Natural Resources Defense Council (NRDC), Issue Brief 15-11-N, *Thirsting for Progress: A Report Card on California's Response to the Drought* 18 (December 2015), *available at* http://www.nrdc.org/water/files/california-drought-response-IP.pdf; Jeffrey Mount et al. *Aquatic Ecosystem Stressors in the Sacramento San Joaquin Delta*, PPIC 2-18 (June 2012), *available at* http://www.ppic.org/content/pubs/report/R_612JMR.pdf; Hanak et al., Managing California's Water, *supra* note

6, at 59-60; Delta Vision Blue Ribbon Task Force, *Our Vision for the California Delta* (2008), *available at* http://www.water.ca.gov/deltainit/docs/DeltaVisionSummary.pdf (finding that "Californians must . . . change their relationship toward the environment and water"); *In re Bay Delta Programmatic Environmental Impact Report Coordinated Proceedings*, 43 Cal. 4th 1143, 1168 (June 5, 2008) ("water exports from the Bay Delta ultimately must be subordinated to environmental considerations."); Dale Kasler, *Delta Smelt 'Abundance' Index Hits Zero as California Drought Worsens*, Sacramento Bee (July 10, 2015), http://www.sacbee.com/news/state/california/water-and-drought/article26982244.html; Bureau of Reclamation, *Biological Review for Endangered Species Act Compliance with the WY 2015 Drought Contingency Plan April through September Project Description*, *available at* http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/docs/tucp/2015/biorev2_aprsep.pdf.

[124] Dep't of Water Resources, *California Water Action Plan: 2016 Update*, 7, *available at* http://resources.ca.gov/docs/california_water_action_plan/Final_California_Water_Action_Plan.pdf.

[125] State Water Res. Control Bd., *Development of Flow Criteria for the Sacramento San Joaquin Delta Ecosystem* 2, 5 (Aug. 3, 2010), *available at* http://www.waterboards.ca.gov/waterrights/water_issues/programs/hearings/bay.

[126] Gibler, *supra* note 52, at 15.

[127] Dave Owen, *The Mono Lake Case, the Public Trust Doctrine, and the Administrative State*, 45 U.C. Davis L. Rev. 1109, 1152-53 (2012).

[128] *Id.* at 1146.

[129] *Id*.

[130] *Id.* at 1149.

[131] *Id*.

[132] *Id*.

[133] Fish and Game Code Section 5937 requires dam owners to allow sufficient instream flows passing through a dam to preserve fish below the dam. For more discussion on the state's Section 5937 implementation failures, *see* Karrigon Börk et al., *The Rebirth of California Fish & Game Code 5937: Water for Fish*, 45 U. Cal. Davis L. Rev. 809, 814 (2012) *available at* https://watershed.ucdavis.edu/files/biblio/45-3_bork.pdf.

[134] PPIC, *Allocating California's Water*, *supra* note 7, at 10-12 (suggesting that interim flows in the form of an 'environmental water budget' (EWB) "could be defined as a water right that would function as the most senior water right within the river system").

[135] Little Hoover Commission, *Managing for Change: Modernizing California's Water Governance*, (Aug. 2010) *available at* http://www.lhc.ca.gov/studies/201/Report201.pdf.

[136] *1978 Water Commission Report*, *supra* note 12, at 12-13, 112-115.

[137] *See, e.g*., PPIC, *Allocating California's Water*, *supra* note 7, at 10.

[138] Hoover Institution, Stanford University, *Hoover Institution Golden State Poll: Californians Open To Sacrifice When It Comes To Addressing The Drought* (Sept. 29, 2015), *available at* http://www.hoover.org/press-releases/hoover-institution-golden-state-poll-californias-drought-conundrum.

[139] *PUD No. 1 of Jefferson County v. Wash. Dep't of Ecology*, 511 U.S. 700, 714 (1994).

[140] For example, Australia allows water utilities to issue on-the-spot fines to water users exceeding the water use restrictions in place in most capital cities and some regional towns. Alliance for Water Efficiency *et al*., *Managing Drought: Learning from Australia*, 38 (Feb. 2016), *available at* http://www.allianceforwaterefficiency.org/AWE-Australia-Drought-Report.aspx. Australian water law at the state and national levels also allows for temporary suspension of the right to use water on land as a penalty for breach of condition, with some states also allowing for forfeiture of an entitlement or allocation. Megan Dyson, Evolution of Australian Water Rights – Comparisons with the US West, Presentation at Stanford University, Water in the West (May 17, 2016).

[141] Wilson Report, *supra* note 105.

[142] Renée Johnson & Betsy A. Cody, Congressional Research Service, R44093, *California Agricultural Production and Irrigated Water Use* 1 (2015) (noting that other sources place agricultural water use at 40% when considering total water amounts left instream.)

[143] *See, e.g*., Natural Resources Defense Council, Issue Brief 14-05-C, *The Untapped Potential of California's Water Supply: Efficiency, Reuse, and Stormwater* 4 (June 2014) (finding that agricultural water use could be reduced 17-22 percent each year while maintaining current irrigated acreage and mix of crops), *available at* http://www.nrdc.org/water/files/ca-water-supply-solutions-capstone-IB.pdf.

[144] *See, e.g.*, Alliance for Water Efficiency et al., *Managing Drought: Learning From Australia*, 8 (Feb. 2016), *available at* http://www.allianceforwaterefficiency.org/AWE-Australia-Drought-Report.aspx.
[145] Legislative Analyst's Office, *California's Water: An LAO Primer*, 68-69 (Oct. 2008), at: http://www.lao.ca.gov/2008/rsrc/water_primer/water_primer_102208.pdf (emphasis added).
[146] *See, e.g.*, Matt Stevens, *Weaker water conservation numbers prompt fears that California is going back to its old bad habits*, LA Times (Oct. 5, 2016), *available at* http://www.latimes.com/local/lanow/la-me-ln-water-conservation-20161005-snap-story.html.
[147] For example, urban efficiency can be achieved by repairing leaks, replacing lawns with drought tolerant plants, and leading to 30-60 percent increased efficiency for businesses and 40-60 percent for residents, and increasing efficiency of appliances. Natural Resources Defense Council, *supra* note 143, at 4.
[148] *Id.*
[149] LAEDC, *Where Will We Get the Water? Assessing Southern California's Future Water Strategies* (Aug. 14, 2008); at: http://www.laedc.org/reports/WhereWillWeGettheWater.pdf
[150] Alliance for Water Efficiency *et al.*, *supra* note 144, at 6.
[151] Legislative Analyst's Office, *California's Water: An LAO Primer*, *supra* note 113, at 67-68. The experiences of Australia in reducing demand during its Millennium Drought illustrate the significant benefits of this "least cost, highest gain" approach. Australian policymakers found that investment in water efficiency is more cost effective than almost all supply options. Water demand dropped significantly due to water efficiency programs, restrictions on outdoor water use, building regulations requiring water-using equipment in new and refurbished homes and new policy measures. For example, in South East Queensland residential water demand fell by 60% to 33 gpcd with conservation measures in place. A major lesson from this effort was to avoid over-investment in large-scale, expensive infrastructure such as desalination plants, which turned out to be unnecessary in light of positive public responses to efficiency measures (see Appendix 2). Alliance for Water Efficiency et al., *supra* note 144, at 6-10.
[152] LAEDC, *supra* note 149.
[153] NRDC, *Thirsting for Progress: A Report Card on California's Response to the Drought*, 20 (Dec. 2015), *available at* https://www.nrdc.org/sites/default/files/california-drought-response-IP.pdf.
[154] Australian Bureau of Statistics, Series 4618.0, *Water Use on Australian Farms*, *available at* http://bit.ly/2ev3VDM.
[155] For example, one proposal recommends that urban users be allowed to dedicate their conserved water to the environment. Jay Lund, U.C. Davis, *Urban water conservation for the birds* (Oct. 6, 2015), *available at* https://californiawaterblog.com/2015/10/06/water-conservation-could-be-for-the-birds/.
[156] Oregon Water Resources Dep't, Allocation of Conserved Water, *available at* http://www.oregon.gov/OWRD/pages/mgmt_conserved_water.aspx.
[157] Groenfeldt, *supra* note 70, at 108.
[158] *Id.* at 166.
[159] By contrast, the 1978 water commission was made up of a narrow subset of water experts and interests, and it failed to address difficult questions or result in any meaningful reforms. 1978 Water Commission Report, *supra* note 12, at 3-4.
[160] Particularly with respect to vision-setting, we need to expand the voices actively involved to fundamentally "transform our relationship with water." As noted by systems scientist Donella Meadows, a vision best becomes "responsible" by "sharing it with other people who bring in their knowledge, their points of view, and their visions. The more a vision is shared, the more responsible it gets, and also the more ethical . . . and the path reveals itself." Donella Meadows, *Envisioning a Sustainable World* (Oct. 8, 2012), *available at* http://donellameadows.org/envisioning-a-sustainable-world/.
[161] *See, e.g.*, Christopher D. Stone, *Should Trees Have Standing? - Toward Legal Rights for Natural Objects*, 45 S. Cal. L. Rev. 450 (1972).
[162] Hanak & Stryjewski, *supra* note 6, at 2.
[163] Cal. Water Code § 1707(a)(1).
[164] *Id.* § 1707(b).
[165]Cal. State Water Board, *Petitions for Instream Flow Dedication*, http://www.waterboards.ca.gov/waterrights/water_issues/programs/applications/instream_flow_dedication/.
[166] *Id.*; *see also* Leon Szeptycki et al., Stanford University, Water in the West, *Environmental Water Rights Transfers: A Review of State Laws*, 35, n.59 (2015), *available at* http://waterinthewest.stanford.edu/sites/default/files/WITW-WaterRightsLawReview-2015-FINAL.pdf.

[167] "While the statute envisions private rights being held to benefit and enhance fish and wildlife habitat, to date that has not been its main use." Steven Malloch, Trout Unlimited, *Liquid Assets: Protecting and Restoring the West's Rivers and Wetlands through Environmental Water Transactions*, 38 (2005).
[168] Szeptycki et al., *supra* note 166, at 24.
[169] *Id.*
[170] *Id.*
[171] Hanak & Stryjewski, *California's Water Market*, *supra* note 6, at 34.
[172] SWIFT, *A Practitioner's Guide to Instream Flow Transactions in California*, 31 (March 2016), *available at* http://b.3cdn.net/amrivers/f22b08cb2e38fe1d64_trm6zaawl.pdf.
[173] The EWA accounted for half of all environmental water purchases between 2001 and 2007, with annual acquisitions from a variety of parties averaging nearly 180,000 af. Starting in 2008, this program was converted to a multiyear lease agreement with the Yuba County Water Agency, and it was scaled back to only 60,000 af/year. Hanak & Stryjewski, *California's Water Market*, *supra* note 6, at 33.
[174] *Id.*
[175] Larry R. Brown et al., *Managing Water to Protect Fish: A Review of California's Environmental Water Account, 2001–2005*, 14 Environmental Management 237-261, Table 3 (2009), *available at* http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/deltaflow/docs/exhibits/swrcb/swrcb_brown2008.pdf.
[176] *Id.* at 237.
[177] *Id.* at 26.
[178] Bruce Aylward et al., California Coastkeeper Alliance and Klamath Riverkeeper, *Measuring Cost-Effectiveness of Environmental Water Transactions*, 2 (2016), *available at* http://klamathriver.org/wp-content/uploads/2016/07/NEW-High-Def-PRINT-Measuring-Cost-Effectiveness-of-EWTs-160720.pdf.
[179] Assuming that the transfer program is inserted within the structure of larger reforms that prioritize environmental water needs, several changes would still be needed to ensure the program's effectiveness. Most particularly, dedicated water use rights must either be senior to or unencumbered by downstream diverters in order to protect the dedicated instream water from downstream diversion. SWIFT, *supra* note 172, at 13. Good monitoring and enforcement is also critical to success. *Id.* at 15. Given the limited number and jurisdiction of California's water masters, and the lack of stream gauges and diversion monitoring, this is a significant limitation on the efficacy of 1707 transfers.
[180] State Water Res. Control Bd., *Curtailment Frequently Asked Questions*, http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/docs/water_availability/curtailment2015faq.pdf (last visited Nov. 30, 2016).
[181] State Water Res. Control Bd., *State Water Board Drought Year Water Actions: Notices of Water Availability (Curtailment and Emergency Regulations)*; at: http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/water_availability.shtml (last visited Nov. 2, 2016).
[182] State Water Res. Control Bd., *2015 Summary of Water Shortage Notices* (Dec. 18, 2015), *available at* http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/docs/curtail_summary_2015.pdf.
[183] To achieve these minimum flows, the regulations empowered the Water Board to issue curtailment orders directing diverters to cease or reduce their diversions as necessary, with the exception of minimum health and safety needs. State Water Res. Control Bd., *Resolution No.2015-0014*, *available at* http://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2015/rs2015_0014.pdf. For more documents and information related to these emergency regulations, *see* http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/mill_deer_antelope_creeks.shtml. Notably, however, Mill, Deer, and Antelope Creeks are the only watersheds in California for which such minimum flow requirements for fisheries were set during the drought, despite serious environmental needs throughout the state. And even in those watersheds, the state felt required to support their position based on the threatened and endangered status of the species at issue, as well as the need to maintain "minimum" flows for salmonid passage at "critical" migration periods.
[184] State Water Res. Control Bd., *Resolution No. 2014-0023*, *available at* http://www.waterboards.ca.gov/board_decisions//adopted_orders/resolutions/2014/rs2014_0023_corrected_with%20regs.pdf; *see also* Cal. Code Regs., tit. 23, §§ 877-879.2. For more documents and information related to these emergency regulations, *see*

http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/mill_deer_antelope_creeks.shtml.

[185] PPIC, Policy Priorities for Managing Drought, *supra* note 19.

[186] Ellen Hanak at al., *Modernizing drought water allocations*, UC Davis Center for Watershed Sciences (Oct. 16, 2014), https://californiawaterblog.com/2014/10/16/modernizing-drought-water-allocations/.

[187] PPIC, *Allocating California's Water*, *supra* note 7, at 10.

[188] *See, e.g*., Hanak et al., *What if California's Drought Continues*, *supra* note 21, at 12-13.

[189] Cal. Water Code section 13247 reads: "State offices, departments, and boards, in carrying out activities which may affect water quality, shall comply with water quality control plans approved or adopted by the state board unless otherwise directed or authorized by statute, in which case they shall indicate to the regional boards in writing their authority for not complying with such plans." Cal. Water Code § 13247.

[190] *See, e.g*., PPIC, *California's Water*, *supra* note 9, at 14 ("Droughts are a regular feature of California's variable, semiarid climate").

[191] Ellen Hanak et al., *What If California's Drought Continues?* Technical Appendix, 6 (Aug. 2015), *available at* http://www.ppic.org/content/pubs/other/815EHR_appendix.pdf.

[192] *Id.*

[193] *See, e.g*., NRDC *et al., Conservation Groups Sue EPA over #BayDelta Water Quality and #Salmon* (Apr. 22, 2016), *available at* https://www.nrdc.org/media/2016/160422-1.

[194] For example, the recently completed coastal desalination plant in Carlsbad cost $1 billion. *See* Stephen Stock et al., *Barriers Stand in the Way of Innovation That Could Help Solve California's Water Crisis*, NBC Bay Area (Nov. 12, 2015), http://www.nbcbayarea.com/investigations/Bureaucratic-Barriers-Stand-in-the-Way-of-Innovation-That-Could-Help-Solve-Californias-Water-Crisis-346981822.html.

[195] By promoting privatization, desalination potentially threatens taxpayer interests and advocates the "sale" of water to the highest bidder. However, small-scale and local desalination facilities, such as the proposed desalination plant in Carmel, may be appropriate in certain circumstances.

[196] Heather Cooley & Matthew Heberger, *Key Issues for Seawater Desalination in California: Energy and Greenhouse Gas Emissions*, Pacific Institute 2 (May 2013), *available at* www.pacinst.org/reports/desalination_2013/energy (experts estimate that desalination uses 15,000 kWh per million gallons of water produced; it may be higher depending on actual operating conditions); *see also id*. at 8 ("[s]eawater desalination is thus considerably more energy intensive than almost every other water supply option available"; desalination uses 12,000-18,000 kWh per million gallons of water, compared to the next most energy intensive source of water, the State Water Project, pumping water from the Sacramento-San Joaquin Delta to Southern California and using 7,900-14,000 kWh per million gallons).

[197] Heather Cooley et al., Pacific Institute, *Key Issues in Seawater Desalination in California: Marine Impacts*, 12 (Dec. 2013) (desalination produces both brine and cleaning solutions—while the cleaning solutions are produced in relatively small quantities, the brine is produced "continuously and in relatively large amounts" and contains increased salinity, natural constituents of seawater, and chemical additives, including coagulants (such as ferrous chloride and aluminum chloride), antiscalants (including polyphosphates and phosphonates), biocides, anti-foaming additives, detergents, and heavy metals from corroding equipment, including copper, zinc, and nickel).

[198] *Id.* at 13.

[199] *Id.* at 3.

[200] Alliance for Water Efficiency et al., *supra* note 144, at 6.

[201] 1978 Water Commission Report, *supra* note 12, at 14.

[202] Tara Moran & Amanda Cravens, Water in the West, Stanford Law School, *California's Sustainable Groundwater Management Act of 2014: Recommendations for Preventing and Resolving Groundwater Conflicts*, 3 (Apr. 2015), *available at* http://waterinthewest.stanford.edu/sites/default/files/SGMA_RecommendationsforGWConflicts_2.pdf.

[203] *Id.*

[204] Hanak et al., *What if California's Drought Continues*, *supra* note 21, at 5.

[205] *Id.* at 11.

[206] Zoe Myers, *Residential Wells Run Completely Dry in the Central Valley*, *High Country News* (July 13, 2015), *available at* http://www.hcn.org/articles/residential-wells-dry-drought-porterville-water.

[207] State Water Res. Control Bd., *Communities That Rely on a Contaminated Groundwater Source for Drinking Water*, AB 2222 Report, 37 (2013), *available at*

http://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/38/attachments/original/1394272808/xaxvc1nv_compressPdf.pdf?1394272808.
[208] *Id.* at 11.
[209] *Id.*
[210] Cal. Water Code § 10723.
[211] *Id.* § 10720.5; *see also* Moran & Cravens, *supra* note 202, 15 (there are three categories of rights: overlying rights to pump groundwater for landowners located above a basin; appropriative water use rights, when there is a surplus after overlying rights users extract from the basin (considered "first in time, first in right"); and prescriptive rights, when a user pumps more than the basin's safe yield for more than five consecutive years).
[212] Moran & Cravens, *supra* note 202, at 7.
[213] *Id.* at 8.
[214] *Id.*
[215] Communication with Steve Shimek, Executive Director, Monterey County Coastkeeper and The Otter Project (May 11, 2016).
[216] Cal. Water Code § 10721(v) (emphasis added).
[217] *Id.* § 10721(x).
[218] Hanak et al., *What if California's Drought Continues, supra* note 21.
[219] Grantham & Viers, *supra* note 8, at 9.
[220] *Report of the Conservation Commission of the State of California*, 34-35 (Jan. 1, 1913) (hereinafter 1912 Commission Report), *available at* https://archive.org/details/reportconservat00leegoog.
[221] Ten percent of people did not respond and some responses were inaccurate or incomplete, so the number of unreported diversions may be even higher. State Water Res. Control Bd., E*mergency Actions Due to Insufficient Flow for Specific Fisheries in Tributaries to the Russian River*, 22-23 (March 14, 2016), *available at* http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/docs/russian_river/20160314_rrtribsemreg_digest.pdf (this document provides supporting information for the proposed update and partial re-adoption of an emergency regulation for "Additional Water User Information for the Protection of Specific Fisheries in Tributaries to the Russian River").
[222] *Id.*
[223] USGS and U.S. EPA, *Draft EPA-USGS Technical Report: Protecting Aquatic Life from Effects of Hydrologic Alteration*, EPA Report 822–P–15–002, USGS Scientific Investigations Report 2015–5160, 43 (Feb. 2016), *available at* https://www.epa.gov/sites/production/files/2016-03/documents/aquatic-life-hydrologic-alteration-report.pdf.
[224] Tenn. Comp. R. & Regs. 0400-40-03-.03(3)(o)(2016).
[225] 1978 Water Commission Report, *supra* note 12, at 112-13.
[226] *See, e.g.*, Cal. Natural Resources Agency, *California Water Action Plan: 2016 Update*, 13 (2016), *available at* http://resources.ca.gov/docs/california_water_action_plan/Final_California_Water_Action_Plan.pdf.
[227] *Senate Natural Resources and Water Committee Hearing, Overview of California Water Rights Laws* (March 10, 2009) (Testimony of Thomas Howard, Executive Director, State Water Resources Control Board).
[228] State Water Res. Control Bd., *California Water Boards' Annual Performance Report - Fiscal Year 2014-15*, *available at* http://www.waterboards.ca.gov/about_us/performance_report_1415/allocate/62111_wr_alloc_enforcement.shtml.
[229] *Id.*
[230] State Water Res. Control Bd., *Executive Director Reports*, *available at* http://www.waterboards.ca.gov/board_info/exec_dir_rpts/.
[231] State Water Res. Control Bd., *California Water Boards' Annual Performance Report - Fiscal Year 2014-15*, *supra* note 228. For prior year Performance Reports, *see*: http://www.waterboards.ca.gov/about_us/performance_report_1415/.
[232] State Water Res. Control Bd., *California Water Boards' Annual Performance Reports - Fiscal Years 2009-15*, *available at* http://www.waterboards.ca.gov/about_us/performance_report_1415/.
[233] Craig M. Wilson, Delta Watermaster, *Improving Water Right Enforcement Authority: A Report to the State Water Resources Control Board and the Delta Stewardship Council* (Sept. 2012), *available at* http://www.waterboards.ca.gov/board_info/agendas/2012/sep/091912_11_wr_enf_auth.pdf.
[234] Some scholars have argued that markets and privatization can help protect public trust resources. *See e.g.* Barton H. Thompson, Jr., *Water As A Public Commodity*, 95 Marq. L. Rev. 17, 41 (2011) (Governments can and do

use markets to promote a number of public trust goals, including environmental protection. . . . [T]he commoditization of water, by increasing water efficiency, can reduce the pressure on existing environmental flows and on groundwater aquifers. Private water markets, moreover, can both assist the government in achieving environmental protection and permit individuals to contribute toward a higher level of protection than the government provides.”). *See also* R. Prescott Jaunich, *The Environment, the Free Market, and Property Rights: Post- Lucas Privatization of the Public Trust*, 15 Pub. Land L. Rev. 167, 189 (1994) (“By subjecting public trust resources to market pressures, we can guarantee that our resources will most efficiently maximize social wealth.”).

[235] Water Education Foundation, *Monterey Amendment*, *available at* http://www.watereducation.org/aquapedia/monterey-amendment.

[236] Bill Blum, *A Run on the Water Bank*, California Lawyer 33 (Dec. 2011).

[237] *Planning & Conservation League v. Dep't of Water Res.,* 83 Cal. App. 4th 892, 900 (2000), *as modified on denial of reh'g* (Oct. 16, 2000) (noting that “[a]lthough agricultural contractors suffer first during a temporary shortage under subdivision (a), they are entitled to make-up water first in times of surplus.”).

[238] *Id.* at 900, 908 n. 5.

[239] Blum, *supra* note 235, 33-34.

[240] *Planning & Conservation League v. Dep't of Water Res.*, 83 Cal. App. 4th at 908.

[241] Gibler, Water Heist, *supra* note 38, at 2.

[242] *Id.* at 2, 5-8. The Kern Water Bank Authority is a joint powers authority filled with corporate connections and comprised of the Semitropic Water Storage District (Newhall Land and Farming direct client), the Wheeler Ridge-Maricopa Water Storage District (Dennis Mullins, Vice President, General Counsel, and Secretary, Tejon Ranch), Dudley Ridge Water District (Joseph MacIlvaine: President, President, Paramount Farming Company), Tejon-Castac Water District (Dennis Mullins, Vice President, General Counsel, and Secretary, Tejon Ranch), Kern County Water Agency, and Westside Mutual Water Company (William Phillimore: Chairman, Vice President, Paramount Farming Company). *See also* Piper, *supra* note 44, at 59; Blum, *supra* note 235, at 34 (“Westside Mutual holds 48.06 percent of the base shares. Another 9.62 percent are held by the Dudley Ridge district - which is overseen by a Paramount Farming executive - and another 24.03 percent belong to a water district that Tejon Ranch controls. In effect, Resnick, along with Tejon Ranch, was in position to control millions of acre-feet of water through KWBA transactions.”).

[243] Piper, *supra* note 44, at 44, 59 (noting that the Boswells “store[d] water in the combined public-private Semitropic Water Storage District bank.”).

[244] Trish Cypher & Colin Grinnell, *Governments Working Together: A Citizen’s Guide to Joint Powers Agreements*, 5-7, 13-14 (Aug. 2007). *See also* Gibler, *Water Heist, supra* note 38, at 7 (“In 1994, the California State Legislature approved Assembly Bill 2014. Introduced in the Assembly on March 5, 1993, the bill was amended in the Senate on June 13, 1994, where the original language concerning water rights was entirely deleted and replaced with a single sentence authorizing mutual water companies to enter into joint powers agreements.”).

[245] Gaffney, *supra* note 63, at 499.

[246] *Id.* at 500, 510 n. 86.

[247] Piper, *supra* note 44, at 47.

[248] *Id.*

[249] *Id.*

[250] Gaffney, *supra* note 63, at 485.

[251] Harkinson, *supra* note 40.

[252] Piper, *supra* note 44, at 61; Mike Taugher, *Pumping Water and Cash from the Delta*, San Jose Mercury News, May 23, 2009.

[253] *Id.*

[254] *Id.*

[255] *Id.* (quoting Jonas Minton, Water Policy Adviser to the Planning and Conservation League)(internal quotation marks omitted).

[256] Recently, the Kern Water Bank has caused neighboring water users’ wells to go dry, and “[i]n 2014, Judge Frawley of the Superior Court of California for the County of Sacramento held that environmental review regarding the Kern Water Bank failed to adequately analyze the potential environmental impacts of the transfer of the bank from state to local control and failed to adequately analyze the potential impacts of the use and operation of the bank as a water bank operation.” Adam Keats & Chelsea Tu, *Not All Water Stored Underground Is Groundwater: Aquifer Privatization and California's 2014 Groundwater Sustainable Management Act*, 9 Golden

Gate U. Envtl. L.J. 93, 96 (2015) (citing *Central Delta Water Agency, et al. v. California Department of Water Resources*, Sacramento County Superior Court Case No. 34-2010-80000561; *Rosedale-Rio Bravo Water Storage District, et al. v. California Department of Water Resources*, Sacramento County Superior Court Case No. 34-2010-80000703.).

[257] Gaffney, *supra* note 63, at 487.

[258] Gibler, *Water Heist*, *supra* note 38, at 3.

[259] *Id.* at 12.

[260] Piper, *supra* note 44, at 65; Gibler, *Water Heist*, *supra* note 38, 12-13.

[261] Zoe Myers, *Millions in Debt, a Community Wonders If Its Water Source Will Provide*, High Country News, Dec. 8, 2015, *available at* https://www.hcn.org/articles/worth-of-water-mountain-house-drought-california-debt.

[262] Gibler, *Water Heist*, *supra* note 38, at 13.

[263] *Id.*

[264] *Id. See also* Mark Arax, *Massive Farm Owned by L.A. Man Uses Water Bank Conceived for State Needs*, LA Times, Dec. 19, 2003, *available at* http://articles.latimes.com/2003/dec/19/local/me-kern19.

[265] Piper, *supra* note 44, at 64.

[266] Randele Kanouse & Douglas Wallace, *Optimizing Land Use and Water Supply Planning: A Path to Sustainability?*, 4 Golden Gate U. Envtl. L.J. 145, 155 (2010).

[267] Piper, *supra* note 44, at 64.

[268] *Id.* at 63.

[269] Gibler, *Water Heist*, *supra* note 38, at 12.

[270] Piper, *supra* note 44, at 64.

[271] *Id.* at 65.

[272] Gaffney, *supra* note 63, at 481.

[273] *Id.* at 493.

[274] *Id.* at 494.

[275] Taugher, *supra* note 251.

[276] Alastair Bland, *Is California's Water System Really Broken*, KQED, Apr. 20, 2016, http://ww2.kqed.org/science/2016/04/20/is-californias-water-system-really-broken/.

[277] Taugher, *supra* note 251.

[278] Bland, *supra* note 273.

[279] *Planning & Conservation League v. Dep't of Water Res.*, 83 Cal. App. 4th at 914 n. 7.

[280] Several scholars and studies have cited the Kern Water Bank as an example of a successful conjunctive use project. *See* Gregory Thomas, *Designing Successful Groundwater Banking Programs in the Central Valley: Lessons From Experience* (2001) (identifying and detailing the success of the Kern Water Bank as a conjunctive use project); Brian E. Gray, *Global Climate Change: Water Supply Risks and Water Management Opportunities*, 14 Hastings W.-N.W. J. Envtl. L. & Pol'y 1453, 1457–58 (2008) (citing the Kern County Water Bank as an example of a "successful long-term conjunctive management program[]"); David A. Sandino, *California's Groundwater Management Since the Governor's Commission Review: The Consolidation of Local Control*, 36 McGeorge L. Rev. 471, 490 (2005) (noting that the transfer of the Kern Water Bank to local agencies allowed "the Kern Water Bank Authority . . . to manage and deliver an average of fifty thousand acre-feet per year to water users in the area . . . improve[ing] Kern County control over its local groundwater resources, while simultaneously diminishing state authority"); Eric L. Garner & Jill N. Willis, *Right Back Where We Started from: The Last Twenty-Five Years of Groundwater Law in California*, 36 McGeorge L. Rev. 413, 430 (2005) (crediting the Kern Water Bank for contributing to the increased "reliability" and "flexibility" of California's water supply).

[281] This commodification changes how water is perceived and managed, with decisions about its management dominated by market economic rules rather than non-market social rules. Gleick *et al.*, *The New Economy of Water: The Risks and Benefits of Globalization and Privatization of Freshwater*, Pacific Institute for Studies in Development, Environment, and Security (Feb. 2002)

[282] Alliance for Water Efficiency et al., *supra* note 144, at 6.

[283] Jose Luis Jiménez, *Troubles in Tampa Imperil Carlsbad Desalination Deal*, San Diego Union-Tribune, Jan. 29, 2004.

[284] *Id.*

[285] *Id.*

[286] PPIC, *supra* note 7, at 10-12.

[287] *Id*. at 11.
[288] The PPIC recommendation notes that in "times of extreme scarcity, however, public health and safety would take precedence even over this top priority water right." *Id*. at 11.
[289] *Id*. at 12.
[290] Or. Dep't of Fish and Wildlife, *Instream Water Rights*, 2 (1997), *available at* http://www.dfw.state.or.us/fish/water/docs/BKGWaterRights.pdf.
[291] Or. Water Res. Dep't, *Flow Restoration in Oregon* (updated Aug. 2009), *available at* http://www.oregon.gov/owrd/pages/mgmt_instream.aspx.
[292] WaterWatch, *Legally Dry: How Oregon's Water Law Fail Our Rivers*, 5, *available at* http://waterwatch.org/wp-content/uploads/2011/07/Legally-Dry-WaterWatch.pdf.
[293] *Id.*
[294] Colo. Water Conservation Bd., *Instream Flow Appropriations*, *available at* http://cwcb.state.co.us/environment/instream-flow-program/Pages/InstreamFlowAppropriations.aspx,
[295] Dan Merriman & Anne M. Janicki, *Colorado's Instream Flow Program—How It Works and Why It's Good For Colorado*, Colorado Water Conservation Board, 1, *available at* http://cwcb.state.co.us/environment/instream-flow-program/documents/whyisfprogramworksgoodforcopdf.pdf.
[296] Constitution of the Republic of South Africa, Chapter 2 (27)(1)(b) (1996) *available at* http://www.constitutionalcourt.org.za/site/theconstitution/english-2013.pdf.
[297] *Id.* at Chapter 2(24)(2)(a), (b).
[298] *Id.* at Chapter 2(24)(2)(b).
[299] Dep't of Water Affairs and Forestry, Pretoria, South Africa, *Guide to the National Water Act*, 9, *available at* https://www.dwa.gov.za/documents/publications/NWAguide.pdf.
[300] Republic of South Africa, National Water Act, Ch. 3, Pt. 3, *available at* https://www.dwa.gov.za/Documents/Legislature/nw_act/NWA.pdf.
[301] *Id.*
[302] Murray-Darling Basin Authority, *Environmental Watering Plan, MDBA Reports*, available at: http://www.mdba.gov.au/publications/mdba-reports/environmental-watering-plan.
[303] Murray-Darling Basin Authority, *Making the Most of Water for the Environment*, 3, *available at* http://www.mdba.gov.au/sites/default/files/pubs/MDBA-2014-BWS-summary.pdf.
[304] Murray-Darling Basin Authority, *Environmental Watering Plan, MDBA Reports*, *supra* note 298.
[305] Murray-Darling Basin Authority, *Towards a Healthy, Working Murray-Darling Basin*: *Basin Plan Annual Report 2014-15*, *available at* http://www.mdba.gov.au/publications/mdba-reports/basin-plan-annual-report-2014-15.
[306] *Id.* at 3.
[307] *Id*.
[308] *See* Craig Kauffman & Pamela Martin, *Testing Ecuador's Rights of Nature: Why Some Lawsuits Succeed and Others Fail*, Paper Presented at the International Studies Association Annual Convention (Atlanta, GA, Mar. 18, 2016), *available at* http://bit.ly/1TJbPpM.
[309] *Vilcabamba River v. Provincial Government of Loja* (Provincial Justice Court of Loja, No 11121-2011-0010 (Mar. 30 2011). *See also* Natalia Greene, *The first successful case of the Rights of Nature implementation in Ecuador*, *available at* http://therightsofnature.org/first-ron-case-ecuador/.
[310] *See, e.g*., Bolivia, Act of the Rights of Mother Earth (2010), *available at* http://f.cl.ly/items/212y0r1R0W2k2F1M021G/Mother_Earth_Law.pdf.
[311] *See, e.g*., Whanganui River Agreement, New Zealand: Tutohu Whakatupua (Aug. 31, 2012) (recognizing the independent legal standing of the river) *available at* http://bit.ly/2fudrZb.
[312] For more information on these and other such laws and decisions, *see* http://www.earthlawcenter.org/earth-community/ and http://www.earthlawcenter.org/literature/.
[313] City of Pittsburgh, Code of Ordinances, Title 6, Art. 1, Ch. 618, Marcellus Shale Natural Gas Drilling Ordinance (Nov. 2010), *available at* https://www.municode.com/library/pa/pittsburgh/codes/code_of_ordinances?nodeId=COOR_TITSIXCO_ARTIRERIAC_CH618MASHNAGADR.
[314] Santa Monica, Sustainability Rights Ordinance, Santa Monica Municipal Code Ch. 4.75 (April 2013), *available at* http://www.smgov.net/departments/council/agendas/2013/20130409/s20130409_07A1.htm.
[315] City of Santa Monica Task Force in the Environment, Meeting Minutes (Oct. 24, 2016), *available at* https://www.smgov.net/Departments/OSE/Task_Force_on_the_Environment/Meeting_Agendas___Minutes.aspx.

[316] Gordon R. Miller, *Shaping California Water Law, 1781 to 1928*, S. Cal. Q. 27 (Spring 1973) (internal quotation marks omitted).
[317] 1911 Cal. Stat. 822.
[318] *See, e.g.*, *Platform of the Progressive Party Platform, 1912,* (Aug. 17, 1912), re-printed at PBS American Experience, http://www.pbs.org/wgbh/americanexperience/features/primary-resources/tr-progressive/.
[319] 1912 Commission Report, *supra* note 220.
[320] *See, e.g.*, Joseph L. Sax, *We Don't Do Groundwater: A Morsel of California Legal History*, 6 U. of Denv. Water L. Rev. 269, 287 (2002) *available at* http://scholarship.law.berkeley.edu/facpubs/1394.
[321] 1912 Commission Report, *supra* note 220, at 35.
[322] 1913 Cal. Stat. 1012.
[323] Miller, *supra* note 312, at 28; *see also* Sax, *supra* note 316, at 287.
[324] Cal. Dep't of Water Resources, *The 1976-77 California Drought: A Review*, 101 (May 1978), *available at* http://www.water.ca.gov/watertransfers/docs/9_drought-1976-77.pdf.
[325] Cal. Exec. Order No. B-26-77 (May 11, 1977). The original reporting deadline of June 30, 1978 was changed to December 31, 1978 by Cal. Exec. Order No. B-33-77 (Aug. 26, 1977).
[326] 1978 Water Commission Report, *supra* note 12, at 12.
[327] *Id.* at 13.
[328] *Id.* at 112-113.
[329] *Id.* at 113.
[330] *Id.* at 115.
[331] For a more detailed water loading order, *see* USGBC California, *On Big-Ticket Bonds & Budgets: Establishing a Loading Order for Water* (Aug. 9, 2014), *available at* http://usgbc-california.org/big-ticket-bonds-budgets-establishing-loading-order-water/.
[332] Letter from Sean Bothwell, Staff Attorney, California Coastkeeper Alliance to Mike McCoy, Exec. Dir., Strategic Growth Council re: "Sustainable Communities Planning Grant and Incentives Program" (Oct. 18, 2013), *available at* http://www.cacoastkeeper.org/document/comments-supporting-a-water-loading-order.pdf.
[333] CAISO was created in 1996 as a non-profit public benefit corporation and "operates the wholesale power grid that serves about 75 percent of Californians, facilitates the spot market for power and also is involved in planning for electricity needs and transmission lines." Little Hoover Commission, *Rewiring California: Integrating Agendas for Energy Reform*, 14-15 (Dec. 2012) *available at* http://www.lhc.ca.gov/studies/214/Report214.html.
[334] *See* CAISO, *Company Information and Facts*, *available at* https://www.caiso.com/Documents/CompanyInformation_Facts.pdf; *see also* Little Hoover Commission, *supra* note 329, at 14-15.
[335] The Bureau of State Audits (BSA) established an Applicant Review Panel, which consisted of three independent auditors, randomly drawn from a pool. They then selected the first eight commissioners based on 36,000 submitted applications, with conflicting interests eliminated from the pool. The review panel chose 60 applicants (20 Democrats, 20 Republicans and 20 with no affiliation). The legislature then reduced each pool to 12 ("the President pro Tempore of the Senate, the Minority Floor Leader of the Senate, the Speaker of the Assembly, and the Minority Floor Leader of the Assembly may each strike up to two applicants from each subpool of 20 for a total of eight possible strikes per subpool"). Then eight names were drawn randomly to be the first eight commissioners (3,3,2 see above). There was a full and public discussion of applicants under consideration. The first eight commissioners then select the remaining six based on the 28 applicants left over in the pool after the legislative strikes (2,2,2). This is to be carried out in a public and transparent process and to ensure the Commission has a "balance of diversity." (The six appointees shall be chosen to ensure the commission reflects this state's diversity, including, but not limited to, racial, ethnic, geographic, and gender diversity.) (One criticism was that the first eight commissioners can only choose from the narrowed-down pool the auditors created for the last six.) Raphael J. Sonenshein, *When the People Draw the Lines: An Examination of the California Citizens Re-districting Commission* (2013), *available at* https://cavotes.org/sites/default/files/jobs/RedistrictingCommission%20Report6122013.pdf.
[336] David Rapport et al., eds., *Ecosystem Health*, 23, 94 (1998).
[337] For more information on the utility and recommended structure and process for effective focus groups, *see* Synneve Dahlin Ivanoff & John Hultberg, *Understanding the multiple realities of everyday life: Basic assumptions in focus-group methodology*, 13 Scandinavian J. of Occupational Therapy 125-132 (2006).